This document was too large to scan as a single document. It has been divided into smaller sections.

Section 9 OF 15

Document Information			
Document #	0601116		
Title	ECOLOGY APPROVAL OF THE CONSTRUCTION OF THE IN-CONTAINER VITRIFICATION SYSTEM AND THE OFF-GAS TREATMENT SYSTEM OF THE FINAL DANGEROUS AND/OR MIXED WASTE RESEARCH AND DEVELOPMENT AND DEMONSTRATION PERMIT (RD&D PERMIT) WA789000/8967		
DATE	07/24/2006		
Originator	J. A. HEDGES	Originator Co.	DOEC
Recipient	R. J. SCHEPENS, M.S. SPEARS	Recipient Co.	DOE-ORP, CH2M
References			
Keywords			
Projects			
Other Information			

Joint Boundary Conditions (Continued)

	Joint Label	X [lb/in]	Y [lb/in]	Z [lb/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
65	N116	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
66	N117	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
67	N118	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
68	N120						
69	N121						
70	N122						
71	N123						
72	N124						
73	N126						
74	N127						
75	N128						
76	N129						
77	N130						
78	N132						
79	N133						
80	N134						
81	N135						
82	N136						
83	N13						
84	N4						
85	N2		Reaction				
86	N7						
87	N131						
88	N139	Reaction	Reaction				
89	N140	Reaction	Reaction				
90	N138	Reaction	Reaction				

General Material Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (\1E5 F)	Density[lb/in^3]
1	gen_Conc3NW	3155	1372	.15	.6	.084
2	gen_Conc4NW	3644	1584	.15	.6	.084
3	gen_Conc3LW	2085	906	.15	.6	.064
4	gen_Conc4LW	2408	1047	.15	.6	.064
5	gen_Alum	10600	4077	.3	1.29	.1
6	gen_Steel	29000	11154	.3	.65	.284
7	RIGID	1e+7		0	0	0

General Section Sets

	Label	Shape	Type	Material	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	GEN1A	RE4X4	Beam	gen_Conc3NW	16	21.333	21.333	36.053
2	RIGID		None	RIGID	1e+6	1e+8	1e+8	1e+6

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (\1E5 F)	Density[lb/in^3]	Yield[ksi]
1	A36	29000	11154	.3	.779	.283	36
2	A312TP316L	29000	11154	.3	1.013	.29	25
3	A312TP316	29000	11154	.3	1.013	.29	30

Hot Rolled Steel Section Sets

	Label	Shape	Design List	Type	Material	Design Rules	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	2DIADUCT	2 in Sch 40..	Pipe	Beam	A36	Typical	.815	.522	.522	1.044
2	3DIADUCT	3 in Sch 40..	Pipe	Beam	A36	Typical	1.769	2.459	2.459	4.918

Company : **DMJM H&N**
Designer : **Kevin M. Jones - DMJMH&N**
Job Number : **145579-V-CA-005 DBVS Off-Gas Treatment Duct Analysis**

Mar 25, 2006
12:05 PM
Checked By:_____

Hot Rolled Steel Section Sets (Continued)

	Label	Shape	Design List	Type	Material	Design Rules	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
3	4DIADUCT	4 in Sch 40...	Pipe	Beam	A36	Typical	2.539	5.914	5.914	11.828
4	6DIADUCT	6 in Sch 40...	Pipe	Beam	A312TP316L	Typical	4.64	23.744	23.744	47.488

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(de...	Section/Shape	Design List	Type	Material	Design Rules
1	M1	N1	N131			6DIADUCT	Pipe	Beam	A312TP3...	Typical
2	M2	N2	N4			6DIADUCT	Pipe	Beam	A312TP3...	Typical
3	M3	N4	N5			6DIADUCT	Pipe	Beam	A312TP3...	Typical
4	M4	N5	N6			6DIADUCT	Pipe	Beam	A312TP3...	Typical
5	M5	N6	N7			6DIADUCT	Pipe	Beam	A312TP3...	Typical
6	M6	N7	N8			6DIADUCT	Pipe	Beam	A312TP3...	Typical
7	M7	N8	N10			6DIADUCT	Pipe	Beam	A312TP3...	Typical
8	M8	N10	N11			6DIADUCT	Pipe	Beam	A312TP3...	Typical
9	M9	N11	N12			6DIADUCT	Pipe	Beam	A312TP3...	Typical
10	M10	N12	N13			6DIADUCT	Pipe	Beam	A312TP3...	Typical
11	M11	N13	N139			6DIADUCT	Pipe	Beam	A312TP3...	Typical
12	M12	N14	N16			6DIADUCT	Pipe	Beam	A312TP3...	Typical
13	M13	N16	N17			6DIADUCT	Pipe	Beam	A312TP3...	Typical
14	M14	N17	N18			6DIADUCT	Pipe	Beam	A312TP3...	Typical
15	M15	N18	N19			6DIADUCT	Pipe	Beam	A312TP3...	Typical
16	M16	N19	N20			6DIADUCT	Pipe	Beam	A312TP3...	Typical
17	M17	N20	N132A			6DIADUCT	Pipe	Beam	A312TP3...	Typical
18	M18	N21	N22			6DIADUCT	Pipe	Beam	A312TP3...	Typical
19	M19	N22	N84			6DIADUCT	Pipe	Beam	A312TP3...	Typical
20	M20	N23	N24			6DIADUCT	Pipe	Beam	A312TP3...	Typical
21	M21	N24	N25			6DIADUCT	Pipe	Beam	A312TP3...	Typical
22	M22	N25	N27			6DIADUCT	Pipe	Beam	A312TP3...	Typical
23	M23	N27	N28			6DIADUCT	Pipe	Beam	A312TP3...	Typical
24	M24	N28	N29			6DIADUCT	Pipe	Beam	A312TP3...	Typical
25	M25	N29	N30			6DIADUCT	Pipe	Beam	A312TP3...	Typical
26	M26	N30	N31			6DIADUCT	Pipe	Beam	A312TP3...	Typical
27	M27	N31	N87			6DIADUCT	Pipe	Beam	A312TP3...	Typical
28	M28	N32	N33			6DIADUCT	Pipe	Beam	A312TP3...	Typical
29	M29	N33	N34			6DIADUCT	Pipe	Beam	A312TP3...	Typical
30	M30	N34	N35			6DIADUCT	Pipe	Beam	A312TP3...	Typical
31	M31	N35	N36			6DIADUCT	Pipe	Beam	A312TP3...	Typical
32	M32	N36	N37			6DIADUCT	Pipe	Beam	A312TP3...	Typical
33	M33	N37	N38			6DIADUCT	Pipe	Beam	A312TP3...	Typical
34	M36	N38	N41			6DIADUCT	Pipe	Beam	A312TP3...	Typical
35	M37	N41	N42			6DIADUCT	Pipe	Beam	A312TP3...	Typical
36	M38	N42	N43			6DIADUCT	Pipe	Beam	A312TP3...	Typical
37	M39	N43	N45			6DIADUCT	Pipe	Beam	A312TP3...	Typical
38	M40	N45	N46			6DIADUCT	Pipe	Beam	A312TP3...	Typical
39	M41	N46	N47			6DIADUCT	Pipe	Beam	A312TP3...	Typical
40	M42	N47	N48			6DIADUCT	Pipe	Beam	A312TP3...	Typical
41	M43	N48	N49			6DIADUCT	Pipe	Beam	A312TP3...	Typical
42	M44	N49	N51			6DIADUCT	Pipe	Beam	A312TP3...	Typical
43	M45	N51	N52			6DIADUCT	Pipe	Beam	A312TP3...	Typical
44	M46	N52	N53			6DIADUCT	Pipe	Beam	A312TP3...	Typical
45	M47	N53	N54			6DIADUCT	Pipe	Beam	A312TP3...	Typical
46	M48	N54	N55			6DIADUCT	Pipe	Beam	A312TP3...	Typical
47	M49	N55	N56			6DIADUCT	Pipe	Beam	A312TP3...	Typical
48	M50	N56	N57			6DIADUCT	Pipe	Beam	A312TP3...	Typical
49	M51	N58	N59			6DIADUCT	Pipe	Beam	A312TP3...	Typical
50	M52	N57	N58			RIGID	None	None	RIGID	Typical
51	M53	N55	N60			6DIADUCT	Pipe	Beam	A312TP3...	Typical

Company : DMJM H&N
Designer : Kevin M. Jones - DMJMH&N
Job Number : 145579-V-CA-005 DBVS Off-Gas Treatment Duct Analysis

Mar 25, 2006
12:05 PM
Checked By:_____

Member Primary Data (Continued)

	Label	I Joint	J Joint	K Joint	Rotate(de...	Section/Shape	Design List	Type	Material	Design Rules
52	M54	N60	N62			6DIADUCT	Pipe	Beam	A312TP3...	Typical
53	M55	N62	N63			6DIADUCT	Pipe	Beam	A312TP3...	Typical
54	M56	N63	N64			6DIADUCT	Pipe	Beam	A312TP3...	Typical
55	M57	N64	N65			6DIADUCT	Pipe	Beam	A312TP3...	Typical
56	M58	N65	N66			6DIADUCT	Pipe	Beam	A312TP3...	Typical
57	M59	N84A	N67			4DIADUCT	Pipe	Beam	A36	Typical
58	M60	N67	N68			4DIADUCT	Pipe	Beam	A36	Typical
59	M61	N68	N70			4DIADUCT	Pipe	Beam	A36	Typical
60	M62	N70	N72			4DIADUCT	Pipe	Beam	A36	Typical
61	M63	N72	N74			4DIADUCT	Pipe	Beam	A36	Typical
62	M64	N74	N76			4DIADUCT	Pipe	Beam	A36	Typical
63	M65	N76	N138			4DIADUCT	Pipe	Beam	A36	Typical
64	M66	N75	N71			4DIADUCT	Pipe	Beam	A36	Typical
65	M67	N71	N73			4DIADUCT	Pipe	Beam	A36	Typical
66	M68	N73	N69			4DIADUCT	Pipe	Beam	A36	Typical
67	M69	N69	N77			4DIADUCT	Pipe	Beam	A36	Typical
68	M70	N77	N78			4DIADUCT	Pipe	Beam	A36	Typical
69	M71	N78	N79			4DIADUCT	Pipe	Beam	A36	Typical
70	M72	N79	N80			4DIADUCT	Pipe	Beam	A36	Typical
71	M73	N80	N81			4DIADUCT	Pipe	Beam	A36	Typical
72	M74	N81	N82			4DIADUCT	Pipe	Beam	A36	Typical
73	M75	N82	N83			4DIADUCT	Pipe	Beam	A36	Typical
74	M76	N84	N85			6DIADUCT	Pipe	Beam	A312TP3...	Typical
75	M77	N85	N86			6DIADUCT	Pipe	Beam	A312TP3...	Typical
76	M78	N86	N23			6DIADUCT	Pipe	Beam	A312TP3...	Typical
77	M79	N87	N88			6DIADUCT	Pipe	Beam	A312TP3...	Typical
78	M80	N88	N89			6DIADUCT	Pipe	Beam	A312TP3...	Typical
79	M81	N89	N32			6DIADUCT	Pipe	Beam	A312TP3...	Typical
80	M82	N83	N61			4DIADUCT	Pipe	Beam	A36	Typical
81	M83	N61	N85A			4DIADUCT	Pipe	Beam	A36	Typical
82	M84	N85A	N86A			4DIADUCT	Pipe	Beam	A36	Typical
83	M85	N87A	N88A			2DIADUCT	Pipe	Beam	A36	Typical
84	M86	N88A	N89A			2DIADUCT	Pipe	Beam	A36	Typical
85	M87	N89A	N97			2DIADUCT	Pipe	Beam	A36	Typical
86	M88	N97	N96			2DIADUCT	Pipe	Beam	A36	Typical
87	M89	N96	N95			2DIADUCT	Pipe	Beam	A36	Typical
88	M90	N95	N94			2DIADUCT	Pipe	Beam	A36	Typical
89	M91	N94	N93			2DIADUCT	Pipe	Beam	A36	Typical
90	M92	N93	N92			2DIADUCT	Pipe	Beam	A36	Typical
91	M93	N86A	N109A			4DIADUCT	Pipe	Beam	A36	Typical
92	M94	N109A	N110			3DIADUCT	Pipe	Beam	A36	Typical
93	M95	N110	N111			2DIADUCT	Pipe	Beam	A36	Typical
94	M96	N111	N114			2DIADUCT	Pipe	Beam	A36	Typical
95	M97	N114	N136			2DIADUCT	Pipe	Beam	A36	Typical
96	M98	N109	N103			2DIADUCT	Pipe	Beam	A36	Typical
97	M99	N103	N107			2DIADUCT	Pipe	Beam	A36	Typical
98	M100	N107	N130			2DIADUCT	Pipe	Beam	A36	Typical
99	M101	N97A	N99			2DIADUCT	Pipe	Beam	A36	Typical
100	M102	N99	N101			2DIADUCT	Pipe	Beam	A36	Typical
101	M103	N101	N124			2DIADUCT	Pipe	Beam	A36	Typical
102	M104	N124	N123			2DIADUCT	Pipe	Beam	A36	Typical
103	M105	N123	N122			2DIADUCT	Pipe	Beam	A36	Typical
104	M106	N122	N121			2DIADUCT	Pipe	Beam	A36	Typical
105	M107	N121	N120			2DIADUCT	Pipe	Beam	A36	Typical
106	M108	N120	N116			2DIADUCT	Pipe	Beam	A36	Typical
107	M109	N130	N129			2DIADUCT	Pipe	Beam	A36	Typical
108	M110	N129	N128			2DIADUCT	Pipe	Beam	A36	Typical

Member Primary Data (Continued)

	Label	I Joint	J Joint	K Joint	Rotate(de...	Section/Shape	Design List	Type	Material	Design Rules
109	M111	N128	N127			2DIADUCT	Pipe	Beam	A36	Typical
110	M112	N127	N126			2DIADUCT	Pipe	Beam	A36	Typical
111	M113	N126	N117			2DIADUCT	Pipe	Beam	A36	Typical
112	M114	N136	N135			2DIADUCT	Pipe	Beam	A36	Typical
113	M115	N135	N134			2DIADUCT	Pipe	Beam	A36	Typical
114	M116	N134	N133			2DIADUCT	Pipe	Beam	A36	Typical
115	M117	N133	N132			2DIADUCT	Pipe	Beam	A36	Typical
116	M118	N132	N118			2DIADUCT	Pipe	Beam	A36	Typical
117	M119	N131	N2			6DIADUCT	Pipe	Beam	A312TP3...	Typical
118	M120	N132A	N137			6DIADUCT	Pipe	Beam	A312TP3...	Typical
119	M121	N137	N21			6DIADUCT	Pipe	Beam	A312TP3...	Typical
120	M122	N139	N14			6DIADUCT	Pipe	Beam	A312TP3...	Typical
121	M123	N138	N140			4DIADUCT	Pipe	Beam	A36	Typical
122	M124	N140	N75			4DIADUCT	Pipe	Beam	A36	Typical

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed	Area (Me...	Surface (...
1	SELFWEIGHT	DL						121		
2	DAMPER WEIGHT	DL				1				
3	SEISMIC X	ELX				1		121		
4	SEISMIC Z	ELZ				1		121		
5	THERMAL	None						122		
6	WIND X	WLX						99		
7	WIND Z	WLZ						81		

Joint Loads and Enforced Displacements (BLC 2 : DAMPER WEIGHT)

	Joint Label	L,D,M	Direction	Magnitude[lb,k-ft in,rad lb*s^2/in]
1	N56	L	Y	-76

Joint Loads and Enforced Displacements (BLC 3 : SEISMIC X)

	Joint Label	L,D,M	Direction	Magnitude[lb,k-ft in,rad lb*s^2/in]
1	N56	L	X	38

Joint Loads and Enforced Displacements (BLC 4 : SEISMIC Z)

	Joint Label	L,D,M	Direction	Magnitude[lb,k-ft in,rad lb*s^2/in]
1	N56	L	Z	38

Member Distributed Loads (BLC 1 : SELFWEIGHT)

	Member Label	Direction	Start Magnitude[lb/ft,deg]	End Magnitude[lb/ft,deg]	Start Location[i...	End Location[i...
1	M59	Y	-11.05	-11.05	0	0
2	M60	Y	-11.05	-11.05	0	0
3	M61	Y	-11.05	-11.05	0	0
4	M62	Y	-11.05	-11.05	0	0
5	M63	Y	-11.05	-11.05	0	0
6	M64	Y	-11.05	-11.05	0	0
7	M65	Y	-11.05	-11.05	0	0
8	M1	Y	-19.42	-19.42	0	0
9	M2	Y	-19.42	-19.42	0	0
10	M3	Y	-19.42	-19.42	0	0
11	M4	Y	-19.42	-19.42	0	0
12	M5	Y	-19.42	-19.42	0	0
13	M6	Y	-19.42	-19.42	0	0

Member Distributed Loads (BLC 1 : SELFWEIGHT) (Continued)

	Member Label	Direction	Start Magnitude[lb/ft,deg]	End Magnitude[lb/ft,deg]	Start Location[i...	End Location[i...
14	M7	Y	-19.42	-19.42	0	0
15	M8	Y	-19.42	-19.42	0	0
16	M9	Y	-19.42	-19.42	0	0
17	M10	Y	-19.42	-19.42	0	0
18	M11	Y	-19.42	-19.42	0	0
19	M12	Y	-19.42	-19.42	0	0
20	M13	Y	-19.42	-19.42	0	0
21	M14	Y	-19.42	-19.42	0	0
22	M15	Y	-19.42	-19.42	0	0
23	M16	Y	-19.42	-19.42	0	0
24	M17	Y	-19.42	-19.42	0	0
25	M18	Y	-19.42	-19.42	0	0
26	M19	Y	-19.42	-19.42	0	0
27	M20	Y	-19.42	-19.42	0	0
28	M21	Y	-19.42	-19.42	0	0
29	M22	Y	-19.42	-19.42	0	0
30	M23	Y	-19.42	-19.42	0	0
31	M24	Y	-19.42	-19.42	0	0
32	M25	Y	-19.42	-19.42	0	0
33	M26	Y	-19.42	-19.42	0	0
34	M27	Y	-19.42	-19.42	0	0
35	M28	Y	-19.42	-19.42	0	0
36	M29	Y	-19.42	-19.42	0	0
37	M30	Y	-19.42	-19.42	0	0
38	M31	Y	-19.42	-19.42	0	0
39	M32	Y	-19.42	-19.42	0	0
40	M33	Y	-19.42	-19.42	0	0
41	M36	Y	-19.42	-19.42	0	0
42	M37	Y	-19.42	-19.42	0	0
43	M38	Y	-19.42	-19.42	0	0
44	M39	Y	-19.42	-19.42	0	0
45	M40	Y	-19.42	-19.42	0	0
46	M41	Y	-19.42	-19.42	0	0
47	M42	Y	-19.42	-19.42	0	0
48	M43	Y	-19.42	-19.42	0	0
49	M44	Y	-19.42	-19.42	0	0
50	M45	Y	-19.42	-19.42	0	0
51	M46	Y	-19.42	-19.42	0	0
52	M47	Y	-19.42	-19.42	0	0
53	M48	Y	-19.42	-19.42	0	0
54	M49	Y	-19.42	-19.42	0	0
55	M50	Y	-19.42	-19.42	0	0
56	M51	Y	-19.42	-19.42	0	0
57	M53	Y	-19.42	-19.42	0	0
58	M54	Y	-19.42	-19.42	0	0
59	M55	Y	-19.42	-19.42	0	0
60	M56	Y	-19.42	-19.42	0	0
61	M57	Y	-19.42	-19.42	0	0
62	M58	Y	-19.42	-19.42	0	0
63	M76	Y	-19.42	-19.42	0	0
64	M77	Y	-19.42	-19.42	0	0
65	M78	Y	-19.42	-19.42	0	0
66	M79	Y	-19.42	-19.42	0	0
67	M80	Y	-19.42	-19.42	0	0
68	M81	Y	-19.42	-19.42	0	0
69	M66	Y	-11.05	-11.05	0	0
70	M67	Y	-11.05	-11.05	0	0

Member Distributed Loads (BLC 1 : SELFWEIGHT) (Continued)

	Member Label	Direction	Start Magnitude[lb/ft,deg]	End Magnitude[lb/ft,deg]	Start Location[i...	End Location[i...
71	M68	Y	-11.05	-11.05	0	0
72	M69	Y	-11.05	-11.05	0	0
73	M70	Y	-11.05	-11.05	0	0
74	M71	Y	-11.05	-11.05	0	0
75	M72	Y	-11.05	-11.05	0	0
76	M73	Y	-11.05	-11.05	0	0
77	M74	Y	-11.05	-11.05	0	0
78	M75	Y	-11.05	-11.05	0	0
79	M82	Y	-11.05	-11.05	0	0
80	M93	Y	-11.05	-11.05	0	0
81	M84	Y	-11.05	-11.05	0	0
82	M83	Y	-11.05	-11.05	0	0
83	M94	Y	-7.76	-7.76	0	0
84	M85	Y	-3.74	-3.74	0	0
85	M86	Y	-3.74	-3.74	0	0
86	M87	Y	-3.74	-3.74	0	0
87	M101	Y	-3.74	-3.74	0	0
88	M102	Y	-3.74	-3.74	0	0
89	M103	Y	-3.74	-3.74	0	0
90	M92	Y	-3.74	-3.74	0	0
91	M108	Y	-3.74	-3.74	0	0
92	M98	Y	-3.74	-3.74	0	0
93	M99	Y	-3.74	-3.74	0	0
94	M100	Y	-3.74	-3.74	0	0
95	M95	Y	-3.74	-3.74	0	0
96	M96	Y	-3.74	-3.74	0	0
97	M97	Y	-3.74	-3.74	0	0
98	M118	Y	-3.74	-3.74	0	0
99	M113	Y	-3.74	-3.74	0	0
100	M117	Y	-3.74	-3.74	0	0
101	M116	Y	-3.74	-3.74	0	0
102	M115	Y	-3.74	-3.74	0	0
103	M114	Y	-3.74	-3.74	0	0
104	M112	Y	-3.74	-3.74	0	0
105	M111	Y	-3.74	-3.74	0	0
106	M110	Y	-3.74	-3.74	0	0
107	M109	Y	-3.74	-3.74	0	0
108	M107	Y	-3.74	-3.74	0	0
109	M106	Y	-3.74	-3.74	0	0
110	M105	Y	-3.74	-3.74	0	0
111	M104	Y	-3.74	-3.74	0	0
112	M91	Y	-3.74	-3.74	0	0
113	M90	Y	-3.74	-3.74	0	0
114	M89	Y	-3.74	-3.74	0	0
115	M88	Y	-3.74	-3.74	0	0
116	M119	Y	-19.42	-19.42	0	0
117	M120	Y	-19.42	-19.42	0	0
118	M121	Y	-19.42	-19.42	0	0
119	M122	Y	-19.42	-19.42	0	0
120	M123	Y	-11.05	-11.05	0	0
121	M124	Y	-11.05	-11.05	0	0

Member Distributed Loads (BLC 3 : SEISMIC X)

	Member Label	Direction	Start Magnitude[lb/ft,deg]	End Magnitude[lb/ft,deg]	Start Location[i...	End Location[i...
1	M59	X	5.525	5.525	0	0
2	M60	X	5.525	5.525	0	0
3	M61	X	5.525	5.525	0	0

Member Distributed Loads (BLC 3 : SEISMIC X) (Continued)

	Member Label	Direction	Start Magnitude[lb/ft,deg]	End Magnitude[lb/ft,deg]	Start Location[i...	End Location[i...
4	M62	X	5.525	5.525	0	0
5	M63	X	5.525	5.525	0	0
6	M64	X	5.525	5.525	0	0
7	M65	X	5.525	5.525	0	0
8	M1	X	9.71	9.71	0	0
9	M2	X	9.71	9.71	0	0
10	M3	X	9.71	9.71	0	0
11	M4	X	9.71	9.71	0	0
12	M5	X	9.71	9.71	0	0
13	M6	X	9.71	9.71	0	0
14	M7	X	9.71	9.71	0	0
15	M8	X	9.71	9.71	0	0
16	M9	X	9.71	9.71	0	0
17	M10	X	9.71	9.71	0	0
18	M11	X	9.71	9.71	0	0
19	M12	X	9.71	9.71	0	0
20	M13	X	9.71	9.71	0	0
21	M14	X	9.71	9.71	0	0
22	M15	X	9.71	9.71	0	0
23	M16	X	9.71	9.71	0	0
24	M17	X	9.71	9.71	0	0
25	M18	X	9.71	9.71	0	0
26	M19	X	9.71	9.71	0	0
27	M20	X	9.71	9.71	0	0
28	M21	X	9.71	9.71	0	0
29	M22	X	9.71	9.71	0	0
30	M23	X	9.71	9.71	0	0
31	M24	X	9.71	9.71	0	0
32	M25	X	9.71	9.71	0	0
33	M26	X	9.71	9.71	0	0
34	M27	X	9.71	9.71	0	0
35	M28	X	9.71	9.71	0	0
36	M29	X	9.71	9.71	0	0
37	M30	X	9.71	9.71	0	0
38	M31	X	9.71	9.71	0	0
39	M32	X	9.71	9.71	0	0
40	M33	X	9.71	9.71	0	0
41	M36	X	9.71	9.71	0	0
42	M37	X	9.71	9.71	0	0
43	M38	X	9.71	9.71	0	0
44	M39	X	9.71	9.71	0	0
45	M40	X	9.71	9.71	0	0
46	M41	X	9.71	9.71	0	0
47	M42	X	9.71	9.71	0	0
48	M43	X	9.71	9.71	0	0
49	M44	X	9.71	9.71	0	0
50	M45	X	9.71	9.71	0	0
51	M46	X	9.71	9.71	0	0
52	M47	X	9.71	9.71	0	0
53	M48	X	9.71	9.71	0	0
54	M49	X	9.71	9.71	0	0
55	M50	X	9.71	9.71	0	0
56	M51	X	9.71	9.71	0	0
57	M53	X	9.71	9.71	0	0
58	M54	X	9.71	9.71	0	0
59	M55	X	9.71	9.71	0	0
60	M56	X	9.71	9.71	0	0

Member Distributed Loads (BLC 3 : SEISMIC X) (Continued)

	Member Label	Direction	Start Magnitude[lb/ft,deg]	End Magnitude[lb/ft,deg]	Start Location[i...	End Location[i...
61	M57	X	9.71	9.71	0	0
62	M58	X	9.71	9.71	0	0
63	M76	X	9.71	9.71	0	0
64	M77	X	9.71	9.71	0	0
65	M78	X	9.71	9.71	0	0
66	M79	X	9.71	9.71	0	0
67	M80	X	9.71	9.71	0	0
68	M81	X	9.71	9.71	0	0
69	M66	X	5.525	5.525	0	0
70	M67	X	5.525	5.525	0	0
71	M68	X	5.525	5.525	0	0
72	M69	X	5.525	5.525	0	0
73	M70	X	5.525	5.525	0	0
74	M71	X	5.525	5.525	0	0
75	M72	X	5.525	5.525	0	0
76	M73	X	5.525	5.525	0	0
77	M74	X	5.525	5.525	0	0
78	M75	X	5.525	5.525	0	0
79	M82	X	5.525	5.525	0	0
80	M93	X	5.525	5.525	0	0
81	M84	X	5.525	5.525	0	0
82	M83	X	5.525	5.525	0	0
83	M94	X	3.88	3.88	0	0
84	M85	X	1.87	1.87	0	0
85	M86	X	1.87	1.87	0	0
86	M87	X	1.87	1.87	0	0
87	M101	X	1.87	1.87	0	0
88	M102	X	1.87	1.87	0	0
89	M103	X	1.87	1.87	0	0
90	M92	X	1.87	1.87	0	0
91	M108	X	1.87	1.87	0	0
92	M98	X	1.87	1.87	0	0
93	M99	X	1.87	1.87	0	0
94	M100	X	1.87	1.87	0	0
95	M95	X	1.87	1.87	0	0
96	M96	X	1.87	1.87	0	0
97	M97	X	1.87	1.87	0	0
98	M118	X	1.87	1.87	0	0
99	M113	X	1.87	1.87	0	0
100	M117	X	1.87	1.87	0	0
101	M116	X	1.87	1.87	0	0
102	M115	X	1.87	1.87	0	0
103	M114	X	1.87	1.87	0	0
104	M112	X	1.87	1.87	0	0
105	M111	X	1.87	1.87	0	0
106	M110	X	1.87	1.87	0	0
107	M109	X	1.87	1.87	0	0
108	M107	X	1.87	1.87	0	0
109	M106	X	1.87	1.87	0	0
110	M105	X	1.87	1.87	0	0
111	M104	X	1.87	1.87	0	0
112	M91	X	1.87	1.87	0	0
113	M90	X	1.87	1.87	0	0
114	M89	X	1.87	1.87	0	0
115	M88	X	1.87	1.87	0	0
116	M119	X	9.71	9.71	0	0
117	M120	X	9.71	9.71	0	0

Member Distributed Loads (BLC 3 : SEISMIC X) (Continued)

	Member Label	Direction	Start Magnitude[lb/ft,deg]	End Magnitude[lb/ft,deg]	Start Location[i...	End Location[i...
118	M121	X	9.71	9.71	0	0
119	M122	X	9.71	9.71	0	0
120	M123	X	5.525	5.525	0	0
121	M124	X	5.525	5.525	0	0

Member Distributed Loads (BLC 4 : SEISMIC Z)

	Member Label	Direction	Start Magnitude[lb/ft,deg]	End Magnitude[lb/ft,deg]	Start Location[i...	End Location[i...
1	M59	Z	5.525	5.525	0	0
2	M60	Z	5.525	5.525	0	0
3	M61	Z	5.525	5.525	0	0
4	M62	Z	5.525	5.525	0	0
5	M63	Z	5.525	5.525	0	0
6	M64	Z	5.525	5.525	0	0
7	M65	Z	5.525	5.525	0	0
8	M1	Z	9.71	9.71	0	0
9	M2	Z	9.71	9.71	0	0
10	M3	Z	9.71	9.71	0	0
11	M4	Z	9.71	9.71	0	0
12	M5	Z	9.71	9.71	0	0
13	M6	Z	9.71	9.71	0	0
14	M7	Z	9.71	9.71	0	0
15	M8	Z	9.71	9.71	0	0
16	M9	Z	9.71	9.71	0	0
17	M10	Z	9.71	9.71	0	0
18	M11	Z	9.71	9.71	0	0
19	M12	Z	9.71	9.71	0	0
20	M13	Z	9.71	9.71	0	0
21	M14	Z	9.71	9.71	0	0
22	M15	Z	9.71	9.71	0	0
23	M16	Z	9.71	9.71	0	0
24	M17	Z	9.71	9.71	0	0
25	M18	Z	9.71	9.71	0	0
26	M19	Z	9.71	9.71	0	0
27	M20	Z	9.71	9.71	0	0
28	M21	Z	9.71	9.71	0	0
29	M22	Z	9.71	9.71	0	0
30	M23	Z	9.71	9.71	0	0
31	M24	Z	9.71	9.71	0	0
32	M25	Z	9.71	9.71	0	0
33	M26	Z	9.71	9.71	0	0
34	M27	Z	9.71	9.71	0	0
35	M28	Z	9.71	9.71	0	0
36	M29	Z	9.71	9.71	0	0
37	M30	Z	9.71	9.71	0	0
38	M31	Z	9.71	9.71	0	0
39	M32	Z	9.71	9.71	0	0
40	M33	Z	9.71	9.71	0	0
41	M36	Z	9.71	9.71	0	0
42	M37	Z	9.71	9.71	0	0
43	M38	Z	9.71	9.71	0	0
44	M39	Z	9.71	9.71	0	0
45	M40	Z	9.71	9.71	0	0
46	M41	Z	9.71	9.71	0	0
47	M42	Z	9.71	9.71	0	0
48	M43	Z	9.71	9.71	0	0
49	M44	Z	9.71	9.71	0	0
50	M45	Z	9.71	9.71	0	0

Member Distributed Loads (BLC 4 : SEISMIC Z) (Continued)

	Member Label	Direction	Start Magnitude[lb/ft,deg]	End Magnitude[lb/ft,deg]	Start Location[i...	End Location[i...
51	M46	Z	9.71	9.71	0	0
52	M47	Z	9.71	9.71	0	0
53	M48	Z	9.71	9.71	0	0
54	M49	Z	9.71	9.71	0	0
55	M50	Z	9.71	9.71	0	0
56	M51	Z	9.71	9.71	0	0
57	M53	Z	9.71	9.71	0	0
58	M54	Z	9.71	9.71	0	0
59	M55	Z	9.71	9.71	0	0
60	M56	Z	9.71	9.71	0	0
61	M57	Z	9.71	9.71	0	0
62	M58	Z	9.71	9.71	0	0
63	M76	Z	9.71	9.71	0	0
64	M77	Z	9.71	9.71	0	0
65	M78	Z	9.71	9.71	0	0
66	M79	Z	9.71	9.71	0	0
67	M80	Z	9.71	9.71	0	0
68	M81	Z	9.71	9.71	0	0
69	M66	Z	5.525	5.525	0	0
70	M67	Z	5.525	5.525	0	0
71	M68	Z	5.525	5.525	0	0
72	M69	Z	5.525	5.525	0	0
73	M70	Z	5.525	5.525	0	0
74	M71	Z	5.525	5.525	0	0
75	M72	Z	5.525	5.525	0	0
76	M73	Z	5.525	5.525	0	0
77	M74	Z	5.525	5.525	0	0
78	M75	Z	5.525	5.525	0	0
79	M82	Z	5.525	5.525	0	0
80	M93	Z	5.525	5.525	0	0
81	M84	Z	5.525	5.525	0	0
82	M83	Z	5.525	5.525	0	0
83	M94	Z	3.88	3.88	0	0
84	M85	Z	1.87	1.87	0	0
85	M86	Z	1.87	1.87	0	0
86	M87	Z	1.87	1.87	0	0
87	M101	Z	1.87	1.87	0	0
88	M102	Z	1.87	1.87	0	0
89	M103	Z	1.87	1.87	0	0
90	M92	Z	1.87	1.87	0	0
91	M108	Z	1.87	1.87	0	0
92	M98	Z	1.87	1.87	0	0
93	M99	Z	1.87	1.87	0	0
94	M100	Z	1.87	1.87	0	0
95	M95	Z	1.87	1.87	0	0
96	M96	Z	1.87	1.87	0	0
97	M97	Z	1.87	1.87	0	0
98	M118	Z	1.87	1.87	0	0
99	M113	Z	1.87	1.87	0	0
100	M117	Z	1.87	1.87	0	0
101	M116	Z	1.87	1.87	0	0
102	M115	Z	1.87	1.87	0	0
103	M114	Z	1.87	1.87	0	0
104	M112	Z	1.87	1.87	0	0
105	M111	Z	1.87	1.87	0	0
106	M110	Z	1.87	1.87	0	0
107	M109	Z	1.87	1.87	0	0

Member Distributed Loads (BLC 4 : SEISMIC Z) (Continued)

	Member Label	Direction	Start Magnitude[lb/ft,deg]	End Magnitude[lb/ft,deg]	Start Location[i...	End Location[i...
108	M107	Z	1.87	1.87	0	0
109	M106	Z	1.87	1.87	0	0
110	M105	Z	1.87	1.87	0	0
111	M104	Z	1.87	1.87	0	0
112	M91	Z	1.87	1.87	0	0
113	M90	Z	1.87	1.87	0	0
114	M89	Z	1.87	1.87	0	0
115	M88	Z	1.87	1.87	0	0
116	M119	Z	9.71	9.71	0	0
117	M120	Z	9.71	9.71	0	0
118	M121	Z	9.71	9.71	0	0
119	M122	Z	9.71	9.71	0	0
120	M123	Z	5.525	5.525	0	0
121	M124	Z	5.525	5.525	0	0

Member Distributed Loads (BLC 5 : THERMAL)

	Member Label	Direction	Start Magnitude[lb/ft,deg]	End Magnitude[lb/ft,deg]	Start Location[i...	End Location[i...
1	M1	T	237	237	0	0
2	M2	T	237	237	0	0
3	M3	T	237	237	0	0
4	M4	T	237	237	0	0
5	M5	T	237	237	0	0
6	M6	T	237	237	0	0
7	M7	T	237	237	0	0
8	M8	T	237	237	0	0
9	M9	T	237	237	0	0
10	M10	T	237	237	0	0
11	M11	T	237	237	0	0
12	M12	T	237	237	0	0
13	M13	T	237	237	0	0
14	M14	T	237	237	0	0
15	M15	T	237	237	0	0
16	M16	T	237	237	0	0
17	M17	T	237	237	0	0
18	M18	T	237	237	0	0
19	M19	T	237	237	0	0
20	M20	T	237	237	0	0
21	M21	T	237	237	0	0
22	M22	T	237	237	0	0
23	M23	T	237	237	0	0
24	M24	T	237	237	0	0
25	M25	T	237	237	0	0
26	M26	T	237	237	0	0
27	M27	T	237	237	0	0
28	M28	T	237	237	0	0
29	M29	T	237	237	0	0
30	M30	T	237	237	0	0
31	M31	T	237	237	0	0
32	M32	T	237	237	0	0
33	M33	T	237	237	0	0
34	M36	T	237	237	0	0
35	M37	T	237	237	0	0
36	M38	T	237	237	0	0
37	M39	T	237	237	0	0
38	M40	T	237	237	0	0
39	M41	T	237	237	0	0
40	M42	T	237	237	0	0

Member Distributed Loads (BLC 5 : THERMAL) (Continued)

	Member Label	Direction	Start Magnitude[lb/ft,deg]	End Magnitude[lb/ft,deg]	Start Location[i...	End Location[i...
41	M43	T	237	237	0	0
42	M44	T	237	237	0	0
43	M45	T	237	237	0	0
44	M46	T	237	237	0	0
45	M47	T	237	237	0	0
46	M48	T	237	237	0	0
47	M49	T	102	102	0	0
48	M50	T	102	102	0	0
49	M51	T	102	102	0	0
50	M52	T	102	102	0	0
51	M53	T	102	102	0	0
52	M54	T	102	102	0	0
53	M55	T	102	102	0	0
54	M56	T	102	102	0	0
55	M57	T	102	102	0	0
56	M58	T	102	102	0	0
57	M59	T	102	102	0	0
58	M60	T	102	102	0	0
59	M61	T	102	102	0	0
60	M62	T	102	102	0	0
61	M63	T	102	102	0	0
62	M64	T	102	102	0	0
63	M65	T	102	102	0	0
64	M76	T	237	237	0	0
65	M77	T	237	237	0	0
66	M78	T	237	237	0	89
67	M79	T	237	237	0	0
68	M80	T	237	237	0	0
69	M81	T	237	237	0	46
70	M66	T	102	102	0	0
71	M67	T	102	102	0	0
72	M68	T	102	102	0	0
73	M69	T	102	102	0	0
74	M70	T	102	102	0	0
75	M71	T	102	102	0	0
76	M72	T	102	102	0	0
77	M73	T	102	102	0	0
78	M74	T	102	102	0	0
79	M75	T	102	102	0	0
80	M82	T	102	102	0	0
81	M83	T	102	102	0	0
82	M84	T	102	102	0	0
83	M85	T	102	102	0	0
84	M86	T	102	102	0	0
85	M93	T	102	102	0	0
86	M87	T	102	102	0	0
87	M92	T	102	102	0	0
88	M101	T	102	102	0	0
89	M102	T	102	102	0	0
90	M94	T	102	102	0	0
91	M88	T	102	102	0	0
92	M89	T	102	102	0	0
93	M90	T	102	102	0	0
94	M90	T	102	102	0	0
95	M104	T	102	102	0	0
96	M105	T	102	102	0	0
97	M106	T	102	102	0	0

Member Distributed Loads (BLC 5 : THERMAL) (Continued)

	Member Label	Direction	Start Magnitude[lb/ft,deg]	End Magnitude[lb/ft,deg]	Start Location[i...	End Location[i...
98	M107	T	102	102	0	0
99	M108	T	102	102	0	0
100	M103	T	102	102	0	0
101	M95	T	102	102	0	0
102	M98	T	102	102	0	0
103	M99	T	102	102	0	0
104	M113	T	102	102	0	0
105	M100	T	102	102	0	0
106	M109	T	102	102	0	0
107	M110	T	102	102	0	0
108	M111	T	102	102	0	0
109	M112	T	102	102	0	0
110	M96	T	102	102	0	0
111	M117	T	102	102	0	0
112	M116	T	102	102	0	0
113	M115	T	102	102	0	0
114	M114	T	102	102	0	0
115	M97	T	102	102	0	0
116	M118	T	102	102	0	0
117	M119	T	237	237	0	6.625
118	M120	T	237	237	0	0
119	M121	T	237	237	0	127
120	M122	T	237	237	0	40.5
121	M123	T	102	102	0	0
122	M124	T	102	102	0	75.12

Member Distributed Loads (BLC 6 : WIND X)

	Member Label	Direction	Start Magnitude[lb/ft,deg]	End Magnitude[lb/ft,deg]	Start Location[i...	End Location[i...
1	M1	X	9.16	9.16	0	0
2	M2	X	9.16	9.16	0	0
3	M3	X	9.16	9.16	0	0
4	M4	X	9.16	9.16	0	0
5	M5	X	9.16	9.16	0	0
6	M6	X	9.16	9.16	0	0
7	M7	X	9.16	9.16	0	0
8	M8	X	9.16	9.16	0	0
9	M9	X	9.16	9.16	0	0
10	M10	X	9.16	9.16	0	0
11	M11	X	9.16	9.16	0	0
12	M12	X	9.16	9.16	0	0
13	M13	X	9.16	9.16	0	0
14	M14	X	9.16	9.16	0	0
15	M23	X	9.16	9.16	0	0
16	M24	X	9.16	9.16	0	0
17	M25	X	9.16	9.16	0	0
18	M26	X	9.16	9.16	0	0
19	M27	X	9.16	9.16	0	0
20	M28	X	9.16	9.16	0	0
21	M29	X	9.16	9.16	0	0
22	M30	X	9.16	9.16	0	0
23	M31	X	9.16	9.16	0	0
24	M32	X	9.16	9.16	0	0
25	M33	X	9.16	9.16	0	0
26	M36	X	9.16	9.16	0	0
27	M37	X	9.16	9.16	0	0
28	M38	X	9.16	9.16	0	0
29	M39	X	9.16	9.16	0	0

Member Distributed Loads (BLC 6 : WIND X) (Continued)

	Member Label	Direction	Start Magnitude[lb/ft,deg]	End Magnitude[lb/ft,deg]	Start Location[i...	End Location[i...
30	M40	X	9.16	9.16	0	0
31	M41	X	9.16	9.16	0	0
32	M42	X	9.16	9.16	0	0
33	M43	X	9.16	9.16	0	0
34	M44	X	9.16	9.16	0	0
35	M45	X	9.16	9.16	0	0
36	M46	X	9.16	9.16	0	0
37	M47	X	9.16	9.16	0	0
38	M48	X	9.16	9.16	0	0
39	M49	X	9.16	9.16	0	0
40	M50	X	9.16	9.16	0	0
41	M51	X	9.16	9.16	0	0
42	M52	X	9.16	9.16	0	0
43	M53	X	9.16	9.16	0	0
44	M54	X	9.16	9.16	0	0
45	M55	X	9.16	9.16	0	0
46	M56	X	9.16	9.16	0	0
47	M57	X	9.16	9.16	0	0
48	M58	X	9.16	9.16	0	0
49	M59	X	6.22	6.22	0	0
50	M60	X	6.22	6.22	0	0
51	M63	X	6.22	6.22	0	0
52	M64	X	6.22	6.22	0	0
53	M65	X	6.22	6.22	0	0
54	M66	X	6.22	6.22	0	0
55	M67	X	6.22	6.22	0	0
56	M68	X	6.22	6.22	0	0
57	M69	X	6.22	6.22	0	0
58	M79	X	9.16	9.16	0	0
59	M80	X	9.16	9.16	0	0
60	M81	X	9.16	9.16	0	0
61	M83	X	6.22	6.22	0	0
62	M85	X	3.28	3.28	0	0
63	M86	X	3.28	3.28	0	0
64	M87	X	3.28	3.28	0	0
65	M88	X	3.28	3.28	0	0
66	M89	X	3.28	3.28	0	0
67	M90	X	3.28	3.28	0	0
68	M91	X	3.28	3.28	0	0
69	M92	X	3.28	3.28	0	0
70	M93	X	6.22	6.22	0	0
71	M94	X	4.84	4.84	0	0
72	M95	X	3.28	3.28	0	0
73	M96	X	3.28	3.28	0	0
74	M97	X	3.28	3.28	0	0
75	M98	X	3.28	3.28	0	0
76	M99	X	3.28	3.28	0	0
77	M100	X	3.28	3.28	0	0
78	M101	X	3.28	3.28	0	0
79	M102	X	3.28	3.28	0	0
80	M103	X	3.28	3.28	0	0
81	M104	X	3.28	3.28	0	0
82	M105	X	3.28	3.28	0	0
83	M106	X	3.28	3.28	0	0
84	M107	X	3.28	3.28	0	0
85	M108	X	3.28	3.28	0	0
86	M109	X	3.28	3.28	0	0

Member Distributed Loads (BLC 6 : WIND X) (Continued)

	Member Label	Direction	Start Magnitude[lb/ft,deg]	End Magnitude[lb/ft,deg]	Start Location[i...	End Location[i...
87	M110	X	3.28	3.28	0	0
88	M111	X	3.28	3.28	0	0
89	M112	X	3.28	3.28	0	0
90	M113	X	3.28	3.28	0	0
91	M114	X	3.28	3.28	0	0
92	M115	X	3.28	3.28	0	0
93	M116	X	3.28	3.28	0	0
94	M117	X	3.28	3.28	0	0
95	M118	X	3.28	3.28	0	0
96	M119	X	9.16	9.16	0	0
97	M122	X	9.16	9.16	0	0
98	M123	X	6.22	6.22	0	0
99	M124	X	6.22	6.22	0	0

Member Distributed Loads (BLC 7 : WIND Z)

	Member Label	Direction	Start Magnitude[lb/ft,deg]	End Magnitude[lb/ft,deg]	Start Location[i...	End Location[i...
1	M63	Z	6.22	6.22	0	0
2	M62	Z	6.22	6.22	0	0
3	M61	Z	6.22	6.22	0	0
4	M60	Z	6.22	6.22	0	0
5	M59	Z	6.22	6.22	0	0
6	M48	Z	9.16	9.16	0	0
7	M47	Z	9.16	9.16	0	0
8	M46	Z	9.16	9.16	0	0
9	M45	Z	9.16	9.16	0	0
10	M44	Z	9.16	9.16	0	0
11	M43	Z	9.16	9.16	0	0
12	M42	Z	9.16	9.16	0	0
13	M41	Z	9.16	9.16	0	0
14	M40	Z	9.16	9.16	0	0
15	M39	Z	9.16	9.16	0	0
16	M38	Z	9.16	9.16	0	0
17	M24	Z	9.16	9.16	0	0
18	M23	Z	9.16	9.16	0	0
19	M21	Z	9.16	9.16	0	0
20	M22	Z	9.16	9.16	0	0
21	M20	Z	9.16	9.16	0	0
22	M19	Z	9.16	9.16	0	0
23	M18	Z	9.16	9.16	0	0
24	M17	Z	9.16	9.16	0	0
25	M16	Z	9.16	9.16	0	0
26	M15	Z	9.16	9.16	0	0
27	M14	Z	9.16	9.16	0	0
28	M13	Z	9.16	9.16	0	0
29	M9	Z	9.16	9.16	0	0
30	M8	Z	9.16	9.16	0	0
31	M7	Z	9.16	9.16	0	0
32	M6	Z	9.16	9.16	0	0
33	M5	Z	9.16	9.16	0	0
34	M4	Z	9.16	9.16	0	0
35	M3	Z	9.16	9.16	0	0
36	M76	Z	9.16	9.16	0	0
37	M77	Z	9.16	9.16	0	0
38	M78	Z	9.16	9.16	0	0
39	M75	Z	6.22	6.22	0	0
40	M74	Z	6.22	6.22	0	0
41	M73	Z	6.22	6.22	0	0

Member Distributed Loads (BLC 7 : WIND Z) (Continued)

	Member Label	Direction	Start Magnitude[lb/ft,deg]	End Magnitude[lb/ft,deg]	Start Location[i...	End Location[i...
42	M72	Z	6.22	6.22	0	0
43	M68	Z	6.22	6.22	0	0
44	M69	Z	6.22	6.22	0	0
45	M70	Z	6.22	6.22	0	0
46	M71	Z	6.22	6.22	0	0
47	M97	Z	3.28	3.28	0	0
48	M114	Z	3.28	3.28	0	0
49	M115	Z	3.28	3.28	0	0
50	M116	Z	3.28	3.28	0	0
51	M117	Z	3.28	3.28	0	0
52	M118	Z	3.28	3.28	0	0
53	M95	Z	3.28	3.28	0	0
54	M98	Z	3.28	3.28	0	0
55	M100	Z	3.28	3.28	0	0
56	M109	Z	3.28	3.28	0	0
57	M110	Z	3.28	3.28	0	0
58	M111	Z	3.28	3.28	0	0
59	M112	Z	3.28	3.28	0	0
60	M113	Z	3.28	3.28	0	0
61	M101	Z	3.28	3.28	0	0
62	M108	Z	3.28	3.28	0	0
63	M107	Z	3.28	3.28	0	0
64	M105	Z	3.28	3.28	0	0
65	M106	Z	3.28	3.28	0	0
66	M104	Z	3.28	3.28	0	0
67	M103	Z	3.28	3.28	0	0
68	M85	Z	3.28	3.28	0	0
69	M88	Z	3.28	3.28	0	0
70	M89	Z	3.28	3.28	0	0
71	M90	Z	3.28	3.28	0	0
72	M91	Z	3.28	3.28	0	0
73	M92	Z	3.28	3.28	0	0
74	M87	Z	3.28	3.28	0	0
75	M94	Z	4.84	4.84	0	0
76	M93	Z	6.22	6.22	0	0
77	M84	Z	6.22	6.22	0	0
78	M83	Z	6.22	6.22	0	0
79	M82	Z	6.22	6.22	0	0
80	M120	Z	9.16	9.16	0	0
81	M121	Z	9.16	9.16	0	0

Member Point Loads

Member Label	Direction	Magnitude[lb,k-ft]	Location[in,%]
No Data to Print ...			

Load Combinations

	Description	Sol...	PD...	SR...	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
1	Normal Load	Yes			DL	1														
2	Normal + Wind (+X) + Thermal	Yes			DL	1	WLX	1	5	1										
3	Normal + Wind (-X) + Thermal	Yes			DL	1	WLX	-1	5	1										
4	Normal + Wind (+Z) + Thermal	Yes			DL	1	WLZ	1	5	1										
5	Normal + Wind (-Z) + Thermal	Yes			DL	1	WLZ	-1	5	1										
6	Normal + Seismic (+X)(+Z) +..	Yes			DL	1	ELX	1	ELZ	1	5	1								
7	Normal + Seismic (+X)(-Z) + ..	Yes			DL	1	ELX	1	ELZ	-1	5	1								
8	Normal + Seismic (-X)(+Z) + ..	Yes			DL	1	ELX	-1	ELZ	1	5	1								

Company : **DMJM H&N**
Designer : **Kevin M. Jones - DMJMH&N**
Job Number : **145579-V-CA-005 DBVS Off-Gas Treatment Duct Analysis**

Mar 25, 2006
12:05 PM
Checked By:_____

Load Combinations (Continued)

	Description	Sol.	PD	SR	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
9	Normal + Seismic (-X)(-Z) + ...	Yes			DL	1	ELX	-1	ELZ	-1	5	1								

Envelope Joint Reactions

	Joint		X [lb]	lc	Y [lb]	lc	Z [lb]	lc	MX [k-ft]	lc	MY [k-ft]	lc	MZ [k-ft]	lc
1	N75	max	203.242	7	73.544	1	0	1	0	1	0	1	0	1
2		min	-122.632	8	32.945	6	0	1	0	1	0	1	0	1
3	N66	max	-77.488	1	2579.157	6	1309.856	7	4.088	7	.938	7	2.064	6
4		min	-1018.607	6	219.977	1	-713.441	8	.091	1	.061	1	-.883	9
5	N1	max	0	1	0	1	0	1	4.414	7	.008	1	.25	1
6		min	0	1	0	1	0	1	.098	1	-.613	8	-.536	8
7	N20	max	280.991	8	-32.213	1	111.677	9	0	1	0	1	0	1
8		min	-1.777	1	-908.681	6	-111.677	8	0	1	0	1	0	1
9	N21	max	0	1	413.96	1	217.885	7	0	1	0	1	0	1
10		min	0	1	354.815	8	-186.797	8	0	1	0	1	0	1
11	N22	max	0	1	218.63	8	97.219	9	0	1	0	1	0	1
12		min	0	1	144.545	1	-70.168	6	0	1	0	1	0	1
13	N23	max	0	1	264.9	1	-.011	1	0	1	0	1	0	1
14		min	0	1	245.529	8	-322.351	8	0	1	0	1	0	1
15	N24	max	0	1	214.878	7	885.044	9	0	1	0	1	0	1
16		min	0	1	179.16	8	.005	1	0	1	0	1	0	1
17	N31	max	486.245	8	129.595	8	-.003	1	0	1	0	1	0	1
18		min	-822.371	7	77.5	7	-679.2	8	0	1	0	1	0	1
19	N32	max	327.249	3	303.172	7	0	1	0	1	0	1	0	1
20		min	.009	1	285.853	8	0	1	0	1	0	1	0	1
21	N33	max	154.398	8	328.837	6	0	1	0	1	0	1	0	1
22		min	-194.678	7	326.658	1	0	1	0	1	0	1	0	1
23	N34	max	76.488	3	126.119	1	0	1	0	1	0	1	0	1
24		min	-44.151	2	119.552	6	0	1	0	1	0	1	0	1
25	N35	max	65.282	8	189.972	6	0	1	0	1	0	1	0	1
26		min	-112.987	7	170.612	1	0	1	0	1	0	1	0	1
27	N36	max	238.496	9	170.131	1	0	1	0	1	0	1	0	1
28		min	4.185	6	55.786	6	0	1	0	1	0	1	0	1
29	N37	max	-28.088	1	579.849	6	0	1	0	1	0	1	0	1
30		min	-657.419	9	64.895	1	0	1	0	1	0	1	0	1
31	N38	max	1420.606	8	222.269	1	0	1	0	1	0	1	0	1
32		min	39.584	1	-829.739	6	0	1	0	1	0	1	0	1
33	N58	max	902.912	6	1284.919	8	0	1	0	1	0	1	0	1
34		min	-72.874	1	-135.279	1	0	1	0	1	0	1	0	1
35	N57	max	100.27	1	528.651	1	0	1	0	1	0	1	0	1
36		min	-1962.144	6	-1981.397	8	0	1	0	1	0	1	0	1
37	N71	max	572.818	8	71.095	1	0	1	0	1	0	1	0	1
38		min	-1002.669	7	50.237	6	0	1	0	1	0	1	0	1
39	N79	max	0	1	43.562	8	-2.553	1	0	1	0	1	0	1
40		min	0	1	24.894	1	-604.561	8	0	1	0	1	0	1
41	N80	max	0	1	154.774	7	146.428	9	0	1	0	1	0	1
42		min	0	1	148.97	1	-25.578	6	0	1	0	1	0	1
43	N81	max	0	1	182.365	1	98.286	5	0	1	0	1	0	1
44		min	0	1	178.9	2	-109.579	4	0	1	0	1	0	1
45	N82	max	0	1	216.44	2	117.151	5	0	1	0	1	0	1
46		min	0	1	206.565	1	-113.157	4	0	1	0	1	0	1
47	N83	max	0	1	181.128	3	101.767	5	0	1	0	1	0	1
48		min	0	1	127.065	2	-105.346	4	0	1	0	1	0	1
49	N85A	max	0	1	193.16	7	242.018	7	0	1	0	1	0	1
50		min	0	1	161.632	1	-15.851	8	0	1	0	1	0	1
51	N90	max	83.07	3	33.257	1	0	1	0	1	0	1	0	1
52		min	.343	1	4.823	7	0	1	0	1	0	1	0	1

Envelope Joint Reactions (Continued)

	Joint		X [lb]	lc	Y [lb]	lc	Z [lb]	lc	MX [k-ft]	lc	MY [k-ft]	lc	MZ [k-ft]	lc
53	N92	max	17.876	3	52.949	7	-.762	1	0	1	.007	3	.063	2
54		min	-12.16	2	27.903	1	-70.429	4	-.241	4	-.005	2	-.003	1
55	N98	max	0	1	186.393	2	164.475	9	0	1	0	1	0	1
56		min	0	1	160.073	3	-69.199	6	0	1	0	1	0	1
57	N100	max	115.692	3	34.929	1	0	1	0	1	0	1	0	1
58		min	-.415	1	8.931	7	0	1	0	1	0	1	0	1
59	N104	max	0	1	98.428	9	117.77	9	0	1	0	1	0	1
60		min	0	1	93.628	6	-43.65	6	0	1	0	1	0	1
61	N106	max	125.998	3	35.909	1	0	1	0	1	0	1	0	1
62		min	-.156	1	15.126	5	0	1	0	1	0	1	0	1
63	N112	max	0	1	37.985	1	72.617	9	0	1	0	1	0	1
64		min	0	1	34.748	4	-20.443	6	0	1	0	1	0	1
65	N113	max	101.832	3	35.623	1	0	1	0	1	0	1	0	1
66		min	-.866	1	8.482	5	0	1	0	1	0	1	0	1
67	N116	max	.258	1	49.178	7	-.052	1	0	1	.002	3	.153	2
68		min	-32.178	2	26.739	1	-63.566	4	-.217	4	-.012	2	0	1
69	N117	max	.031	1	46.9	5	-.032	1	0	1	.001	3	.173	2
70		min	-37.184	2	26.498	1	-66.603	4	-.231	4	-.013	2	0	1
71	N118	max	3.236	3	52.78	5	.042	1	0	1	.004	3	.154	2
72		min	-30.182	2	26.37	1	-74.221	4	-.261	6	-.01	2	0	1
73	N2	max	0	1	-155.533	1	0	1	0	1	0	1	0	1
74		min	0	1	-3607.697	6	0	1	0	1	0	1	0	1
75	N139	max	9.005	9	4739.731	6	0	1	0	1	0	1	0	1
76		min	-342.917	6	411.099	1	0	1	0	1	0	1	0	1
77	N140	max	-14.115	1	258.77	6	0	1	0	1	0	1	0	1
78		min	-316.745	7	70.477	1	0	1	0	1	0	1	0	1
79	N138	max	1156.227	9	86.928	1	0	1	0	1	0	1	0	1
80		min	44.287	1	-778.096	7	0	1	0	1	0	1	0	1
81	Totals:	max	2541.985	9	5083.97	6	2541.987	7						
82		min	-2541.985	6	5083.97	7	-2541.983	8						

Envelope Joint Displacements

	Joint		X [in]	lc	Y [in]	lc	Z [in]	lc	X Rotation ...	lc	Y Rotation ...	lc	Z Rotation ...	lc
1	N1	max	0	1	0	1	0	1	0	1	0	8	0	8
2		min	0	1	0	1	0	1	0	7	0	1	0	1
3	N2	max	.005	1	0	6	0	1	-2.665e-5	1	1.768e-4	8	2.017e-4	8
4		min	-.024	8	0	1	-.258	7	-1.277e-3	7	-2.249e-6	1	-9.412e-5	1
5	N4	max	.005	1	.004	7	0	1	-2.99e-5	1	2.121e-4	8	2.418e-4	8
6		min	-.023	8	0	1	-.249	7	-1.515e-3	7	-1.851e-6	1	-1.138e-4	1
7	N5	max	.004	1	.004	7	0	1	-3.01e-5	1	2.476e-4	8	2.761e-4	8
8		min	-.022	8	0	1	-.239	7	-1.694e-3	7	-2.512e-7	1	-1.322e-4	1
9	N6	max	.004	1	0	7	0	1	-2.789e-5	1	2.869e-4	8	3.065e-4	8
10		min	-.02	8	0	1	-.229	7	-1.828e-3	7	1.295e-6	1	-1.488e-4	1
11	N7	max	.003	1	0	1	0	1	-2.435e-5	1	3.317e-4	8	3.368e-4	8
12		min	-.019	8	-.006	8	-.221	7	-1.937e-3	7	1.56e-6	1	-1.643e-4	1
13	N8	max	.002	1	0	1	0	1	-1.549e-5	1	4.388e-4	8	4.081e-4	8
14		min	-.016	8	-.025	8	-.204	7	-2.171e-3	7	1.534e-7	1	-1.991e-4	1
15	N10	max	.001	1	0	1	0	1	-1.121e-5	1	4.835e-4	8	4.368e-4	8
16		min	-.014	8	-.032	8	-.195	7	-2.266e-3	7	4.191e-7	1	-2.146e-4	1
17	N11	max	0	1	0	1	0	1	-5.42e-6	1	5.227e-4	8	4.644e-4	8
18		min	-.012	8	-.034	8	-.183	7	-2.337e-3	7	1.965e-6	1	-2.312e-4	1
19	N12	max	0	1	0	1	0	1	3.223e-6	1	5.573e-4	8	4.951e-4	9
20		min	-.009	8	-.032	8	-.171	7	-2.362e-3	9	3.565e-6	1	-2.496e-4	1
21	N13	max	0	1	0	1	0	1	1.568e-5	1	5.908e-4	8	5.307e-4	9
22		min	-.007	8	-.025	8	-.162	7	-2.329e-3	8	3.962e-6	1	-2.693e-4	1
23	N14	max	.036	8	.024	8	0	1	2.609e-4	1	8.789e-4	7	1.138e-3	8

Company : DMJM H&N
Designer : Kevin M. Jones - DMJMH&N
Job Number : 145579-V-CA-005 DBVS Off-Gas Treatment Duct Analysis

Mar 25, 2006
12:05 PM
Checked By:_____

Envelope Joint Displacements (Continued)

	Joint		X [in]	lc	Y [in]	lc	Z [in]	lc	X Rotation ...	lc	Y Rotation ...	lc	Z Rotation ...	lc
24		min	0	1	-.009	1	-.038	7	1.954e-4	8	-1.008e-6	1	-5.891e-4	1
25	N16	max	.037	6	.022	8	0	1	2.628e-4	1	8.906e-4	7	1.172e-3	8
26		min	0	1	-.01	1	-.029	7	2.274e-4	8	-1.055e-6	1	-6.091e-4	1
27	N17	max	.034	6	.019	8	0	1	2.649e-4	1	9.004e-4	7	1.195e-3	8
28		min	0	1	-.009	1	-.02	7	2.44e-4	8	-1.073e-6	1	-6.283e-4	1
29	N18	max	.029	6	.015	8	0	1	2.682e-4	7	9.082e-4	7	1.204e-3	8
30		min	0	1	-.008	1	-.013	7	2.502e-4	8	-1.069e-6	1	-6.464e-4	1
31	N19	max	.021	7	.01	8	0	1	2.687e-4	7	9.14e-4	7	1.198e-3	8
32		min	0	1	-.006	1	-.008	7	2.504e-4	8	-1.053e-6	1	-6.643e-4	1
33	N20	max	0	1	0	6	0	8	2.64e-4	7	9.204e-4	9	1.112e-3	8
34		min	0	8	0	1	0	9	2.45e-4	8	-1.006e-6	1	-7.127e-4	1
35	N21	max	1.2	7	0	8	0	8	1.876e-4	7	4.22e-4	9	-1.155e-4	8
36		min	0	1	0	1	0	7	1.554e-4	8	-3.06e-5	6	-5.275e-4	1
37	N22	max	.854	7	0	1	0	6	1.111e-4	7	6.1e-8	1	1.501e-4	1
38		min	0	1	0	8	0	9	6.576e-5	8	-1.877e-4	9	3.934e-5	8
39	N23	max	.551	7	0	8	0	8	3.142e-5	7	3.217e-4	9	-1.541e-5	9
40		min	0	1	0	1	0	1	-2.758e-5	8	-1.537e-8	1	-4.393e-5	1
41	N24	max	.205	7	0	8	0	1	-4.506e-5	7	0	1	4.396e-6	1
42		min	0	1	0	7	0	9	-1.172e-4	8	-1.115e-3	8	-2.488e-6	7
43	N25	max	.068	7	-.003	7	0	1	-7.539e-5	7	0	1	1.331e-4	8
44		min	0	1	-.004	8	-.078	9	-1.527e-4	8	-1.475e-3	7	4.464e-5	7
45	N27	max	.058	7	-.003	7	0	1	-7.709e-5	7	0	1	1.411e-4	8
46		min	0	1	-.005	8	-.08	9	-1.553e-4	8	-1.473e-3	7	4.164e-5	7
47	N28	max	.048	7	-.003	7	0	1	-7.843e-5	7	0	1	1.505e-4	8
48		min	0	1	-.005	8	-.078	9	-1.582e-4	8	-1.464e-3	7	3.844e-5	7
49	N29	max	.039	7	-.002	7	0	1	-7.957e-5	7	0	1	1.613e-4	8
50		min	0	1	-.005	8	-.072	9	-1.604e-4	8	-1.445e-3	7	3.491e-5	7
51	N30	max	.033	7	-.002	7	0	1	-8.073e-5	7	0	1	1.731e-4	8
52		min	0	1	-.004	8	-.065	7	-1.612e-4	8	-1.416e-3	7	3.105e-5	7
53	N31	max	0	7	0	7	0	8	-7.538e-5	7	0	1	2.654e-4	8
54		min	0	8	0	8	0	1	-1.259e-4	8	-8.764e-4	7	7.791e-7	7
55	N32	max	0	1	0	8	-.025	1	1.994e-4	8	3.875e-4	7	5.731e-4	8
56		min	0	3	0	7	-2.664	9	1.816e-4	7	-1.364e-5	8	-1.001e-4	7
57	N33	max	0	7	0	1	-.025	1	-1.634e-4	7	6.84e-5	9	1.332e-3	8
58		min	0	8	0	6	-2.13	9	-1.665e-4	8	-1.403e-4	6	-3.491e-4	7
59	N34	max	0	2	0	6	-.025	1	-1.47e-7	1	9.19e-6	6	1.783e-3	8
60		min	0	3	0	1	-1.813	9	-3.759e-6	6	-2.181e-6	9	-4.971e-4	7
61	N35	max	0	7	0	1	-.025	1	3.165e-5	6	2.089e-5	7	2.071e-3	8
62		min	0	8	0	6	-1.611	9	1.843e-5	1	7.305e-7	1	-5.913e-4	7
63	N36	max	0	6	0	6	-.025	1	-1.885e-5	1	-3.174e-6	1	2.46e-3	8
64		min	0	9	0	1	-1.337	9	-7.701e-5	6	-7.516e-5	7	-7.192e-4	7
65	N37	max	0	9	0	1	-.025	1	1.84e-4	6	2.6e-4	9	2.706e-3	8
66		min	0	1	0	6	-1.164	9	-7.378e-6	1	1.044e-5	1	-7.999e-4	7
67	N38	max	0	1	0	6	-.025	1	4.968e-5	1	-4.046e-5	1	2.953e-3	8
68		min	0	8	0	1	-.991	9	-6.92e-4	6	-1.018e-3	9	-8.806e-4	7
69	N41	max	0	1	.012	6	-.025	1	7.975e-5	1	-6.329e-5	1	2.998e-3	8
70		min	-.018	9	0	1	-.959	9	-1.039e-3	6	-1.661e-3	9	-8.954e-4	7
71	N42	max	0	1	.019	6	-.025	1	8.244e-5	1	-6.696e-5	1	2.997e-3	8
72		min	-.017	9	-.002	1	-.952	9	-1.095e-3	6	-1.776e-3	9	-9.048e-4	7
73	N43	max	.09	6	.244	6	-.017	1	-8.88e-5	1	-1.321e-4	1	9.553e-5	8
74		min	-.07	9	-.015	1	-.572	7	-4.09e-3	7	-3.539e-3	9	-4.097e-4	7
75	N45	max	.093	6	.242	6	-.016	1	-1.079e-5	8	-1.313e-4	1	5.989e-6	1
76		min	-.073	9	-.014	1	-.555	7	-4.23e-3	7	-3.489e-3	9	-4.019e-4	6
77	N46	max	.095	6	.237	6	-.016	1	1.32e-4	8	-1.305e-4	1	1.459e-5	1
78		min	-.076	9	-.014	1	-.535	7	-4.366e-3	7	-3.424e-3	9	-6.306e-4	6
79	N47	max	.095	6	.229	6	-.015	1	2.747e-4	8	-1.294e-4	1	2.264e-5	1
80		min	-.077	9	-.014	1	-.515	7	-4.488e-3	7	-3.348e-3	9	-8.51e-4	6

Envelope Joint Displacements (Continued)

	Joint		X [in]	Ic	Y [in]	Ic	Z [in]	Ic	X Rotation ...	Ic	Y Rotation ...	Ic	Z Rotation ...	Ic
81	N48	max	.092	6	.22	6	-.015	1	4.127e-4	8	-1.278e-4	1	7.253e-5	9
82		min	-.077	9	-.014	1	-.496	7	-4.593e-3	7	-3.267e-3	9	-1.057e-3	6
83	N49	max	-.001	1	.062	6	-.005	1	5.461e-4	8	-9.595e-5	1	6.455e-4	9
84		min	-.047	9	-.05	9	-.183	7	-4.017e-3	7	-1.746e-3	9	-1.909e-3	6
85	N51	max	0	1	.053	6	-.004	1	4.156e-4	8	-9.463e-5	1	6.412e-4	9
86		min	-.05	8	-.057	9	-.168	7	-3.851e-3	7	-1.672e-3	9	-1.793e-3	6
87	N52	max	0	1	.043	6	-.004	1	2.732e-4	8	-9.39e-5	1	6.364e-4	9
88		min	-.051	8	-.058	9	-.151	7	-3.667e-3	7	-1.609e-3	9	-1.667e-3	6
89	N53	max	0	1	.035	6	-.003	1	1.266e-4	8	-9.318e-5	1	6.386e-4	9
90		min	-.049	8	-.054	9	-.136	7	-3.461e-3	7	-1.549e-3	9	-1.537e-3	6
91	N54	max	0	1	.03	6	-.003	1	-1.493e-5	8	-9.183e-5	1	6.504e-4	9
92		min	-.044	8	-.046	9	-.124	7	-3.237e-3	7	-1.478e-3	9	-1.409e-3	6
93	N55	max	.011	6	.021	8	0	1	-5.38e-5	1	1.994e-4	6	7.496e-4	9
94		min	-.006	9	-.001	1	-.049	7	-1.159e-3	7	-4.757e-4	9	-7.26e-4	6
95	N56	max	.003	6	.005	8	0	1	4.537e-5	1	3.233e-4	6	7.496e-4	9
96		min	0	9	0	1	-.072	7	-5.294e-4	8	-1.083e-4	9	-7.26e-4	6
97	N57	max	0	6	0	8	0	1	0	1	0	6	7.496e-4	9
98		min	0	1	0	1	-.087	7	0	8	0	9	-7.26e-4	6
99	N58	max	0	1	0	1	0	1	0	1	0	6	7.496e-4	9
100		min	0	6	0	8	-.087	7	0	8	0	1	-7.26e-4	6
101	N59	max	0	7	0	1	0	1	-5.586e-6	1	2.793e-6	8	7.496e-4	9
102		min	0	8	0	8	-.113	7	-5.586e-6	8	-2.793e-6	7	-7.26e-4	6
103	N60	max	.013	6	.03	8	0	1	-5.276e-5	1	1.166e-4	6	6.681e-4	9
104		min	-.01	9	0	1	-.038	7	-1.086e-3	7	-3.323e-4	9	-6.14e-4	6
105	N61	max	0	1	.034	2	.017	8	1.244e-3	8	2.382e-4	8	8.616e-4	2
106		min	-.738	8	.002	1	-.003	7	-3.369e-4	7	-1.162e-4	7	-9.962e-5	3
107	N62	max	.013	6	.032	8	0	1	-5.058e-5	1	8.711e-5	6	6.38e-4	9
108		min	-.01	9	0	1	-.034	7	-1.077e-3	7	-3.052e-4	9	-5.75e-4	6
109	N63	max	.012	6	.032	8	0	1	-4.741e-5	1	5.32e-5	6	6.038e-4	9
110		min	-.01	9	0	1	-.029	7	-1.07e-3	7	-2.852e-4	9	-5.361e-4	6
111	N64	max	.01	6	.031	9	0	1	-4.342e-5	1	1.638e-5	6	5.649e-4	9
112		min	-.009	9	0	1	-.024	7	-1.058e-3	7	-2.721e-4	9	-5.003e-4	6
113	N65	max	.009	6	.028	7	0	1	-3.894e-5	1	-2.013e-5	6	5.189e-4	9
114		min	-.007	9	0	1	-.019	7	-1.034e-3	7	-2.663e-4	9	-4.688e-4	6
115	N66	max	0	6	0	1	0	8	0	1	0	1	0	9
116		min	0	1	0	6	0	7	0	7	0	7	0	6
117	N67	max	-.005	1	.092	6	-.002	1	-1.05e-4	1	1.217e-4	9	1.42e-3	6
118		min	-.048	9	-.004	1	-.265	7	-8.261e-4	7	-6.2e-4	6	-5.69e-5	1
119	N68	max	-.005	1	.085	6	-.002	1	-2.273e-5	8	4.953e-4	9	1.803e-3	6
120		min	-.056	9	-.004	1	-.268	7	-3.547e-4	7	-2.463e-4	6	-6.323e-5	1
121	N69	max	.025	7	.002	7	.067	8	4.749e-5	1	1.376e-3	7	1.464e-4	7
122		min	-.036	8	0	1	-.028	7	-1.061e-4	7	-2.338e-3	8	-1.686e-5	1
123	N70	max	-.004	1	.063	6	0	1	8.224e-4	8	1.311e-3	9	2.222e-3	6
124		min	-.064	9	-.003	1	-.264	7	-1.091e-4	1	1.424e-4	1	-6.97e-5	1
125	N71	max	0	7	0	6	.055	8	1.369e-5	1	1.17e-3	7	2.671e-4	7
126		min	0	8	0	1	-.043	7	-1.053e-4	7	-1.542e-3	8	-1.978e-5	1
127	N72	max	-.004	1	.056	6	0	1	1.079e-3	6	1.577e-3	9	2.246e-3	6
128		min	-.066	9	-.003	1	-.26	7	-1.095e-4	1	1.472e-4	1	-7.05e-5	1
129	N73	max	.021	7	.002	7	.067	8	4.463e-5	1	1.447e-3	7	1.672e-4	7
130		min	-.029	8	0	1	-.031	7	-1.064e-4	7	-2.252e-3	8	-1.705e-5	1
131	N74	max	-.004	1	.048	6	0	1	1.301e-3	6	1.83e-3	9	2.224e-3	6
132		min	-.063	9	-.003	1	-.256	7	-1.094e-4	1	1.513e-4	1	-7.067e-5	1
133	N75	max	0	8	0	6	0	1	1.113e-4	7	5.142e-4	8	8.336e-4	6
134		min	0	7	0	1	-.106	7	-7.06e-6	1	-2.019e-4	7	-3.47e-5	1
135	N76	max	-.004	1	.042	6	0	1	1.466e-3	6	2.045e-3	9	2.197e-3	6
136		min	-.058	9	-.002	1	-.252	7	-1.085e-4	1	1.538e-4	1	-7.034e-5	1
137	N77	max	.026	7	.002	7	.064	8	4.983e-5	1	1.27e-3	7	1.278e-4	7

Envelope Joint Displacements (Continued)

	Joint		X [in]	lc	Y [in]	lc	Z [in]	lc	X Rotation ...	lc	Y Rotation ...	lc	Z Rotation ...	lc
138		min	-.043	8	0	1	-.023	7	-1.046e-4	7	-2.394e-3	8	-1.733e-5	1
139	N78	max	.025	7	.001	7	.057	8	5.197e-5	1	1.149e-3	7	1.115e-4	7
140		min	-.048	8	0	1	-.019	7	-1.042e-4	7	-2.42e-3	8	-1.827e-5	1
141	N79	max	.005	7	0	1	0	8	6.854e-5	1	4.363e-4	7	1.066e-5	7
142		min	-.068	8	0	8	0	1	-1.112e-4	7	-1.652e-3	8	-3.426e-5	1
143	N80	max	0	1	0	1	0	6	1.224e-4	1	6.913e-4	8	2.179e-4	1
144		min	-.136	8	0	7	0	9	-1.338e-4	7	-2.584e-4	7	2.055e-4	9
145	N81	max	0	1	0	2	0	4	4.038e-4	8	7.118e-5	7	-5.925e-5	3
146		min	-.289	8	0	1	0	5	-1.854e-4	7	-1.861e-4	8	-8.85e-5	2
147	N82	max	0	1	0	1	0	4	7.078e-4	8	1.444e-4	8	3.627e-4	2
148		min	-.451	8	0	2	0	5	-2.402e-4	7	-1.289e-4	7	2.365e-4	1
149	N83	max	0	1	0	2	0	4	1.048e-3	8	2.148e-4	5	-4.05e-4	1
150		min	-.633	8	0	3	0	5	-3.015e-4	7	-1.521e-4	4	-9.088e-4	2
151	N84	max	.84	7	0	8	0	1	1.079e-4	7	5.275e-8	1	1.536e-4	1
152		min	0	1	0	1	-.001	9	6.203e-5	8	-1.942e-4	9	5.78e-5	8
153	N84A	max	.003	6	.014	9	0	1	-2.115e-5	1	-1.865e-5	1	2.333e-4	9
154		min	-.001	9	0	1	-.006	7	-7.861e-4	7	-2.856e-4	7	-3.502e-4	6
155	N85	max	.813	7	-.001	8	0	1	1.021e-4	7	3.877e-8	1	1.479e-4	1
156		min	0	1	-.003	1	-.003	9	5.518e-5	8	-1.955e-4	9	7.742e-5	8
157	N85A	max	.002	1	0	1	0	8	1.256e-3	8	3.647e-4	8	1.175e-3	2
158		min	-.751	8	0	7	0	7	-3.203e-4	7	-2.516e-4	7	8.076e-5	3
159	N86	max	.765	7	-.003	8	0	1	9.144e-5	7	1.706e-8	1	1.061e-4	1
160		min	0	1	-.005	1	-.007	9	4.274e-5	8	-1.669e-4	9	7.494e-5	9
161	N86A	max	.002	1	-.005	3	.008	8	1.222e-3	8	1.333e-4	8	8.768e-4	2
162		min	-.773	8	-.029	2	-.011	7	-2.972e-4	7	-4.567e-4	7	2.288e-4	3
163	N87	max	0	1	0	8	.014	8	-6.966e-5	7	0	1	2.859e-4	8
164		min	-.005	7	0	7	0	1	-1.098e-4	8	-7.003e-4	7	-5.949e-6	7
165	N87A	max	.002	1	0	3	.001	8	1.249e-3	8	3.842e-4	8	1.151e-3	2
166		min	-.754	8	-.004	2	0	7	-3.085e-4	7	-2.659e-4	7	1.149e-4	3
167	N88	max	0	1	.002	8	-.025	1	-6.029e-5	7	0	1	3.236e-4	8
168		min	-.011	7	.001	7	-2.832	9	-8.344e-5	8	-4.142e-4	7	-1.828e-5	7
169	N88A	max	.003	1	-.008	9	.036	8	9.811e-4	8	3.539e-3	8	8.299e-4	2
170		min	-.739	8	-.023	6	0	1	1.243e-4	7	2.3e-5	1	-3.615e-5	3
171	N89	max	0	1	.003	8	-.025	1	-2.729e-5	8	5.816e-5	3	4.056e-4	8
172		min	-.014	7	.002	7	-2.774	9	-3.137e-5	7	0	1	-4.519e-5	7
173	N89A	max	.059	4	.006	3	.126	8	-1.08e-4	2	3.957e-3	2	5.123e-4	1
174		min	-.001	1	.003	2	0	1	-3.447e-4	1	-1.067e-4	1	-2.282e-3	4
175	N90	max	0	1	0	7	.117	8	-4.053e-4	2	5.552e-3	8	5.005e-4	1
176		min	0	3	0	1	0	1	-5.759e-4	3	-8.907e-5	1	-1.994e-3	4
177	N92	max	0	2	0	1	0	4	0	4	0	2	0	1
178		min	0	3	0	7	0	1	0	1	0	3	0	2
179	N93	max	.082	2	.052	8	.206	4	3.413e-3	2	3.297e-4	2	1.747e-4	1
180		min	-.005	1	0	1	-.004	1	-1.489e-4	1	-4.558e-4	3	-2.408e-3	4
181	N94	max	.085	2	.052	8	.21	4	3.323e-3	4	3.341e-4	2	1.786e-4	1
182		min	-.006	1	0	1	-.004	1	-1.536e-4	1	-4.65e-4	3	-2.448e-3	4
183	N95	max	.088	2	.054	5	.212	4	3.229e-3	4	3.363e-4	2	1.831e-4	1
184		min	-.006	1	0	1	-.004	1	-1.586e-4	1	-4.746e-4	3	-2.484e-3	4
185	N96	max	.09	2	.055	5	.213	4	3.13e-3	4	3.401e-4	2	1.884e-4	1
186		min	-.006	1	0	1	-.004	1	-1.638e-4	1	-4.815e-4	3	-2.516e-3	4
187	N97	max	.091	2	.055	5	.213	4	3.028e-3	4	3.495e-4	2	1.943e-4	1
188		min	-.006	1	0	1	-.004	1	-1.689e-4	1	-4.826e-4	3	-2.543e-3	4
189	N97A	max	.002	1	.001	2	.001	7	9.843e-4	8	3.027e-4	7	-2.936e-4	9
190		min	-.899	8	0	3	0	1	2.637e-5	7	-1.537e-5	1	-5.957e-4	6
191	N98	max	.002	1	0	3	0	6	9.785e-4	8	2.934e-4	7	-3.248e-4	9
192		min	-.897	8	0	2	0	9	5.915e-6	7	-1.575e-5	1	-6.347e-4	6
193	N99	max	.002	1	.004	7	.034	8	8.086e-4	8	4.426e-3	8	-2.01e-4	1
194		min	-.872	8	-.008	8	0	1	3.37e-4	7	-2.164e-5	1	-8.874e-4	6

Envelope Joint Displacements (Continued)

	Joint		X [in]	lc	Y [in]	lc	Z [in]	lc	X Rotation ...	lc	Y Rotation ...	lc	Z Rotation ...	lc
195	N100	max	0	1	0	7	.11	8	-7.752e-5	2	7.32e-3	8	-5.784e-5	1
196		min	0	3	0	1	0	1	-4.325e-4	3	1.788e-8	1	-3.161e-3	2
197	N101	max	.161	2	.003	3	.134	8	7.655e-4	2	3.399e-3	2	-1.199e-5	1
198		min	0	1	-.009	2	0	1	7.282e-5	1	1.413e-5	1	-3.897e-3	2
199	N103	max	.002	1	-.009	7	.045	8	7.691e-4	8	5.535e-3	8	8.191e-5	1
200		min	-.987	8	-.011	8	0	1	5.717e-4	7	-6.475e-6	1	-4.499e-4	8
201	N104	max	.002	1	0	6	0	6	9.575e-4	8	8.676e-4	4	5.018e-5	7
202		min	-1.027	8	0	9	0	9	5.682e-4	7	5.128e-6	1	-1.74e-4	8
203	N106	max	0	1	0	5	.121	8	-1.698e-4	2	8.101e-3	8	9.982e-5	1
204		min	0	3	0	1	0	1	-3.936e-4	3	-2.413e-5	1	-3.075e-3	2
205	N107	max	.177	2	.002	1	.145	8	8.532e-4	2	3.679e-3	2	1.056e-4	1
206		min	0	1	-.009	2	0	1	3.e-5	1	-1.871e-5	1	-3.961e-3	2
207	N109	max	.002	1	0	3	.003	4	9.65e-4	8	9.93e-4	4	8.73e-5	7
208		min	-1.029	8	0	2	0	1	5.85e-4	7	4.813e-6	1	-1.341e-4	8
209	N109A	max	.002	1	.007	2	.006	7	1.01e-3	8	1.425e-4	2	-1.749e-4	9
210		min	-.909	8	.002	3	0	1	7.68e-5	7	-1.32e-5	1	-4.401e-4	6
211	N110	max	.002	1	-.003	3	.017	4	1.01e-3	8	8.129e-4	4	2.449e-4	7
212		min	-1.037	8	-.005	2	0	1	6.347e-4	7	5.309e-6	1	3.444e-5	8
213	N111	max	.002	1	.02	2	.072	8	9.656e-4	3	6.882e-3	8	-8.951e-4	1
214		min	-1.151	8	.009	1	0	1	6.959e-4	1	-2.894e-5	1	-1.903e-3	2
215	N112	max	.002	1	0	4	0	6	9.477e-4	3	4.914e-3	5	-1.016e-3	1
216		min	-1.157	8	0	1	0	9	6.515e-4	1	-2.255e-5	1	-1.798e-3	2
217	N113	max	0	1	0	5	.157	8	-9.725e-5	2	7.747e-3	4	-3.569e-4	1
218		min	0	3	0	1	0	1	-3.563e-4	3	3.003e-5	1	-3.904e-3	2
219	N114	max	.171	2	0	3	.181	8	9.404e-4	2	3.522e-3	2	-2.047e-4	1
220		min	.001	1	-.011	2	0	1	1.452e-4	1	6.133e-5	1	-4.47e-3	2
221	N116	max	0	2	0	1	0	4	0	4	0	2	0	1
222		min	0	1	0	7	0	1	0	1	0	3	0	2
223	N117	max	0	2	0	1	0	4	0	4	0	2	0	1
224		min	0	1	0	5	0	1	0	1	0	3	0	2
225	N118	max	0	2	0	1	0	4	0	6	0	2	0	1
226		min	0	3	0	5	0	1	0	1	0	3	0	2
227	N120	max	.174	2	.052	8	.193	2	3.343e-3	2	8.147e-4	2	-3.013e-5	1
228		min	0	1	0	1	0	1	3.52e-6	1	-1.406e-4	3	-4.247e-3	2
229	N121	max	.179	2	.053	3	.196	2	3.264e-3	2	8.276e-4	2	-3.131e-5	1
230		min	0	1	0	1	0	1	3.502e-6	1	-1.444e-4	3	-4.271e-3	2
231	N122	max	.183	2	.053	3	.199	2	3.179e-3	2	8.377e-4	2	-3.242e-5	1
232		min	0	1	0	1	0	1	3.682e-6	1	-1.495e-4	3	-4.292e-3	2
233	N123	max	.186	2	.053	3	.199	2	3.089e-3	2	8.492e-4	2	-3.336e-5	1
234		min	0	1	0	1	0	1	4.176e-6	1	-1.518e-4	3	-4.307e-3	2
235	N124	max	.187	2	.052	3	.199	2	2.994e-3	2	8.67e-4	2	-3.404e-5	1
236		min	0	1	0	1	0	1	5.014e-6	1	-1.473e-4	3	-4.317e-3	2
237	N126	max	.192	2	.052	4	.203	2	3.579e-3	2	8.429e-4	2	2.892e-5	1
238		min	0	1	0	1	0	1	-1.329e-5	1	-8.227e-5	3	-4.569e-3	2
239	N127	max	.198	2	.052	3	.207	2	3.499e-3	2	8.559e-4	2	2.941e-5	1
240		min	-.001	1	0	1	0	1	-1.359e-5	1	-8.527e-5	3	-4.586e-3	2
241	N128	max	.202	2	.053	3	.21	2	3.413e-3	2	8.66e-4	2	3.007e-5	1
242		min	-.001	1	0	1	0	1	-1.379e-5	1	-8.969e-5	3	-4.599e-3	2
243	N129	max	.205	2	.053	3	.211	2	3.32e-3	2	8.776e-4	2	3.102e-5	1
244		min	-.001	1	0	1	0	1	-1.379e-5	1	-9.114e-5	3	-4.606e-3	2
245	N130	max	.206	2	.052	3	.21	2	3.223e-3	2	8.963e-4	2	3.228e-5	1
246		min	-.001	1	0	1	0	1	-1.352e-5	1	-8.513e-5	3	-4.607e-3	2
247	N131	max	.005	1	0	1	0	1	-1.672e-5	1	1.067e-4	8	1.213e-4	8
248		min	-.025	8	-.007	7	-.274	7	-7.689e-4	7	-1.353e-6	1	-5.661e-5	1
249	N132	max	.182	2	.052	4	.232	2	4.03e-3	2	6.964e-4	2	-1.138e-4	1
250		min	.003	1	0	1	.001	1	4.079e-5	1	-2.707e-4	3	-4.568e-3	2
251	N132A	max	0	1	.004	1	.006	9	2.609e-4	7	9.21e-4	9	1.019e-3	8

Company : DMJM H&N
Designer : Kevin M. Jones - DMJMH&N
Job Number : 145579-V-CA-005 DBVS Off-Gas Treatment Duct Analysis

Mar 25, 2006
12:05 PM
Checked By:_____

Envelope Joint Displacements (Continued)

	Joint		X [in]	lc	Y [in]	lc	Z [in]	lc	X Rotation ...	lc	Y Rotation ...	lc	Z Rotation ...	lc
252		min	-.014	8	-.006	8	0	1	2.412e-4	8	-9.736e-7	1	-7.477e-4	1
253	N133	max	.187	2	.053	5	.236	2	3.935e-3	2	7.07e-4	2	-1.174e-4	1
254		min	.003	1	0	1	.001	1	4.172e-5	1	-2.77e-4	3	-4.603e-3	2
255	N134	max	.191	2	.053	5	.239	2	3.834e-3	2	7.15e-4	2	-1.21e-4	1
256		min	.003	1	0	1	.001	1	4.302e-5	1	-2.844e-4	3	-4.635e-3	2
257	N135	max	.195	2	.053	5	.24	2	3.727e-3	2	7.249e-4	2	-1.247e-4	1
258		min	.003	1	0	1	.001	1	4.48e-5	1	-2.884e-4	3	-4.661e-3	2
259	N136	max	.196	2	.053	5	.24	2	3.614e-3	2	7.419e-4	2	-1.283e-4	1
260		min	.003	1	0	1	.001	1	4.702e-5	1	-2.847e-4	3	-4.68e-3	2
261	N137	max	1.505	7	.016	8	0	1	2.55e-4	7	9.22e-4	9	8.466e-4	8
262		min	0	1	-.115	1	-.101	9	2.344e-4	8	-9.141e-7	1	-8.117e-4	1
263	N138	max	0	1	0	7	0	1	1.373e-3	6	1.865e-3	9	2.016e-3	6
264		min	0	9	0	1	-.232	7	-4.608e-5	1	1.06e-4	1	-6.563e-5	1
265	N139	max	0	6	0	1	0	1	8.297e-5	1	6.944e-4	8	6.489e-4	8
266		min	0	9	0	6	-.135	7	-1.807e-3	8	2.474e-6	1	-3.316e-4	1
267	N140	max	0	7	0	1	0	1	1.063e-5	1	-2.782e-5	1	1.414e-3	6
268		min	0	1	0	6	-.166	7	-3.623e-4	6	-5.414e-4	9	-4.989e-5	1

Envelope Member Section Stresses

	Member	Sec		Axial[...	lc	y Shear[...	lc	z Shear[k...	lc	y-T...	lc	y-Bot[ksi]	lc	z-Top[ksi]	lc	z-Bot[ksi]	lc
1	M1	1	...	0	1	0	1	0	1	7.39	7	-.164	1	.013	1	1.027	8
2			...	0	1	0	1	0	1	.164	1	-7.39	7	-1.027	8	-.013	1
3		2	...	0	6	-.002	1	0	8	7.3...	7	-.164	1	.013	1	1.026	8
4			...	0	7	-.002	1	0	6	.164	1	-7.389	7	-1.026	8	-.013	1
5		3	...	0	6	-.003	1	.002	8	7.3...	7	-.162	1	.013	1	1.025	8
6			...	0	7	-.003	1	-.002	6	.162	1	-7.387	7	-1.025	8	-.013	1
7		4	...	.001	6	-.005	1	.003	8	7.3...	7	-.158	1	.013	1	1.023	8
8			...	-.001	7	-.005	1	-.003	6	.158	1	-7.383	7	-1.023	8	-.013	1
9		5	...	.002	6	-.007	1	.003	8	7.3...	7	-.153	1	.013	1	1.021	8
10			...	-.002	7	-.007	1	-.003	6	.153	1	-7.378	7	-1.021	8	-.013	1
11	M2	1	...	.156	6	-.077	1	.006	8	7.3...	7	-.133	1	.094	1	1.166	8
12			...	.008	1	-1.535	6	-.006	6	.133	1	-7.358	7	-1.166	8	-.094	1
13		2	...	.156	6	-.078	1	.006	8	6.9...	7	-.111	1	.094	1	1.165	8
14			...	.008	1	-1.536	6	-.006	6	.111	1	-6.927	7	-1.165	8	-.094	1
15		3	...	.156	6	-.078	1	.006	8	6.4...	7	-.089	1	.094	1	1.163	8
16			...	.008	1	-1.536	6	-.006	6	.089	1	-6.496	7	-1.163	8	-.094	1
17		4	...	.156	6	-.079	1	.007	8	6.0...	7	-.067	1	.094	1	1.161	8
18			...	.008	1	-1.537	6	-.007	6	.067	1	-6.065	7	-1.161	8	-.094	1
19		5	...	.156	6	-.08	1	.007	8	5.6...	7	-.044	1	.094	1	1.159	8
20			...	.008	1	-1.538	6	-.007	6	.044	1	-5.633	7	-1.159	8	-.094	1
21	M3	1	...	.439	6	-.067	1	.007	8	5.6...	7	-.044	1	.243	1	1.332	8
22			...	.023	1	-1.301	6	-.007	6	.044	1	-5.633	7	-1.332	8	-.243	1
23		2	...	.439	6	-.068	1	.007	8	5.2...	7	-.025	1	.243	1	1.33	8
24			...	.023	1	-1.301	6	-.007	6	.025	1	-5.266	7	-1.33	8	-.243	1
25		3	...	.439	6	-.068	1	.008	8	4.8...	7	-.006	1	.243	1	1.328	8
26			...	.023	1	-1.301	6	-.008	6	.006	1	-4.899	7	-1.328	8	-.243	1
27		4	...	.44	6	-.069	1	.008	8	4.5...	9	.014	1	.243	1	1.326	8
28			...	.023	1	-1.302	6	-.008	6	-.014	1	-4.533	9	-1.326	8	-.243	1
29		5	...	.44	6	-.069	1	.008	8	4.1...	9	.034	1	.243	1	1.323	8
30			...	.023	1	-1.302	6	-.008	6	-.034	1	-4.167	9	-1.323	8	-.243	1
31	M4	1	...	.656	6	-.046	1	.008	9	4.1...	9	.034	1	.355	1	1.294	8
32			...	.035	1	-.868	7	-.008	7	-.034	1	-4.167	9	-1.294	8	-.355	1
33		2	...	.656	6	-.047	1	.009	9	3.9...	9	.047	1	.355	1	1.292	8
34			...	.035	1	-.869	7	-.009	7	-.047	1	-3.921	9	-1.292	8	-.355	1
35		3	...	.656	6	-.047	1	.009	9	3.6...	9	.06	1	.355	1	1.289	8
36			...	.035	1	-.869	7	-.009	7	-.06	1	-3.675	9	-1.289	8	-.355	1

Company : **DMJM H&N**
Designer : **Kevin M. Jones - DMJMH&N**
Job Number : **145579-V-CA-005 DBVS Off-Gas Treatment Duct Analysis**

Mar 25, 2006
12:05 PM
Checked By:_____

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[...	lc	y Shear[..	lc	z Shear[k...	lc	y-T...	lc	y-Bot[ksi]	lc	z-Top[ksi]	lc	z-Bot[ksi]	lc
37		4	...	.657	6	-.047	1	.009	9	3.4...	9	.074	1	.355	1	1.287	8
38			...	.035	1	-.87	7	-.009	7	-.074	1	-3.429	9	-1.287	8	-.355	1
39		5	...	.657	6	-.048	1	.009	9	3.1...	9	.087	1	.355	1	1.284	8
40			...	.036	1	-.87	7	-.009	7	-.087	1	-3.182	9	-1.284	8	-.355	1
41	M5	1	...	.773	6	-.017	1	.009	9	3.1...	9	.087	1	.413	1	1.058	8
42			...	.042	1	-.312	7	-.009	6	-.087	1	-3.182	9	-1.058	8	-.413	1
43		2	...	.773	6	-.017	1	.01	9	3.0...	9	.092	1	.413	1	1.056	8
44			...	.042	1	-.313	7	-.01	6	-.092	1	-3.094	9	-1.056	8	-.413	1
45		3	...	.773	6	-.017	1	.01	9	3.0...	9	.097	1	.413	1	1.053	8
46			...	.043	1	-.313	7	-.01	6	-.097	1	-3.005	9	-1.053	8	-.413	1
47		4	...	.774	6	-.017	1	.01	9	2.9...	9	.102	1	.413	1	1.05	8
48			...	.043	1	-.313	7	-.01	6	-.102	1	-2.916	9	-1.05	8	-.413	1
49		5	...	.774	6	-.017	1	.011	9	2.8...	9	.106	1	.413	1	1.047	8
50			...	.043	1	-.314	7	-.011	6	-.106	1	-2.828	9	-1.047	8	-.413	1
51	M6	1	...	.788	6	.011	9	.011	9	.418	1	.871	8	.106	1	2.828	9
52			...	.044	1	-.011	6	-.011	6	-.871	8	-.418	1	-2.828	9	-.106	1
53		2	...	.789	6	.011	9	.011	9	.418	1	.864	8	.106	1	2.82	9
54			...	.045	1	-.011	6	-.011	6	-.864	8	-.418	1	-2.82	9	-.106	1
55		3	...	.79	6	.012	9	.012	9	.418	1	.856	8	.106	1	2.814	8
56			...	.046	1	-.012	6	-.012	6	-.856	8	-.418	1	-2.814	8	-.106	1
57		4	...	.79	6	.013	9	.013	9	.418	1	.848	8	.106	1	2.822	8
58			...	.046	1	-.013	6	-.013	6	-.848	8	-.418	1	-2.822	8	-.106	1
59		5	...	.791	6	.013	9	.013	9	.418	1	.839	8	.106	1	2.831	8
60			...	.047	1	-.013	6	-.013	6	-.839	8	-.418	1	-2.831	8	-.106	1
61	M7	1	...	.777	6	-.018	1	.013	9	2.8...	8	.106	1	.413	1	1.016	8
62			...	.046	1	-.318	7	-.013	7	-.106	1	-2.831	8	-1.016	8	-.413	1
63		2	...	.777	6	-.018	1	.014	9	2.7...	8	.112	1	.413	1	1.012	8
64			...	.046	1	-.318	7	-.014	7	-.112	1	-2.747	8	-1.012	8	-.413	1
65		3	...	.778	6	-.019	1	.014	9	2.6...	8	.117	1	.413	1	1.008	8
66			...	.047	1	-.318	7	-.014	7	-.117	1	-2.664	8	-1.008	8	-.413	1
67		4	...	.778	6	-.019	1	.014	9	2.58	8	.122	1	.413	1	1.004	8
68			...	.047	1	-.319	7	-.014	7	-.122	1	-2.58	8	-1.004	8	-.413	1
69		5	...	.778	6	-.019	1	.015	9	2.4...	8	.128	1	.413	1	1	8
70			...	.047	1	-.319	7	-.015	7	-.128	1	-2.497	8	-1	8	-.413	1
71	M8	1	...	.663	6	-.054	1	.015	9	2.4...	8	.128	1	.355	1	1.232	8
72			...	.04	1	-.881	7	-.015	7	-.128	1	-2.497	8	-1.232	8	-.355	1
73		2	...	.663	6	-.054	1	.015	9	2.2...	8	.143	1	.355	1	1.228	8
74			...	.04	1	-.881	7	-.015	7	-.143	1	-2.251	8	-1.228	8	-.355	1
75		3	...	.663	6	-.054	1	.015	9	2.0...	8	.158	1	.355	1	1.224	8
76			...	.041	1	-.882	7	-.015	7	-.158	1	-2.005	8	-1.224	8	-.355	1
77		4	...	.664	6	-.055	1	.016	9	1.7...	8	.174	1	.355	1	1.22	8
78			...	.041	1	-.882	7	-.016	7	-.174	1	-1.759	8	-1.22	8	-.355	1
79		5	...	.664	6	-.055	1	.016	9	1.5...	8	.189	1	.355	1	1.215	8
80			...	.041	1	-.883	7	-.016	7	-.189	1	-1.513	8	-1.215	8	-.355	1
81	M9	1	...	.447	6	-.082	1	.016	8	1.5...	8	.189	1	.243	1	1.261	8
82			...	.027	1	-1.311	6	-.016	6	-.189	1	-1.513	8	-1.261	8	-.243	1
83		2	...	.448	6	-.083	1	.016	8	1.1...	8	.213	1	.243	1	1.256	8
84			...	.028	1	-1.311	7	-.016	6	-.213	1	-1.142	8	-1.256	8	-.243	1
85		3	...	.448	6	-.083	1	.017	8	.771	8	.236	1	.243	1	1.256	6
86			...	.028	1	-1.312	7	-.017	6	-.236	1	-.771	8	-1.256	6	-.243	1
87		4	...	.448	6	-.084	1	.017	8	.4	8	.26	1	.243	1	1.261	6
88			...	.028	1	-1.313	7	-.017	6	-.26	1	-.4	8	-1.261	6	-.243	1
89		5	...	.449	6	-.084	1	.017	8	.028	8	.284	1	.243	1	1.265	6
90			...	.028	1	-1.313	7	-.017	6	-.284	1	-.028	8	-1.265	6	-.243	1
91	M10	1	...	.163	6	-.099	1	.017	8	.028	8	.284	1	.094	1	1.113	6
92			...	.01	1	-1.555	6	-.017	7	-.284	1	-.028	8	-1.113	6	-.094	1
93		2	...	.164	6	-.1	1	.017	8	-.312	1	.504	7	.094	1	1.118	6

Company : **DMJM H&N**
Designer : **Kevin M. Jones - DMJMH&N**
Job Number : **145579-V-CA-005 DBVS Off-Gas Treatment Duct Analysis**

Mar 25, 2006
12:05 PM
Checked By:_____

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[...	lc	y Shear[...	lc	z Shear[k...	lc	y-T...	lc	y-Bot[ksi]	lc	z-Top[ksi]	lc	z-Bot[ksi]	lc
94			...	.01	1	-1.556	6	-.017	7	-.504	7	.312	1	-1.118	6	-.094	1
95		3	...	.164	6	-.101	1	.018	8	-.341	1	.942	7	.094	1	1.123	6
96			...	.01	1	-1.557	6	-.018	7	-.942	7	.341	1	-1.123	6	-.094	1
97		4	...	.164	6	-.101	1	.018	8	-.369	1	1.381	7	.094	1	1.128	6
98			...	.01	1	-1.557	6	-.018	7	-1.3...	7	.369	1	-1.128	6	-.094	1
99		5	...	.164	6	-.102	1	.018	8	-.398	1	1.819	7	.094	1	1.133	6
100			...	.01	1	-1.558	6	-.018	7	-1.8...	7	.398	1	-1.133	6	-.094	1
101	M11	1	...	.009	6	-.104	1	.018	9	-.398	1	1.819	7	.013	1	.991	6
102			...	-.009	7	-1.592	6	-.018	7	-1.8...	7	.398	1	-.991	6	-.013	1
103		2	...	.01	6	-.106	1	.019	9	-.492	1	3.218	7	.013	1	1.008	6
104			...	-.01	7	-1.594	6	-.019	7	-3.2...	7	.492	1	-1.008	6	-.013	1
105		3	...	.01	6	-.108	1	.02	9	-.587	1	4.618	7	.013	1	1.025	6
106			...	-.01	7	-1.596	6	-.02	7	-4.6...	7	.587	1	-1.025	6	-.013	1
107		4	...	.011	6	-.11	1	.021	9	-.683	1	6.02	7	.013	1	1.044	6
108			...	-.011	7	-1.598	6	-.021	7	-6.02	7	.683	1	-1.044	6	-.013	1
109		5	...	.011	6	-.111	1	.022	9	-.782	1	7.439	6	.013	1	1.063	6
110			...	-.011	7	-1.599	6	-.022	7	-7.4...	6	.782	1	-1.063	6	-.013	1
111	M12	1	...	.03	8	.412	6	.102	8	.035	1	1.284	7	.669	6	.36	9
112			...	-.015	7	.034	1	0	1	-1.2...	7	-.035	1	-.36	9	-.669	6
113		2	...	.03	8	.411	6	.102	8	.045	1	1.168	7	.698	6	.348	9
114			...	-.016	7	.033	1	0	1	-1.1...	7	-.045	1	-.348	9	-.698	6
115		3	...	.03	8	.411	6	.102	8	.054	1	1.051	7	.726	6	.336	9
116			...	-.016	7	.033	1	0	1	-1.0...	7	-.054	1	-.336	9	-.726	6
117		4	...	.03	8	.41	6	.102	8	.063	1	.935	7	.754	6	.324	9
118			...	-.016	7	.032	1	0	1	-.935	7	-.063	1	-.324	9	-.754	6
119		5	...	.03	8	.409	6	.102	8	.072	1	.819	7	.782	6	.312	9
120			...	-.016	7	.032	1	0	1	-.819	7	-.072	1	-.312	9	-.782	6
121	M13	1	...	.048	8	.409	6	.077	4	.227	1	.98	7	.782	6	.312	9
122			...	-.008	7	.032	1	0	1	-.98	7	-.227	1	-.312	9	-.782	6
123		2	...	.048	8	.409	6	.077	4	.236	1	.865	7	.802	6	.298	9
124			...	-.008	7	.031	1	0	1	-.865	7	-.236	1	-.298	9	-.802	6
125		3	...	.048	8	.408	6	.077	4	.245	1	.749	7	.821	6	.283	9
126			...	-.008	7	.03	1	0	1	-.749	7	-.245	1	-.283	9	-.821	6
127		4	...	.048	8	.407	6	.077	4	.253	1	.633	7	.84	6	.268	9
128			...	-.008	7	.03	1	0	1	-.633	7	-.253	1	-.268	9	-.84	6
129		5	...	.048	8	.407	6	.077	4	.262	1	.518	7	.859	6	.253	9
130			...	-.008	7	.029	1	0	1	-.518	7	-.262	1	-.253	9	-.859	6
131	M14	1	...	.058	8	.407	6	.054	9	.38	1	.565	7	.859	6	.253	9
132			...	0	1	.029	1	0	1	-.565	7	-.38	1	-.253	9	-.859	6
133		2	...	.059	8	.406	6	.055	9	.388	1	.45	7	.867	6	.238	9
134			...	0	1	.028	1	0	1	-.45	7	-.388	1	-.238	9	-.867	6
135		3	...	.059	8	.406	6	.055	9	.396	1	.335	7	.874	6	.222	9
136			...	0	1	.028	1	0	1	-.335	7	-.396	1	-.222	9	-.874	6
137		4	...	.059	8	.405	6	.055	9	.404	1	.22	7	.881	6	.207	9
138			...	0	1	.027	1	0	1	-.22	7	-.404	1	-.207	9	-.881	6
139		5	...	.059	8	.404	6	.056	9	.411	1	.105	7	.888	6	.191	9
140			...	0	1	.027	1	0	1	-.105	7	-.411	1	-.191	9	-.888	6
141	M15	1	...	.06	8	.404	6	.048	9	.469	1	.103	6	.888	6	.191	9
142			...	0	1	.027	1	-.02	6	-.103	6	-.469	1	-.191	9	-.888	6
143		2	...	.061	8	.404	6	.049	9	.476	1	-.012	6	.882	6	.177	9
144			...	0	1	.026	1	-.021	6	.012	6	-.476	1	-.177	9	-.882	6
145		3	...	.061	8	.403	6	.049	9	.484	1	-.127	6	.876	6	.163	9
146			...	0	1	.025	1	-.021	6	.127	6	-.484	1	-.163	9	-.876	6
147		4	...	.061	8	.403	6	.049	9	.491	1	-.241	6	.87	6	.149	9
148			...	0	1	.025	1	-.021	6	.241	6	-.491	1	-.149	9	-.87	6
149		5	...	.061	8	.402	6	.05	9	.498	1	-.355	7	.864	6	.135	9
150			...	0	1	.024	1	-.022	6	.355	7	-.498	1	-.135	9	-.864	6

Company : **DMJM H&N**
Designer : **Kevin M. Jones - DMJMH&N**
Job Number : **145579-V-CA-005 DBVS Off-Gas Treatment Duct Analysis**

Mar 25, 2006
12:05 PM
Checked By:_____

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[...	Ic	y Shear[...	Ic	z Shear[k...	Ic	y-T...	Ic	y-Bot[ksi]	Ic	z-Top[ksi]	Ic	z-Bot[ksi]	Ic
151	M16	1	...	.058	8	.402	6	.043	9	.499	1	-.353	6	.864	6	.135	9
152			...	0	1	.024	1	-.043	8	.353	6	-.499	1	-.135	9	-.864	6
153		2	...	.058	8	.4	6	.044	9	.662	9	-.516	1	.833	6	.104	9
154			...	0	1	.023	1	-.044	8	.516	1	-.662	9	-.104	9	-.833	6
155		3	...	.059	8	.399	6	.045	9	.943	8	-.531	1	.802	6	.073	9
156			...	0	1	.021	1	-.045	8	.531	1	-.943	8	-.073	9	-.802	6
157		4	...	.059	8	.397	6	.045	9	1.2...	8	-.546	1	.77	6	.041	9
158			...	0	1	.02	1	-.045	8	.546	1	-1.223	8	-.041	9	-.77	6
159		5	...	.06	8	.396	6	.046	9	1.5...	8	-.559	1	.738	6	.009	9
160			...	0	1	.018	1	-.046	8	.559	1	-1.502	8	-.009	9	-.738	6
161	M17	1	...	.001	6	.004	3	.002	6	1.5...	8	-.559	1	.738	6	.009	9
162			...	-.001	8	.004	1	-.002	7	.559	1	-1.502	8	-.009	9	-.738	6
163		2	...	0	6	.003	3	.002	6	1.5...	8	-.561	1	.739	6	.01	9
164			...	0	8	.003	1	-.002	7	.561	1	-1.504	8	-.01	9	-.739	6
165		3	...	0	6	.002	3	.001	6	1.5...	8	-.562	1	.739	6	.01	9
166			...	0	8	.002	1	-.001	7	.562	1	-1.505	8	-.01	9	-.739	6
167		4	...	0	6	.001	3	0	6	1.5...	8	-.563	1	.74	6	.011	9
168			...	0	8	.001	1	0	7	.563	1	-1.506	8	-.011	9	-.74	6
169		5	...	0	1	0	1	0	1	1.5...	8	-.563	1	.74	6	.011	9
170			...	0	1	0	1	0	1	.563	1	-1.506	8	-.011	9	-.74	6
171	M18	1	...	.024	8	.082	1	.032	8	-.644	8	1.587	1	1.068	7	.339	8
172			...	-.024	6	.057	8	-.046	7	-1.5...	1	.644	8	-.339	8	-1.068	7
173		2	...	.03	8	.057	1	.02	8	-.13	8	.775	1	.613	9	.041	6
174			...	-.03	6	.032	8	-.033	7	-.775	1	.13	8	-.041	6	-.613	9
175		3	...	.037	8	.032	1	.007	8	.092	8	.257	1	.309	9	0	1
176			...	-.037	6	.006	8	-.021	7	-.257	1	-.092	8	0	1	-.309	9
177		4	...	.043	8	.007	1	0	1	.021	8	.031	1	.151	9	0	1
178			...	-.043	6	-.019	8	-.008	7	-.031	1	-.021	8	0	1	-.151	9
179		5	...	.049	8	-.018	1	.005	9	-.098	1	.343	8	.14	9	.035	6
180			...	-.049	6	-.044	8	-.019	6	-.343	8	.098	1	-.035	6	-.14	9
181	M19	1	...	.049	9	.05	8	.012	6	-.098	1	.343	8	.14	9	.035	6
182			...	-.049	6	.044	1	-.037	9	-.343	8	.098	1	-.035	6	-.14	9
183		2	...	.049	9	.049	8	.011	6	-.077	1	.319	8	.122	9	.03	6
184			...	-.049	6	.043	1	-.036	9	-.319	8	.077	1	-.03	6	-.122	9
185		3	...	.05	9	.048	8	.011	6	-.056	1	.295	8	.105	9	.025	6
186			...	-.05	6	.042	1	-.036	9	-.295	8	.056	1	-.025	6	-.105	9
187		4	...	.05	9	.047	8	.01	6	-.036	1	.272	8	.087	9	.02	6
188			...	-.05	6	.041	1	-.035	9	-.272	8	.036	1	-.02	6	-.087	9
189		5	...	.05	9	.046	8	.009	6	-.016	1	.249	8	.07	9	.015	6
190			...	-.05	6	.04	1	-.035	9	-.249	8	.016	1	-.015	6	-.07	9
191	M20	1	...	.075	9	.054	1	.095	8	-.433	8	.5	1	0	1	.878	8
192			...	-.075	6	.052	8	0	1	-.5	1	.433	8	-.878	8	0	1
193		2	...	.082	9	.028	1	.082	8	.023	9	.022	1	.162	9	0	1
194			...	-.082	6	.027	8	0	1	-.022	1	-.023	9	0	1	-.162	9
195		3	...	.088	9	.003	1	.07	8	.186	9	-.163	1	1.037	8	0	1
196			...	-.088	6	.001	8	0	1	.163	1	-.186	9	0	1	-1.037	8
197		4	...	.094	9	-.022	1	.077	9	.058	7	-.056	1	1.775	8	0	1
198			...	-.094	6	-.024	8	0	1	.056	1	-.058	7	0	1	-1.775	8
199		5	...	.1	9	-.047	1	.089	9	-.344	1	.366	8	2.632	9	0	1
200			...	-.1	6	-.049	8	0	1	-.366	8	.344	1	0	1	-2.632	9
201	M21	1	...	.1	9	.044	7	0	1	-.344	1	.366	8	2.632	9	0	1
202			...	-.1	7	.028	8	-.292	9	-.366	8	.344	1	0	1	-2.632	9
203		2	...	.103	9	.034	7	0	1	-.18	1	.258	8	1.559	7	0	1
204			...	-.103	7	.018	8	-.287	9	-.258	8	.18	1	0	1	-1.559	7
205		3	...	.105	9	.024	7	0	1	-.049	7	.195	8	1.025	7	.05	8
206			...	-.105	7	.009	8	-.282	9	-.195	8	.049	7	-.05	8	-1.025	7
207		4	...	.108	9	.014	7	0	1	.04	7	.179	8	.535	6	1.313	9

Company : **DMJM H&N**
Designer : **Kevin M. Jones - DMJMH&N**
Job Number : **145579-V-CA-005 DBVS Off-Gas Treatment Duct Analysis**

Mar 25, 2006
12:05 PM
Checked By:_____

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[...	Ic	y Shear[...	Ic	z Shear[k...	Ic	y-T...	Ic	y-Bot[ksi]	Ic	z-Top[ksi]	Ic	z-Bot[ksi]	Ic
208			...	-.108	7	-.001	8	-.277	9	-.179	8	-.04	7	-1.313	9	-.535	6
209		5	...	.11	9	.004	7	0	1	.082	7	.209	8	.05	6	2.583	9
210			...	-.11	7	-.011	8	-.276	8	-.209	8	-.082	7	-2.583	9	-.05	6
211	M22	1	...	.135	8	.004	7	0	1	.088	7	.196	8	.05	6	2.583	9
212			...	-.098	7	-.011	8	-.228	8	-.196	8	-.088	7	-2.583	9	-.05	6
213		2	...	.135	8	.003	7	0	1	.089	7	.199	8	.008	6	2.646	9
214			...	-.098	7	-.012	8	-.228	8	-.199	8	-.089	7	-2.646	9	-.008	6
215		3	...	.136	8	.003	7	0	1	.09	7	.203	8	0	1	2.709	9
216			...	-.099	7	-.013	8	-.228	8	-.203	8	-.09	7	-2.709	9	0	1
217		4	...	.136	8	.002	7	0	1	.09	7	.206	8	0	1	2.773	9
218			...	-.099	7	-.013	8	-.229	8	-.206	8	-.09	7	-2.773	9	0	1
219		5	...	.136	8	.002	7	0	1	.091	7	.21	8	0	1	2.836	9
220			...	-.099	7	-.014	8	-.229	8	-.21	8	-.091	7	-2.836	9	0	1
221	M23	1	...	.169	8	.002	7	0	1	.093	7	.161	8	0	1	2.836	9
222			...	-.064	7	-.014	8	-.214	6	-.161	8	-.093	7	-2.836	9	0	1
223		2	...	.17	8	.001	7	0	1	.093	7	.165	8	0	1	2.865	9
224			...	-.064	7	-.014	8	-.214	6	-.165	8	-.093	7	-2.865	9	0	1
225		3	...	.17	8	0	7	0	1	.093	7	.17	8	0	1	2.894	9
226			...	-.064	7	-.015	8	-.214	6	-.17	8	-.093	7	-2.894	9	0	1
227		4	...	.17	8	0	7	0	1	.093	7	.174	8	0	1	2.922	9
228			...	-.065	7	-.016	8	-.215	6	-.174	8	-.093	7	-2.922	9	0	1
229		5	...	.17	8	0	7	0	1	.093	7	.178	8	0	1	2.951	9
230			...	-.065	7	-.016	8	-.215	6	-.178	8	-.093	7	-2.951	9	0	1
231	M24	1	...	.178	8	0	7	.036	9	.081	7	.104	8	0	1	2.951	9
232			...	-.02	7	-.016	8	-.247	6	-.104	8	-.081	7	-2.951	9	0	1
233		2	...	.178	8	-.001	7	.036	9	.08	7	.108	8	0	1	2.941	9
234			...	-.02	7	-.017	8	-.247	6	-.108	8	-.08	7	-2.941	9	0	1
235		3	...	.178	8	-.002	7	.037	9	.08	7	.113	8	0	1	2.93	9
236			...	-.021	7	-.018	8	-.247	6	-.113	8	-.08	7	-2.93	9	0	1
237		4	...	.179	8	-.003	7	.037	9	.079	7	.118	8	0	1	2.92	9
238			...	-.021	7	-.018	8	-.248	6	-.118	8	-.079	7	-2.92	9	0	1
239		5	...	.179	8	-.003	7	.038	9	.078	7	.124	8	0	1	2.909	9
240			...	-.021	7	-.019	8	-.248	6	-.124	8	-.078	7	-2.909	9	0	1
241	M25	1	...	.159	8	-.003	7	.168	9	.054	7	.032	8	0	1	2.909	9
242			...	0	1	-.019	8	-.242	6	-.032	8	-.054	7	-2.909	9	0	1
243		2	...	.159	8	-.004	7	.168	9	.053	7	.037	8	0	1	2.861	9
244			...	0	1	-.019	8	-.242	6	-.037	8	-.053	7	-2.861	9	0	1
245		3	...	.16	8	-.004	7	.169	9	.052	7	.043	8	0	1	2.814	9
246			...	0	1	-.02	8	-.243	6	-.043	8	-.052	7	-2.814	9	0	1
247		4	...	.16	8	-.005	7	.169	9	.05	7	.048	8	0	1	2.766	9
248			...	0	1	-.021	8	-.243	6	-.048	8	-.05	7	-2.766	9	0	1
249		5	...	.16	8	-.006	7	.169	9	.049	7	.054	8	0	1	2.718	9
250			...	0	1	-.021	8	-.243	6	-.054	8	-.049	7	-2.718	9	0	1
251	M26	1	...	.141	8	-.006	7	.226	9	.033	7	.005	8	0	1	2.718	9
252			...	0	1	-.021	8	-.226	7	-.005	8	-.033	7	-2.718	9	0	1
253		2	...	.142	8	-.01	7	.228	9	.016	7	.057	8	0	1	2.222	9
254			...	0	1	-.026	8	-.228	7	-.057	8	-.016	7	-2.222	9	0	1
255		3	...	.143	8	-.015	7	.23	9	-.012	7	.118	8	0	1	1.918	7
256			...	0	1	-.031	8	-.23	7	-.118	8	.012	7	-1.918	7	0	1
257		4	...	.144	8	-.02	7	.233	9	-.05	7	.19	8	0	1	2.424	7
258			...	0	1	-.035	8	-.233	7	-.19	8	.05	7	-2.424	7	0	1
259		5	...	.145	8	-.025	7	.235	9	-.099	7	.273	8	0	1	2.935	7
260			...	0	1	-.04	8	-.235	7	-.273	8	.099	7	-2.935	7	0	1
261	M27	1	...	.001	7	.016	8	.119	7	-.099	7	.273	8	0	1	2.935	7
262			...	-.001	6	.009	7	0	1	-.273	8	.099	7	-2.935	7	0	1
263		2	...	0	7	.015	8	.119	7	-.095	7	.265	8	0	1	2.877	7
264			...	0	6	.008	7	0	1	-.265	8	.095	7	-2.877	7	0	1

Company : **DMJM H&N**
Designer : **Kevin M. Jones - DMJMH&N**
Job Number : **145579-V-CA-005 DBVS Off-Gas Treatment Duct Analysis**

Mar 25, 2006
12:05 PM
Checked By:_____

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[...	Ic	y Shear[...	Ic	z Shear[k...	Ic	y-T...	Ic	y-Bot[ksi]	Ic	z-Top[ksi]	Ic	z-Bot[ksi]	Ic
265		3	...	0	7	.014	8	.118	7	-.091	7	.258	8	0	1	2.819	7
266			...	0	6	.007	7	0	1	-.258	8	.091	7	-2.819	7	0	1
267		4	...	0	7	.013	8	.118	7	-.088	7	.252	8	0	1	2.762	7
268			...	0	6	.006	7	0	1	-.252	8	.088	7	-2.762	7	0	1
269		5	...	0	1	.012	8	.117	7	-.086	7	.246	8	0	1	2.705	7
270			...	0	1	.005	7	0	1	-.246	8	.086	7	-2.705	7	0	1
271	M28	1	...	.015	8	.077	7	.031	2	-.726	8	.755	7	.653	3	.071	2
272			...	-.015	9	.076	8	-.042	3	-.755	7	.726	8	-.071	2	-.653	3
273		2	...	.024	8	.038	7	.013	2	.295	8	-.277	7	.446	7	.058	8
274			...	-.024	9	.038	8	-.023	3	.277	7	-.295	8	-.058	8	-.446	7
275		3	...	.034	8	0	7	0	1	.622	8	-.613	7	.46	6	.267	9
276			...	-.034	9	-.001	8	-.009	7	.613	7	-.622	8	-.267	9	-.46	6
277		4	...	.044	8	-.039	7	.017	8	.254	1	-.253	6	.127	6	.129	9
278			...	-.044	9	-.04	8	-.028	7	.253	6	-.254	1	-.129	9	-.127	6
279		5	...	.053	8	-.078	7	.037	8	-.801	9	.811	6	.358	8	.555	7
280			...	-.053	9	-.079	8	-.048	7	-.811	6	.801	9	-.555	7	-.358	8
281	M29	1	...	.053	6	.063	6	.036	7	-.801	9	.811	6	.358	8	.555	7
282			...	-.053	7	.063	1	-.03	8	-.811	6	.801	9	-.555	7	-.358	8
283		2	...	.059	6	.04	6	.025	7	-.254	7	.26	8	.102	9	.229	6
284			...	-.059	7	.04	1	-.018	8	-.26	8	.254	7	-.229	6	-.102	9
285		3	...	.065	6	.017	6	.013	7	.047	7	-.044	1	0	1	.05	3
286			...	-.065	7	.017	1	-.007	8	.044	1	-.047	7	-.05	3	0	1
287		4	...	.071	6	-.006	6	.006	3	.105	6	-.098	1	.055	7	.043	8
288			...	-.071	7	-.006	1	0	1	.098	1	-.105	6	-.043	8	-.055	7
289		5	...	.076	6	-.029	6	.017	3	-.081	6	.094	1	.087	3	.005	2
290			...	-.076	7	-.029	1	-.011	2	-.094	1	.081	6	-.005	2	-.087	3
291	M30	1	...	.076	6	.025	1	.009	6	-.081	6	.094	1	.087	3	.005	2
292			...	-.076	7	.023	6	-.016	9	-.094	1	.081	6	-.005	2	-.087	3
293		2	...	.08	6	.01	1	.001	2	.025	1	-.022	6	.042	6	.01	9
294			...	-.08	7	.008	6	-.009	3	.022	6	-.025	1	-.01	9	-.042	6
295		3	...	.084	6	-.004	1	0	1	.045	1	-.026	6	.026	6	.045	9
296			...	-.084	7	-.007	6	-.007	7	.026	6	-.045	1	-.045	9	-.026	6
297		4	...	.087	6	-.019	1	.007	8	-.035	1	.07	6	-.002	1	.054	7
298			...	-.087	7	-.021	6	-.014	7	-.07	6	.035	1	-.054	7	.002	1
299		5	...	.091	6	-.034	1	.014	8	-.214	1	.265	6	.055	8	.175	7
300			...	-.091	7	-.036	6	-.022	7	-.265	6	.214	1	-.175	7	-.055	8
301	M31	1	...	.091	8	.046	6	.027	7	-.214	1	.265	6	.055	8	.175	7
302			...	-.091	9	.04	1	-.014	8	-.265	6	.214	1	-.175	7	-.055	8
303		2	...	.096	8	.026	6	.017	7	.066	6	-.061	1	.029	2	.028	3
304			...	-.096	9	.02	1	-.004	8	.061	1	-.066	6	-.028	3	-.029	2
305		3	...	.101	8	.006	6	.008	9	.214	6	-.154	1	.142	7	.02	8
306			...	-.101	9	0	1	0	1	.154	1	-.214	6	-.02	8	-.142	7
307		4	...	.106	8	-.014	6	.018	9	.178	6	-.062	1	.163	7	-.006	1
308			...	-.106	9	-.02	1	-.005	6	.062	1	-.178	6	.006	1	-.163	7
309		5	...	.111	8	-.034	6	.028	9	-.041	6	.212	1	.336	9	-.009	1
310			...	-.111	9	-.04	1	-.015	6	-.212	1	.041	6	.009	1	-.336	9
311	M32	1	...	.111	8	.034	1	-.002	1	-.041	6	.212	1	.336	9	-.009	1
312			...	-.111	9	-.01	6	-.075	9	-.212	1	.041	6	.009	1	-.336	9
313		2	...	.114	8	.021	1	-.002	1	-.053	1	.134	6	-.004	1	.117	7
314			...	-.114	9	-.022	6	-.069	9	-.134	6	.053	1	-.117	7	.004	1
315		3	...	.117	8	.009	1	-.002	1	.033	1	.3	6	-.018	1	.462	9
316			...	-.117	9	-.035	6	-.062	9	-.3	6	-.033	1	-.462	9	.018	1
317		4	...	.12	8	-.004	1	-.002	1	.047	1	.539	6	-.032	1	.807	9
318			...	-.12	9	-.047	6	-.056	9	-.539	6	-.047	1	-.807	9	.032	1
319		5	...	.123	8	-.017	1	-.002	1	-.014	1	.851	6	-.046	1	1.115	9
320			...	-.123	9	-.06	6	-.058	7	-.851	6	.014	1	-1.115	9	.046	1
321	M33	1	...	.123	6	.19	6	.234	9	-.014	1	.851	6	-.046	1	1.115	9

Company : **DMJM H&N**
Designer : **Kevin M. Jones - DMJMH&N**
Job Number : **145579-V-CA-005 DBVS Off-Gas Treatment Duct Analysis**

Mar 25, 2006
12:05 PM
Checked By:_____

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[...	lc	y Shear[..	lc	z Shear[k...	lc	y-T...	lc	y-Bot[ksi]	lc	z-Top[ksi]	lc	z-Bot[ksi]	lc
322			...	-.123	9	.011	1	.01	1	-.851	6	.014	1	-1.115	9	.046	1
323		2	...	.127	6	.178	6	.24	9	.22	6	-.016	1	.265	9	-.011	1
324			...	-.127	9	-.001	1	.01	1	.016	1	-.22	6	.011	1	-.265	9
325		3	...	.13	6	.165	6	.246	9	1.2...	6	.027	1	1.681	9	-.068	1
326			...	-.13	9	-.014	1	.01	1	-.027	1	-1.218	6	.068	1	-1.681	9
327		4	...	.133	6	.152	6	.252	9	2.1...	6	.144	1	3.134	9	-.125	1
328			...	-.133	9	-.026	1	.01	1	-.144	1	-2.142	6	.125	1	-3.134	9
329		5	...	.136	6	.14	6	.259	9	2.9...	6	.334	1	4.623	9	-.181	1
330			...	-.136	9	-.039	1	.01	1	-.334	1	-2.993	6	.181	1	-4.623	9
331	M36	1	...	.136	6	.121	9	.104	7	2.9...	6	.334	1	4.623	9	-.181	1
332			...	-.136	7	-.218	6	-.42	8	-.334	1	-2.993	6	.181	1	-4.623	9
333		2	...	.137	6	.119	9	.103	7	2.7...	6	.274	1	4.645	9	-.174	1
334			...	-.137	7	-.22	6	-.419	8	-.274	1	-2.759	6	.174	1	-4.645	9
335		3	...	.137	6	.117	9	.101	7	2.5...	6	.217	1	4.668	9	-.166	1
336			...	-.137	7	-.222	6	-.418	8	-.217	1	-2.522	6	.166	1	-4.668	9
337		4	...	.138	6	.115	9	.1	7	2.2...	6	.162	1	4.692	9	-.158	1
338			...	-.138	7	-.225	6	-.417	8	-.162	1	-2.283	6	.158	1	-4.692	9
339		5	...	.138	6	.112	9	.099	7	2.0...	7	.11	1	4.717	9	-.15	1
340			...	-.138	7	-.227	6	-.416	8	-.11	1	-2.064	7	.15	1	-4.717	9
341	M37	1	...	.245	8	.112	9	-.005	1	1.62	6	.099	1	4.717	9	-.15	1
342			...	-.133	7	-.227	6	-.179	9	-.099	1	-1.62	6	.15	1	-4.717	9
343		2	...	.245	8	.112	9	-.005	1	1.5...	6	.09	1	4.682	9	-.149	1
344			...	-.133	7	-.227	6	-.179	9	-.09	1	-1.576	6	.149	1	-4.682	9
345		3	...	.245	8	.111	9	-.005	1	1.5...	6	.081	1	4.648	9	-.148	1
346			...	-.133	7	-.228	6	-.179	9	-.081	1	-1.532	6	.148	1	-4.648	9
347		4	...	.245	8	.111	9	-.005	1	1.4...	6	.072	1	4.614	9	-.147	1
348			...	-.133	7	-.228	6	-.179	9	-.072	1	-1.488	6	.147	1	-4.614	9
349		5	...	.245	8	.111	9	-.005	1	1.4...	7	.063	1	4.579	9	-.146	1
350			...	-.133	7	-.229	6	-.179	9	-.063	1	-1.475	7	.146	1	-4.579	9
351	M38	1	...	.245	8	.111	9	-.005	1	1.4...	7	.063	1	4.579	9	-.146	1
352			...	-.133	7	-.229	6	-.179	9	-.063	1	-1.475	7	.146	1	-4.579	9
353		2	...	.245	8	.093	9	-.005	1	2.1...	7	.514	8	3.14	9	-.104	1
354			...	-.133	7	-.246	6	-.179	9	-.514	8	-2.178	7	.104	1	-3.14	9
355		3	...	.245	8	.076	9	-.005	1	2.8...	9	2.523	6	1.731	7	-.063	1
356			...	-.133	7	-.263	6	-.179	9	-2.5...	6	-2.815	9	.063	1	-1.731	7
357		4	...	.245	8	.058	9	-.005	1	3.3...	9	4.716	6	.462	7	.384	8
358			...	-.133	7	-.281	6	-.179	9	-4.7...	6	-3.356	9	-.384	8	-.462	7
359		5	...	.245	8	.041	9	-.005	1	3.7...	9	7.05	6	-.021	1	1.179	9
360			...	-.133	7	-.298	6	-.179	9	-7.05	6	-3.758	9	-1.179	9	.021	1
361	M39	1	...	.268	6	-.011	9	-.005	1	3.7...	9	7.05	6	-.031	1	.896	9
362			...	-.133	9	-.197	6	-.179	9	-7.05	6	-3.758	9	-.896	9	.031	1
363		2	...	.268	6	-.012	9	-.005	1	3.7...	9	7.106	6	-.033	1	.947	9
364			...	-.133	9	-.198	6	-.179	9	-7.1...	6	-3.755	9	-.947	9	.033	1
365		3	...	.268	6	-.012	9	-.005	1	3.7...	9	7.162	6	-.034	1	.997	9
366			...	-.133	9	-.199	6	-.179	9	-7.1...	6	-3.751	9	-.997	9	.034	1
367		4	...	.269	6	-.013	9	-.005	1	3.7...	9	7.219	6	-.036	1	1.048	9
368			...	-.133	9	-.199	6	-.179	9	-7.2...	6	-3.748	9	-1.048	9	.036	1
369		5	...	.269	6	-.014	9	-.005	1	3.7...	9	7.276	6	-.037	1	1.099	9
370			...	-.134	9	-.2	6	-.179	9	-7.2...	6	-3.744	9	-1.099	9	.037	1
371	M40	1	...	.287	6	.034	8	-.005	1	3.7...	9	7.276	6	.202	6	.425	9
372			...	-.121	9	-.128	7	-.179	9	-7.2...	6	-3.744	9	-.425	9	-.202	6
373		2	...	.287	6	.034	8	-.005	1	3.7...	9	7.27	6	.189	6	.475	9
374			...	-.121	9	-.128	7	-.179	9	-7.27	6	-3.711	9	-.475	9	-.189	6
375		3	...	.287	6	.033	8	-.005	1	3.6...	9	7.264	6	.176	6	.526	9
376			...	-.121	9	-.129	7	-.179	9	-7.2...	6	-3.678	9	-.526	9	-.176	6
377		4	...	.288	6	.033	8	-.005	1	3.6...	9	7.258	6	.163	6	.577	9
378			...	-.121	9	-.129	7	-.179	7	-7.2...	6	-3.645	9	-.577	9	-.163	6

Company : **DMJM H&N**
Designer : **Kevin M. Jones - DMJMH&N**
Job Number : **145579-V-CA-005 DBVS Off-Gas Treatment Duct Analysis**

Mar 25, 2006
12:05 PM
Checked By:_____

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[...	Ic	y Shear[...	Ic	z Shear[k...	Ic	y-T...	Ic	y-Bot[ksi]	Ic	z-Top[ksi]	Ic	z-Bot[ksi]	Ic
379		5	...	.288	6	.032	8	-.005	1	3.6...	9	7.252	6	.15	6	.628	9
380			...	-.121	9	-.13	7	-.179	7	-7.2...	6	-3.611	9	-.628	9	-.15	6
381	M41	1	...	.262	6	.247	8	-.005	1	3.6...	9	7.251	6	.668	6	.068	1
382			...	-.089	9	-.209	7	-.179	7	-7.2...	6	-3.612	9	-.068	1	-.668	6
383		2	...	.263	6	.246	8	-.005	1	3.5...	9	7.183	6	.655	6	.069	1
384			...	-.089	9	-.209	7	-.18	7	-7.1...	6	-3.555	9	-.069	1	-.655	6
385		3	...	.263	6	.246	8	-.005	1	3.4...	9	7.115	6	.643	6	.071	1
386			...	-.089	9	-.21	7	-.18	7	-7.1...	6	-3.497	9	-.071	1	-.643	6
387		4	...	.263	6	.246	8	-.005	1	3.4...	9	7.047	6	.63	6	.072	1
388			...	-.089	9	-.21	7	-.181	7	-7.0...	6	-3.439	9	-.072	1	-.63	6
389		5	...	.264	6	.245	8	-.005	1	3.3...	9	6.979	6	.617	6	.078	9
390			...	-.089	9	-.21	7	-.181	7	-6.9...	6	-3.381	9	-.078	9	-.617	6
391	M42	1	...	.198	6	.423	8	-.005	1	3.38	9	6.981	6	1.027	6	.071	1
392			...	-.043	9	-.257	7	-.181	7	-6.9...	6	-3.38	9	-.071	1	-1.027	6
393		2	...	.198	6	.423	8	-.005	1	3.3...	9	6.861	6	1.015	6	.072	1
394			...	-.042	9	-.257	7	-.182	7	-6.8...	6	-3.307	9	-.072	1	-1.015	6
395		3	...	.198	6	.424	6	-.005	1	3.2...	9	6.74	6	1.002	6	.074	1
396			...	-.042	9	-.257	9	-.182	7	-6.74	6	-3.234	9	-.074	1	-1.002	6
397		4	...	.199	6	.424	6	-.005	1	3.1...	9	6.62	6	.989	6	.075	1
398			...	-.042	9	-.258	9	-.183	7	-6.62	6	-3.161	9	-.075	1	-.989	6
399		5	...	.199	6	.424	6	-.005	1	3.0...	9	6.499	6	.976	6	.077	1
400			...	-.042	9	-.258	9	-.183	7	-6.4...	6	-3.088	9	-.077	1	-.976	6
401	M43	1	...	.154	6	.065	9	.317	9	5.3...	6	1.606	9	3.792	6	2.762	9
402			...	-.016	9	-.381	6	-.317	8	-1.6...	9	-5.398	6	-2.762	9	-3.792	6
403		2	...	.16	6	.07	9	.323	9	3.3...	6	1.245	9	2.08	6	1.049	9
404			...	-.01	9	-.387	6	-.323	8	-1.2...	9	-3.344	6	-1.049	9	-2.08	6
405		3	...	.166	6	.076	9	.329	9	1.2...	6	.853	9	.816	7	.118	1
406			...	-.004	9	-.393	6	-.329	8	-.853	9	-1.259	6	-.118	1	-.816	7
407		4	...	.171	6	.082	9	.334	9	-.337	1	.857	6	2.59	7	1.56	8
408			...	.002	9	-.398	6	-.334	8	-.857	6	.337	1	-1.56	8	-2.59	7
409		5	...	.177	6	.088	9	.34	9	.023	9	3.004	6	4.395	7	3.365	8
410			...	.007	9	-.404	6	-.34	8	-3.0...	6	-.023	9	-3.365	8	-4.395	7
411	M44	1	...	.225	6	.447	6	-.005	1	4.4...	6	3.035	9	.242	8	3.486	7
412			...	-.022	9	-.299	9	-.216	7	-3.0...	9	-4.417	6	-3.486	7	-.242	8
413		2	...	.225	6	.447	6	-.005	1	4.5...	6	3.12	9	.239	8	3.547	7
414			...	-.022	9	-.3	9	-.216	7	-3.12	9	-4.544	6	-3.547	7	-.239	8
415		3	...	.226	6	.448	6	-.005	1	4.6...	6	3.206	9	.237	8	3.609	7
416			...	-.022	9	-.301	9	-.216	7	-3.2...	9	-4.671	6	-3.609	7	-.237	8
417		4	...	.226	6	.448	6	-.005	1	4.7...	6	3.291	9	.235	8	3.67	7
418			...	-.021	9	-.301	9	-.217	7	-3.2...	9	-4.798	6	-3.67	7	-.235	8
419		5	...	.226	6	.448	6	-.005	1	4.9...	6	3.377	9	.234	8	3.732	7
420			...	-.021	9	-.302	9	-.217	7	-3.3...	9	-4.926	6	-3.732	7	-.234	8
421	M45	1	...	.295	6	.241	6	-.005	1	4.9...	6	3.381	9	-.177	1	3.736	7
422			...	-.077	9	-.263	9	-.217	7	-3.3...	9	-4.926	6	-3.736	7	.177	1
423		2	...	.295	6	.241	6	-.005	1	4.9...	6	3.455	9	-.178	1	3.798	7
424			...	-.077	9	-.263	9	-.217	7	-3.4...	9	-4.994	6	-3.798	7	.178	1
425		3	...	.296	6	.241	6	-.005	1	5.0...	6	3.53	9	-.18	1	3.86	7
426			...	-.077	9	-.264	9	-.218	7	-3.53	9	-5.063	6	-3.86	7	.18	1
427		4	...	.296	6	.241	6	-.005	1	5.1...	6	3.605	9	-.181	1	3.922	7
428			...	-.077	9	-.265	9	-.218	7	-3.6...	9	-5.131	6	-3.922	7	.181	1
429		5	...	.296	6	.241	6	-.005	8	5.2	6	3.681	9	-.183	1	3.984	7
430			...	-.077	9	-.265	9	-.219	7	-3.6...	9	-5.2	6	-3.984	7	.183	1
431	M46	1	...	.32	6	-.004	6	-.005	8	5.2	6	3.68	9	-.14	1	3.414	9
432			...	-.122	9	-.186	9	-.219	7	-3.68	9	-5.2	6	-3.414	9	.14	1
433		2	...	.32	6	-.004	6	-.004	8	5.1...	6	3.733	9	-.142	1	3.467	7
434			...	-.122	9	-.187	9	-.219	7	-3.7...	9	-5.199	6	-3.467	7	.142	1
435		3	...	.321	6	-.005	6	-.004	8	5.1...	6	3.786	9	-.143	1	3.529	7

Company : **DMJM H&N**
Designer : **Kevin M. Jones - DMJMH&N**
Job Number : **145579-V-CA-005 DBVS Off-Gas Treatment Duct Analysis**

Mar 25, 2006
12:05 PM
Checked By:_____

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[...	lc	y Shear[..	lc	z Shear[k...	lc	y-T...	lc	y-Bot[ksi]	lc	z-Top[ksi]	lc	z-Bot[ksi]	lc
436			...	-.122	9	-.188	9	-.22	7	-3.7...	9	-5.197	6	-3.529	7	.143	1
437		4	...	.321	6	-.005	6	-.004	8	5.1...	6	3.84	9	-.145	1	3.591	7
438			...	-.122	9	-.189	9	-.22	7	-3.84	9	-5.196	6	-3.591	7	.145	1
439		5	...	.321	6	-.005	6	-.003	8	5.1...	6	3.893	9	-.146	1	3.654	7
440			...	-.122	9	-.189	9	-.221	7	-3.8...	9	-5.194	6	-3.654	7	.146	1
441	M47	1	...	.296	6	-.082	9	-.003	8	5.1...	6	3.893	9	-.082	1	2.662	9
442			...	-.149	9	-.251	6	-.221	7	-3.8...	9	-5.194	6	-2.662	9	.082	1
443		2	...	.296	6	-.082	9	-.003	8	5.1...	6	3.916	9	-.084	1	2.713	9
444			...	-.149	9	-.251	6	-.221	7	-3.9...	9	-5.123	6	-2.713	9	.084	1
445		3	...	.296	6	-.083	9	-.002	8	5.0...	6	3.94	9	-.085	1	2.764	9
446			...	-.149	9	-.252	6	-.221	7	-3.94	9	-5.052	6	-2.764	9	.085	1
447		4	...	.297	6	-.084	9	-.002	8	4.98	6	3.963	9	-.087	1	2.814	9
448			...	-.149	9	-.252	6	-.222	7	-3.9...	9	-4.98	6	-2.814	9	.087	1
449		5	...	.297	6	-.084	9	-.001	8	4.9...	6	3.987	9	-.088	1	2.865	9
450			...	-.149	9	-.253	6	-.222	7	-3.9...	9	-4.908	6	-2.865	9	.088	1
451	M48	1	...	.267	6	-.025	9	-.001	8	4.9...	6	3.988	9	-.051	1	2.22	9
452			...	-.155	9	-.364	6	-.222	7	-3.9...	9	-4.908	6	-2.22	9	.051	1
453		2	...	.269	6	-.03	9	.002	8	3.9...	6	4.056	9	-.064	1	2.667	9
454			...	-.157	9	-.369	6	-.226	7	-4.0...	9	-3.991	6	-2.667	9	.064	1
455		3	...	.27	6	-.035	9	.006	8	3.06	6	4.138	9	-.077	1	3.198	7
456			...	-.159	9	-.375	6	-.23	7	-4.1...	9	-3.06	6	-3.198	7	.077	1
457		4	...	.272	6	-.041	9	.01	8	2.1...	6	4.233	9	-.09	1	3.778	7
458			...	-.16	9	-.38	6	-.234	7	-4.2...	9	-2.116	6	-3.778	7	.09	1
459		5	...	.274	6	-.046	9	.014	8	1.1...	6	4.342	9	-.102	1	4.368	7
460			...	-.162	9	-.385	6	-.238	7	-4.3...	9	-1.159	6	-4.368	7	.102	1
461	M49	1	...	.019	8	.376	8	.419	6	4.7...	7	.05	8	-.104	1	2.726	7
462			...	-.019	7	-.281	7	-.012	1	-.05	8	-4.778	7	-2.726	7	.104	1
463		2	...	.018	8	.372	8	.421	6	4.2...	7	-.606	8	-.125	1	2.256	7
464			...	-.018	7	-.285	7	-.012	1	.606	8	-4.282	7	-2.256	7	.125	1
465		3	...	.017	8	.368	8	.423	6	3.7...	7	-.444	1	-.146	1	1.783	7
466			...	-.017	7	-.288	7	-.012	1	.444	1	-3.779	7	-1.783	7	.146	1
467		4	...	.016	8	.364	8	.425	6	3.2...	7	-.262	1	.193	6	1.332	9
468			...	-.016	7	-.292	7	-.012	1	.262	1	-3.269	7	-1.332	9	-.193	6
469		5	...	.015	8	.361	8	.426	6	2.7...	7	-.073	1	.939	6	1.042	9
470			...	-.015	7	-.296	7	-.012	1	.073	1	-2.753	7	-1.042	9	-.939	6
471	M50	1	...	.007	8	.328	8	.443	6	2.7...	7	-.073	1	.939	6	1.042	9
472			...	-.007	7	-.329	7	-.012	1	.073	1	-2.753	7	-1.042	9	-.939	6
473		2	...	.006	8	.325	8	.444	6	2.9...	8	.103	1	1.487	6	.861	9
474			...	-.006	7	-.331	7	-.012	1	-.103	1	-2.937	8	-.861	9	-1.487	6
475		3	...	.006	8	.322	8	.445	6	3.3...	8	.284	1	2.036	6	.681	9
476			...	-.006	7	-.334	7	-.012	1	-.284	1	-3.337	8	-.681	9	-2.036	6
477		4	...	.005	8	.32	8	.447	6	3.7...	8	.467	1	2.586	6	.503	9
478			...	-.005	7	-.337	7	-.012	1	-.467	1	-3.733	8	-.503	9	-2.586	6
479		5	...	.004	8	.317	8	.448	6	4.1...	8	.654	1	3.138	6	.327	9
480			...	-.004	7	-.339	7	-.012	1	-.654	1	-4.126	8	-.327	9	-3.138	6
481	M51	1	...	.004	6	.017	9	.008	8	-.066	3	.066	1	.033	7	.033	8
482			...	-.004	9	.017	6	-.008	6	-.066	1	.066	3	-.033	8	-.033	7
483		2	...	.003	6	.013	9	.006	8	-.037	3	.037	9	.019	7	.019	8
484			...	-.003	9	.013	6	-.006	6	-.037	9	.037	3	-.019	8	-.019	7
485		3	...	.002	6	.008	9	.004	8	-.017	3	.017	1	.008	7	.008	8
486			...	-.002	9	.008	6	-.004	6	-.017	1	.017	3	-.008	8	-.008	7
487		4	...	.001	6	.004	9	.002	8	-.004	3	.004	6	.002	7	.002	8
488			...	-.001	9	.004	6	-.002	6	-.004	6	.004	3	-.002	8	-.002	7
489		5	...	0	1	0	1	0	1	0	1	0	1	0	1	0	1
490			...	0	1	0	1	0	1	0	1	0	1	0	1	0	1
491	M52	1	...	0	1	0	1	0	1	0	1	0	1	0	1	0	1
492			...	0	1	0	1	0	1	0	1	0	1	0	1	0	1

Company : **DMJM H&N**
Designer : **Kevin M. Jones - DMJMH&N**
Job Number : **145579-V-CA-005 DBVS Off-Gas Treatment Duct Analysis**

Mar 25, 2006
12:05 PM
Checked By:_____

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[...	Ic	y Shear[...	Ic	z Shear[k...	Ic	y-T...	Ic	y-Bot[ksi]	Ic	z-Top[ksi]	Ic	z-Bot[ksi]	Ic
493		2	...	0	1	0	1	0	1	0	1	0	1	0	1	0	1
494			...	0	1	0	1	0	1	0	1	0	1	0	1	0	1
495		3	...	0	1	0	1	0	1	0	1	0	1	0	1	0	1
496			...	0	1	0	1	0	1	0	1	0	1	0	1	0	1
497		4	...	0	1	0	1	0	1	0	1	0	1	0	1	0	1
498			...	0	1	0	1	0	1	0	1	0	1	0	1	0	1
499		5	...	0	1	0	1	0	1	0	1	0	1	0	1	0	1
500			...	0	1	0	1	0	1	0	1	0	1	0	1	0	1
501	M53	1	...	.197	8	.22	7	.287	7	1.0...	8	1.041	7	.766	6	1.787	9
502			...	-.197	7	-.746	8	-.019	1	-1.0...	7	-1.052	8	-1.787	9	-.766	6
503		2	...	.197	8	.218	7	.286	7	.421	8	.856	7	.765	6	1.555	9
504			...	-.197	7	-.748	8	-.019	1	-.856	7	-.421	8	-1.555	9	-.765	6
505		3	...	.198	8	.216	7	.285	7	-.009	1	.673	7	.763	6	1.321	9
506			...	-.198	7	-.75	8	-.019	1	-.673	7	.009	1	-1.321	9	-.763	6
507		4	...	.198	8	.215	7	.284	7	-.026	1	.845	8	.76	6	1.087	9
508			...	-.198	7	-.752	8	-.019	1	-.845	8	.026	1	-1.087	9	-.76	6
509		5	...	.199	8	.213	7	.283	7	-.046	1	1.481	8	.757	6	.853	9
510			...	-.199	7	-.754	8	-.019	1	-1.4...	8	.046	1	-.853	9	-.757	6
511	M54	1	...	.268	8	.131	7	.283	7	-.046	1	1.481	8	.587	6	.724	9
512			...	-.216	7	-.662	8	-.019	1	-1.4...	8	.046	1	-.724	9	-.587	6
513		2	...	.269	8	.13	7	.283	7	-.053	1	1.669	8	.586	6	.645	9
514			...	-.216	7	-.662	8	-.019	1	-1.6...	8	.053	1	-.645	9	-.586	6
515		3	...	.269	8	.13	7	.282	7	-.06	1	1.857	8	.585	6	.565	9
516			...	-.216	7	-.663	8	-.019	1	-1.8...	8	.06	1	-.565	9	-.585	6
517		4	...	.269	8	.129	7	.282	7	-.067	1	2.045	8	.583	6	.486	9
518			...	-.216	7	-.663	8	-.019	1	-2.0...	8	.067	1	-.486	9	-.583	6
519		5	...	.269	8	.128	7	.282	7	-.074	1	2.234	8	.581	6	.406	9
520			...	-.216	7	-.664	8	-.019	1	-2.2...	8	.074	1	-.406	9	-.581	6
521	M55	1	...	.376	8	-.022	1	.282	7	-.074	1	2.234	8	.198	1	.103	7
522			...	-.224	7	-.407	8	-.019	1	-2.2...	8	.074	1	-.103	7	-.198	1
523		2	...	.376	8	-.022	1	.281	7	-.08	1	2.35	8	.192	1	.023	7
524			...	-.224	7	-.408	8	-.019	1	-2.35	8	.08	1	-.023	7	-.192	1
525		3	...	.376	8	-.023	1	.281	7	-.087	1	2.466	8	.187	8	-.057	7
526			...	-.224	7	-.408	8	-.019	1	-2.4...	8	.087	1	.057	7	-.187	8
527		4	...	.377	8	-.023	1	.281	7	-.093	1	2.582	8	.21	4	-.111	5
528			...	-.224	7	-.408	8	-.019	1	-2.5...	8	.093	1	.111	5	-.21	4
529		5	...	.377	8	-.024	1	.281	9	-.1	1	2.698	8	.241	4	-.158	5
530			...	-.224	7	-.409	8	-.019	1	-2.6...	8	.1	1	.158	5	-.241	4
531	M56	1	...	.426	8	-.016	1	.281	9	-.1	1	2.698	8	.525	9	.25	6
532			...	-.197	7	-.226	9	-.019	1	-2.6...	8	.1	1	-.25	6	-.525	9
533		2	...	.427	8	-.016	1	.281	9	-.104	1	2.723	8	.605	9	.252	6
534			...	-.197	7	-.227	9	-.019	1	-2.7...	8	.104	1	-.252	6	-.605	9
535		3	...	.427	8	-.017	1	.282	9	-.109	1	2.748	8	.685	9	.254	6
536			...	-.197	7	-.227	9	-.019	1	-2.7...	8	.109	1	-.254	6	-.685	9
537		4	...	.427	8	-.017	1	.282	9	-.114	1	2.774	8	.765	9	.256	6
538			...	-.197	7	-.228	9	-.019	1	-2.7...	8	.114	1	-.256	6	-.765	9
539		5	...	.428	8	-.017	1	.282	9	-.119	1	2.799	8	.845	9	.259	6
540			...	-.197	7	-.228	9	-.019	1	-2.7...	8	.119	1	-.259	6	-.845	9
541	M57	1	...	.412	8	.248	6	.282	9	-.119	1	2.799	8	1.042	9	.646	6
542			...	-.14	7	-.356	9	-.019	1	-2.7...	8	.119	1	-.646	6	-1.042	9
543		2	...	.413	8	.248	6	.282	9	-.121	1	2.73	8	1.123	9	.648	6
544			...	-.14	7	-.357	9	-.019	1	-2.73	8	.121	1	-.648	6	-1.123	9
545		3	...	.413	8	.248	6	.283	9	-.122	1	2.66	8	1.203	9	.651	6
546			...	-.139	7	-.357	9	-.019	1	-2.66	8	.122	1	-.651	6	-1.203	9
547		4	...	.413	8	.249	6	.283	9	-.124	1	2.59	8	1.283	9	.653	6
548			...	-.139	7	-.358	9	-.019	1	-2.59	8	.124	1	-.653	6	-1.283	9
549		5	...	.414	8	.249	6	.283	9	-.126	1	2.521	8	1.364	9	.656	6

Company : **DMJM H&N**
Designer : **Kevin M. Jones - DMJMH&N**
Job Number : **145579-V-CA-005 DBVS Off-Gas Treatment Duct Analysis**

Mar 25, 2006
12:05 PM
Checked By:_____

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[...	Ic	y Shear[...	Ic	z Shear[k...	Ic	y-T...	Ic	y-Bot[ksi]	Ic	z-Top[ksi]	Ic	z-Bot[ksi]	Ic
550			...	-.139	7	-.358	9	-.019	1	-2.5...	8	.126	1	-.656	6	-1.364	9
551	M58	1	...	.382	8	.283	9	.402	7	1.3...	9	.815	6	2.521	8	-.126	1
552			...	-.101	7	-.019	1	-.402	8	-.815	6	-1.398	9	.126	1	-2.521	8
553		2	...	.384	8	.286	9	.405	7	2.0...	9	.839	6	1.82	9	-.126	1
554			...	-.099	7	-.019	1	-.405	8	-.839	6	-2.019	9	.126	1	-1.82	9
555		3	...	.386	8	.288	9	.407	7	2.6...	9	.867	6	2.707	9	-.126	1
556			...	-.097	7	-.019	1	-.407	8	-.867	6	-2.646	9	.126	1	-2.707	9
557		4	...	.553	6	-.033	1	.562	7	1.6...	9	2.499	6	5.613	7	-.151	1
558			...	.045	1	-.437	6	-.305	8	-2.4...	6	-1.668	9	.151	1	-5.613	7
559		5	...	.556	6	-.033	1	.565	7	1.4...	9	3.455	6	6.844	7	-.153	1
560			...	.047	1	-.439	6	-.308	8	-3.4...	6	-1.479	9	.153	1	-6.844	7
561	M59	1	...	.512	7	.035	1	-.001	1	2.7...	7	.366	1	6.681	7	-.015	1
562			...	.037	1	-.132	7	-.28	7	-.366	1	-2.723	7	.015	1	-6.681	7
563		2	...	.502	7	.022	1	-.001	1	1.0...	7	.014	1	3.383	6	.003	1
564			...	.03	1	-.138	7	-.27	7	-.014	1	-1.051	7	-.003	1	-3.383	6
565		3	...	.492	7	.009	1	-.001	1	.179	1	1.076	6	.443	6	.293	9
566			...	.024	1	-.144	7	-.261	7	-1.0...	6	-.179	1	-.293	9	-.443	6
567		4	...	.482	7	-.004	1	-.001	1	.212	1	2.668	6	-.04	1	3.18	7
568			...	.017	1	-.151	7	-.252	7	-2.6...	6	-.212	1	-3.18	7	.04	1
569		5	...	.472	7	-.017	1	-.001	1	.086	1	4.427	7	-.058	1	6.238	7
570			...	.01	1	-.163	9	-.261	6	-4.4...	7	-.086	1	-6.238	7	.058	1
571	M60	1	...	.475	7	.117	6	-.001	1	.086	1	4.427	7	-.077	1	5.99	7
572			...	.012	1	-.01	1	-.261	6	-4.4...	7	-.086	1	-5.99	7	.077	1
573		2	...	.475	7	.116	6	-.001	1	.078	1	4.349	7	-.078	1	6.166	7
574			...	.012	1	-.011	1	-.261	6	-4.3...	7	-.078	1	-6.166	7	.078	1
575		3	...	.474	7	.116	6	-.001	1	.069	1	4.271	7	-.079	1	6.34	7
576			...	.012	1	-.012	1	-.262	6	-4.2...	7	-.069	1	-6.34	7	.079	1
577		4	...	.474	7	.115	6	-.001	1	.06	1	4.194	7	-.08	1	6.515	7
578			...	.011	1	-.013	1	-.262	6	-4.1...	7	-.06	1	-6.515	7	.08	1
579		5	...	.473	7	.114	6	-.001	1	.05	1	4.117	7	-.081	1	6.689	7
580			...	.011	1	-.014	1	-.263	6	-4.1...	7	-.05	1	-6.689	7	.081	1
581	M61	1	...	.383	7	.566	7	-.001	1	.05	1	4.117	7	-.099	1	4.92	7
582			...	.013	1	-.001	1	-.263	6	-4.1...	7	-.05	1	-4.92	7	.099	1
583		2	...	.383	7	.564	7	-.001	1	.047	1	3.401	7	-.101	1	5.224	7
584			...	.013	1	-.003	1	-.264	6	-3.4...	7	-.047	1	-5.224	7	.101	1
585		3	...	.382	7	.562	7	-.001	1	.042	1	2.687	7	-.102	1	5.527	7
586			...	.013	1	-.005	1	-.265	6	-2.6...	7	-.042	1	-5.527	7	.102	1
587		4	...	.382	7	.56	7	-.001	1	.034	1	1.976	7	-.104	1	5.829	7
588			...	.013	1	-.007	1	-.266	6	-1.9...	7	-.034	1	-5.829	7	.104	1
589		5	...	.381	7	.558	7	-.001	1	.024	1	1.267	7	-.106	1	6.129	7
590			...	.013	1	-.009	1	-.267	6	-1.2...	7	-.024	1	-6.129	7	.106	1
591	M62	1	...	.399	7	.558	7	.005	1	.025	1	2.48	7	-.106	1	6.129	7
592			...	.013	1	-.009	1	-.07	6	-2.48	7	-.025	1	-6.129	7	.106	1
593		2	...	.399	7	.557	7	.005	1	.022	1	2.271	7	-.104	1	6.141	7
594			...	.013	1	-.01	1	-.071	6	-2.2...	7	-.022	1	-6.141	7	.104	1
595		3	...	.399	7	.557	7	.005	1	.018	1	2.062	7	-.102	1	6.152	7
596			...	.013	1	-.01	1	-.071	6	-2.0...	7	-.018	1	-6.152	7	.102	1
597		4	...	.399	7	.556	7	.005	1	.014	1	1.854	7	-.1	1	6.164	7
598			...	.013	1	-.011	1	-.071	6	-1.8...	7	-.014	1	-6.164	7	.1	1
599		5	...	.398	7	.556	7	.005	1	.01	1	1.645	7	-.098	1	6.175	7
600			...	.013	1	-.011	1	-.072	6	-1.6...	7	-.01	1	-6.175	7	.098	1
601	M63	1	...	.353	7	.556	7	.377	9	.01	1	3.605	7	-.098	1	6.175	7
602			...	.01	1	-.011	1	.017	1	-3.6...	7	-.01	1	-6.175	7	.098	1
603		2	...	.352	7	.555	7	.378	9	.006	1	3.396	7	-.092	1	6.035	7
604			...	.01	1	-.012	1	.017	1	-3.3...	7	-.006	1	-6.035	7	.092	1
605		3	...	.352	7	.555	7	.378	9	.001	1	3.188	7	-.085	1	5.896	7
606			...	.01	1	-.012	1	.017	1	-3.1...	7	-.001	1	-5.896	7	.085	1

Company : **DMJM H&N**
Designer : **Kevin M. Jones - DMJMH&N**
Job Number : **145579-V-CA-005 DBVS Off-Gas Treatment Duct Analysis**

Mar 25, 2006
12:05 PM
Checked By:_____

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[...	Ic	y Shear[...	Ic	z Shear[k...	Ic	y-T...	Ic	y-Bot[ksi]	Ic	z-Top[ksi]	Ic	z-Bot[ksi]	Ic
607		4	...	.352	7	.554	7	.378	9	-.003	1	2.98	7	-.079	1	5.756	7
608			...	.01	1	-.013	1	.017	1	-2.98	7	.003	1	-5.756	7	.079	1
609		5	...	.352	7	.554	7	.379	9	-.008	1	2.773	7	-.072	1	5.617	7
610			...	.01	1	-.013	1	.017	1	-2.7...	7	.008	1	-5.617	7	.072	1
611	M64	1	...	.223	6	.554	7	.674	7	-.009	1	3.878	7	-.072	1	5.617	7
612			...	.004	1	-.013	1	.025	1	-3.8...	7	.009	1	-5.617	7	.072	1
613		2	...	.224	6	.553	7	.674	7	-.014	1	3.671	7	-.063	1	5.374	6
614			...	.004	1	-.014	1	.025	1	-3.6...	7	.014	1	-5.374	6	.063	1
615		3	...	.224	6	.552	7	.674	7	-.019	1	3.463	7	-.054	1	5.139	6
616			...	.004	1	-.015	1	.025	1	-3.4...	7	.019	1	-5.139	6	.054	1
617		4	...	.224	6	.552	7	.674	7	-.025	1	3.256	7	-.044	1	4.903	6
618			...	.004	1	-.015	1	.025	1	-3.2...	7	.025	1	-4.903	6	.044	1
619		5	...	.224	6	.551	7	.673	7	-.031	1	3.049	7	-.035	1	4.668	6
620			...	.004	1	-.016	1	.025	1	-3.0...	7	.031	1	-4.668	6	.035	1
621	M65	1	...	.135	6	.551	7	.76	7	-.029	1	3.249	7	-.035	1	4.668	6
622			...	0	1	-.016	1	.026	1	-3.2...	7	.029	1	-4.668	6	.035	1
623		2	...	.136	6	.547	7	.757	7	-.084	1	1.579	7	.044	1	2.478	6
624			...	0	1	-.02	1	.026	1	-1.5...	7	.084	1	-2.478	6	-.044	1
625		3	...	.137	6	.542	7	.755	7	.32	8	.153	1	.464	9	.295	6
626			...	0	1	-.025	1	.026	1	-.153	1	-.32	8	-.295	6	-.464	9
627		4	...	.139	6	.538	7	.753	7	1.8...	6	.235	1	2.724	9	-.203	1
628			...	0	1	-.029	1	.026	1	-.235	1	-1.856	6	.203	1	-2.724	9
629		5	...	.14	6	.533	7	.75	7	3.4...	6	.331	1	4.992	9	-.282	1
630			...	0	1	-.034	1	.026	1	-.331	1	-3.446	6	.282	1	-4.992	9
631	M66	1	...	.17	6	.028	7	.114	8	.022	6	.186	1	1.112	7	.696	8
632			...	0	1	.026	8	-.106	7	-.186	1	-.022	6	-.696	8	-1.112	7
633		2	...	.173	6	.014	7	.121	8	.211	6	-.014	1	.436	8	-.015	1
634			...	0	1	.012	8	-.114	7	.014	1	-.211	6	.015	1	-.436	8
635		3	...	.177	6	0	7	.128	8	.27	7	-.076	1	1.638	8	1.077	7
636			...	0	1	-.003	8	-.121	7	.076	1	-.27	7	-1.077	7	-1.638	8
637		4	...	.18	6	-.015	7	.136	8	.193	7	.002	1	2.909	8	2.275	7
638			...	0	1	-.017	8	-.128	7	-.002	1	-.193	7	-2.275	7	-2.909	8
639		5	...	.184	6	-.03	7	.143	8	-.022	7	.218	1	4.249	8	3.543	7
640			...	0	1	-.032	8	-.135	7	-.218	1	.022	7	-3.543	7	-4.249	8
641	M67	1	...	.184	6	.026	1	.654	7	-.022	7	.218	1	4.249	8	3.543	7
642			...	0	1	.009	6	-.308	8	-.218	1	.022	7	-3.543	7	-4.249	8
643		2	...	.185	6	.024	1	.653	7	-.005	7	.174	1	3.706	8	2.389	7
644			...	0	1	.006	6	-.307	8	-.174	1	.005	7	-2.389	7	-3.706	8
645		3	...	.185	6	.021	1	.652	7	.008	7	.135	1	3.165	8	1.236	7
646			...	0	1	.003	6	-.306	8	-.135	1	-.008	7	-1.236	7	-3.165	8
647		4	...	.186	6	.018	1	.65	7	.016	7	.1	1	2.626	8	.086	7
648			...	0	1	0	6	-.304	8	-.1	1	-.016	7	-.086	7	-2.626	8
649		5	...	.187	6	.016	1	.649	7	.019	7	.07	1	2.757	6	-.007	1
650			...	0	1	-.002	6	-.303	8	-.07	1	-.019	7	.007	1	-2.757	6
651	M68	1	...	.264	6	.016	1	.593	7	.107	7	.07	1	2.757	6	-.007	1
652			...	0	1	-.002	6	-.381	8	-.07	1	-.107	7	.007	1	-2.757	6
653		2	...	.264	6	.015	1	.593	7	.107	7	.064	1	2.954	6	-.007	1
654			...	0	1	-.003	6	-.38	8	-.064	1	-.107	7	.007	1	-2.954	6
655		3	...	.264	6	.015	1	.593	7	.107	7	.059	1	3.151	6	-.006	1
656			...	0	1	-.003	6	-.38	8	-.059	1	-.107	7	.006	1	-3.151	6
657		4	...	.264	6	.014	1	.593	7	.107	7	.054	1	3.348	6	-.006	1
658			...	0	1	-.004	6	-.38	8	-.054	1	-.107	7	.006	1	-3.348	6
659		5	...	.264	6	.013	1	.593	7	.106	7	.048	1	3.544	6	.074	9
660			...	0	1	-.004	6	-.38	8	-.048	1	-.106	7	-.074	9	-3.544	6
661	M69	1	...	.36	6	.013	1	.367	7	.255	7	.037	1	3.544	6	.074	9
662			...	-.071	9	-.004	6	-.455	8	-.037	1	-.255	7	-.074	9	-3.544	6
663		2	...	.36	6	.013	1	.367	7	.254	7	.032	1	3.615	6	.177	9

Company : **DMJM H&N**
Designer : **Kevin M. Jones - DMJMH&N**
Job Number : **145579-V-CA-005 DBVS Off-Gas Treatment Duct Analysis**

Mar 25, 2006
12:05 PM
Checked By:_____

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[...	Ic	y Shear[..	Ic	z Shear[k...	Ic	y-T...	Ic	y-Bot[ksi]	Ic	z-Top[ksi]	Ic	z-Bot[ksi]	Ic
664			...	-.071	9	-.005	6	-.455	8	-.032	1	-.254	7	-.177	9	-3.615	6
665		3	...	.36	6	.012	1	.367	7	.254	7	.028	1	3.686	6	.281	9
666			...	-.071	9	-.005	6	-.455	8	-.028	1	-.254	7	-.281	9	-3.686	6
667		4	...	.36	6	.012	1	.367	7	.252	7	.023	1	3.757	6	.385	9
668			...	-.071	9	-.006	6	-.455	8	-.023	1	-.252	7	-.385	9	-3.757	6
669		5	...	.36	6	.011	1	.367	7	.251	7	.019	1	3.828	6	.488	9
670			...	-.071	9	-.006	6	-.455	8	-.019	1	-.251	7	-.488	9	-3.828	6
671	M70	1	...	.359	6	.011	1	.044	7	.332	7	0	1	3.828	6	.488	9
672			...	-.131	9	-.006	6	-.408	8	0	1	-.332	7	-.488	9	-3.828	6
673		2	...	.358	6	.011	1	.044	7	.33	7	-.004	1	3.754	6	.551	9
674			...	-.13	9	-.007	6	-.409	8	.004	1	-.33	7	-.551	9	-3.754	6
675		3	...	.358	6	.01	1	.045	7	.329	7	-.008	1	3.68	6	.613	9
676			...	-.13	9	-.008	6	-.409	8	.008	1	-.329	7	-.613	9	-3.68	6
677		4	...	.358	6	.009	1	.045	7	.327	7	-.011	1	3.606	6	.676	9
678			...	-.13	9	-.008	6	-.409	8	.011	1	-.327	7	-.676	9	-3.606	6
679		5	...	.358	6	.009	1	.045	7	.324	7	-.015	1	3.531	6	.738	9
680			...	-.13	9	-.009	6	-.409	8	.015	1	-.324	7	-.738	9	-3.531	6
681	M71	1	...	.323	7	.009	1	-.001	1	.341	6	-.024	1	3.531	6	.738	9
682			...	-.15	8	-.009	6	-.377	6	.024	1	-.341	6	-.738	9	-3.531	6
683		2	...	.322	7	.004	1	-.001	1	.307	6	-.044	1	2.352	6	1.024	9
684			...	-.149	8	-.013	6	-.379	6	.044	1	-.307	6	-1.024	9	-2.352	6
685		3	...	.321	7	0	1	-.001	1	.264	7	-.05	1	1.795	7	1.933	8
686			...	-.147	8	-.018	6	-.382	6	.05	1	-.264	7	-1.933	8	-1.795	7
687		4	...	.319	7	-.005	1	-.001	1	.209	7	-.041	1	1.418	7	3.023	8
688			...	-.146	8	-.023	6	-.384	6	.041	1	-.209	7	-3.023	8	-1.418	7
689		5	...	.318	7	-.01	1	-.001	1	.138	7	-.018	1	1.049	7	4.12	8
690			...	-.145	8	-.027	6	-.386	6	.018	1	-.138	7	-4.12	8	-1.049	7
691	M72	1	...	.318	7	.01	1	.124	8	.138	7	-.018	1	1.049	7	4.12	8
692			...	-.145	8	.006	7	-.035	7	.018	1	-.138	7	-4.12	8	-1.049	7
693		2	...	.314	7	-.005	1	.116	8	.122	7	-.04	1	.73	7	2.906	8
694			...	-.141	8	-.009	7	-.028	7	.04	1	-.122	7	-2.906	8	-.73	7
695		3	...	.311	7	-.021	1	.108	8	-.049	7	.093	1	.488	7	1.769	8
696			...	-.137	8	-.024	7	-.02	7	-.093	1	.049	7	-1.769	8	-.488	7
697		4	...	.307	7	-.036	1	.101	8	-.37	9	.38	1	.323	7	.709	8
698			...	-.134	8	-.04	7	-.012	7	-.38	1	.37	9	-.709	8	-.323	7
699		5	...	.303	7	-.051	1	.093	8	-.822	1	.854	7	.713	9	.204	6
700			...	-.13	8	-.055	7	-.005	7	-.854	7	.822	1	-.204	6	-.713	9
701	M73	1	...	.303	7	.067	2	.033	4	-.822	1	.854	7	.713	9	.204	6
702			...	-.13	8	.066	1	-.04	5	-.854	7	.822	1	-.204	6	-.713	9
703		2	...	.294	7	.032	2	.013	4	.309	1	-.295	7	.622	8	.274	7
704			...	-.121	8	.031	1	-.02	5	.295	7	-.309	1	-.274	7	-.622	8
705		3	...	.286	7	-.003	2	.004	7	.639	2	-.628	3	.567	8	.381	7
706			...	-.112	8	-.003	1	-.011	8	.628	3	-.639	2	-.381	7	-.567	8
707		4	...	.277	7	-.037	2	.022	7	.175	2	-.149	1	.109	8	.084	7
708			...	-.104	8	-.038	1	-.028	8	.149	1	-.175	2	-.084	7	-.109	8
709		5	...	.268	7	-.072	2	.039	7	-1.0...	2	1.142	1	.616	7	.753	8
710			...	-.095	8	-.073	1	-.046	8	-1.1...	1	1.097	2	-.753	8	-.616	7
711	M74	1	...	.268	7	.071	1	.041	4	-1.0...	2	1.142	1	.616	7	.753	8
712			...	-.095	8	.069	2	-.039	5	-1.1...	1	1.097	2	-.753	8	-.616	7
713		2	...	.259	7	.034	1	.02	4	.143	3	-.139	2	.035	6	.124	9
714			...	-.086	8	.032	2	-.018	5	.139	2	-.143	3	-.124	9	-.035	6
715		3	...	.25	7	-.003	1	.003	9	.513	1	-.463	2	.268	4	.309	5
716			...	-.077	8	-.005	2	0	6	.463	2	-.513	1	-.309	5	-.268	4
717		4	...	.24	7	-.04	1	.023	5	-.027	1	.124	2	.016	7	.01	8
718			...	-.067	8	-.042	2	-.021	4	.124	2	.027	1	-.01	8	-.016	7
719		5	...	.231	7	-.077	1	.044	5	-1.4...	1	1.622	2	.843	5	.79	4
720			...	-.058	8	-.079	2	-.042	4	-1.6...	2	1.478	1	-.79	4	-.843	5

Company : **DMJM H&N**
Designer : **Kevin M. Jones - DMJMH&N**
Job Number : **145579-V-CA-005 DBVS Off-Gas Treatment Duct Analysis**

Mar 25, 2006
12:05 PM
Checked By:_____

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[...	lc	y Shear[...	lc	z Shear[k...	lc	y-T...	lc	y-Bot[ksi]	lc	z-Top[ksi]	lc	z-Bot[ksi]	lc
721	M75	1	...	.231	7	.091	2	.047	4	-1.4...	1	1.622	2	.843	5	.79	4
722			...	-.058	8	.085	1	-.048	5	-1.6...	2	1.478	1	-.79	4	-.843	5
723		2	...	.221	7	.05	2	.024	4	.32	2	-.301	1	.18	4	.16	5
724			...	-.048	8	.044	1	-.025	5	.301	1	-.32	2	-.16	5	-.18	4
725		3	...	.21	7	.008	2	0	6	1.1...	2	-.942	1	.509	4	.522	5
726			...	-.037	8	.003	1	-.002	9	.942	1	-1.123	2	-.522	5	-.509	4
727		4	...	.2	7	-.033	2	.022	5	.787	2	-.445	1	.197	4	.244	5
728			...	-.027	8	-.039	1	-.023	4	.445	1	-.787	2	-.244	5	-.197	4
729		5	...	.19	7	-.074	2	.045	5	-.686	2	1.19	1	.676	5	.756	4
730			...	-.017	8	-.08	1	-.046	4	-1.19	1	.686	2	-.756	4	-.676	5
731	M76	1	...	.05	8	.046	8	.009	6	-.016	1	.249	8	.07	9	.015	6
732			...	-.05	6	.04	1	-.035	9	-.249	8	.016	1	-.015	6	-.07	9
733		2	...	.051	8	.044	8	.009	6	.018	1	.209	8	.04	9	.007	6
734			...	-.051	6	.038	1	-.034	9	-.209	8	-.018	1	-.007	6	-.04	9
735		3	...	.051	8	.042	8	.008	6	.051	1	.17	8	.022	8	.011	7
736			...	-.051	6	.036	1	-.033	9	-.17	8	-.051	1	-.011	7	-.022	8
737		4	...	.052	8	.041	8	.007	6	.082	1	.133	8	.025	8	.037	7
738			...	-.052	6	.034	1	-.032	9	-.133	8	-.082	1	-.037	7	-.025	8
739		5	...	.052	8	.039	8	.006	6	.112	1	.098	8	.028	8	.061	7
740			...	-.052	6	.032	1	-.031	9	-.098	8	-.112	1	-.061	7	-.028	8
741	M77	1	...	.052	8	.039	8	.006	6	.112	1	.098	8	.028	8	.061	7
742			...	-.052	6	.032	1	-.031	9	-.098	8	-.112	1	-.061	7	-.028	8
743		2	...	.053	8	.035	8	.004	6	.161	1	.038	8	.03	8	.104	7
744			...	-.053	6	.029	1	-.029	9	-.038	8	-.161	1	-.104	7	-.03	8
745		3	...	.054	8	.032	8	.002	6	.205	1	-.016	8	.029	8	.144	7
746			...	-.054	6	.025	1	-.027	9	.016	8	-.205	1	-.144	7	-.029	8
747		4	...	.055	8	.028	8	0	6	.243	1	-.064	8	.027	6	.182	9
748			...	-.055	6	.022	1	-.025	9	.064	8	-.243	1	-.182	9	-.027	6
749		5	...	.056	8	.025	8	0	1	.275	1	-.107	8	.026	6	.222	9
750			...	-.056	6	.018	1	-.024	9	.107	8	-.275	1	-.222	9	-.026	6
751	M78	1	...	.056	9	.025	8	0	1	.275	1	-.107	8	.026	6	.222	9
752			...	-.056	7	.018	1	-.024	9	.107	8	-.275	1	-.222	9	-.026	6
753		2	...	.061	9	.005	8	0	1	.351	1	-.242	8	0	1	.394	9
754			...	-.061	7	-.001	1	-.015	8	.242	8	-.351	1	-.394	9	0	1
755		3	...	.065	9	-.015	8	0	1	.248	1	-.197	9	0	1	.475	9
756			...	-.065	7	-.021	1	-.025	8	.197	9	-.248	1	-.475	9	0	1
757		4	...	.07	9	-.034	8	.009	7	-.028	8	.036	1	0	1	.518	8
758			...	-.07	7	-.041	1	-.034	8	-.036	1	.028	8	-.518	8	0	1
759		5	...	.075	9	-.054	8	.019	7	-.433	8	.5	1	0	1	.878	8
760			...	-.075	7	-.061	1	-.044	8	-.5	1	.433	8	-.878	8	0	1
761	M79	1	...	0	1	.012	8	.117	7	-.086	7	.246	8	0	1	2.705	7
762			...	0	1	.005	7	0	1	-.246	8	.086	7	-2.705	7	0	1
763		2	...	0	6	.01	8	.116	7	-.082	7	.237	8	0	1	2.601	7
764			...	0	7	.003	7	0	1	-.237	8	.082	7	-2.601	7	0	1
765		3	...	0	6	.008	8	.115	7	-.081	7	.229	8	0	1	2.498	7
766			...	0	7	0	7	0	1	-.229	8	.081	7	-2.498	7	0	1
767		4	...	.001	6	.006	8	.114	7	-.081	7	.223	8	0	1	2.396	7
768			...	-.001	7	-.001	7	0	1	-.223	8	.081	7	-2.396	7	0	1
769		5	...	.002	6	.004	8	.113	7	-.083	7	.218	8	0	1	2.294	7
770			...	-.002	7	-.003	7	0	1	-.218	8	.083	7	-2.294	7	0	1
771	M80	1	...	.002	6	.004	8	.113	7	-.083	7	.218	8	0	1	2.294	7
772			...	-.002	9	-.003	7	0	1	-.218	8	.083	7	-2.294	7	0	1
773		2	...	.003	6	0	8	.111	7	-.092	7	.215	8	0	1	2.076	7
774			...	-.003	9	-.007	7	0	1	-.215	8	.092	7	-2.076	7	0	1
775		3	...	.004	6	-.004	8	.109	7	-.11	7	.219	8	0	1	1.862	7
776			...	-.004	9	-.011	7	0	1	-.219	8	.11	7	-1.862	7	0	1
777		4	...	.005	6	-.009	8	.107	7	-.136	7	.232	8	0	1	1.652	7

Company : **DMJM H&N**
Designer : **Kevin M. Jones - DMJMH&N**
Job Number : **145579-V-CA-005 DBVS Off-Gas Treatment Duct Analysis**

Mar 25, 2006
12:05 PM
Checked By:_____

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[...	Ic	y Shear[..	Jc	z Shear[k...	Ic	y-T...	Ic	y-Bot[ksi]	Ic	z-Top[ksi]	Ic	z-Bot[ksi]	Ic
778			...	-.005	9	-.016	7	0	1	-.232	8	.136	7	-1.652	7	0	1
779		5	...	.006	6	-.013	8	.105	7	-.171	7	.253	8	0	1	1.446	7
780			...	-.006	9	-.02	7	0	1	-.253	8	.171	7	-1.446	7	0	1
781	M81	1	...	.006	8	-.013	8	.105	7	-.171	7	.253	8	0	1	1.446	7
782			...	-.006	9	-.02	7	0	1	-.253	8	.171	7	-1.446	7	0	1
783		2	...	.008	8	-.021	8	.101	7	-.266	7	.32	8	0	1	1.038	7
784			...	-.008	9	-.028	7	0	1	-.32	8	.266	7	-1.038	7	0	1
785		3	...	.01	8	-.03	8	.096	7	-.395	7	.422	8	.081	9	.647	6
786			...	-.01	9	-.037	7	0	1	-.422	8	.395	7	-.647	6	-.081	9
787		4	...	.013	8	-.038	8	.095	3	-.557	6	.558	1	.281	9	.273	6
788			...	-.013	9	-.045	7	0	1	-.558	1	.557	6	-.273	6	-.281	9
789		5	...	.015	8	-.047	8	.099	3	-.726	8	.755	7	.653	3	.071	2
790			...	-.015	9	-.054	7	0	1	-.755	7	.726	8	-.071	2	-.653	3
791	M82	1	...	.19	7	.063	3	.037	4	-.686	2	1.19	1	.676	5	.756	4
792			...	-.017	8	.026	2	-.035	5	-1.19	1	.686	2	-.756	4	-.676	5
793		2	...	.187	2	.039	3	.023	4	-.345	3	.464	2	.223	5	.278	4
794			...	-.014	3	.002	2	-.022	5	-.464	2	.345	3	-.278	4	-.223	5
795		3	...	.187	2	.015	3	.01	4	.087	3	.623	2	.031	7	.06	8
796			...	-.014	3	-.022	2	-.008	5	-.623	2	-.087	3	-.06	8	-.031	7
797		4	...	.187	2	-.009	3	.006	7	.138	3	1.162	2	.067	6	.071	9
798			...	-.014	3	-.046	2	-.004	8	-1.1...	2	-.138	3	-.071	9	-.067	6
799		5	...	.187	2	-.033	3	.019	5	-.191	3	2.081	2	.221	7	.199	8
800			...	-.014	3	-.07	2	-.017	4	-2.0...	2	.191	3	-.199	8	-.221	7
801	M83	1	...	.157	2	.215	2	.019	5	-.191	3	2.081	2	.146	7	.088	8
802			...	.002	3	-.042	3	-.017	4	-2.0...	2	.191	3	-.088	8	-.146	7
803		2	...	.157	2	.21	2	.021	5	-.323	3	1.429	2	.205	7	.141	8
804			...	.004	3	-.044	3	-.02	4	-1.4...	2	.323	3	-.141	8	-.205	7
805		3	...	.158	2	.204	2	.024	5	-.446	8	.806	7	.271	7	.202	8
806			...	.007	3	-.045	3	-.022	4	-.806	7	.446	8	-.202	8	-.271	7
807		4	...	.159	2	.199	2	.026	5	-.17	6	.603	9	.344	7	.27	8
808			...	.01	3	-.047	3	-.025	4	-.603	9	.17	6	-.27	8	-.344	7
809		5	...	.159	2	.194	2	.029	5	.433	2	.746	3	.423	7	.345	8
810			...	.012	3	-.048	3	-.027	4	-.746	3	-.433	2	-.345	8	-.423	7
811	M84	1	...	.181	2	.078	9	-.001	1	.433	2	.746	3	.416	7	.381	8
812			...	-.008	3	.062	6	-.163	7	-.746	3	-.433	2	-.381	8	-.416	7
813		2	...	.158	2	.059	3	.003	8	.566	2	.524	3	.941	5	-.049	1
814			...	-.021	3	.043	2	-.092	7	-.524	3	-.566	2	.049	1	-.941	5
815		3	...	.158	2	.054	3	0	8	.703	2	.333	3	.72	9	-.047	1
816			...	-.021	3	.038	2	-.089	7	-.333	3	-.703	2	.047	1	-.72	9
817		4	...	.158	2	.049	3	0	1	.822	2	.16	3	.663	8	-.044	1
818			...	-.021	3	.033	2	-.087	7	-.16	3	-.822	2	.044	1	-.663	8
819		5	...	.158	2	.044	3	0	1	.924	2	.003	3	.651	8	.018	7
820			...	-.021	3	.028	2	-.084	7	-.003	3	-.924	2	-.018	7	-.651	8
821	M85	1	...	.124	7	.052	7	.042	6	.339	8	.576	7	.043	1	6.314	8
822			...	0	1	.037	8	-.076	9	-.576	7	-.339	8	-6.314	8	-.043	1
823		2	...	.123	7	.049	7	.04	6	.483	8	.367	7	.038	1	6.215	8
824			...	0	1	.033	8	-.073	9	-.367	7	-.483	8	-6.215	8	-.038	1
825		3	...	.121	7	.046	7	.038	6	.613	8	.177	1	.034	1	6.116	8
826			...	0	1	.03	8	-.071	9	-.177	1	-.613	8	-6.116	8	-.034	1
827		4	...	.12	7	.042	7	.035	6	.729	8	.03	1	.029	1	6.224	9
828			...	0	1	.026	8	-.068	9	-.03	1	-.729	8	-6.224	9	-.029	1
829		5	...	.119	7	.039	7	.033	6	.83	8	-.102	1	.024	1	6.501	9
830			...	0	1	.023	8	-.066	9	.102	1	-.83	8	-6.501	9	-.024	1
831	M86	1	...	.104	7	.039	7	.137	2	.659	8	.423	7	.024	1	6.501	9
832			...	0	1	.023	8	0	1	-.423	7	-.659	8	-6.501	9	-.024	1
833		2	...	.099	7	.017	7	.12	5	.98	8	-.313	7	.032	1	3.501	9
834			...	0	1	.001	8	0	1	.313	7	-.98	8	-3.501	9	-.032	1

Company : **DMJM H&N**
Designer : **Kevin M. Jones - DMJMH&N**
Job Number : **145579-V-CA-005 DBVS Off-Gas Treatment Duct Analysis**

Mar 25, 2006
12:05 PM
Checked By:_____

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[...	Ic	y Shear[...	Ic	z Shear[k...	Ic	y-T...	Ic	y-Bot[ksi]	Ic	z-Top[ksi]	Ic	z-Bot[ksi]	Ic
835		3	...	.093	7	-.005	7	.13	9	.725	8	-.472	7	.076	2	.254	3
836			...	0	1	-.021	8	0	1	.472	7	-.725	8	-.254	3	-.076	2
837		4	...	.091	5	-.027	7	.147	3	.111	5	.161	4	3.371	3	-.047	1
838			...	0	1	-.042	8	0	1	-.161	4	-.111	5	.047	1	-3.371	3
839		5	...	.091	5	.025	1	.052	2	-.276	1	1.135	4	5.296	9	-.045	1
840			...	0	1	-.037	7	-.038	3	-1.1...	4	.276	1	.045	1	-5.296	9
841	M87	1	...	.073	7	.025	1	-.002	1	-.091	7	.403	8	5.296	9	-.045	1
842			...	0	1	-.037	7	-.122	9	-.403	8	.091	7	.045	1	-5.296	9
843		2	...	.069	7	.015	1	-.002	1	.027	1	.793	8	3.863	9	-.025	1
844			...	0	1	-.047	7	-.115	9	-.793	8	-.027	1	.025	1	-3.863	9
845		3	...	.066	7	.005	1	-.002	1	.147	1	1.304	8	2.529	8	-.004	1
846			...	0	1	-.057	7	-.108	9	-1.3...	8	-.147	1	.004	1	-2.529	8
847		4	...	.062	7	-.005	1	-.002	1	.146	1	1.983	5	1.448	2	.017	1
848			...	0	1	-.067	7	-.101	9	-1.9...	5	-.146	1	-.017	1	-1.448	2
849		5	...	.059	7	-.015	1	-.002	1	.024	1	2.844	5	.389	2	.037	1
850			...	0	1	-.076	7	-.095	8	-2.8...	5	-.024	1	-.037	1	-.389	2
851	M88	1	...	.065	7	-.015	1	-.002	1	.024	1	2.844	5	.618	2	.002	1
852			...	.002	1	-.052	7	-.095	8	-2.8...	5	-.024	1	-.002	1	-.618	2
853		2	...	.065	7	-.015	1	-.002	1	.02	1	2.858	5	.593	2	.003	1
854			...	.002	1	-.052	7	-.095	8	-2.8...	5	-.02	1	-.003	1	-.593	2
855		3	...	.065	7	-.015	1	-.002	1	.016	1	2.872	5	.569	2	.003	1
856			...	.002	1	-.053	7	-.095	8	-2.8...	5	-.016	1	-.003	1	-.569	2
857		4	...	.065	7	-.015	1	-.002	1	.012	1	2.886	5	.544	2	.004	1
858			...	.002	1	-.053	7	-.095	8	-2.8...	5	-.012	1	-.004	1	-.544	2
859		5	...	.065	7	-.015	1	-.002	1	.008	1	2.901	5	.519	2	.004	1
860			...	.002	1	-.053	7	-.095	8	-2.9...	5	-.008	1	-.004	1	-.519	2
861	M89	1	...	.07	7	.001	2	-.002	1	.008	1	2.901	5	.919	6	-.066	1
862			...	.005	1	-.013	1	-.095	8	-2.9...	5	-.008	1	.066	1	-.919	6
863		2	...	.07	7	0	2	-.002	1	.005	1	2.9	5	.894	6	-.065	1
864			...	.005	1	-.013	1	-.095	8	-2.9	5	-.005	1	.065	1	-.894	6
865		3	...	.07	7	0	2	-.002	1	.001	1	2.901	5	.87	6	-.065	1
866			...	.005	1	-.013	1	-.095	8	-2.9...	5	-.001	1	.065	1	-.87	6
867		4	...	.07	7	0	2	-.002	1	-.002	1	2.901	5	.845	6	-.064	1
868			...	.005	1	-.013	1	-.095	8	-2.9...	5	.002	1	.064	1	-.845	6
869		5	...	.07	7	0	2	-.002	1	-.006	1	2.901	5	.821	6	-.064	1
870			...	.005	1	-.013	1	-.095	8	-2.9...	5	.006	1	.064	1	-.821	6
871	M90	1	...	.065	7	.053	7	-.002	1	-.006	1	2.901	5	1.088	6	-.124	1
872			...	.007	1	-.009	1	-.095	8	-2.9...	5	.006	1	.124	1	-1.088	6
873		2	...	.065	7	.053	7	-.002	1	-.008	1	2.886	5	1.063	6	-.123	1
874			...	.007	1	-.009	1	-.095	8	-2.8...	5	.008	1	.123	1	-1.063	6
875		3	...	.065	7	.052	7	-.002	1	-.011	1	2.872	5	1.039	6	-.123	1
876			...	.007	1	-.009	1	-.095	8	-2.8...	5	.011	1	.123	1	-1.039	6
877		4	...	.065	7	.052	7	-.002	1	-.013	1	2.858	5	1.014	6	-.122	1
878			...	.008	1	-.009	1	-.095	8	-2.8...	5	.013	1	.122	1	-1.014	6
879		5	...	.065	7	.052	7	-.002	1	-.016	1	2.844	5	.989	6	-.122	1
880			...	.008	1	-.009	1	-.095	8	-2.8...	5	.016	1	.122	1	-.989	6
881	M91	1	...	.05	7	.098	7	-.002	1	-.016	1	2.844	5	1.098	6	-.163	1
882			...	.009	1	-.003	1	-.095	8	-2.8...	5	.016	1	.163	1	-1.098	6
883		2	...	.05	7	.097	7	-.002	1	-.016	1	2.818	5	1.074	6	-.162	1
884			...	.009	1	-.003	1	-.095	8	-2.8...	5	.016	1	.162	1	-1.074	6
885		3	...	.05	7	.097	7	-.002	1	-.017	1	2.791	5	1.049	6	-.162	1
886			...	.009	1	-.003	1	-.095	8	-2.7...	5	.017	1	.162	1	-1.049	6
887		4	...	.05	7	.097	7	-.002	1	-.018	1	2.765	5	1.024	6	-.162	1
888			...	.009	1	-.003	1	-.095	8	-2.7...	5	.018	1	.162	1	-1.024	6
889		5	...	.05	7	.097	7	-.002	1	-.019	1	2.739	5	.999	6	-.161	1
890			...	.009	1	-.003	1	-.095	8	-2.7...	5	.019	1	.161	1	-.999	6
891	M92	1	...	.04	7	.019	7	-.002	1	.109	1	1.451	5	2.6	6	-.135	1

Company : **DMJM H&N**
Designer : **Kevin M. Jones - DMJMH&N**
Job Number : **145579-V-CA-005 DBVS Off-Gas Treatment Duct Analysis**

Mar 25, 2006
12:05 PM
Checked By:_____

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[...	lc	y Shear[...	lc	z Shear[k...	lc	y-T...	lc	y-Bot[ksi]	lc	z-Top[ksi]	lc	z-Bot[ksi]	lc
892			...	.009	1	-.005	8	-.145	2	-1.4...	5	-.109	1	.135	1	-2.6	6
893		2	...	.046	7	.018	5	-.002	1	.101	1	1.294	3	.506	4	-.107	1
894			...	.016	1	-.004	4	-.145	2	-1.2...	3	-.101	1	.107	1	-.506	4
895		3	...	.053	7	.022	3	-.002	1	.092	1	1.272	4	.079	1	1.803	2
896			...	.022	1	-.008	2	-.151	4	-1.2...	4	-.092	1	-1.803	2	-.079	1
897		4	...	.059	7	.033	3	-.002	1	.084	1	1.346	2	.05	1	4.056	4
898			...	.028	1	-.019	2	-.162	4	-1.3...	2	-.084	1	-4.056	4	-.05	1
899		5	...	.065	7	.044	3	-.002	1	.076	1	1.715	2	.022	1	6.584	4
900			...	.034	1	-.03	2	-.173	4	-1.7...	2	-.076	1	-6.584	4	-.022	1
901	M93	1	...	.162	2	.044	3	.014	6	.915	2	.01	3	.651	8	.018	7
902			...	-.019	3	.028	2	-.04	9	-.01	3	-.915	2	-.018	7	-.651	8
903		2	...	.154	2	.014	3	0	1	1.1...	2	-.565	3	.465	8	.349	7
904			...	-.01	3	-.002	2	-.022	9	.565	3	-1.169	2	-.349	7	-.465	8
905		3	...	.145	2	-.016	3	0	7	.819	2	-.536	3	.092	4	.492	5
906			...	-.002	3	-.032	2	-.026	8	.536	3	-.819	2	-.492	5	-.092	4
907		4	...	.137	2	-.047	3	.015	5	-.084	8	.145	7	0	1	.588	8
908			...	0	1	-.063	2	-.041	4	-.145	7	.084	8	-.588	8	0	1
909		5	...	.1	2	.04	2	0	6	-.438	1	.647	2	.81	5	.01	1
910			...	-.003	3	.036	1	-.041	9	-.647	2	.438	1	-.01	1	-.81	5
911	M94	1	...	.144	2	.058	2	0	6	-.819	1	1.21	2	1.515	5	.018	1
912			...	-.005	3	.052	1	-.059	9	-1.21	2	.819	1	-.018	1	-1.515	5
913		2	...	.135	2	.029	2	0	1	.127	3	.122	2	.479	6	.012	1
914			...	0	1	.023	1	-.042	9	-.122	2	-.127	3	-.012	1	-.479	6
915		3	...	.126	2	0	2	0	1	.359	3	-.228	2	-.005	1	.604	9
916			...	0	1	-.007	1	-.035	4	.228	2	-.359	3	-.604	9	.005	1
917		4	...	.118	2	-.03	2	0	1	-.137	8	.212	1	.002	1	1.328	4
918			...	0	1	-.036	1	-.053	4	-.212	1	.137	8	-1.328	4	-.002	1
919		5	...	.062	2	.031	4	0	1	-.409	1	.508	8	1.255	5	.002	1
920			...	0	1	.028	1	-.05	5	-.508	8	.409	1	-.002	1	-1.255	5
921	M95	1	...	.134	2	.067	4	0	1	-1.3...	1	1.624	8	4.013	5	.005	1
922			...	0	1	.06	1	-.108	5	-1.6...	8	1.306	1	-.005	1	-4.013	5
923		2	...	.121	2	.037	4	0	1	.336	1	-.262	3	1.215	4	-.001	1
924			...	0	1	.031	1	-.083	5	.262	3	-.336	1	.001	1	-1.215	4
925		3	...	.109	2	.008	4	0	1	1.1...	2	-.9	1	.008	1	1.975	5
926			...	0	1	0	1	-.067	8	.9	1	-1.133	2	-1.975	5	-.008	1
927		4	...	.096	2	-.022	4	0	1	.853	2	-.385	1	.014	1	3.728	8
928			...	0	1	-.029	1	-.088	4	.385	1	-.853	2	-3.728	8	-.014	1
929		5	...	.091	7	.036	5	0	1	.478	2	.143	1	.018	1	6.625	4
930			...	0	1	.033	4	-.195	9	-.143	1	-.478	2	-6.625	4	-.018	1
931	M96	1	...	.115	7	.036	5	.146	2	.042	8	.066	1	.018	1	6.625	4
932			...	0	1	.033	4	0	1	-.066	1	-.042	8	-6.625	4	-.018	1
933		2	...	.108	7	.01	5	.123	9	.736	3	-.609	1	-.006	1	2.801	3
934			...	0	1	.007	4	0	1	.609	1	-.736	3	-2.801	3	.006	1
935		3	...	.102	7	-.017	5	.141	3	.602	3	-.431	1	1.487	5	.029	1
936			...	0	1	-.02	4	0	1	.431	1	-.602	3	-.029	1	-1.487	5
937		4	...	.098	5	-.043	5	.164	3	-.377	5	.597	1	6.251	3	.052	1
938			...	0	1	-.046	4	0	1	-.597	1	.377	5	-.052	1	-6.251	3
939		5	...	.098	5	.016	1	.001	1	0	1	1.681	2	5.069	5	.015	1
940			...	0	1	-.049	5	-.063	3	-1.6...	2	0	1	-.015	1	-5.069	5
941	M97	1	...	.061	5	.016	1	.001	1	-.094	1	.855	5	5.069	5	.015	1
942			...	0	1	-.049	5	-.155	9	-.855	5	.094	1	-.015	1	-5.069	5
943		2	...	.059	5	.009	1	.001	1	.006	1	1.284	5	3.829	5	.007	1
944			...	0	1	-.056	5	-.151	9	-1.2...	5	-.006	1	-.007	1	-3.829	5
945		3	...	.057	5	.002	1	.001	1	.052	1	1.767	5	2.743	2	-.002	1
946			...	0	1	-.063	5	-.146	5	-1.7...	5	-.052	1	.002	1	-2.743	2
947		4	...	.055	5	-.005	1	.001	1	.042	1	2.305	5	1.715	2	-.011	1
948			...	0	1	-.069	5	-.142	5	-2.3...	5	-.042	1	.011	1	-1.715	2

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[...	Ic	y Shear[...	Ic	z Shear[k...	Ic	y-T...	Ic	y-Bot[ksi]	Ic	z-Top[ksi]	Ic	z-Bot[ksi]	Ic
949		5	...	.053	5	-.011	1	.001	1	-.022	1	2.899	5	.653	2	-.019	1
950			...	0	1	-.076	5	-.138	5	-2.8...	5	.022	1	.019	1	-.653	2
951	M98	1	...	.136	7	.038	5	.114	6	.431	8	.192	1	.025	1	9.84	8
952			...	0	1	.033	4	0	1	-.192	1	-.431	8	-9.84	8	-.025	1
953		2	...	.135	7	.034	5	.112	6	.557	8	.05	1	.024	1	9.446	8
954			...	0	1	.03	4	0	1	-.05	1	-.557	8	-9.446	8	-.024	1
955		3	...	.133	7	.031	5	.11	6	.669	8	-.078	1	.022	1	9.051	8
956			...	0	1	.026	4	0	1	.078	1	-.669	8	-9.051	8	-.022	1
957		4	...	.132	7	.028	5	.108	6	.769	8	-.193	1	.021	1	8.654	8
958			...	0	1	.023	4	0	1	.193	1	-.769	8	-8.654	8	-.021	1
959		5	...	.131	7	.025	5	.105	6	.854	8	-.295	1	.02	1	8.502	9
960			...	0	1	.02	4	0	1	.295	1	-.854	8	-8.502	9	-.02	1
961	M99	1	...	.102	7	.025	5	.178	2	.593	8	-.294	7	.02	1	8.502	9
962			...	0	1	.02	4	0	1	.294	7	-.593	8	-8.502	9	-.02	1
963		2	...	.096	7	0	5	.169	9	.815	8	-.657	7	.011	1	3.738	3
964			...	0	1	-.004	4	0	1	.657	7	-.815	8	-3.738	3	-.011	1
965		3	...	.09	7	-.024	5	.186	3	.401	3	-.25	2	1.414	8	-.002	1
966			...	0	1	-.029	4	0	1	.25	2	-.401	3	.002	1	-1.414	8
967		4	...	.085	5	-.048	5	.208	3	-.683	5	.895	4	7.153	3	.007	1
968			...	0	1	-.053	4	0	1	-.895	4	.683	5	-.007	1	-7.153	3
969		5	...	.085	5	.015	1	0	1	-.027	1	1.501	2	5.043	5	.005	1
970			...	0	1	-.035	5	-.08	3	-1.5...	2	.027	1	-.005	1	-5.043	5
971	M100	1	...	.046	7	.015	1	0	1	-.023	1	.536	8	5.043	5	.005	1
972			...	0	1	-.035	5	-.152	9	-.536	8	.023	1	-.005	1	-5.043	5
973		2	...	.043	7	.009	1	0	1	.075	1	.822	5	3.83	5	.005	1
974			...	0	1	-.041	5	-.147	9	-.822	5	-.075	1	-.005	1	-3.83	5
975		3	...	.041	7	.002	1	0	1	.117	1	1.188	5	2.745	2	.005	1
976			...	0	1	-.048	5	-.142	9	-1.1...	5	-.117	1	-.005	1	-2.745	2
977		4	...	.039	7	-.005	1	0	1	.105	1	1.608	5	1.742	2	.005	1
978			...	0	1	-.055	5	-.138	5	-1.6...	5	-.105	1	-.005	1	-1.742	2
979		5	...	.036	7	-.012	1	0	1	.038	1	2.084	5	.704	2	.005	1
980			...	0	1	-.062	5	-.134	5	-2.0...	5	-.038	1	-.005	1	-.704	2
981	M101	1	...	.129	7	.047	7	.105	6	.319	8	.561	7	.016	1	9.279	8
982			...	0	1	.035	8	0	1	-.561	7	-.319	8	-9.279	8	-.016	1
983		2	...	.128	7	.044	7	.103	6	.452	8	.377	7	.014	1	8.913	8
984			...	0	1	.031	8	0	1	-.377	7	-.452	8	-8.913	8	-.014	1
985		3	...	.127	7	.041	7	.1	6	.571	8	.206	7	.012	1	8.546	8
986			...	0	1	.028	8	0	1	-.206	7	-.571	8	-8.546	8	-.012	1
987		4	...	.126	7	.037	7	.098	6	.676	8	.049	7	.011	1	8.176	8
988			...	0	1	.025	8	0	1	-.049	7	-.676	8	-8.176	8	-.011	1
989		5	...	.125	7	.034	7	.096	6	.769	8	-.095	7	.009	1	7.804	8
990			...	0	1	.021	8	0	1	.095	7	-.769	8	-7.804	8	-.009	1
991	M102	1	...	.1	7	.034	7	.161	2	.553	8	.252	7	.009	1	7.804	8
992			...	0	1	.021	8	0	1	-.252	7	-.553	8	-7.804	8	-.009	1
993		2	...	.094	7	.01	7	.153	8	.822	8	-.392	7	-.002	1	3.578	3
994			...	0	1	-.003	8	0	1	.392	7	-.822	8	-3.578	3	.002	1
995		3	...	.088	7	-.014	7	.171	3	.452	3	-.268	2	1.121	3	.013	1
996			...	0	1	-.027	8	0	1	.268	2	-.452	3	-.013	1	-1.121	3
997		4	...	.083	5	-.038	7	.193	3	-.419	5	.762	4	6.437	3	.025	1
998			...	0	1	-.051	8	0	1	-.762	4	.419	5	-.025	1	-6.437	3
999		5	...	.083	5	.015	1	0	1	-.005	1	1.358	6	4.59	5	.007	1
1000			...	0	1	-.04	7	-.07	3	-1.3...	6	.005	1	-.007	1	-4.59	5
1001	M103	1	...	.049	7	.015	1	0	1	-.032	1	.535	8	4.59	5	.007	1
1002			...	0	1	-.04	7	-.14	9	-.535	8	.032	1	-.007	1	-4.59	5
1003		2	...	.047	7	.008	1	0	1	.061	1	.846	5	3.476	5	.004	1
1004			...	0	1	-.047	7	-.135	9	-.846	5	-.061	1	-.004	1	-3.476	5
1005		3	...	.044	7	.001	1	0	1	.099	1	1.254	7	2.501	2	.001	1

Company : **DMJM H&N**
Designer : **Kevin M. Jones - DMJMH&N**
Job Number : **145579-V-CA-005 DBVS Off-Gas Treatment Duct Analysis**

Mar 25, 2006
12:05 PM
Checked By:_____

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[...	lc	y Shear[...	lc	z Shear[k...	lc	y-T...	lc	y-Bot[ksi]	lc	z-Top[ksi]	lc	z-Bot[ksi]	lc
1006			...	0	1	-.054	7	-.131	9	-1.2...	7	-.099	1	-.001	1	-2.501	2
1007		4	...	.042	7	-.005	1	0	1	.082	1	1.721	7	1.597	2	-.002	1
1008			...	0	1	-.061	7	-.126	5	-1.7...	7	-.082	1	.002	1	-1.597	2
1009		5	...	.04	7	-.012	1	0	1	.01	1	2.242	7	.659	2	-.005	1
1010			...	0	1	-.067	7	-.122	5	-2.2...	7	-.01	1	.005	1	-.659	2
1011	M104	1	...	.045	7	-.012	1	0	1	.01	1	2.242	7	.921	2	0	1
1012			...	.001	1	-.05	7	-.122	5	-2.2...	7	-.01	1	0	1	-.921	2
1013		2	...	.045	7	-.012	1	0	1	.007	1	2.255	7	.89	2	0	1
1014			...	.001	1	-.051	7	-.122	5	-2.2...	7	-.007	1	0	1	-.89	2
1015		3	...	.045	7	-.012	1	0	1	.003	1	2.269	7	.858	2	0	1
1016			...	.001	1	-.051	7	-.122	5	-2.2...	7	-.003	1	0	1	-.858	2
1017		4	...	.045	7	-.012	1	0	1	0	1	2.283	7	.826	2	0	1
1018			...	.002	1	-.051	7	-.122	5	-2.2...	7	0	1	0	1	-.826	2
1019		5	...	.045	7	-.013	1	0	1	-.003	1	2.297	7	.794	2	0	1
1020			...	.002	1	-.051	7	-.121	5	-2.2...	7	.003	1	0	1	-.794	2
1021	M105	1	...	.052	7	-.011	1	0	1	-.003	1	2.297	7	1.214	2	.009	1
1022			...	.004	1	-.024	4	-.121	5	-2.2...	7	.003	1	-.009	1	-1.214	2
1023		2	...	.052	7	-.011	1	0	1	-.006	1	2.3	7	1.182	2	.009	1
1024			...	.004	1	-.025	4	-.121	5	-2.3	7	.006	1	-.009	1	-1.182	2
1025		3	...	.052	7	-.011	1	0	1	-.009	1	2.304	7	1.15	2	.009	1
1026			...	.004	1	-.025	4	-.121	5	-2.3...	7	.009	1	-.009	1	-1.15	2
1027		4	...	.052	7	-.011	1	0	1	-.012	1	2.308	7	1.118	2	.009	1
1028			...	.004	1	-.025	4	-.121	5	-2.3...	7	.012	1	-.009	1	-1.118	2
1029		5	...	.052	7	-.011	1	0	1	-.015	1	2.312	7	1.086	2	.009	1
1030			...	.004	1	-.025	4	-.121	5	-2.3...	7	.015	1	-.009	1	-1.086	2
1031	M106	1	...	.05	7	.027	5	0	1	-.015	1	2.312	7	1.33	2	.017	1
1032			...	.006	1	-.007	1	-.121	5	-2.3...	7	.015	1	-.017	1	-1.33	2
1033		2	...	.05	7	.026	5	0	1	-.017	1	2.304	7	1.298	2	.017	1
1034			...	.006	1	-.007	1	-.121	5	-2.3...	7	.017	1	-.017	1	-1.298	2
1035		3	...	.05	7	.026	5	0	1	-.019	1	2.297	7	1.266	2	.017	1
1036			...	.006	1	-.008	1	-.121	5	-2.2...	7	.019	1	-.017	1	-1.266	2
1037		4	...	.051	7	.026	5	0	1	-.021	1	2.29	7	1.234	2	.017	1
1038			...	.006	1	-.008	1	-.121	5	-2.29	7	.021	1	-.017	1	-1.234	2
1039		5	...	.051	7	.026	5	0	1	-.024	1	2.283	7	1.202	2	.017	1
1040			...	.006	1	-.008	1	-.12	5	-2.2...	7	.024	1	-.017	1	-1.202	2
1041	M107	1	...	.042	7	.062	7	0	1	-.024	1	2.283	7	1.254	2	.022	1
1042			...	.007	1	-.002	1	-.12	5	-2.2...	7	.024	1	-.022	1	-1.254	2
1043		2	...	.042	7	.062	7	0	1	-.024	1	2.266	7	1.221	2	.022	1
1044			...	.007	1	-.002	1	-.12	5	-2.2...	7	.024	1	-.022	1	-1.221	2
1045		3	...	.042	7	.062	7	0	1	-.025	1	2.25	7	1.189	2	.022	1
1046			...	.008	1	-.002	1	-.12	5	-2.25	7	.025	1	-.022	1	-1.189	2
1047		4	...	.042	7	.062	7	0	1	-.026	1	2.233	7	1.157	2	.022	1
1048			...	.008	1	-.003	1	-.12	5	-2.2...	7	.026	1	-.022	1	-1.157	2
1049		5	...	.042	7	.062	7	0	1	-.026	1	2.216	7	1.124	2	.022	1
1050			...	.008	1	-.003	1	-.12	5	-2.2...	7	.026	1	-.022	1	-1.124	2
1051	M108	1	...	.035	7	0	1	0	1	-.035	1	.895	5	2.267	2	-.002	1
1052			...	.008	1	-.05	8	-.139	5	-.895	5	.035	1	.002	1	-2.267	2
1053		2	...	.042	7	0	1	0	1	-.025	1	1.412	8	.392	4	0	1
1054			...	.014	1	-.048	4	-.133	2	-1.4...	8	.025	1	0	1	-.392	4
1055		3	...	.048	7	0	1	0	1	-.016	1	2.133	2	-.002	1	1.766	2
1056			...	.02	1	-.057	2	-.135	6	-2.1...	2	.016	1	-1.766	2	.002	1
1057		4	...	.054	7	0	1	0	1	-.006	1	3.079	2	-.004	1	3.782	2
1058			...	.027	1	-.068	2	-.145	4	-3.0...	2	.006	1	-3.782	2	.004	1
1059		5	...	.06	7	0	1	0	1	.003	1	4.189	2	-.006	1	5.934	4
1060			...	.033	1	-.079	2	-.156	4	-4.1...	2	-.003	1	-5.934	4	.006	1
1061	M109	1	...	.042	7	-.011	1	0	1	.038	1	2.084	5	1.004	2	.002	1
1062			...	.001	1	-.049	3	-.134	5	-2.0...	5	-.038	1	-.002	1	-1.004	2

Company : **DMJM H&N**
Designer : **Kevin M. Jones - DMJMH&N**
Job Number : **145579-V-CA-005 DBVS Off-Gas Treatment Duct Analysis**

Mar 25, 2006
12:05 PM
Checked By:_____

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[...	Ic	y Shear[..	Ic	z Shear[k...	Ic	y-T...	Ic	y-Bot[ksi]	Ic	z-Top[ksi]	Ic	z-Bot[ksi]	Ic
1063		2	...	.041	7	-.012	1	0	1	.035	1	2.096	5	.969	2	.002	1
1064			...	.001	1	-.049	3	-.134	5	-2.0...	5	-.035	1	-.002	1	-.969	2
1065		3	...	.041	7	-.012	1	0	1	.032	1	2.109	5	.934	2	.002	1
1066			...	.001	1	-.049	3	-.134	5	-2.1...	5	-.032	1	-.002	1	-.934	2
1067		4	...	.041	7	-.012	1	0	1	.029	1	2.122	5	.899	2	.002	1
1068			...	.001	1	-.05	3	-.134	5	-2.1...	5	-.029	1	-.002	1	-.899	2
1069		5	...	.041	7	-.012	1	0	1	.025	1	2.134	5	.863	2	.002	1
1070			...	.001	1	-.05	3	-.134	5	-2.1...	5	-.025	1	-.002	1	-.863	2
1071	M110	1	...	.047	5	-.01	1	0	1	.025	1	2.134	5	1.347	2	-.005	1
1072			...	.004	1	-.025	8	-.134	5	-2.1...	5	-.025	1	.005	1	-1.347	2
1073		2	...	.047	5	-.011	1	0	1	.023	1	2.138	5	1.312	2	-.005	1
1074			...	.004	1	-.025	8	-.133	5	-2.1...	5	-.023	1	.005	1	-1.312	2
1075		3	...	.047	5	-.011	1	0	1	.02	1	2.141	5	1.277	2	-.005	1
1076			...	.004	1	-.025	8	-.133	5	-2.1...	5	-.02	1	.005	1	-1.277	2
1077		4	...	.047	5	-.011	1	0	1	.017	1	2.145	5	1.242	2	-.005	1
1078			...	.004	1	-.025	8	-.133	5	-2.1...	5	-.017	1	.005	1	-1.242	2
1079		5	...	.047	5	-.011	1	0	1	.014	1	2.148	5	1.206	2	-.005	1
1080			...	.004	1	-.025	8	-.133	5	-2.1...	5	-.014	1	.005	1	-1.206	2
1081	M111	1	...	.046	5	.024	7	0	1	.014	1	2.148	5	1.496	2	-.01	1
1082			...	.006	1	-.007	1	-.133	5	-2.1...	5	-.014	1	.01	1	-1.496	2
1083		2	...	.046	5	.024	7	0	1	.012	1	2.142	5	1.46	2	-.01	1
1084			...	.006	1	-.007	1	-.133	5	-2.1...	5	-.012	1	.01	1	-1.46	2
1085		3	...	.046	5	.023	7	0	1	.01	1	2.135	5	1.425	2	-.01	1
1086			...	.006	1	-.008	1	-.133	5	-2.1...	5	-.01	1	.01	1	-1.425	2
1087		4	...	.046	5	.023	7	0	1	.008	1	2.129	5	1.39	2	-.01	1
1088			...	.006	1	-.008	1	-.133	5	-2.1...	5	-.008	1	.01	1	-1.39	2
1089		5	...	.046	5	.023	7	0	1	.006	1	2.123	5	1.354	2	-.01	1
1090			...	.006	1	-.008	1	-.132	5	-2.1...	5	-.006	1	.01	1	-1.354	2
1091	M112	1	...	.038	5	.057	5	0	1	.006	1	2.123	5	1.427	2	-.015	1
1092			...	.007	1	-.003	1	-.132	5	-2.1...	5	-.006	1	.015	1	-1.427	2
1093		2	...	.039	5	.057	5	0	1	.005	1	2.107	5	1.391	2	-.015	1
1094			...	.007	1	-.003	1	-.132	5	-2.1...	5	-.005	1	.015	1	-1.391	2
1095		3	...	.039	5	.056	5	0	1	.004	1	2.092	5	1.356	2	-.015	1
1096			...	.007	1	-.003	1	-.132	5	-2.0...	5	-.004	1	.015	1	-1.356	2
1097		4	...	.039	5	.056	5	0	1	.003	1	2.077	5	1.32	2	-.015	1
1098			...	.007	1	-.003	1	-.132	5	-2.0...	5	-.003	1	.015	1	-1.32	2
1099		5	...	.039	5	.056	5	0	1	.003	1	2.062	5	1.284	2	-.015	1
1100			...	.007	1	-.003	1	-.132	5	-2.0...	5	-.003	1	.015	1	-1.284	2
1101	M113	1	...	.033	5	0	1	0	1	.013	1	.731	3	2.293	2	-.009	1
1102			...	.008	1	-.059	8	-.143	5	-.731	3	-.013	1	.009	1	-2.293	2
1103		2	...	.039	5	0	1	0	1	.014	1	1.474	8	.363	4	-.008	1
1104			...	.014	1	-.058	2	-.138	2	-1.4...	8	-.014	1	.008	1	-.363	4
1105		3	...	.045	5	0	1	0	1	.015	1	2.304	4	.007	1	1.891	2
1106			...	.02	1	-.069	2	-.142	4	-2.3...	4	-.015	1	-1.891	2	-.007	1
1107		4	...	.051	5	0	1	0	1	.016	1	3.434	2	.006	1	3.983	2
1108			...	.026	1	-.08	2	-.153	4	-3.4...	2	-.016	1	-3.983	2	-.006	1
1109		5	...	.058	5	0	1	0	1	.018	1	4.73	2	.005	1	6.302	4
1110			...	.033	1	-.091	2	-.163	4	-4.73	2	-.018	1	-6.302	4	-.005	1
1111	M114	1	...	.059	5	-.011	1	.001	1	-.022	1	2.899	5	.94	2	0	1
1112			...	.002	1	-.057	3	-.138	5	-2.8...	5	.022	1	0	1	-.94	2
1113		2	...	.059	5	-.011	1	.001	1	-.025	1	2.913	5	.904	2	-.001	1
1114			...	.002	1	-.057	3	-.137	5	-2.9...	5	.025	1	.001	1	-.904	2
1115		3	...	.059	5	-.011	1	.001	1	-.029	1	2.928	5	.868	2	-.001	1
1116			...	.002	1	-.057	3	-.137	5	-2.9...	5	.029	1	.001	1	-.868	2
1117		4	...	.059	5	-.012	1	.001	1	-.032	1	2.943	5	.832	2	-.002	1
1118			...	.002	1	-.057	3	-.137	5	-2.9...	5	.032	1	.002	1	-.832	2
1119		5	...	.059	5	-.012	1	.001	1	-.035	1	2.958	5	.796	2	-.002	1

Company : **DMJM H&N**
Designer : **Kevin M. Jones - DMJMH&N**
Job Number : **145579-V-CA-005 DBVS Off-Gas Treatment Duct Analysis**

Mar 25, 2006
12:05 PM
Checked By:_____

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[...	Ic	y Shear[...	Ic	z Shear[k...	Ic	y-T...	Ic	y-Bot[ksi]	Ic	z-Top[ksi]	Ic	z-Bot[ksi]	Ic
1120			...	.002	1	-.057	3	-.137	5	-2.9...	5	.035	1	.002	1	-.796	2
1121	M115	1	...	.065	5	-.006	5	.001	1	-.035	1	2.958	5	1.263	2	.034	1
1122			...	.004	1	-.021	4	-.137	5	-2.9...	5	.035	1	-.034	1	-1.263	2
1123		2	...	.065	5	-.006	5	.001	1	-.037	1	2.959	5	1.227	2	.034	1
1124			...	.004	1	-.021	4	-.137	5	-2.9...	5	.037	1	-.034	1	-1.227	2
1125		3	...	.065	5	-.006	5	.001	1	-.04	1	2.961	5	1.191	2	.034	1
1126			...	.004	1	-.021	4	-.137	5	-2.9...	5	.04	1	-.034	1	-1.191	2
1127		4	...	.065	5	-.007	5	.001	1	-.043	1	2.963	5	1.155	2	.034	1
1128			...	.004	1	-.021	4	-.137	5	-2.9...	5	.043	1	-.034	1	-1.155	2
1129		5	...	.065	5	-.007	5	.001	1	-.046	1	2.965	5	1.119	2	.033	1
1130			...	.004	1	-.021	4	-.136	5	-2.9...	5	.046	1	-.033	1	-1.119	2
1131	M116	1	...	.061	5	.043	5	.001	1	-.046	1	2.965	5	1.404	2	.065	1
1132			...	.006	1	-.006	1	-.136	5	-2.9...	5	.046	1	-.065	1	-1.404	2
1133		2	...	.061	5	.043	5	.001	1	-.047	1	2.953	5	1.368	2	.064	1
1134			...	.006	1	-.007	1	-.136	5	-2.9...	5	.047	1	-.064	1	-1.368	2
1135		3	...	.061	5	.043	5	.001	1	-.049	1	2.941	5	1.332	2	.064	1
1136			...	.006	1	-.007	1	-.136	5	-2.9...	5	.049	1	-.064	1	-1.332	2
1137		4	...	.061	5	.043	5	.001	1	-.051	1	2.93	5	1.296	2	.064	1
1138			...	.006	1	-.007	1	-.136	5	-2.93	5	.051	1	-.064	1	-1.296	2
1139		5	...	.062	5	.042	5	.001	1	-.053	1	2.918	5	1.259	2	.063	1
1140			...	.006	1	-.007	1	-.136	5	-2.9...	5	.053	1	-.063	1	-1.259	2
1141	M117	1	...	.049	5	.086	5	.001	1	-.053	1	2.918	5	1.342	2	.085	1
1142			...	.007	1	-.002	1	-.136	5	-2.9...	5	.053	1	-.085	1	-1.342	2
1143		2	...	.049	5	.086	5	.001	1	-.053	1	2.895	5	1.306	2	.085	1
1144			...	.007	1	-.002	1	-.136	5	-2.8...	5	.053	1	-.085	1	-1.306	2
1145		3	...	.049	5	.086	5	.001	1	-.054	1	2.871	5	1.269	2	.084	1
1146			...	.007	1	-.002	1	-.136	5	-2.8...	5	.054	1	-.084	1	-1.269	2
1147		4	...	.049	5	.086	5	.001	1	-.054	1	2.848	5	1.233	2	.084	1
1148			...	.007	1	-.002	1	-.135	5	-2.8...	5	.054	1	-.084	1	-1.233	2
1149		5	...	.049	5	.086	5	.001	1	-.055	1	2.825	5	1.196	2	.084	1
1150			...	.007	1	-.002	1	-.135	5	-2.8...	5	.055	1	-.084	1	-1.196	2
1151	M118	1	...	.04	5	.001	1	0	1	-.102	1	1.26	5	2.735	5	.025	1
1152			...	.007	1	-.043	4	-.169	5	-1.26	5	.102	1	-.025	1	-2.735	5
1153		2	...	.046	5	.001	1	0	1	-.081	1	1.726	8	.436	8	.023	1
1154			...	.014	1	-.043	4	-.16	2	-1.7...	8	.081	1	-.023	1	-.436	8
1155		3	...	.052	5	.001	1	0	1	-.06	1	2.343	4	-.022	1	2.129	2
1156			...	.02	1	-.052	2	-.163	6	-2.3...	4	.06	1	-2.129	2	.022	1
1157		4	...	.059	5	.001	1	0	1	-.039	1	3.174	2	-.02	1	4.544	2
1158			...	.026	1	-.063	2	-.171	4	-3.1...	2	.039	1	-4.544	2	.02	1
1159		5	...	.065	5	.008	3	0	1	-.018	1	4.211	2	-.018	1	7.121	6
1160			...	.032	1	-.074	2	-.182	4	-4.2...	2	.018	1	-7.121	6	.018	1
1161	M119	1	...	.002	6	-.007	6	.003	8	7.3...	7	-.153	1	.013	1	1.021	8
1162			...	-.002	7	-.007	2	-.003	6	.153	1	-7.378	7	-1.021	8	-.013	1
1163		2	...	.002	6	-.008	6	.004	8	7.3...	7	-.149	1	.013	1	1.019	8
1164			...	-.002	7	-.008	2	-.004	6	.149	1	-7.374	7	-1.019	8	-.013	1
1165		3	...	.002	6	-.009	6	.005	8	7.37	7	-.144	1	.013	1	1.017	8
1166			...	-.002	7	-.009	2	-.005	6	.144	1	-7.37	7	-1.017	8	-.013	1
1167		4	...	.003	6	-.01	6	.005	8	7.3...	7	-.139	1	.013	1	1.014	8
1168			...	-.003	7	-.01	2	-.005	6	.139	1	-7.364	7	-1.014	8	-.013	1
1169		5	...	.003	6	-.012	6	.006	8	7.3...	7	-.133	1	.013	1	1.011	8
1170			...	-.003	7	-.012	2	-.006	6	.133	1	-7.358	7	-1.011	8	-.013	1
1171	M120	1	...	0	1	0	1	0	1	1.5...	8	-.563	1	.74	6	.011	9
1172			...	0	1	0	1	0	1	.563	1	-1.506	8	-.011	9	-.74	6
1173		2	...	0	8	-.002	1	0	7	1.5...	8	-.562	1	.739	6	.01	9
1174			...	0	6	-.002	1	0	6	.562	1	-1.505	8	-.01	9	-.739	6
1175		3	...	0	8	-.004	1	.002	7	1.5...	8	-.56	1	.738	6	.009	9
1176			...	0	6	-.004	1	-.002	6	.56	1	-1.503	8	-.009	9	-.738	6

Company : **DMJM H&N**
Designer : **Kevin M. Jones - DMJMH&N**
Job Number : **145579-V-CA-005 DBVS Off-Gas Treatment Duct Analysis**

Mar 25, 2006
12:05 PM
Checked By:_____

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[...	Ic	y Shear[...	Ic	z Shear[k...	Ic	y-T...	Ic	y-Bot[ksi]	Ic	z-Top[ksi]	Ic	z-Bot[ksi]	Ic
1177		4	...	.001	8	-.006	1	.003	7	1.4...	8	-.556	1	.736	6	.007	9
1178			...	-.001	6	-.006	1	-.003	6	.556	1	-1.498	8	-.007	9	-.736	6
1179		5	...	.002	8	-.008	1	.004	7	1.4...	8	-.55	1	.733	6	.004	9
1180			...	-.002	6	-.008	1	-.004	6	.55	1	-1.492	8	-.004	9	-.733	6
1181	M121	1	...	.002	8	-.008	2	.004	9	1.4...	8	-.55	1	.733	6	.004	9
1182			...	-.002	6	-.008	5	-.004	8	.55	1	-1.492	8	-.004	9	-.733	6
1183		2	...	.007	8	-.03	2	.015	9	1.3	8	-.357	1	.637	6	0	1
1184			...	-.007	6	-.03	5	-.015	8	.357	1	-1.3	8	0	1	-.637	6
1185		3	...	.013	8	-.052	2	.026	9	.879	8	.063	1	.437	4	0	1
1186			...	-.013	6	-.052	5	-.026	8	-.063	1	-.879	8	0	1	-.437	4
1187		4	...	.019	8	-.074	2	.037	9	.232	8	.711	1	.63	7	0	1
1188			...	-.019	6	-.074	5	-.037	8	-.711	1	-.232	8	0	1	-.63	7
1189		5	...	.024	8	-.096	1	.048	9	-.644	8	1.587	1	1.068	7	.339	8
1190			...	-.024	6	-.096	4	-.048	6	-1.5...	1	.644	8	-.339	8	-1.068	7
1191	M122	1	...	.011	8	.443	6	.126	6	-.782	1	7.439	6	.013	1	1.063	6
1192			...	-.011	7	.066	1	0	1	-7.4...	6	.782	1	-1.063	6	-.013	1
1193		2	...	.013	8	.436	6	.122	6	-.554	1	5.821	6	.01	1	.77	7
1194			...	-.013	7	.058	1	0	1	-5.8...	6	.554	1	-.77	7	-.01	1
1195		3	...	.015	8	.428	6	.118	6	-.356	1	4.232	6	.007	1	.612	7
1196			...	-.015	7	.05	1	0	1	-4.2...	6	.356	1	-.612	7	-.007	1
1197		4	...	.017	8	.42	6	.114	6	-.187	1	2.672	6	.258	6	.479	9
1198			...	-.017	7	.042	1	0	1	-2.6...	6	.187	1	-.479	9	-.258	6
1199		5	...	.019	8	.412	6	.111	8	-.048	1	1.146	7	.669	6	.36	9
1200			...	-.019	7	.034	1	0	1	-1.1...	7	.048	1	-.36	9	-.669	6
1201	M123	1	...	.14	6	.034	1	-.009	1	3.4...	6	.331	1	4.992	9	-.282	1
1202			...	0	1	-.083	6	-.164	9	-.331	1	-3.446	6	.282	1	-4.992	9
1203		2	...	.143	6	.019	1	-.009	1	2.5...	6	.059	1	3.365	9	-.193	1
1204			...	0	1	-.098	6	-.156	9	-.059	1	-2.525	6	.193	1	-3.365	9
1205		3	...	.147	6	.004	1	-.009	1	1.4...	6	-.059	1	1.815	9	-.104	1
1206			...	0	1	-.114	6	-.151	7	.059	1	-1.449	6	.104	1	-1.815	9
1207		4	...	.151	6	-.011	1	-.009	1	.218	6	-.022	1	.398	8	-.015	1
1208			...	0	1	-.129	6	-.159	7	.022	1	-.218	6	.015	1	-.398	8
1209		5	...	.155	6	-.027	1	-.009	1	-.17	1	1.167	6	-.075	1	1.566	7
1210			...	0	1	-.144	6	-.166	7	-1.1...	6	.17	1	-1.566	7	.075	1
1211	M124	1	...	.155	6	.06	6	.083	7	-.17	1	1.167	6	-.075	1	1.566	7
1212			...	0	1	.029	1	-.012	8	-1.1...	6	.17	1	-1.566	7	.075	1
1213		2	...	.159	6	.045	6	.076	7	.042	1	.654	6	-.052	1	.95	9
1214			...	0	1	.014	1	-.005	8	-.654	6	-.042	1	-.95	9	.052	1
1215		3	...	.162	6	.03	6	.068	7	.11	1	.284	6	-.029	1	.893	8
1216			...	0	1	0	1	.002	1	-.284	6	-.11	1	-.893	8	.029	1
1217		4	...	.166	6	.016	6	.061	7	.034	1	.064	7	.551	7	.831	8
1218			...	0	1	-.015	1	.002	1	-.064	7	-.034	1	-.831	8	-.551	7
1219		5	...	.17	6	0	6	.054	7	.022	6	.186	1	1.112	7	.696	8
1220			...	0	1	-.03	1	.002	1	-.186	1	-.022	6	-.696	8	-1.112	7

Envelope Member Section Torsion

	Member	Sec		Torque[k...	Ic	Torsion Shear[ksi]	Ic	y-y Warp...	Ic	z-z Warp Shear[ksi]	Ic	z-Top W...	Ic	z-Bot Wa...	Ic
1	M1	1	max	.25	1	.209	1	NC		NC		NC		NC	
2			min	-.536	8	-.448	8	NC		NC		NC		NC	
3		2	max	.25	1	.209	1	NC		NC		NC		NC	
4			min	-.536	8	-.448	8	NC		NC		NC		NC	
5		3	max	.25	1	.209	1	NC		NC		NC		NC	
6			min	-.536	8	-.448	8	NC		NC		NC		NC	
7		4	max	.25	1	.209	1	NC		NC		NC		NC	
8			min	-.536	8	-.448	8	NC		NC		NC		NC	
9		5	max	.25	1	.209	1	NC		NC		NC		NC	

Envelope Member Section Torsion (Continued)

	Member	Sec		Torque[k...	lc	Torsion Shear[ksi]	lc	y-y Warp...	lc	z-z Warp Shear[ksi]	lc	z-Top W...	lc	z-Bot Wa...	lc
10			min	-.536	8	-.448	8	NC		NC		NC		NC	
11	M2	1	max	.244	1	.204	1	NC		NC		NC		NC	
12			min	-.419	9	-.35	9	NC		NC		NC		NC	
13		2	max	.244	1	.204	1	NC		NC		NC		NC	
14			min	-.419	9	-.35	9	NC		NC		NC		NC	
15		3	max	.244	1	.204	1	NC		NC		NC		NC	
16			min	-.419	9	-.35	9	NC		NC		NC		NC	
17		4	max	.244	1	.204	1	NC		NC		NC		NC	
18			min	-.419	9	-.35	9	NC		NC		NC		NC	
19		5	max	.244	1	.204	1	NC		NC		NC		NC	
20			min	-.419	9	-.35	9	NC		NC		NC		NC	
21	M3	1	max	.203	1	.17	1	NC		NC		NC		NC	
22			min	-.149	9	-.125	9	NC		NC		NC		NC	
23		2	max	.203	1	.17	1	NC		NC		NC		NC	
24			min	-.149	9	-.125	9	NC		NC		NC		NC	
25		3	max	.203	1	.17	1	NC		NC		NC		NC	
26			min	-.149	9	-.125	9	NC		NC		NC		NC	
27		4	max	.203	1	.17	1	NC		NC		NC		NC	
28			min	-.149	9	-.125	9	NC		NC		NC		NC	
29		5	max	.203	1	.17	1	NC		NC		NC		NC	
30			min	-.149	9	-.125	9	NC		NC		NC		NC	
31	M4	1	max	.221	6	.185	6	NC		NC		NC		NC	
32			min	.132	1	.111	1	NC		NC		NC		NC	
33		2	max	.221	6	.185	6	NC		NC		NC		NC	
34			min	.132	1	.111	1	NC		NC		NC		NC	
35		3	max	.221	6	.185	6	NC		NC		NC		NC	
36			min	.132	1	.111	1	NC		NC		NC		NC	
37		4	max	.221	6	.185	6	NC		NC		NC		NC	
38			min	.132	1	.111	1	NC		NC		NC		NC	
39		5	max	.221	6	.185	6	NC		NC		NC		NC	
40			min	.132	1	.111	1	NC		NC		NC		NC	
41	M5	1	max	.478	8	.4	8	NC		NC		NC		NC	
42			min	.041	1	.034	1	NC		NC		NC		NC	
43		2	max	.478	8	.4	8	NC		NC		NC		NC	
44			min	.041	1	.034	1	NC		NC		NC		NC	
45		3	max	.478	8	.4	8	NC		NC		NC		NC	
46			min	.041	1	.034	1	NC		NC		NC		NC	
47		4	max	.478	8	.4	8	NC		NC		NC		NC	
48			min	.041	1	.034	1	NC		NC		NC		NC	
49		5	max	.478	8	.4	8	NC		NC		NC		NC	
50			min	.041	1	.034	1	NC		NC		NC		NC	
51	M6	1	max	.591	8	.494	8	NC		NC		NC		NC	
52			min	-.008	1	-.006	1	NC		NC		NC		NC	
53		2	max	.591	8	.494	8	NC		NC		NC		NC	
54			min	-.008	1	-.006	1	NC		NC		NC		NC	
55		3	max	.591	8	.494	8	NC		NC		NC		NC	
56			min	-.008	1	-.006	1	NC		NC		NC		NC	
57		4	max	.591	8	.494	8	NC		NC		NC		NC	
58			min	-.008	1	-.006	1	NC		NC		NC		NC	
59		5	max	.591	8	.494	8	NC		NC		NC		NC	
60			min	-.008	1	-.006	1	NC		NC		NC		NC	
61	M7	1	max	.481	8	.403	8	NC		NC		NC		NC	
62			min	.041	1	.034	1	NC		NC		NC		NC	
63		2	max	.481	8	.403	8	NC		NC		NC		NC	
64			min	.041	1	.034	1	NC		NC		NC		NC	
65		3	max	.481	8	.403	8	NC		NC		NC		NC	
66			min	.041	1	.034	1	NC		NC		NC		NC	

Envelope Member Section Torsion (Continued)

	Member	Sec		Torque[k...	lc	Torsion Shear[ksi]	lc	y-y Warp...	lc	z-z Warp Shear[ksi]	lc	z-Top W...	lc	z-Bot Wa...	lc
67		4	max	.481	8	.403	8	NC		NC		NC		NC	
68			min	.041	1	.034	1	NC		NC		NC		NC	
69		5	max	.481	8	.403	8	NC		NC		NC		NC	
70			min	.041	1	.034	1	NC		NC		NC		NC	
71	M8	1	max	.216	8	.181	8	NC		NC		NC		NC	
72			min	.132	1	.111	1	NC		NC		NC		NC	
73		2	max	.216	8	.181	8	NC		NC		NC		NC	
74			min	.132	1	.111	1	NC		NC		NC		NC	
75		3	max	.216	8	.181	8	NC		NC		NC		NC	
76			min	.132	1	.111	1	NC		NC		NC		NC	
77		4	max	.216	8	.181	8	NC		NC		NC		NC	
78			min	.132	1	.111	1	NC		NC		NC		NC	
79		5	max	.216	8	.181	8	NC		NC		NC		NC	
80			min	.132	1	.111	1	NC		NC		NC		NC	
81	M9	1	max	.203	1	.17	1	NC		NC		NC		NC	
82			min	-.125	7	-.105	7	NC		NC		NC		NC	
83		2	max	.203	1	.17	1	NC		NC		NC		NC	
84			min	-.125	7	-.105	7	NC		NC		NC		NC	
85		3	max	.203	1	.17	1	NC		NC		NC		NC	
86			min	-.125	7	-.105	7	NC		NC		NC		NC	
87		4	max	.203	1	.17	1	NC		NC		NC		NC	
88			min	-.125	7	-.105	7	NC		NC		NC		NC	
89		5	max	.203	1	.17	1	NC		NC		NC		NC	
90			min	-.125	7	-.105	7	NC		NC		NC		NC	
91	M10	1	max	.244	1	.204	1	NC		NC		NC		NC	
92			min	-.381	7	-.319	7	NC		NC		NC		NC	
93		2	max	.244	1	.204	1	NC		NC		NC		NC	
94			min	-.381	7	-.319	7	NC		NC		NC		NC	
95		3	max	.244	1	.204	1	NC		NC		NC		NC	
96			min	-.381	7	-.319	7	NC		NC		NC		NC	
97		4	max	.244	1	.204	1	NC		NC		NC		NC	
98			min	-.381	7	-.319	7	NC		NC		NC		NC	
99		5	max	.244	1	.204	1	NC		NC		NC		NC	
100			min	-.381	7	-.319	7	NC		NC		NC		NC	
101	M11	1	max	.25	1	.209	1	NC		NC		NC		NC	
102			min	-.495	6	-.414	6	NC		NC		NC		NC	
103		2	max	.25	1	.209	1	NC		NC		NC		NC	
104			min	-.495	6	-.414	6	NC		NC		NC		NC	
105		3	max	.25	1	.209	1	NC		NC		NC		NC	
106			min	-.495	6	-.414	6	NC		NC		NC		NC	
107		4	max	.25	1	.209	1	NC		NC		NC		NC	
108			min	-.495	6	-.414	6	NC		NC		NC		NC	
109		5	max	.25	1	.209	1	NC		NC		NC		NC	
110			min	-.495	6	-.414	6	NC		NC		NC		NC	
111	M12	1	max	.251	1	.21	1	NC		NC		NC		NC	
112			min	-.352	6	-.295	6	NC		NC		NC		NC	
113		2	max	.251	1	.21	1	NC		NC		NC		NC	
114			min	-.352	6	-.295	6	NC		NC		NC		NC	
115		3	max	.251	1	.21	1	NC		NC		NC		NC	
116			min	-.352	6	-.295	6	NC		NC		NC		NC	
117		4	max	.251	1	.21	1	NC		NC		NC		NC	
118			min	-.352	6	-.295	6	NC		NC		NC		NC	
119		5	max	.251	1	.21	1	NC		NC		NC		NC	
120			min	-.352	6	-.295	6	NC		NC		NC		NC	
121	M13	1	max	.215	1	.18	1	NC		NC		NC		NC	
122			min	-.139	6	-.117	6	NC		NC		NC		NC	
123		2	max	.215	1	.18	1	NC		NC		NC		NC	

Company : DMJM H&N
Designer : Kevin M. Jones - DMJMH&N
Job Number : 145579-V-CA-005 DBVS Off-Gas Treatment Duct Analysis

Mar 25, 2006
12:05 PM
Checked By:_____

Envelope Member Section Torsion (Continued)

	Member	Sec		Torque[k...	lc	Torsion Shear[ksi]	lc	y-y Warp...	lc	z-z Warp Shear[ksi]	lc	z-Top W...	lc	z-Bot Wa...	lc
124			min	-.139	6	-.117	6	NC		NC		NC		NC	
125		3	max	.215	1	.18	1	NC		NC		NC		NC	
126			min	-.139	6	-.117	6	NC		NC		NC		NC	
127		4	max	.215	1	.18	1	NC		NC		NC		NC	
128			min	-.139	6	-.117	6	NC		NC		NC		NC	
129		5	max	.215	1	.18	1	NC		NC		NC		NC	
130			min	-.139	6	-.117	6	NC		NC		NC		NC	
131	M14	1	max	.139	1	.116	1	NC		NC		NC		NC	
132			min	-.011	6	-.009	6	NC		NC		NC		NC	
133		2	max	.139	1	.116	1	NC		NC		NC		NC	
134			min	-.011	6	-.009	6	NC		NC		NC		NC	
135		3	max	.139	1	.116	1	NC		NC		NC		NC	
136			min	-.011	6	-.009	6	NC		NC		NC		NC	
137		4	max	.139	1	.116	1	NC		NC		NC		NC	
138			min	-.011	6	-.009	6	NC		NC		NC		NC	
139		5	max	.139	1	.116	1	NC		NC		NC		NC	
140			min	-.011	6	-.009	6	NC		NC		NC		NC	
141	M15	1	max	.034	1	.029	1	NC		NC		NC		NC	
142			min	.013	6	.011	6	NC		NC		NC		NC	
143		2	max	.034	1	.029	1	NC		NC		NC		NC	
144			min	.013	6	.011	6	NC		NC		NC		NC	
145		3	max	.034	1	.029	1	NC		NC		NC		NC	
146			min	.013	6	.011	6	NC		NC		NC		NC	
147		4	max	.034	1	.029	1	NC		NC		NC		NC	
148			min	.013	6	.011	6	NC		NC		NC		NC	
149		5	max	.034	1	.029	1	NC		NC		NC		NC	
150			min	.013	6	.011	6	NC		NC		NC		NC	
151	M16	1	max	-.022	9	-.019	9	NC		NC		NC		NC	
152			min	-.028	6	-.024	6	NC		NC		NC		NC	
153		2	max	-.022	9	-.019	9	NC		NC		NC		NC	
154			min	-.028	6	-.024	6	NC		NC		NC		NC	
155		3	max	-.022	9	-.019	9	NC		NC		NC		NC	
156			min	-.028	6	-.024	6	NC		NC		NC		NC	
157		4	max	-.022	9	-.019	9	NC		NC		NC		NC	
158			min	-.028	6	-.024	6	NC		NC		NC		NC	
159		5	max	-.022	9	-.019	9	NC		NC		NC		NC	
160			min	-.028	6	-.024	6	NC		NC		NC		NC	
161	M17	1	max	-.022	9	-.019	9	NC		NC		NC		NC	
162			min	-.028	6	-.024	6	NC		NC		NC		NC	
163		2	max	-.022	9	-.019	9	NC		NC		NC		NC	
164			min	-.028	6	-.024	6	NC		NC		NC		NC	
165		3	max	-.022	9	-.019	9	NC		NC		NC		NC	
166			min	-.028	6	-.024	6	NC		NC		NC		NC	
167		4	max	-.022	9	-.019	9	NC		NC		NC		NC	
168			min	-.028	6	-.024	6	NC		NC		NC		NC	
169		5	max	-.022	9	-.019	9	NC		NC		NC		NC	
170			min	-.028	6	-.024	6	NC		NC		NC		NC	
171	M18	1	max	-.022	9	-.019	9	NC		NC		NC		NC	
172			min	-.028	6	-.024	6	NC		NC		NC		NC	
173		2	max	-.022	9	-.019	9	NC		NC		NC		NC	
174			min	-.028	6	-.024	6	NC		NC		NC		NC	
175		3	max	-.022	9	-.019	9	NC		NC		NC		NC	
176			min	-.028	6	-.024	6	NC		NC		NC		NC	
177		4	max	-.022	9	-.019	9	NC		NC		NC		NC	
178			min	-.028	6	-.024	6	NC		NC		NC		NC	
179		5	max	-.022	9	-.019	9	NC		NC		NC		NC	
180			min	-.028	6	-.024	6	NC		NC		NC		NC	

Envelope Member Section Torsion (Continued)

	Member	Sec		Torque[k...	lc	Torsion Shear[ksi]	lc	y-y Warp...	lc	z-z Warp Shear[ksi]	lc	z-Top W...	lc	z-Bot Wa...	lc
181	M19	1	max	-.022	9	-.019	9	NC		NC		NC		NC	
182			min	-.028	6	-.024	6	NC		NC		NC		NC	
183		2	max	-.022	9	-.019	9	NC		NC		NC		NC	
184			min	-.028	6	-.024	6	NC		NC		NC		NC	
185		3	max	-.022	9	-.019	9	NC		NC		NC		NC	
186			min	-.028	6	-.024	6	NC		NC		NC		NC	
187		4	max	-.022	9	-.019	9	NC		NC		NC		NC	
188			min	-.028	6	-.024	6	NC		NC		NC		NC	
189		5	max	-.022	9	-.019	9	NC		NC		NC		NC	
190			min	-.028	6	-.024	6	NC		NC		NC		NC	
191	M20	1	max	-.022	9	-.019	9	NC		NC		NC		NC	
192			min	-.028	6	-.024	6	NC		NC		NC		NC	
193		2	max	-.022	9	-.019	9	NC		NC		NC		NC	
194			min	-.028	6	-.024	6	NC		NC		NC		NC	
195		3	max	-.022	9	-.019	9	NC		NC		NC		NC	
196			min	-.028	6	-.024	6	NC		NC		NC		NC	
197		4	max	-.022	9	-.019	9	NC		NC		NC		NC	
198			min	-.028	6	-.024	6	NC		NC		NC		NC	
199		5	max	-.022	9	-.019	9	NC		NC		NC		NC	
200			min	-.028	6	-.024	6	NC		NC		NC		NC	
201	M21	1	max	-.022	9	-.019	9	NC		NC		NC		NC	
202			min	-.028	6	-.024	6	NC		NC		NC		NC	
203		2	max	-.022	9	-.019	9	NC		NC		NC		NC	
204			min	-.028	6	-.024	6	NC		NC		NC		NC	
205		3	max	-.022	9	-.019	9	NC		NC		NC		NC	
206			min	-.028	6	-.024	6	NC		NC		NC		NC	
207		4	max	-.022	9	-.019	9	NC		NC		NC		NC	
208			min	-.028	6	-.024	6	NC		NC		NC		NC	
209		5	max	-.022	9	-.019	9	NC		NC		NC		NC	
210			min	-.028	6	-.024	6	NC		NC		NC		NC	
211	M22	1	max	-.013	9	-.011	9	NC		NC		NC		NC	
212			min	-.052	6	-.043	6	NC		NC		NC		NC	
213		2	max	-.013	9	-.011	9	NC		NC		NC		NC	
214			min	-.052	6	-.043	6	NC		NC		NC		NC	
215		3	max	-.013	9	-.011	9	NC		NC		NC		NC	
216			min	-.052	6	-.043	6	NC		NC		NC		NC	
217		4	max	-.013	9	-.011	9	NC		NC		NC		NC	
218			min	-.052	6	-.043	6	NC		NC		NC		NC	
219		5	max	-.013	9	-.011	9	NC		NC		NC		NC	
220			min	-.052	6	-.043	6	NC		NC		NC		NC	
221	M23	1	max	.008	7	.007	7	NC		NC		NC		NC	
222			min	-.095	8	-.08	8	NC		NC		NC		NC	
223		2	max	.008	7	.007	7	NC		NC		NC		NC	
224			min	-.095	8	-.08	8	NC		NC		NC		NC	
225		3	max	.008	7	.007	7	NC		NC		NC		NC	
226			min	-.095	8	-.08	8	NC		NC		NC		NC	
227		4	max	.008	7	.007	7	NC		NC		NC		NC	
228			min	-.095	8	-.08	8	NC		NC		NC		NC	
229		5	max	.008	7	.007	7	NC		NC		NC		NC	
230			min	-.095	8	-.08	8	NC		NC		NC		NC	
231	M24	1	max	.029	7	.024	7	NC		NC		NC		NC	
232			min	-.129	8	-.108	8	NC		NC		NC		NC	
233		2	max	.029	7	.024	7	NC		NC		NC		NC	
234			min	-.129	8	-.108	8	NC		NC		NC		NC	
235		3	max	.029	7	.024	7	NC		NC		NC		NC	
236			min	-.129	8	-.108	8	NC		NC		NC		NC	
237		4	max	.029	7	.024	7	NC		NC		NC		NC	

Company : **DMJM H&N**
Designer : **Kevin M. Jones - DMJMH&N**
Job Number : **145579-V-CA-005 DBVS Off-Gas Treatment Duct Analysis**

Mar 25, 2006
12:05 PM
Checked By:_____

Envelope Member Section Torsion (Continued)

	Member	Sec		Torque[k...	lc	Torsion Shear[ksi]	lc	y-y Warp...	lc	z-z Warp Shear[ksi]	lc	z-Top W...	lc	z-Bot Wa...	lc
238			min	-.129	8	-.108	8	NC		NC		NC		NC	
239		5	max	.029	7	.024	7	NC		NC		NC		NC	
240			min	-.129	8	-.108	8	NC		NC		NC		NC	
241	M25	1	max	.045	7	.037	7	NC		NC		NC		NC	
242			min	-.147	8	-.123	8	NC		NC		NC		NC	
243		2	max	.045	7	.037	7	NC		NC		NC		NC	
244			min	-.147	8	-.123	8	NC		NC		NC		NC	
245		3	max	.045	7	.037	7	NC		NC		NC		NC	
246			min	-.147	8	-.123	8	NC		NC		NC		NC	
247		4	max	.045	7	.037	7	NC		NC		NC		NC	
248			min	-.147	8	-.123	8	NC		NC		NC		NC	
249		5	max	.045	7	.037	7	NC		NC		NC		NC	
250			min	-.147	8	-.123	8	NC		NC		NC		NC	
251	M26	1	max	.049	7	.041	7	NC		NC		NC		NC	
252			min	-.151	8	-.126	8	NC		NC		NC		NC	
253		2	max	.049	7	.041	7	NC		NC		NC		NC	
254			min	-.151	8	-.126	8	NC		NC		NC		NC	
255		3	max	.049	7	.041	7	NC		NC		NC		NC	
256			min	-.151	8	-.126	8	NC		NC		NC		NC	
257		4	max	.049	7	.041	7	NC		NC		NC		NC	
258			min	-.151	8	-.126	8	NC		NC		NC		NC	
259		5	max	.049	7	.041	7	NC		NC		NC		NC	
260			min	-.151	8	-.126	8	NC		NC		NC		NC	
261	M27	1	max	.049	7	.041	7	NC		NC		NC		NC	
262			min	-.151	8	-.126	8	NC		NC		NC		NC	
263		2	max	.049	7	.041	7	NC		NC		NC		NC	
264			min	-.151	8	-.126	8	NC		NC		NC		NC	
265		3	max	.049	7	.041	7	NC		NC		NC		NC	
266			min	-.151	8	-.126	8	NC		NC		NC		NC	
267		4	max	.049	7	.041	7	NC		NC		NC		NC	
268			min	-.151	8	-.126	8	NC		NC		NC		NC	
269		5	max	.049	7	.041	7	NC		NC		NC		NC	
270			min	-.151	8	-.126	8	NC		NC		NC		NC	
271	M28	1	max	.049	7	.041	7	NC		NC		NC		NC	
272			min	-.151	8	-.126	8	NC		NC		NC		NC	
273		2	max	.049	7	.041	7	NC		NC		NC		NC	
274			min	-.151	8	-.126	8	NC		NC		NC		NC	
275		3	max	.049	7	.041	7	NC		NC		NC		NC	
276			min	-.151	8	-.126	8	NC		NC		NC		NC	
277		4	max	.049	7	.041	7	NC		NC		NC		NC	
278			min	-.151	8	-.126	8	NC		NC		NC		NC	
279		5	max	.049	7	.041	7	NC		NC		NC		NC	
280			min	-.151	8	-.126	8	NC		NC		NC		NC	
281	M29	1	max	.049	7	.041	7	NC		NC		NC		NC	
282			min	-.151	8	-.126	8	NC		NC		NC		NC	
283		2	max	.049	7	.041	7	NC		NC		NC		NC	
284			min	-.151	8	-.126	8	NC		NC		NC		NC	
285		3	max	.049	7	.041	7	NC		NC		NC		NC	
286			min	-.151	8	-.126	8	NC		NC		NC		NC	
287		4	max	.049	7	.041	7	NC		NC		NC		NC	
288			min	-.151	8	-.126	8	NC		NC		NC		NC	
289		5	max	.049	7	.041	7	NC		NC		NC		NC	
290			min	-.151	8	-.126	8	NC		NC		NC		NC	
291	M30	1	max	.049	7	.041	7	NC		NC		NC		NC	
292			min	-.151	8	-.126	8	NC		NC		NC		NC	
293		2	max	.049	7	.041	7	NC		NC		NC		NC	
294			min	-.151	8	-.126	8	NC		NC		NC		NC	

Company : DMJM H&N
Designer : Kevin M. Jones - DMJMH&N
Job Number : 145579-V-CA-005 DBVS Off-Gas Treatment Duct Analysis

Mar 25, 2006
12:05 PM
Checked By:_____

Envelope Member Section Torsion (Continued)

	Member	Sec		Torque[k...	lc	Torsion Shear[ksi]	lc	y-y Warp...	lc	z-z Warp Shear[ksi]	lc	z-Top W...	lc	z-Bot Wa...	lc
295		3	max	.049	7	.041	7	NC		NC		NC		NC	
296			min	-.151	8	-.126	8	NC		NC		NC		NC	
297		4	max	.049	7	.041	7	NC		NC		NC		NC	
298			min	-.151	8	-.126	8	NC		NC		NC		NC	
299		5	max	.049	7	.041	7	NC		NC		NC		NC	
300			min	-.151	8	-.126	8	NC		NC		NC		NC	
301	M31	1	max	.049	7	.041	7	NC		NC		NC		NC	
302			min	-.151	8	-.126	8	NC		NC		NC		NC	
303		2	max	.049	7	.041	7	NC		NC		NC		NC	
304			min	-.151	8	-.126	8	NC		NC		NC		NC	
305		3	max	.049	7	.041	7	NC		NC		NC		NC	
306			min	-.151	8	-.126	8	NC		NC		NC		NC	
307		4	max	.049	7	.041	7	NC		NC		NC		NC	
308			min	-.151	8	-.126	8	NC		NC		NC		NC	
309		5	max	.049	7	.041	7	NC		NC		NC		NC	
310			min	-.151	8	-.126	8	NC		NC		NC		NC	
311	M32	1	max	.049	7	.041	7	NC		NC		NC		NC	
312			min	-.151	8	-.126	8	NC		NC		NC		NC	
313		2	max	.049	7	.041	7	NC		NC		NC		NC	
314			min	-.151	8	-.126	8	NC		NC		NC		NC	
315		3	max	.049	7	.041	7	NC		NC		NC		NC	
316			min	-.151	8	-.126	8	NC		NC		NC		NC	
317		4	max	.049	7	.041	7	NC		NC		NC		NC	
318			min	-.151	8	-.126	8	NC		NC		NC		NC	
319		5	max	.049	7	.041	7	NC		NC		NC		NC	
320			min	-.151	8	-.126	8	NC		NC		NC		NC	
321	M33	1	max	.049	7	.041	7	NC		NC		NC		NC	
322			min	-.151	8	-.126	8	NC		NC		NC		NC	
323		2	max	.049	7	.041	7	NC		NC		NC		NC	
324			min	-.151	8	-.126	8	NC		NC		NC		NC	
325		3	max	.049	7	.041	7	NC		NC		NC		NC	
326			min	-.151	8	-.126	8	NC		NC		NC		NC	
327		4	max	.049	7	.041	7	NC		NC		NC		NC	
328			min	-.151	8	-.126	8	NC		NC		NC		NC	
329		5	max	.049	7	.041	7	NC		NC		NC		NC	
330			min	-.151	8	-.126	8	NC		NC		NC		NC	
331	M36	1	max	.049	7	.041	7	NC		NC		NC		NC	
332			min	-.151	8	-.126	8	NC		NC		NC		NC	
333		2	max	.049	7	.041	7	NC		NC		NC		NC	
334			min	-.151	8	-.126	8	NC		NC		NC		NC	
335		3	max	.049	7	.041	7	NC		NC		NC		NC	
336			min	-.151	8	-.126	8	NC		NC		NC		NC	
337		4	max	.049	7	.041	7	NC		NC		NC		NC	
338			min	-.151	8	-.126	8	NC		NC		NC		NC	
339		5	max	.049	7	.041	7	NC		NC		NC		NC	
340			min	-.151	8	-.126	8	NC		NC		NC		NC	
341	M37	1	max	.906	7	.759	7	NC		NC		NC		NC	
342			min	-.034	1	-.028	1	NC		NC		NC		NC	
343		2	max	.906	7	.759	7	NC		NC		NC		NC	
344			min	-.034	1	-.028	1	NC		NC		NC		NC	
345		3	max	.906	7	.759	7	NC		NC		NC		NC	
346			min	-.034	1	-.028	1	NC		NC		NC		NC	
347		4	max	.906	7	.759	7	NC		NC		NC		NC	
348			min	-.034	1	-.028	1	NC		NC		NC		NC	
349		5	max	.906	7	.759	7	NC		NC		NC		NC	
350			min	-.034	1	-.028	1	NC		NC		NC		NC	
351	M38	1	max	.907	7	.759	7	NC		NC		NC		NC	

Company : **DMJM H&N**
Designer : **Kevin M. Jones - DMJMH&N**
Job Number : **145579-V-CA-005 DBVS Off-Gas Treatment Duct Analysis**

Mar 25, 2006
12:05 PM
Checked By:_____

Envelope Member Section Torsion (Continued)

	Member	Sec		Torque[k...	lc	Torsion Shear[ksi]	lc	y-y Warp...	lc	z-z Warp Shear[ksi]	lc	z-Top W...	lc	z-Bot Wa...	lc
352			min	-.034	1	-.028	1	NC		NC		NC		NC	
353		2	max	.907	7	.759	7	NC		NC		NC		NC	
354			min	-.034	1	-.028	1	NC		NC		NC		NC	
355		3	max	.907	7	.759	7	NC		NC		NC		NC	
356			min	-.034	1	-.028	1	NC		NC		NC		NC	
357		4	max	.907	7	.759	7	NC		NC		NC		NC	
358			min	-.034	1	-.028	1	NC		NC		NC		NC	
359		5	max	.907	7	.759	7	NC		NC		NC		NC	
360			min	-.034	1	-.028	1	NC		NC		NC		NC	
361	M39	1	max	.995	7	.833	7	NC		NC		NC		NC	
362			min	-.031	1	-.026	1	NC		NC		NC		NC	
363		2	max	.995	7	.833	7	NC		NC		NC		NC	
364			min	-.031	1	-.026	1	NC		NC		NC		NC	
365		3	max	.995	7	.833	7	NC		NC		NC		NC	
366			min	-.031	1	-.026	1	NC		NC		NC		NC	
367		4	max	.995	7	.833	7	NC		NC		NC		NC	
368			min	-.031	1	-.026	1	NC		NC		NC		NC	
369		5	max	.995	7	.833	7	NC		NC		NC		NC	
370			min	-.031	1	-.026	1	NC		NC		NC		NC	
371	M40	1	max	1.103	9	.923	9	NC		NC		NC		NC	
372			min	-.02	1	-.017	1	NC		NC		NC		NC	
373		2	max	1.103	9	.923	9	NC		NC		NC		NC	
374			min	-.02	1	-.017	1	NC		NC		NC		NC	
375		3	max	1.103	9	.923	9	NC		NC		NC		NC	
376			min	-.02	1	-.017	1	NC		NC		NC		NC	
377		4	max	1.103	9	.923	9	NC		NC		NC		NC	
378			min	-.02	1	-.017	1	NC		NC		NC		NC	
379		5	max	1.103	9	.923	9	NC		NC		NC		NC	
380			min	-.02	1	-.017	1	NC		NC		NC		NC	
381	M41	1	max	1.161	9	.972	9	NC		NC		NC		NC	
382			min	-.005	1	-.004	1	NC		NC		NC		NC	
383		2	max	1.161	9	.972	9	NC		NC		NC		NC	
384			min	-.005	1	-.004	1	NC		NC		NC		NC	
385		3	max	1.161	9	.972	9	NC		NC		NC		NC	
386			min	-.005	1	-.004	1	NC		NC		NC		NC	
387		4	max	1.161	9	.972	9	NC		NC		NC		NC	
388			min	-.005	1	-.004	1	NC		NC		NC		NC	
389		5	max	1.161	9	.972	9	NC		NC		NC		NC	
390			min	-.005	1	-.004	1	NC		NC		NC		NC	
391	M42	1	max	1.091	9	.913	9	NC		NC		NC		NC	
392			min	.013	1	.011	1	NC		NC		NC		NC	
393		2	max	1.091	9	.913	9	NC		NC		NC		NC	
394			min	.013	1	.011	1	NC		NC		NC		NC	
395		3	max	1.091	9	.913	9	NC		NC		NC		NC	
396			min	.013	1	.011	1	NC		NC		NC		NC	
397		4	max	1.091	9	.913	9	NC		NC		NC		NC	
398			min	.013	1	.011	1	NC		NC		NC		NC	
399		5	max	1.091	9	.913	9	NC		NC		NC		NC	
400			min	.013	1	.011	1	NC		NC		NC		NC	
401	M43	1	max	1.015	9	.85	9	NC		NC		NC		NC	
402			min	.021	1	.018	1	NC		NC		NC		NC	
403		2	max	1.015	9	.85	9	NC		NC		NC		NC	
404			min	.021	1	.018	1	NC		NC		NC		NC	
405		3	max	1.015	9	.85	9	NC		NC		NC		NC	
406			min	.021	1	.018	1	NC		NC		NC		NC	
407		4	max	1.015	9	.85	9	NC		NC		NC		NC	
408			min	.021	1	.018	1	NC		NC		NC		NC	

Envelope Member Section Torsion (Continued)

	Member	Sec		Torque[k...	lc	Torsion Shear[ksi]	lc	y-y Warp...	lc	z-z Warp Shear[ksi]	lc	z-Top W...	lc	z-Bot Wa...	lc
409		5	max	1.015	9	.85	9	NC		NC		NC		NC	
410			min	.021	1	.018	1	NC		NC		NC		NC	
411	M44	1	max	.645	9	.54	9	NC		NC		NC		NC	
412			min	0	1	0	1	NC		NC		NC		NC	
413		2	max	.645	9	.54	9	NC		NC		NC		NC	
414			min	0	1	0	1	NC		NC		NC		NC	
415		3	max	.645	9	.54	9	NC		NC		NC		NC	
416			min	0	1	0	1	NC		NC		NC		NC	
417		4	max	.645	9	.54	9	NC		NC		NC		NC	
418			min	0	1	0	1	NC		NC		NC		NC	
419		5	max	.645	9	.54	9	NC		NC		NC		NC	
420			min	0	1	0	1	NC		NC		NC		NC	
421	M45	1	max	.613	8	.514	8	NC		NC		NC		NC	
422			min	-.432	7	-.362	7	NC		NC		NC		NC	
423		2	max	.613	8	.514	8	NC		NC		NC		NC	
424			min	-.432	7	-.362	7	NC		NC		NC		NC	
425		3	max	.613	8	.514	8	NC		NC		NC		NC	
426			min	-.432	7	-.362	7	NC		NC		NC		NC	
427		4	max	.613	8	.514	8	NC		NC		NC		NC	
428			min	-.432	7	-.362	7	NC		NC		NC		NC	
429		5	max	.613	8	.514	8	NC		NC		NC		NC	
430			min	-.432	7	-.362	7	NC		NC		NC		NC	
431	M46	1	max	.525	8	.44	8	NC		NC		NC		NC	
432			min	-1.31	7	-1.097	7	NC		NC		NC		NC	
433		2	max	.525	8	.44	8	NC		NC		NC		NC	
434			min	-1.31	7	-1.097	7	NC		NC		NC		NC	
435		3	max	.525	8	.44	8	NC		NC		NC		NC	
436			min	-1.31	7	-1.097	7	NC		NC		NC		NC	
437		4	max	.525	8	.44	8	NC		NC		NC		NC	
438			min	-1.31	7	-1.097	7	NC		NC		NC		NC	
439		5	max	.525	8	.44	8	NC		NC		NC		NC	
440			min	-1.31	7	-1.097	7	NC		NC		NC		NC	
441	M47	1	max	.356	8	.298	8	NC		NC		NC		NC	
442			min	-2.046	7	-1.713	7	NC		NC		NC		NC	
443		2	max	.356	8	.298	8	NC		NC		NC		NC	
444			min	-2.046	7	-1.713	7	NC		NC		NC		NC	
445		3	max	.356	8	.298	8	NC		NC		NC		NC	
446			min	-2.046	7	-1.713	7	NC		NC		NC		NC	
447		4	max	.356	8	.298	8	NC		NC		NC		NC	
448			min	-2.046	7	-1.713	7	NC		NC		NC		NC	
449		5	max	.356	8	.298	8	NC		NC		NC		NC	
450			min	-2.046	7	-1.713	7	NC		NC		NC		NC	
451	M48	1	max	.248	8	.208	8	NC		NC		NC		NC	
452			min	-2.332	7	-1.952	7	NC		NC		NC		NC	
453		2	max	.248	8	.208	8	NC		NC		NC		NC	
454			min	-2.332	7	-1.952	7	NC		NC		NC		NC	
455		3	max	.248	8	.208	8	NC		NC		NC		NC	
456			min	-2.332	7	-1.952	7	NC		NC		NC		NC	
457		4	max	.248	8	.208	8	NC		NC		NC		NC	
458			min	-2.332	7	-1.952	7	NC		NC		NC		NC	
459		5	max	.248	8	.208	8	NC		NC		NC		NC	
460			min	-2.332	7	-1.952	7	NC		NC		NC		NC	
461	M49	1	max	0	1	0	1	NC		NC		NC		NC	
462			min	0	1	0	1	NC		NC		NC		NC	
463		2	max	0	1	0	1	NC		NC		NC		NC	
464			min	0	1	0	1	NC		NC		NC		NC	
465		3	max	0	1	0	1	NC		NC		NC		NC	

Company : DMJM H&N
Designer : Kevin M. Jones - DMJMH&N
Job Number : 145579-V-CA-005 DBVS Off-Gas Treatment Duct Analysis

Mar 25, 2006
12:05 PM
Checked By:_____

Envelope Member Section Torsion (Continued)

	Member	Sec		Torque[k...	lc	Torsion Shear[ksi]	lc	y-y Warp...	lc	z-z Warp Shear[ksi]	lc	z-Top W...	lc	z-Bot Wa...	lc
466			min	0	1	0	1	NC		NC		NC		NC	
467		4	max	0	1	0	1	NC		NC		NC		NC	
468			min	0	1	0	1	NC		NC		NC		NC	
469		5	max	0	1	0	1	NC		NC		NC		NC	
470			min	0	1	0	1	NC		NC		NC		NC	
471	M50	1	max	0	1	0	1	NC		NC		NC		NC	
472			min	0	1	0	1	NC		NC		NC		NC	
473		2	max	0	1	0	1	NC		NC		NC		NC	
474			min	0	1	0	1	NC		NC		NC		NC	
475		3	max	0	1	0	1	NC		NC		NC		NC	
476			min	0	1	0	1	NC		NC		NC		NC	
477		4	max	0	1	0	1	NC		NC		NC		NC	
478			min	0	1	0	1	NC		NC		NC		NC	
479		5	max	0	1	0	1	NC		NC		NC		NC	
480			min	0	1	0	1	NC		NC		NC		NC	
481	M51	1	max	0	1	0	1	NC		NC		NC		NC	
482			min	0	1	0	1	NC		NC		NC		NC	
483		2	max	0	1	0	1	NC		NC		NC		NC	
484			min	0	1	0	1	NC		NC		NC		NC	
485		3	max	0	1	0	1	NC		NC		NC		NC	
486			min	0	1	0	1	NC		NC		NC		NC	
487		4	max	0	1	0	1	NC		NC		NC		NC	
488			min	0	1	0	1	NC		NC		NC		NC	
489		5	max	0	1	0	1	NC		NC		NC		NC	
490			min	0	1	0	1	NC		NC		NC		NC	
491	M52	1	max	0	1	0	1	NC		NC		NC		NC	
492			min	0	1	0	1	NC		NC		NC		NC	
493		2	max	0	1	0	1	NC		NC		NC		NC	
494			min	0	1	0	1	NC		NC		NC		NC	
495		3	max	0	1	0	1	NC		NC		NC		NC	
496			min	0	1	0	1	NC		NC		NC		NC	
497		4	max	0	1	0	1	NC		NC		NC		NC	
498			min	0	1	0	1	NC		NC		NC		NC	
499		5	max	0	1	0	1	NC		NC		NC		NC	
500			min	0	1	0	1	NC		NC		NC		NC	
501	M53	1	max	.345	9	.289	9	NC		NC		NC		NC	
502			min	-.474	6	-.397	6	NC		NC		NC		NC	
503		2	max	.345	9	.289	9	NC		NC		NC		NC	
504			min	-.474	6	-.397	6	NC		NC		NC		NC	
505		3	max	.345	9	.289	9	NC		NC		NC		NC	
506			min	-.474	6	-.397	6	NC		NC		NC		NC	
507		4	max	.345	9	.289	9	NC		NC		NC		NC	
508			min	-.474	6	-.397	6	NC		NC		NC		NC	
509		5	max	.345	9	.289	9	NC		NC		NC		NC	
510			min	-.474	6	-.397	6	NC		NC		NC		NC	
511	M54	1	max	.438	9	.366	9	NC		NC		NC		NC	
512			min	-.553	6	-.463	6	NC		NC		NC		NC	
513		2	max	.438	9	.366	9	NC		NC		NC		NC	
514			min	-.553	6	-.463	6	NC		NC		NC		NC	
515		3	max	.438	9	.366	9	NC		NC		NC		NC	
516			min	-.553	6	-.463	6	NC		NC		NC		NC	
517		4	max	.438	9	.366	9	NC		NC		NC		NC	
518			min	-.553	6	-.463	6	NC		NC		NC		NC	
519		5	max	.438	9	.366	9	NC		NC		NC		NC	
520			min	-.553	6	-.463	6	NC		NC		NC		NC	
521	M55	1	max	.497	9	.416	9	NC		NC		NC		NC	
522			min	-.644	6	-.539	6	NC		NC		NC		NC	

Company : **DMJM H&N**
Designer : **Kevin M. Jones - DMJMH&N**
Job Number : **145579-V-CA-005 DBVS Off-Gas Treatment Duct Analysis**

Mar 25, 2006
12:05 PM
Checked By:_____

Envelope Member Section Torsion (Continued)

	Member	Sec		Torque[k...	lc	Torsion Shear[ksi]	lc	y-y Warp...	lc	z-z Warp Shear[ksi]	lc	z-Top W...	lc	z-Bot Wa...	lc
523		2	max	.497	9	.416	9	NC		NC		NC		NC	
524			min	-.644	6	-.539	6	NC		NC		NC		NC	
525		3	max	.497	9	.416	9	NC		NC		NC		NC	
526			min	-.644	6	-.539	6	NC		NC		NC		NC	
527		4	max	.497	9	.416	9	NC		NC		NC		NC	
528			min	-.644	6	-.539	6	NC		NC		NC		NC	
529		5	max	.497	9	.416	9	NC		NC		NC		NC	
530			min	-.644	6	-.539	6	NC		NC		NC		NC	
531	M56	1	max	.408	9	.342	9	NC		NC		NC		NC	
532			min	-.635	6	-.531	6	NC		NC		NC		NC	
533		2	max	.408	9	.342	9	NC		NC		NC		NC	
534			min	-.635	6	-.531	6	NC		NC		NC		NC	
535		3	max	.408	9	.342	9	NC		NC		NC		NC	
536			min	-.635	6	-.531	6	NC		NC		NC		NC	
537		4	max	.408	9	.342	9	NC		NC		NC		NC	
538			min	-.635	6	-.531	6	NC		NC		NC		NC	
539		5	max	.408	9	.342	9	NC		NC		NC		NC	
540			min	-.635	6	-.531	6	NC		NC		NC		NC	
541	M57	1	max	.184	9	.154	9	NC		NC		NC		NC	
542			min	-.527	6	-.441	6	NC		NC		NC		NC	
543		2	max	.184	9	.154	9	NC		NC		NC		NC	
544			min	-.527	6	-.441	6	NC		NC		NC		NC	
545		3	max	.184	9	.154	9	NC		NC		NC		NC	
546			min	-.527	6	-.441	6	NC		NC		NC		NC	
547		4	max	.184	9	.154	9	NC		NC		NC		NC	
548			min	-.527	6	-.441	6	NC		NC		NC		NC	
549		5	max	.184	9	.154	9	NC		NC		NC		NC	
550			min	-.527	6	-.441	6	NC		NC		NC		NC	
551	M58	1	max	.071	1	.059	1	NC		NC		NC		NC	
552			min	-.441	6	-.369	6	NC		NC		NC		NC	
553		2	max	.071	1	.059	1	NC		NC		NC		NC	
554			min	-.441	6	-.369	6	NC		NC		NC		NC	
555		3	max	.071	1	.059	1	NC		NC		NC		NC	
556			min	-.441	6	-.369	6	NC		NC		NC		NC	
557		4	max	.938	7	.785	7	NC		NC		NC		NC	
558			min	.061	1	.051	1	NC		NC		NC		NC	
559		5	max	.938	7	.785	7	NC		NC		NC		NC	
560			min	.061	1	.051	1	NC		NC		NC		NC	
561	M59	1	max	.01	6	.022	6	NC		NC		NC		NC	
562			min	-.022	9	-.05	9	NC		NC		NC		NC	
563		2	max	.01	6	.022	6	NC		NC		NC		NC	
564			min	-.022	9	-.05	9	NC		NC		NC		NC	
565		3	max	.01	6	.022	6	NC		NC		NC		NC	
566			min	-.022	9	-.05	9	NC		NC		NC		NC	
567		4	max	.01	6	.022	6	NC		NC		NC		NC	
568			min	-.022	9	-.05	9	NC		NC		NC		NC	
569		5	max	.01	6	.022	6	NC		NC		NC		NC	
570			min	-.022	9	-.05	9	NC		NC		NC		NC	
571	M60	1	max	.381	7	.87	7	NC		NC		NC		NC	
572			min	-.013	1	-.029	1	NC		NC		NC		NC	
573		2	max	.381	7	.87	7	NC		NC		NC		NC	
574			min	-.013	1	-.029	1	NC		NC		NC		NC	
575		3	max	.381	7	.87	7	NC		NC		NC		NC	
576			min	-.013	1	-.029	1	NC		NC		NC		NC	
577		4	max	.381	7	.87	7	NC		NC		NC		NC	
578			min	-.013	1	-.029	1	NC		NC		NC		NC	
579		5	max	.381	7	.87	7	NC		NC		NC		NC	

Company : DMJM H&N
Designer : Kevin M. Jones - DMJMH&N
Job Number : 145579-V-CA-005 DBVS Off-Gas Treatment Duct Analysis

Mar 25, 2006
12:05 PM
Checked By:_____

Envelope Member Section Torsion (Continued)

	Member	Sec		Torque[k...	lc	Torsion Shear[ksi]	lc	y-y Warp...	lc	z-z Warp Shear[ksi]	lc	z-Top W...	lc	z-Bot Wa...	lc
580			min	-.013	1	-.029	1	NC		NC		NC		NC	
581	M61	1	max	1.063	7	2.427	7	NC		NC		NC		NC	
582			min	-.002	1	-.004	1	NC		NC		NC		NC	
583		2	max	1.063	7	2.427	7	NC		NC		NC		NC	
584			min	-.002	1	-.004	1	NC		NC		NC		NC	
585		3	max	1.063	7	2.427	7	NC		NC		NC		NC	
586			min	-.002	1	-.004	1	NC		NC		NC		NC	
587		4	max	1.063	7	2.427	7	NC		NC		NC		NC	
588			min	-.002	1	-.004	1	NC		NC		NC		NC	
589		5	max	1.063	7	2.427	7	NC		NC		NC		NC	
590			min	-.002	1	-.004	1	NC		NC		NC		NC	
591	M62	1	max	.955	7	2.18	7	NC		NC		NC		NC	
592			min	0	1	-.001	1	NC		NC		NC		NC	
593		2	max	.955	7	2.18	7	NC		NC		NC		NC	
594			min	0	1	-.001	1	NC		NC		NC		NC	
595		3	max	.955	7	2.18	7	NC		NC		NC		NC	
596			min	0	1	-.001	1	NC		NC		NC		NC	
597		4	max	.955	7	2.18	7	NC		NC		NC		NC	
598			min	0	1	-.001	1	NC		NC		NC		NC	
599		5	max	.955	7	2.18	7	NC		NC		NC		NC	
600			min	0	1	-.001	1	NC		NC		NC		NC	
601	M63	1	max	.647	7	1.477	7	NC		NC		NC		NC	
602			min	0	1	.002	1	NC		NC		NC		NC	
603		2	max	.647	7	1.477	7	NC		NC		NC		NC	
604			min	0	1	.002	1	NC		NC		NC		NC	
605		3	max	.647	7	1.477	7	NC		NC		NC		NC	
606			min	0	1	.002	1	NC		NC		NC		NC	
607		4	max	.647	7	1.477	7	NC		NC		NC		NC	
608			min	0	1	.002	1	NC		NC		NC		NC	
609		5	max	.647	7	1.477	7	NC		NC		NC		NC	
610			min	0	1	.002	1	NC		NC		NC		NC	
611	M64	1	max	.257	7	.586	7	NC		NC		NC		NC	
612			min	0	1	0	1	NC		NC		NC		NC	
613		2	max	.257	7	.586	7	NC		NC		NC		NC	
614			min	0	1	0	1	NC		NC		NC		NC	
615		3	max	.257	7	.586	7	NC		NC		NC		NC	
616			min	0	1	0	1	NC		NC		NC		NC	
617		4	max	.257	7	.586	7	NC		NC		NC		NC	
618			min	0	1	0	1	NC		NC		NC		NC	
619		5	max	.257	7	.586	7	NC		NC		NC		NC	
620			min	0	1	0	1	NC		NC		NC		NC	
621	M65	1	max	.079	6	.18	6	NC		NC		NC		NC	
622			min	-.002	1	-.005	1	NC		NC		NC		NC	
623		2	max	.079	6	.18	6	NC		NC		NC		NC	
624			min	-.002	1	-.005	1	NC		NC		NC		NC	
625		3	max	.079	6	.18	6	NC		NC		NC		NC	
626			min	-.002	1	-.005	1	NC		NC		NC		NC	
627		4	max	.079	6	.18	6	NC		NC		NC		NC	
628			min	-.002	1	-.005	1	NC		NC		NC		NC	
629		5	max	.079	6	.18	6	NC		NC		NC		NC	
630			min	-.002	1	-.005	1	NC		NC		NC		NC	
631	M66	1	max	.079	6	.18	6	NC		NC		NC		NC	
632			min	-.002	1	-.005	1	NC		NC		NC		NC	
633		2	max	.079	6	.18	6	NC		NC		NC		NC	
634			min	-.002	1	-.005	1	NC		NC		NC		NC	
635		3	max	.079	6	.18	6	NC		NC		NC		NC	
636			min	-.002	1	-.005	1	NC		NC		NC		NC	

Envelope Member Section Torsion (Continued)

	Member	Sec		Torque[k...	lc	Torsion Shear[ksi]	lc	y-y Warp...	lc	z-z Warp Shear[ksi]	lc	z-Top W...	lc	z-Bot Wa...	lc
637		4	max	.079	6	.18	6	NC		NC		NC		NC	
638			min	-.002	1	-.005	1	NC		NC		NC		NC	
639		5	max	.079	6	.18	6	NC		NC		NC		NC	
640			min	-.002	1	-.005	1	NC		NC		NC		NC	
641	M67	1	max	.079	6	.18	6	NC		NC		NC		NC	
642			min	-.002	1	-.005	1	NC		NC		NC		NC	
643		2	max	.079	6	.18	6	NC		NC		NC		NC	
644			min	-.002	1	-.005	1	NC		NC		NC		NC	
645		3	max	.079	6	.18	6	NC		NC		NC		NC	
646			min	-.002	1	-.005	1	NC		NC		NC		NC	
647		4	max	.079	6	.18	6	NC		NC		NC		NC	
648			min	-.002	1	-.005	1	NC		NC		NC		NC	
649		5	max	.079	6	.18	6	NC		NC		NC		NC	
650			min	-.002	1	-.005	1	NC		NC		NC		NC	
651	M68	1	max	.078	6	.178	6	NC		NC		NC		NC	
652			min	.002	1	.005	1	NC		NC		NC		NC	
653		2	max	.078	6	.178	6	NC		NC		NC		NC	
654			min	.002	1	.005	1	NC		NC		NC		NC	
655		3	max	.078	6	.178	6	NC		NC		NC		NC	
656			min	.002	1	.005	1	NC		NC		NC		NC	
657		4	max	.078	6	.178	6	NC		NC		NC		NC	
658			min	.002	1	.005	1	NC		NC		NC		NC	
659		5	max	.078	6	.178	6	NC		NC		NC		NC	
660			min	.002	1	.005	1	NC		NC		NC		NC	
661	M69	1	max	.061	6	.14	6	NC		NC		NC		NC	
662			min	.007	1	.016	1	NC		NC		NC		NC	
663		2	max	.061	6	.14	6	NC		NC		NC		NC	
664			min	.007	1	.016	1	NC		NC		NC		NC	
665		3	max	.061	6	.14	6	NC		NC		NC		NC	
666			min	.007	1	.016	1	NC		NC		NC		NC	
667		4	max	.061	6	.14	6	NC		NC		NC		NC	
668			min	.007	1	.016	1	NC		NC		NC		NC	
669		5	max	.061	6	.14	6	NC		NC		NC		NC	
670			min	.007	1	.016	1	NC		NC		NC		NC	
671	M70	1	max	.033	8	.076	8	NC		NC		NC		NC	
672			min	.008	1	.019	1	NC		NC		NC		NC	
673		2	max	.033	8	.076	8	NC		NC		NC		NC	
674			min	.008	1	.019	1	NC		NC		NC		NC	
675		3	max	.033	8	.076	8	NC		NC		NC		NC	
676			min	.008	1	.019	1	NC		NC		NC		NC	
677		4	max	.033	8	.076	8	NC		NC		NC		NC	
678			min	.008	1	.019	1	NC		NC		NC		NC	
679		5	max	.033	8	.076	8	NC		NC		NC		NC	
680			min	.008	1	.019	1	NC		NC		NC		NC	
681	M71	1	max	.016	8	.037	8	NC		NC		NC		NC	
682			min	-.003	7	-.007	7	NC		NC		NC		NC	
683		2	max	.016	8	.037	8	NC		NC		NC		NC	
684			min	-.003	7	-.007	7	NC		NC		NC		NC	
685		3	max	.016	8	.037	8	NC		NC		NC		NC	
686			min	-.003	7	-.007	7	NC		NC		NC		NC	
687		4	max	.016	8	.037	8	NC		NC		NC		NC	
688			min	-.003	7	-.007	7	NC		NC		NC		NC	
689		5	max	.016	8	.037	8	NC		NC		NC		NC	
690			min	-.003	7	-.007	7	NC		NC		NC		NC	
691	M72	1	max	.016	8	.037	8	NC		NC		NC		NC	
692			min	-.003	7	-.007	7	NC		NC		NC		NC	
693		2	max	.016	8	.037	8	NC		NC		NC		NC	

Company : **DMJM H&N**
Designer : **Kevin M. Jones - DMJMH&N**
Job Number : **145579-V-CA-005 DBVS Off-Gas Treatment Duct Analysis**

Mar 25, 2006
12:05 PM
Checked By:_____

Envelope Member Section Torsion (Continued)

	Member	Sec		Torque[k...	lc	Torsion Shear[ksi]	lc	y-y Warp...	lc	z-z Warp Shear[ksi]	lc	z-Top W...	lc	z-Bot Wa...	lc
694			min	-.003	7	-.007	7	NC		NC		NC		NC	
695		3	max	.016	8	.037	8	NC		NC		NC		NC	
696			min	-.003	7	-.007	7	NC		NC		NC		NC	
697		4	max	.016	8	.037	8	NC		NC		NC		NC	
698			min	-.003	7	-.007	7	NC		NC		NC		NC	
699		5	max	.016	8	.037	8	NC		NC		NC		NC	
700			min	-.003	7	-.007	7	NC		NC		NC		NC	
701	M73	1	max	.016	8	.037	8	NC		NC		NC		NC	
702			min	-.003	7	-.007	7	NC		NC		NC		NC	
703		2	max	.016	8	.037	8	NC		NC		NC		NC	
704			min	-.003	7	-.007	7	NC		NC		NC		NC	
705		3	max	.016	8	.037	8	NC		NC		NC		NC	
706			min	-.003	7	-.007	7	NC		NC		NC		NC	
707		4	max	.016	8	.037	8	NC		NC		NC		NC	
708			min	-.003	7	-.007	7	NC		NC		NC		NC	
709		5	max	.016	8	.037	8	NC		NC		NC		NC	
710			min	-.003	7	-.007	7	NC		NC		NC		NC	
711	M74	1	max	.016	8	.037	8	NC		NC		NC		NC	
712			min	-.003	7	-.007	7	NC		NC		NC		NC	
713		2	max	.016	8	.037	8	NC		NC		NC		NC	
714			min	-.003	7	-.007	7	NC		NC		NC		NC	
715		3	max	.016	8	.037	8	NC		NC		NC		NC	
716			min	-.003	7	-.007	7	NC		NC		NC		NC	
717		4	max	.016	8	.037	8	NC		NC		NC		NC	
718			min	-.003	7	-.007	7	NC		NC		NC		NC	
719		5	max	.016	8	.037	8	NC		NC		NC		NC	
720			min	-.003	7	-.007	7	NC		NC		NC		NC	
721	M75	1	max	.016	8	.037	8	NC		NC		NC		NC	
722			min	-.003	7	-.007	7	NC		NC		NC		NC	
723		2	max	.016	8	.037	8	NC		NC		NC		NC	
724			min	-.003	7	-.007	7	NC		NC		NC		NC	
725		3	max	.016	8	.037	8	NC		NC		NC		NC	
726			min	-.003	7	-.007	7	NC		NC		NC		NC	
727		4	max	.016	8	.037	8	NC		NC		NC		NC	
728			min	-.003	7	-.007	7	NC		NC		NC		NC	
729		5	max	.016	8	.037	8	NC		NC		NC		NC	
730			min	-.003	7	-.007	7	NC		NC		NC		NC	
731	M76	1	max	-.022	9	-.019	9	NC		NC		NC		NC	
732			min	-.028	6	-.024	6	NC		NC		NC		NC	
733		2	max	-.022	9	-.019	9	NC		NC		NC		NC	
734			min	-.028	6	-.024	6	NC		NC		NC		NC	
735		3	max	-.022	9	-.019	9	NC		NC		NC		NC	
736			min	-.028	6	-.024	6	NC		NC		NC		NC	
737		4	max	-.022	9	-.019	9	NC		NC		NC		NC	
738			min	-.028	6	-.024	6	NC		NC		NC		NC	
739		5	max	-.022	9	-.019	9	NC		NC		NC		NC	
740			min	-.028	6	-.024	6	NC		NC		NC		NC	
741	M77	1	max	-.022	9	-.019	9	NC		NC		NC		NC	
742			min	-.028	6	-.024	6	NC		NC		NC		NC	
743		2	max	-.022	9	-.019	9	NC		NC		NC		NC	
744			min	-.028	6	-.024	6	NC		NC		NC		NC	
745		3	max	-.022	9	-.019	9	NC		NC		NC		NC	
746			min	-.028	6	-.024	6	NC		NC		NC		NC	
747		4	max	-.022	9	-.019	9	NC		NC		NC		NC	
748			min	-.028	6	-.024	6	NC		NC		NC		NC	
749		5	max	-.022	9	-.019	9	NC		NC		NC		NC	
750			min	-.028	6	-.024	6	NC		NC		NC		NC	

Company : DMJM H&N
Designer : Kevin M. Jones - DMJMH&N
Job Number : 145579-V-CA-005 DBVS Off-Gas Treatment Duct Analysis

Mar 25, 2006
12:05 PM
Checked By:_____

Envelope Member Section Torsion (Continued)

	Member	Sec		Torque[k...	lc	Torsion Shear[ksi]	lc	y-y Warp...	lc	z-z Warp Shear[ksi]	lc	z-Top W...	lc	z-Bot Wa...	lc
751	M78	1	max	-.022	9	-.019	9	NC		NC		NC		NC	
752			min	-.028	6	-.024	6	NC		NC		NC		NC	
753		2	max	-.022	9	-.019	9	NC		NC		NC		NC	
754			min	-.028	6	-.024	6	NC		NC		NC		NC	
755		3	max	-.022	9	-.019	9	NC		NC		NC		NC	
756			min	-.028	6	-.024	6	NC		NC		NC		NC	
757		4	max	-.022	9	-.019	9	NC		NC		NC		NC	
758			min	-.028	6	-.024	6	NC		NC		NC		NC	
759		5	max	-.022	9	-.019	9	NC		NC		NC		NC	
760			min	-.028	6	-.024	6	NC		NC		NC		NC	
761	M79	1	max	.049	7	.041	7	NC		NC		NC		NC	
762			min	-.151	8	-.126	8	NC		NC		NC		NC	
763		2	max	.049	7	.041	7	NC		NC		NC		NC	
764			min	-.151	8	-.126	8	NC		NC		NC		NC	
765		3	max	.049	7	.041	7	NC		NC		NC		NC	
766			min	-.151	8	-.126	8	NC		NC		NC		NC	
767		4	max	.049	7	.041	7	NC		NC		NC		NC	
768			min	-.151	8	-.126	8	NC		NC		NC		NC	
769		5	max	.049	7	.041	7	NC		NC		NC		NC	
770			min	-.151	8	-.126	8	NC		NC		NC		NC	
771	M80	1	max	.049	7	.041	7	NC		NC		NC		NC	
772			min	-.151	8	-.126	8	NC		NC		NC		NC	
773		2	max	.049	7	.041	7	NC		NC		NC		NC	
774			min	-.151	8	-.126	8	NC		NC		NC		NC	
775		3	max	.049	7	.041	7	NC		NC		NC		NC	
776			min	-.151	8	-.126	8	NC		NC		NC		NC	
777		4	max	.049	7	.041	7	NC		NC		NC		NC	
778			min	-.151	8	-.126	8	NC		NC		NC		NC	
779		5	max	.049	7	.041	7	NC		NC		NC		NC	
780			min	-.151	8	-.126	8	NC		NC		NC		NC	
781	M81	1	max	.049	7	.041	7	NC		NC		NC		NC	
782			min	-.151	8	-.126	8	NC		NC		NC		NC	
783		2	max	.049	7	.041	7	NC		NC		NC		NC	
784			min	-.151	8	-.126	8	NC		NC		NC		NC	
785		3	max	.049	7	.041	7	NC		NC		NC		NC	
786			min	-.151	8	-.126	8	NC		NC		NC		NC	
787		4	max	.049	7	.041	7	NC		NC		NC		NC	
788			min	-.151	8	-.126	8	NC		NC		NC		NC	
789		5	max	.049	7	.041	7	NC		NC		NC		NC	
790			min	-.151	8	-.126	8	NC		NC		NC		NC	
791	M82	1	max	.016	8	.037	8	NC		NC		NC		NC	
792			min	-.003	7	-.007	7	NC		NC		NC		NC	
793		2	max	.016	8	.037	8	NC		NC		NC		NC	
794			min	-.003	7	-.007	7	NC		NC		NC		NC	
795		3	max	.016	8	.037	8	NC		NC		NC		NC	
796			min	-.003	7	-.007	7	NC		NC		NC		NC	
797		4	max	.016	8	.037	8	NC		NC		NC		NC	
798			min	-.003	7	-.007	7	NC		NC		NC		NC	
799		5	max	.016	8	.037	8	NC		NC		NC		NC	
800			min	-.003	7	-.007	7	NC		NC		NC		NC	
801	M83	1	max	.042	8	.097	8	NC		NC		NC		NC	
802			min	-.036	7	-.083	7	NC		NC		NC		NC	
803		2	max	.042	8	.097	8	NC		NC		NC		NC	
804			min	-.036	7	-.083	7	NC		NC		NC		NC	
805		3	max	.042	8	.097	8	NC		NC		NC		NC	
806			min	-.036	7	-.083	7	NC		NC		NC		NC	
807		4	max	.042	8	.097	8	NC		NC		NC		NC	

Envelope Member Section Torsion (Continued)

	Member	Sec		Torque[k...	lc	Torsion Shear[ksi]	lc	y-y Warp...	lc	z-z Warp Shear[ksi]	lc	z-Top W...	lc	z-Bot Wa...	lc
808			min	-.036	7	-.083	7	NC		NC		NC		NC	
809		5	max	.042	8	.097	8	NC		NC		NC		NC	
810			min	-.036	7	-.083	7	NC		NC		NC		NC	
811	M84	1	max	.045	5	.103	5	NC		NC		NC		NC	
812			min	-.029	4	-.065	4	NC		NC		NC		NC	
813		2	max	.02	9	.046	9	NC		NC		NC		NC	
814			min	-.027	6	-.062	6	NC		NC		NC		NC	
815		3	max	.02	9	.046	9	NC		NC		NC		NC	
816			min	-.027	6	-.062	6	NC		NC		NC		NC	
817		4	max	.02	9	.046	9	NC		NC		NC		NC	
818			min	-.027	6	-.062	6	NC		NC		NC		NC	
819		5	max	.02	9	.046	9	NC		NC		NC		NC	
820			min	-.027	6	-.062	6	NC		NC		NC		NC	
821	M85	1	max	.028	7	.386	7	NC		NC		NC		NC	
822			min	-.005	1	-.069	1	NC		NC		NC		NC	
823		2	max	.028	7	.386	7	NC		NC		NC		NC	
824			min	-.005	1	-.069	1	NC		NC		NC		NC	
825		3	max	.028	7	.386	7	NC		NC		NC		NC	
826			min	-.005	1	-.069	1	NC		NC		NC		NC	
827		4	max	.028	7	.386	7	NC		NC		NC		NC	
828			min	-.005	1	-.069	1	NC		NC		NC		NC	
829		5	max	.028	7	.386	7	NC		NC		NC		NC	
830			min	-.005	1	-.069	1	NC		NC		NC		NC	
831	M86	1	max	.026	2	.359	2	NC		NC		NC		NC	
832			min	0	1	-.013	1	NC		NC		NC		NC	
833		2	max	.026	2	.359	2	NC		NC		NC		NC	
834			min	0	1	-.013	1	NC		NC		NC		NC	
835		3	max	.026	2	.359	2	NC		NC		NC		NC	
836			min	0	1	-.013	1	NC		NC		NC		NC	
837		4	max	.026	2	.359	2	NC		NC		NC		NC	
838			min	0	1	-.013	1	NC		NC		NC		NC	
839		5	max	.026	2	.359	2	NC		NC		NC		NC	
840			min	0	1	-.013	1	NC		NC		NC		NC	
841	M87	1	max	.046	6	.622	6	NC		NC		NC		NC	
842			min	.006	1	.089	1	NC		NC		NC		NC	
843		2	max	.046	6	.622	6	NC		NC		NC		NC	
844			min	.006	1	.089	1	NC		NC		NC		NC	
845		3	max	.046	6	.622	6	NC		NC		NC		NC	
846			min	.006	1	.089	1	NC		NC		NC		NC	
847		4	max	.046	6	.622	6	NC		NC		NC		NC	
848			min	.006	1	.089	1	NC		NC		NC		NC	
849		5	max	.046	6	.622	6	NC		NC		NC		NC	
850			min	.006	1	.089	1	NC		NC		NC		NC	
851	M88	1	max	.042	6	.573	6	NC		NC		NC		NC	
852			min	.007	1	.091	1	NC		NC		NC		NC	
853		2	max	.042	6	.573	6	NC		NC		NC		NC	
854			min	.007	1	.091	1	NC		NC		NC		NC	
855		3	max	.042	6	.573	6	NC		NC		NC		NC	
856			min	.007	1	.091	1	NC		NC		NC		NC	
857		4	max	.042	6	.573	6	NC		NC		NC		NC	
858			min	.007	1	.091	1	NC		NC		NC		NC	
859		5	max	.042	6	.573	6	NC		NC		NC		NC	
860			min	.007	1	.091	1	NC		NC		NC		NC	
861	M89	1	max	.032	6	.43	6	NC		NC		NC		NC	
862			min	.006	1	.084	1	NC		NC		NC		NC	
863		2	max	.032	6	.43	6	NC		NC		NC		NC	
864			min	.006	1	.084	1	NC		NC		NC		NC	

Envelope Member Section Torsion (Continued)

	Member	Sec		Torque[k...	lc	Torsion Shear[ksi]	lc	y-y Warp...	lc	z-z Warp Shear[ksi]	lc	z-Top W...	lc	z-Bot Wa...	lc
865		3	max	.032	6	.43	6	NC		NC		NC		NC	
866			min	.006	1	.084	1	NC		NC		NC		NC	
867		4	max	.032	6	.43	6	NC		NC		NC		NC	
868			min	.006	1	.084	1	NC		NC		NC		NC	
869		5	max	.032	6	.43	6	NC		NC		NC		NC	
870			min	.006	1	.084	1	NC		NC		NC		NC	
871	M90	1	max	.021	3	.291	3	NC		NC		NC		NC	
872			min	.005	1	.066	1	NC		NC		NC		NC	
873		2	max	.021	3	.291	3	NC		NC		NC		NC	
874			min	.005	1	.066	1	NC		NC		NC		NC	
875		3	max	.021	3	.291	3	NC		NC		NC		NC	
876			min	.005	1	.066	1	NC		NC		NC		NC	
877		4	max	.021	3	.291	3	NC		NC		NC		NC	
878			min	.005	1	.066	1	NC		NC		NC		NC	
879		5	max	.021	3	.291	3	NC		NC		NC		NC	
880			min	.005	1	.066	1	NC		NC		NC		NC	
881	M91	1	max	.012	3	.159	3	NC		NC		NC		NC	
882			min	.002	2	.028	2	NC		NC		NC		NC	
883		2	max	.012	3	.159	3	NC		NC		NC		NC	
884			min	.002	2	.028	2	NC		NC		NC		NC	
885		3	max	.012	3	.159	3	NC		NC		NC		NC	
886			min	.002	2	.028	2	NC		NC		NC		NC	
887		4	max	.012	3	.159	3	NC		NC		NC		NC	
888			min	.002	2	.028	2	NC		NC		NC		NC	
889		5	max	.012	3	.159	3	NC		NC		NC		NC	
890			min	.002	2	.028	2	NC		NC		NC		NC	
891	M92	1	max	.007	3	.093	3	NC		NC		NC		NC	
892			min	-.005	2	-.067	2	NC		NC		NC		NC	
893		2	max	.007	3	.093	3	NC		NC		NC		NC	
894			min	-.005	2	-.067	2	NC		NC		NC		NC	
895		3	max	.007	3	.093	3	NC		NC		NC		NC	
896			min	-.005	2	-.067	2	NC		NC		NC		NC	
897		4	max	.007	3	.093	3	NC		NC		NC		NC	
898			min	-.005	2	-.067	2	NC		NC		NC		NC	
899		5	max	.007	3	.093	3	NC		NC		NC		NC	
900			min	-.005	2	-.067	2	NC		NC		NC		NC	
901	M93	1	max	.044	7	.1	7	NC		NC		NC		NC	
902			min	-.006	8	-.013	8	NC		NC		NC		NC	
903		2	max	.044	7	.1	7	NC		NC		NC		NC	
904			min	-.006	8	-.013	8	NC		NC		NC		NC	
905		3	max	.044	7	.1	7	NC		NC		NC		NC	
906			min	-.006	8	-.013	8	NC		NC		NC		NC	
907		4	max	.044	7	.1	7	NC		NC		NC		NC	
908			min	-.006	8	-.013	8	NC		NC		NC		NC	
909		5	max	.013	7	.03	7	NC		NC		NC		NC	
910			min	-.002	8	-.005	8	NC		NC		NC		NC	
911	M94	1	max	.013	7	.054	7	NC		NC		NC		NC	
912			min	-.003	8	-.011	8	NC		NC		NC		NC	
913		2	max	.013	7	.054	7	NC		NC		NC		NC	
914			min	-.003	8	-.011	8	NC		NC		NC		NC	
915		3	max	.013	7	.054	7	NC		NC		NC		NC	
916			min	-.003	8	-.011	8	NC		NC		NC		NC	
917		4	max	.013	7	.054	7	NC		NC		NC		NC	
918			min	-.003	8	-.011	8	NC		NC		NC		NC	
919		5	max	.004	7	.019	7	NC		NC		NC		NC	
920			min	-.001	1	.005	1	NC		NC		NC		NC	
921	M95	1	max	.004	7	.06	7	NC		NC		NC		NC	

Company : **DMJM H&N**
Designer : **Kevin M. Jones - DMJMH&N**
Job Number : **145579-V-CA-005 DBVS Off-Gas Treatment Duct Analysis**

Mar 25, 2006
12:05 PM
Checked By:_____

Envelope Member Section Torsion (Continued)

	Member	Sec		Torque[k...	lc	Torsion Shear[ksi]	lc	y-y Warp...	lc	z-z Warp Shear[ksi]	lc	z-Top W...	lc	z-Bot Wa...	lc
922			min	.001	1	.017	1	NC		NC		NC		NC	
923		2	max	.004	7	.06	7	NC		NC		NC		NC	
924			min	.001	1	.017	1	NC		NC		NC		NC	
925		3	max	.004	7	.06	7	NC		NC		NC		NC	
926			min	.001	1	.017	1	NC		NC		NC		NC	
927		4	max	.004	7	.06	7	NC		NC		NC		NC	
928			min	.001	1	.017	1	NC		NC		NC		NC	
929		5	max	.004	7	.06	7	NC		NC		NC		NC	
930			min	.001	1	.017	1	NC		NC		NC		NC	
931	M96	1	max	.018	2	.245	2	NC		NC		NC		NC	
932			min	-.005	1	-.066	1	NC		NC		NC		NC	
933		2	max	.018	2	.245	2	NC		NC		NC		NC	
934			min	-.005	1	-.066	1	NC		NC		NC		NC	
935		3	max	.018	2	.245	2	NC		NC		NC		NC	
936			min	-.005	1	-.066	1	NC		NC		NC		NC	
937		4	max	.018	2	.245	2	NC		NC		NC		NC	
938			min	-.005	1	-.066	1	NC		NC		NC		NC	
939		5	max	.018	2	.245	2	NC		NC		NC		NC	
940			min	-.005	1	-.066	1	NC		NC		NC		NC	
941	M97	1	max	.056	2	.767	2	NC		NC		NC		NC	
942			min	-.003	1	-.046	1	NC		NC		NC		NC	
943		2	max	.056	2	.767	2	NC		NC		NC		NC	
944			min	-.003	1	-.046	1	NC		NC		NC		NC	
945		3	max	.056	2	.767	2	NC		NC		NC		NC	
946			min	-.003	1	-.046	1	NC		NC		NC		NC	
947		4	max	.056	2	.767	2	NC		NC		NC		NC	
948			min	-.003	1	-.046	1	NC		NC		NC		NC	
949		5	max	.056	2	.767	2	NC		NC		NC		NC	
950			min	-.003	1	-.046	1	NC		NC		NC		NC	
951	M98	1	max	.017	2	.225	2	NC		NC		NC		NC	
952			min	-.007	1	-.095	1	NC		NC		NC		NC	
953		2	max	.017	2	.225	2	NC		NC		NC		NC	
954			min	-.007	1	-.095	1	NC		NC		NC		NC	
955		3	max	.017	2	.225	2	NC		NC		NC		NC	
956			min	-.007	1	-.095	1	NC		NC		NC		NC	
957		4	max	.017	2	.225	2	NC		NC		NC		NC	
958			min	-.007	1	-.095	1	NC		NC		NC		NC	
959		5	max	.017	2	.225	2	NC		NC		NC		NC	
960			min	-.007	1	-.095	1	NC		NC		NC		NC	
961	M99	1	max	.028	2	.384	2	NC		NC		NC		NC	
962			min	0	1	-.002	1	NC		NC		NC		NC	
963		2	max	.028	2	.384	2	NC		NC		NC		NC	
964			min	0	1	-.002	1	NC		NC		NC		NC	
965		3	max	.028	2	.384	2	NC		NC		NC		NC	
966			min	0	1	-.002	1	NC		NC		NC		NC	
967		4	max	.028	2	.384	2	NC		NC		NC		NC	
968			min	0	1	-.002	1	NC		NC		NC		NC	
969		5	max	.028	2	.384	2	NC		NC		NC		NC	
970			min	0	1	-.002	1	NC		NC		NC		NC	
971	M100	1	max	.059	2	.801	2	NC		NC		NC		NC	
972			min	0	1	.008	1	NC		NC		NC		NC	
973		2	max	.059	2	.801	2	NC		NC		NC		NC	
974			min	0	1	.008	1	NC		NC		NC		NC	
975		3	max	.059	2	.801	2	NC		NC		NC		NC	
976			min	0	1	.008	1	NC		NC		NC		NC	
977		4	max	.059	2	.801	2	NC		NC		NC		NC	
978			min	0	1	.008	1	NC		NC		NC		NC	

Envelope Member Section Torsion (Continued)

	Member	Sec		Torque[k...	lc	Torsion Shear[ksi]	lc	y-y Warp...	lc	z-z Warp Shear[ksi]	lc	z-Top W...	lc	z-Bot Wa...	lc
979		5	max	.059	2	.801	2	NC		NC		NC		NC	
980			min	0	1	.008	1	NC		NC		NC		NC	
981	M101	1	max	.023	7	.315	7	NC		NC		NC		NC	
982			min	-.006	1	-.077	1	NC		NC		NC		NC	
983		2	max	.023	7	.315	7	NC		NC		NC		NC	
984			min	-.006	1	-.077	1	NC		NC		NC		NC	
985		3	max	.023	7	.315	7	NC		NC		NC		NC	
986			min	-.006	1	-.077	1	NC		NC		NC		NC	
987		4	max	.023	7	.315	7	NC		NC		NC		NC	
988			min	-.006	1	-.077	1	NC		NC		NC		NC	
989		5	max	.023	7	.315	7	NC		NC		NC		NC	
990			min	-.006	1	-.077	1	NC		NC		NC		NC	
991	M102	1	max	.023	2	.318	2	NC		NC		NC		NC	
992			min	-.001	1	-.02	1	NC		NC		NC		NC	
993		2	max	.023	2	.318	2	NC		NC		NC		NC	
994			min	-.001	1	-.02	1	NC		NC		NC		NC	
995		3	max	.023	2	.318	2	NC		NC		NC		NC	
996			min	-.001	1	-.02	1	NC		NC		NC		NC	
997		4	max	.023	2	.318	2	NC		NC		NC		NC	
998			min	-.001	1	-.02	1	NC		NC		NC		NC	
999		5	max	.023	2	.318	2	NC		NC		NC		NC	
1000			min	-.001	1	-.02	1	NC		NC		NC		NC	
1001	M103	1	max	.052	2	.704	2	NC		NC		NC		NC	
1002			min	0	1	-.012	1	NC		NC		NC		NC	
1003		2	max	.052	2	.704	2	NC		NC		NC		NC	
1004			min	0	1	-.012	1	NC		NC		NC		NC	
1005		3	max	.052	2	.704	2	NC		NC		NC		NC	
1006			min	0	1	-.012	1	NC		NC		NC		NC	
1007		4	max	.052	2	.704	2	NC		NC		NC		NC	
1008			min	0	1	-.012	1	NC		NC		NC		NC	
1009		5	max	.052	2	.704	2	NC		NC		NC		NC	
1010			min	0	1	-.012	1	NC		NC		NC		NC	
1011	M104	1	max	.046	2	.626	2	NC		NC		NC		NC	
1012			min	0	1	-.012	1	NC		NC		NC		NC	
1013		2	max	.046	2	.626	2	NC		NC		NC		NC	
1014			min	0	1	-.012	1	NC		NC		NC		NC	
1015		3	max	.046	2	.626	2	NC		NC		NC		NC	
1016			min	0	1	-.012	1	NC		NC		NC		NC	
1017		4	max	.046	2	.626	2	NC		NC		NC		NC	
1018			min	0	1	-.012	1	NC		NC		NC		NC	
1019		5	max	.046	2	.626	2	NC		NC		NC		NC	
1020			min	0	1	-.012	1	NC		NC		NC		NC	
1021	M105	1	max	.034	9	.468	9	NC		NC		NC		NC	
1022			min	0	1	-.011	1	NC		NC		NC		NC	
1023		2	max	.034	9	.468	9	NC		NC		NC		NC	
1024			min	0	1	-.011	1	NC		NC		NC		NC	
1025		3	max	.034	9	.468	9	NC		NC		NC		NC	
1026			min	0	1	-.011	1	NC		NC		NC		NC	
1027		4	max	.034	9	.468	9	NC		NC		NC		NC	
1028			min	0	1	-.011	1	NC		NC		NC		NC	
1029		5	max	.034	9	.468	9	NC		NC		NC		NC	
1030			min	0	1	-.011	1	NC		NC		NC		NC	
1031	M106	1	max	.022	3	.302	3	NC		NC		NC		NC	
1032			min	0	1	-.009	1	NC		NC		NC		NC	
1033		2	max	.022	3	.302	3	NC		NC		NC		NC	
1034			min	0	1	-.009	1	NC		NC		NC		NC	
1035		3	max	.022	3	.302	3	NC		NC		NC		NC	

Envelope Member Section Torsion (Continued)

	Member	Sec		Torque[k...	lc	Torsion Shear[ksi]	lc	y-y Warp...	lc	z-z Warp Shear[ksi]	lc	z-Top W...	lc	z-Bot Wa...	lc
1036			min	0	1	-.009	1	NC		NC		NC		NC	
1037		4	max	.022	3	.302	3	NC		NC		NC		NC	
1038			min	0	1	-.009	1	NC		NC		NC		NC	
1039		5	max	.022	3	.302	3	NC		NC		NC		NC	
1040			min	0	1	-.009	1	NC		NC		NC		NC	
1041	M107	1	max	.009	3	.118	3	NC		NC		NC		NC	
1042			min	-.004	2	-.057	2	NC		NC		NC		NC	
1043		2	max	.009	3	.118	3	NC		NC		NC		NC	
1044			min	-.004	2	-.057	2	NC		NC		NC		NC	
1045		3	max	.009	3	.118	3	NC		NC		NC		NC	
1046			min	-.004	2	-.057	2	NC		NC		NC		NC	
1047		4	max	.009	3	.118	3	NC		NC		NC		NC	
1048			min	-.004	2	-.057	2	NC		NC		NC		NC	
1049		5	max	.009	3	.118	3	NC		NC		NC		NC	
1050			min	-.004	2	-.057	2	NC		NC		NC		NC	
1051	M108	1	max	.002	3	.029	3	NC		NC		NC		NC	
1052			min	-.012	2	-.165	2	NC		NC		NC		NC	
1053		2	max	.002	3	.029	3	NC		NC		NC		NC	
1054			min	-.012	2	-.165	2	NC		NC		NC		NC	
1055		3	max	.002	3	.029	3	NC		NC		NC		NC	
1056			min	-.012	2	-.165	2	NC		NC		NC		NC	
1057		4	max	.002	3	.029	3	NC		NC		NC		NC	
1058			min	-.012	2	-.165	2	NC		NC		NC		NC	
1059		5	max	.002	3	.029	3	NC		NC		NC		NC	
1060			min	-.012	2	-.165	2	NC		NC		NC		NC	
1061	M109	1	max	.053	2	.717	2	NC		NC		NC		NC	
1062			min	0	1	.008	1	NC		NC		NC		NC	
1063		2	max	.053	2	.717	2	NC		NC		NC		NC	
1064			min	0	1	.008	1	NC		NC		NC		NC	
1065		3	max	.053	2	.717	2	NC		NC		NC		NC	
1066			min	0	1	.008	1	NC		NC		NC		NC	
1067		4	max	.053	2	.717	2	NC		NC		NC		NC	
1068			min	0	1	.008	1	NC		NC		NC		NC	
1069		5	max	.053	2	.717	2	NC		NC		NC		NC	
1070			min	0	1	.008	1	NC		NC		NC		NC	
1071	M110	1	max	.038	5	.515	5	NC		NC		NC		NC	
1072			min	0	1	.008	1	NC		NC		NC		NC	
1073		2	max	.038	5	.515	5	NC		NC		NC		NC	
1074			min	0	1	.008	1	NC		NC		NC		NC	
1075		3	max	.038	5	.515	5	NC		NC		NC		NC	
1076			min	0	1	.008	1	NC		NC		NC		NC	
1077		4	max	.038	5	.515	5	NC		NC		NC		NC	
1078			min	0	1	.008	1	NC		NC		NC		NC	
1079		5	max	.038	5	.515	5	NC		NC		NC		NC	
1080			min	0	1	.008	1	NC		NC		NC		NC	
1081	M111	1	max	.024	3	.323	3	NC		NC		NC		NC	
1082			min	0	1	.007	1	NC		NC		NC		NC	
1083		2	max	.024	3	.323	3	NC		NC		NC		NC	
1084			min	0	1	.007	1	NC		NC		NC		NC	
1085		3	max	.024	3	.323	3	NC		NC		NC		NC	
1086			min	0	1	.007	1	NC		NC		NC		NC	
1087		4	max	.024	3	.323	3	NC		NC		NC		NC	
1088			min	0	1	.007	1	NC		NC		NC		NC	
1089		5	max	.024	3	.323	3	NC		NC		NC		NC	
1090			min	0	1	.007	1	NC		NC		NC		NC	
1091	M112	1	max	.008	3	.116	3	NC		NC		NC		NC	
1092			min	-.003	2	-.047	2	NC		NC		NC		NC	

Company : DMJM H&N
Designer : Kevin M. Jones - DMJMH&N
Job Number : 145579-V-CA-005 DBVS Off-Gas Treatment Duct Analysis

Mar 25, 2006
12:05 PM
Checked By:_____

Envelope Member Section Torsion (Continued)

	Member	Sec		Torque[k...	Ic	Torsion Shear[ksi]	Ic	y-y Warp...	Ic	z-z Warp Shear[ksi]	Ic	z-Top W...	Ic	z-Bot Wa...	Ic
1093		2	max	.008	3	.116	3	NC		NC		NC		NC	
1094			min	-.003	2	-.047	2	NC		NC		NC		NC	
1095		3	max	.008	3	.116	3	NC		NC		NC		NC	
1096			min	-.003	2	-.047	2	NC		NC		NC		NC	
1097		4	max	.008	3	.116	3	NC		NC		NC		NC	
1098			min	-.003	2	-.047	2	NC		NC		NC		NC	
1099		5	max	.008	3	.116	3	NC		NC		NC		NC	
1100			min	-.003	2	-.047	2	NC		NC		NC		NC	
1101	M113	1	max	.001	3	.017	3	NC		NC		NC		NC	
1102			min	-.013	2	-.171	2	NC		NC		NC		NC	
1103		2	max	.001	3	.017	3	NC		NC		NC		NC	
1104			min	-.013	2	-.171	2	NC		NC		NC		NC	
1105		3	max	.001	3	.017	3	NC		NC		NC		NC	
1106			min	-.013	2	-.171	2	NC		NC		NC		NC	
1107		4	max	.001	3	.017	3	NC		NC		NC		NC	
1108			min	-.013	2	-.171	2	NC		NC		NC		NC	
1109		5	max	.001	3	.017	3	NC		NC		NC		NC	
1110			min	-.013	2	-.171	2	NC		NC		NC		NC	
1111	M114	1	max	.05	2	.688	2	NC		NC		NC		NC	
1112			min	-.003	1	-.047	1	NC		NC		NC		NC	
1113		2	max	.05	2	.688	2	NC		NC		NC		NC	
1114			min	-.003	1	-.047	1	NC		NC		NC		NC	
1115		3	max	.05	2	.688	2	NC		NC		NC		NC	
1116			min	-.003	1	-.047	1	NC		NC		NC		NC	
1117		4	max	.05	2	.688	2	NC		NC		NC		NC	
1118			min	-.003	1	-.047	1	NC		NC		NC		NC	
1119		5	max	.05	2	.688	2	NC		NC		NC		NC	
1120			min	-.003	1	-.047	1	NC		NC		NC		NC	
1121	M115	1	max	.039	5	.532	5	NC		NC		NC		NC	
1122			min	-.003	1	-.044	1	NC		NC		NC		NC	
1123		2	max	.039	5	.532	5	NC		NC		NC		NC	
1124			min	-.003	1	-.044	1	NC		NC		NC		NC	
1125		3	max	.039	5	.532	5	NC		NC		NC		NC	
1126			min	-.003	1	-.044	1	NC		NC		NC		NC	
1127		4	max	.039	5	.532	5	NC		NC		NC		NC	
1128			min	-.003	1	-.044	1	NC		NC		NC		NC	
1129		5	max	.039	5	.532	5	NC		NC		NC		NC	
1130			min	-.003	1	-.044	1	NC		NC		NC		NC	
1131	M116	1	max	.025	3	.347	3	NC		NC		NC		NC	
1132			min	-.003	1	-.034	1	NC		NC		NC		NC	
1133		2	max	.025	3	.347	3	NC		NC		NC		NC	
1134			min	-.003	1	-.034	1	NC		NC		NC		NC	
1135		3	max	.025	3	.347	3	NC		NC		NC		NC	
1136			min	-.003	1	-.034	1	NC		NC		NC		NC	
1137		4	max	.025	3	.347	3	NC		NC		NC		NC	
1138			min	-.003	1	-.034	1	NC		NC		NC		NC	
1139		5	max	.025	3	.347	3	NC		NC		NC		NC	
1140			min	-.003	1	-.034	1	NC		NC		NC		NC	
1141	M117	1	max	.011	3	.15	3	NC		NC		NC		NC	
1142			min	-.002	2	-.025	2	NC		NC		NC		NC	
1143		2	max	.011	3	.15	3	NC		NC		NC		NC	
1144			min	-.002	2	-.025	2	NC		NC		NC		NC	
1145		3	max	.011	3	.15	3	NC		NC		NC		NC	
1146			min	-.002	2	-.025	2	NC		NC		NC		NC	
1147		4	max	.011	3	.15	3	NC		NC		NC		NC	
1148			min	-.002	2	-.025	2	NC		NC		NC		NC	
1149		5	max	.011	3	.15	3	NC		NC		NC		NC	

Company : DMJM H&N
Designer : Kevin M. Jones - DMJMH&N
Job Number : 145579-V-CA-005 DBVS Off-Gas Treatment Duct Analysis

Mar 25, 2006
12:05 PM
Checked By:_____

Envelope Member Section Torsion (Continued)

	Member	Sec		Torque[k...	lc	Torsion Shear[ksi]	lc	y-y Warp...	lc	z-z Warp Shear[ksi]	lc	z-Top W...	lc	z-Bot Wa...	lc
1150			min	-.002	2	-.025	2	NC		NC		NC		NC	
1151	M118	1	max	.004	3	.055	3	NC		NC		NC		NC	
1152			min	-.01	2	-.141	2	NC		NC		NC		NC	
1153		2	max	.004	3	.055	3	NC		NC		NC		NC	
1154			min	-.01	2	-.141	2	NC		NC		NC		NC	
1155		3	max	.004	3	.055	3	NC		NC		NC		NC	
1156			min	-.01	2	-.141	2	NC		NC		NC		NC	
1157		4	max	.004	3	.055	3	NC		NC		NC		NC	
1158			min	-.01	2	-.141	2	NC		NC		NC		NC	
1159		5	max	.004	3	.055	3	NC		NC		NC		NC	
1160			min	-.01	2	-.141	2	NC		NC		NC		NC	
1161	M119	1	max	.25	1	.209	1	NC		NC		NC		NC	
1162			min	-.536	8	-.448	8	NC		NC		NC		NC	
1163		2	max	.25	1	.209	1	NC		NC		NC		NC	
1164			min	-.536	8	-.448	8	NC		NC		NC		NC	
1165		3	max	.25	1	.209	1	NC		NC		NC		NC	
1166			min	-.536	8	-.448	8	NC		NC		NC		NC	
1167		4	max	.25	1	.209	1	NC		NC		NC		NC	
1168			min	-.536	8	-.448	8	NC		NC		NC		NC	
1169		5	max	.25	1	.209	1	NC		NC		NC		NC	
1170			min	-.536	8	-.448	8	NC		NC		NC		NC	
1171	M120	1	max	-.022	9	-.019	9	NC		NC		NC		NC	
1172			min	-.028	6	-.024	6	NC		NC		NC		NC	
1173		2	max	-.022	9	-.019	9	NC		NC		NC		NC	
1174			min	-.028	6	-.024	6	NC		NC		NC		NC	
1175		3	max	-.022	9	-.019	9	NC		NC		NC		NC	
1176			min	-.028	6	-.024	6	NC		NC		NC		NC	
1177		4	max	-.022	9	-.019	9	NC		NC		NC		NC	
1178			min	-.028	6	-.024	6	NC		NC		NC		NC	
1179		5	max	-.022	9	-.019	9	NC		NC		NC		NC	
1180			min	-.028	6	-.024	6	NC		NC		NC		NC	
1181	M121	1	max	-.022	9	-.019	9	NC		NC		NC		NC	
1182			min	-.028	6	-.024	6	NC		NC		NC		NC	
1183		2	max	-.022	9	-.019	9	NC		NC		NC		NC	
1184			min	-.028	6	-.024	6	NC		NC		NC		NC	
1185		3	max	-.022	9	-.019	9	NC		NC		NC		NC	
1186			min	-.028	6	-.024	6	NC		NC		NC		NC	
1187		4	max	-.022	9	-.019	9	NC		NC		NC		NC	
1188			min	-.028	6	-.024	6	NC		NC		NC		NC	
1189		5	max	-.022	9	-.019	9	NC		NC		NC		NC	
1190			min	-.028	6	-.024	6	NC		NC		NC		NC	
1191	M122	1	max	.25	1	.209	1	NC		NC		NC		NC	
1192			min	-.495	6	-.414	6	NC		NC		NC		NC	
1193		2	max	.25	1	.209	1	NC		NC		NC		NC	
1194			min	-.495	6	-.414	6	NC		NC		NC		NC	
1195		3	max	.25	1	.209	1	NC		NC		NC		NC	
1196			min	-.495	6	-.414	6	NC		NC		NC		NC	
1197		4	max	.25	1	.209	1	NC		NC		NC		NC	
1198			min	-.495	6	-.414	6	NC		NC		NC		NC	
1199		5	max	.25	1	.209	1	NC		NC		NC		NC	
1200			min	-.495	6	-.414	6	NC		NC		NC		NC	
1201	M123	1	max	.079	6	.18	6	NC		NC		NC		NC	
1202			min	-.002	1	-.005	1	NC		NC		NC		NC	
1203		2	max	.079	6	.18	6	NC		NC		NC		NC	
1204			min	-.002	1	-.005	1	NC		NC		NC		NC	
1205		3	max	.079	6	.18	6	NC		NC		NC		NC	
1206			min	-.002	1	-.005	1	NC		NC		NC		NC	

Company : **DMJM H&N**
Designer : **Kevin M. Jones - DMJMH&N**
Job Number : **145579-V-CA-005 DBVS Off-Gas Treatment Duct Analysis**

Mar 25, 2006
12:05 PM
Checked By:_____

Envelope Member Section Torsion (Continued)

	Member	Sec		Torque[k...	lc	Torsion Shear[ksi]	lc	y-y Warp...	lc	z-z Warp Shear[ksi]	lc	z-Top W...	lc	z-Bot Wa...	lc
1207		4	max	.079	6	.18	6	NC		NC		NC		NC	
1208			min	-.002	1	-.005	1	NC		NC		NC		NC	
1209		5	max	.079	6	.18	6	NC		NC		NC		NC	
1210			min	-.002	1	-.005	1	NC		NC		NC		NC	
1211	M124	1	max	.079	6	.18	6	NC		NC		NC		NC	
1212			min	-.002	1	-.005	1	NC		NC		NC		NC	
1213		2	max	.079	6	.18	6	NC		NC		NC		NC	
1214			min	-.002	1	-.005	1	NC		NC		NC		NC	
1215		3	max	.079	6	.18	6	NC		NC		NC		NC	
1216			min	-.002	1	-.005	1	NC		NC		NC		NC	
1217		4	max	.079	6	.18	6	NC		NC		NC		NC	
1218			min	-.002	1	-.005	1	NC		NC		NC		NC	
1219		5	max	.079	6	.18	6	NC		NC		NC		NC	
1220			min	-.002	1	-.005	1	NC		NC		NC		NC	

amec

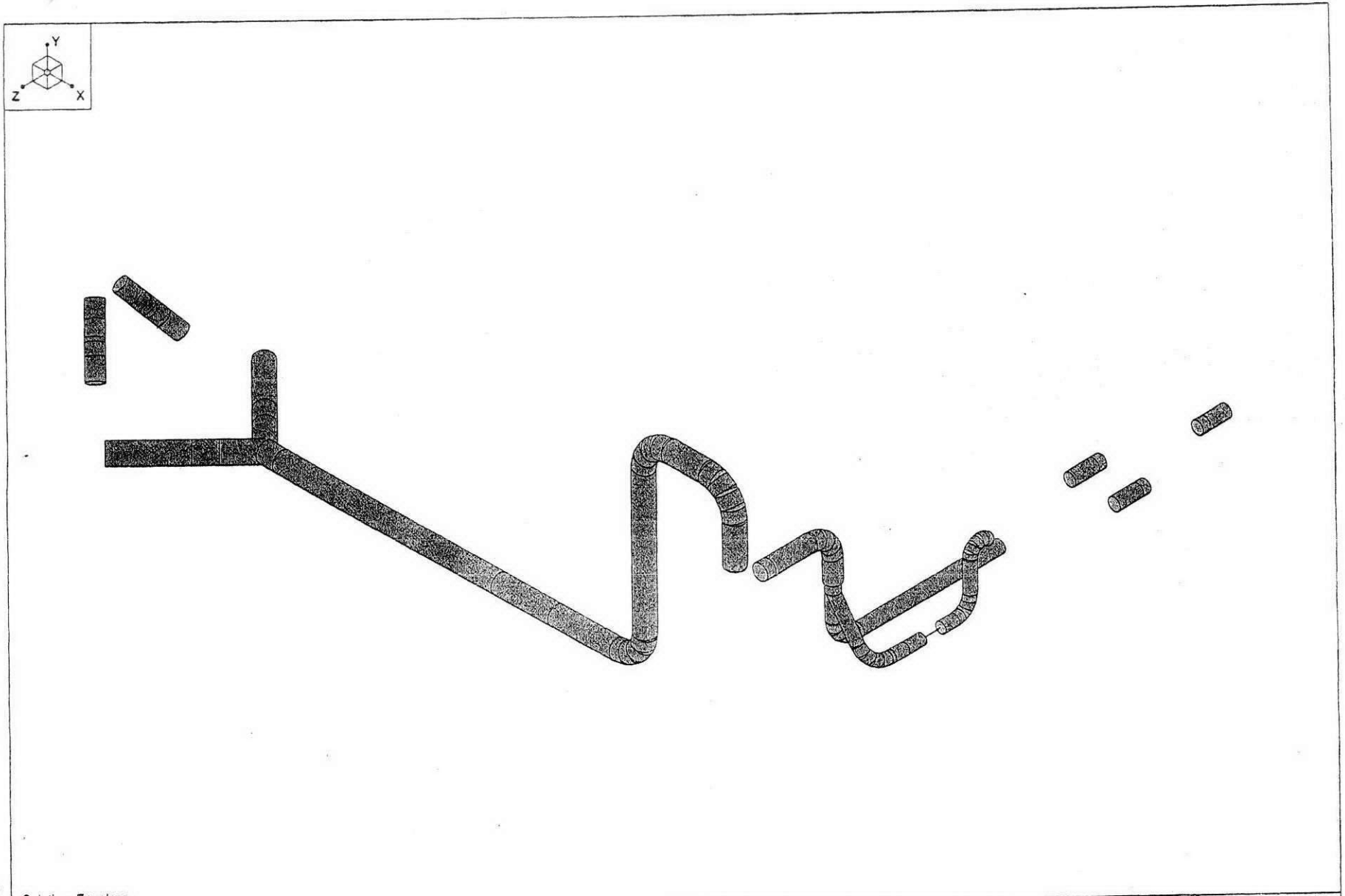
CALCULATION SHEET

CALC. NO.:	145579-V-CA-005	REV:	1	DATE:	March 26, 2006
CALC. TITLE:	Off-Gas Treatment System Pipe Stress Analysis				
PROJECT NO.:	145579	PROJECT TITLE:	Final DBVS Design		

Attachment 8 Model 5 RISA 3D Analysis Input and Output Data

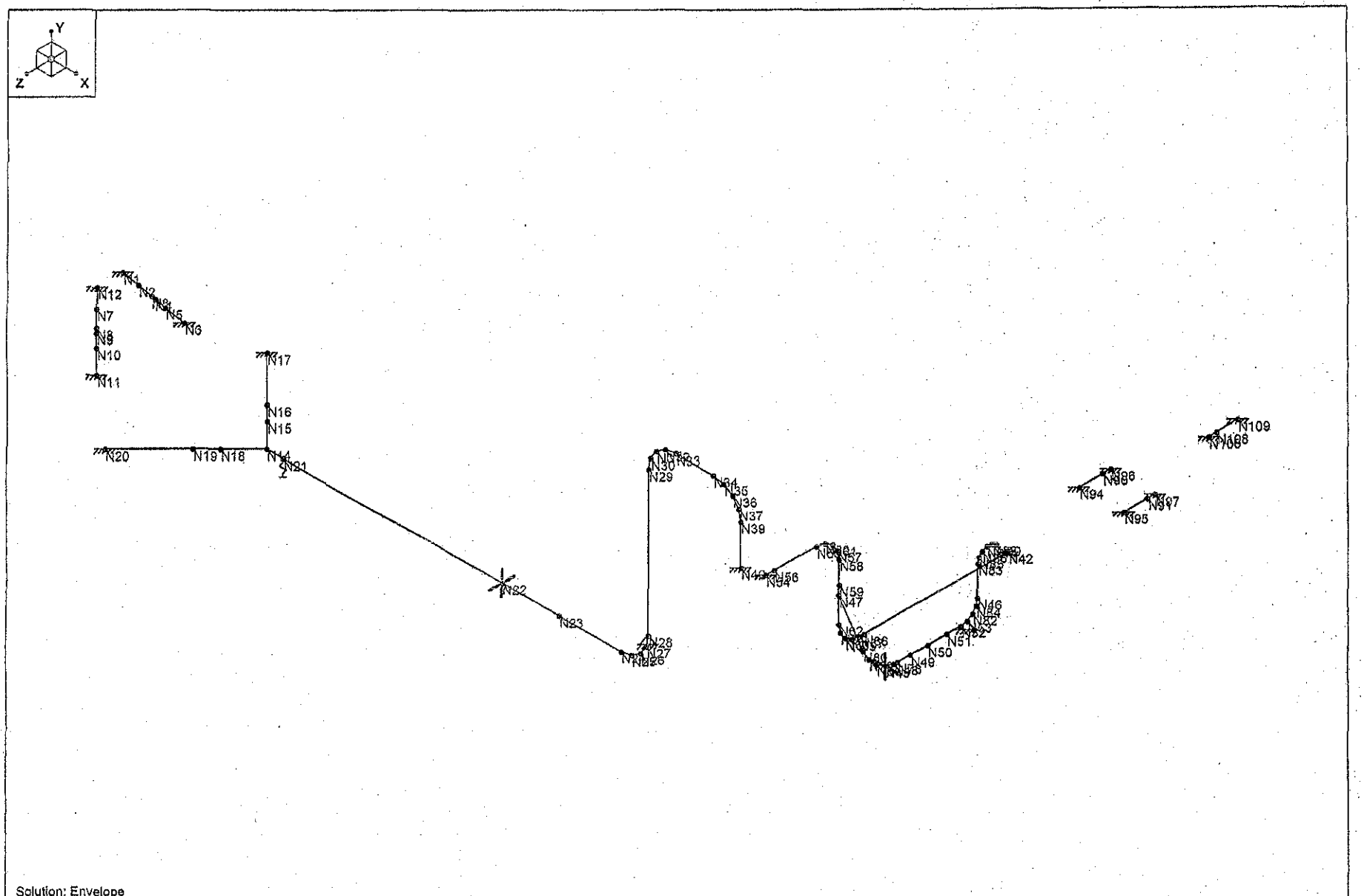
NOTE: This cover sheet represents the approval signatures of the originator and checker for all pages of this attachment

ORIGINATOR:	DATE:	CHECKER:	DATE:
Kevin M. Jones KMJ	3/26/06	J. Van Corbach JVC	3/26/06



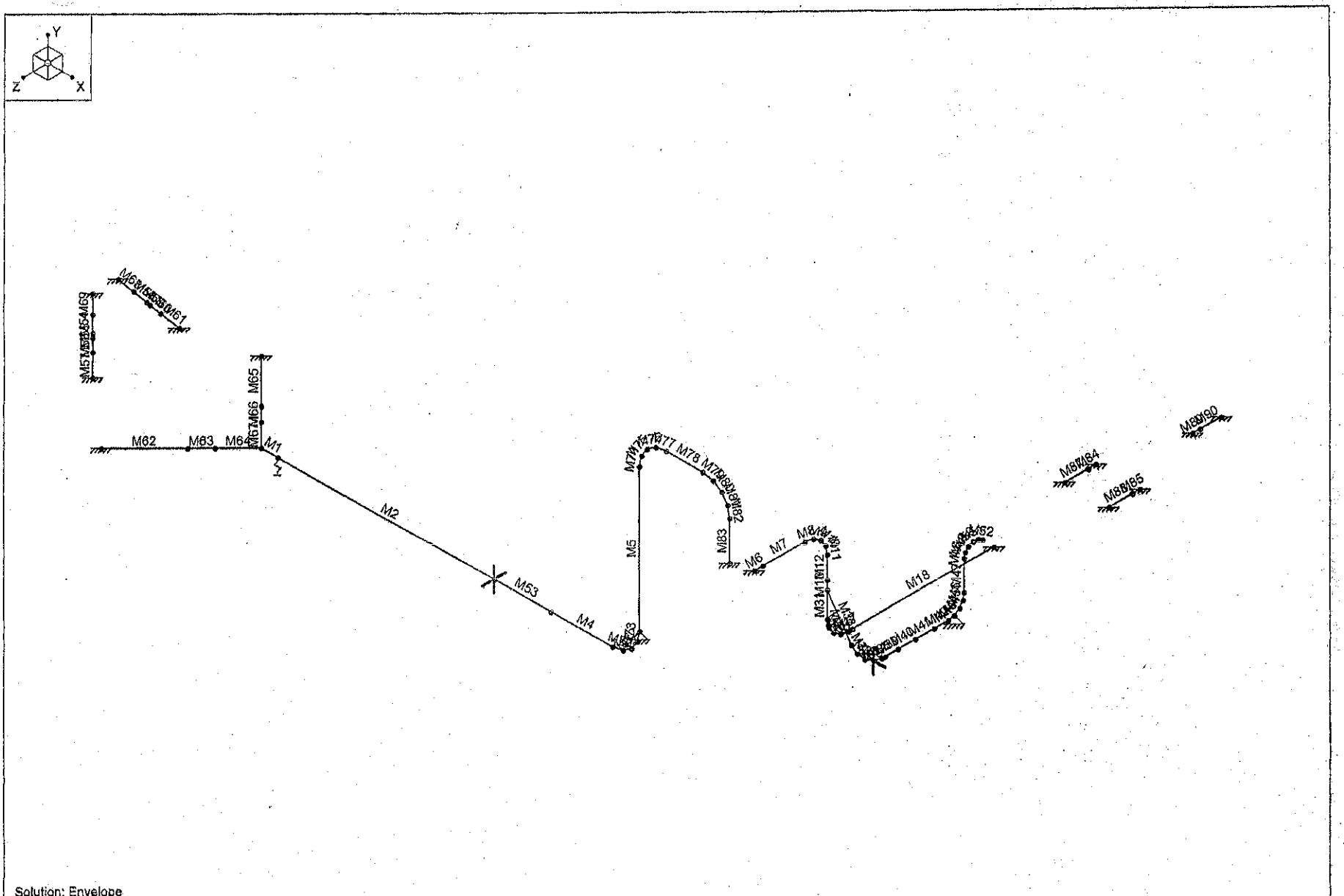
Solution: Envelope

DMJM H&N	DBVS Off-Gas Treatment Duct Analysis	
Kevin M. Jones		Feb 24, 2006 at 7:38 AM
145579-V-CA-005 Model 5	Rendered Model Geometry	145579-V-CA-005 Model 5.r3d



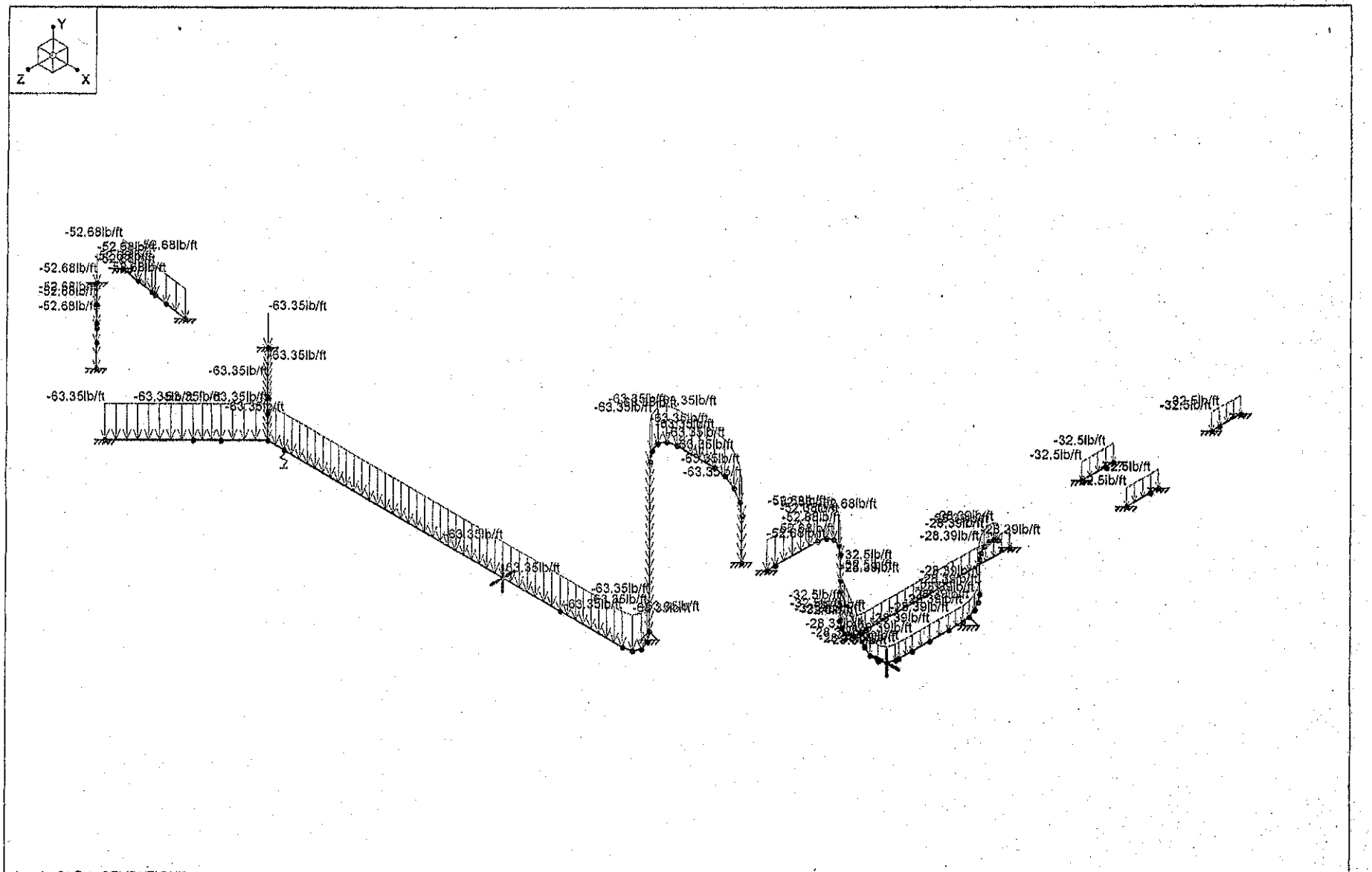
Solution: Envelope

DMJM H&N	DBVS Off-Gas Treatment Duct Analysis	
Kevin M. Jones		Feb 24, 2006 at 7:41 AM
145579-V-CA-005 Model 5	Nodes and Support Locations	145579-V-CA-005 Model 5.r3d



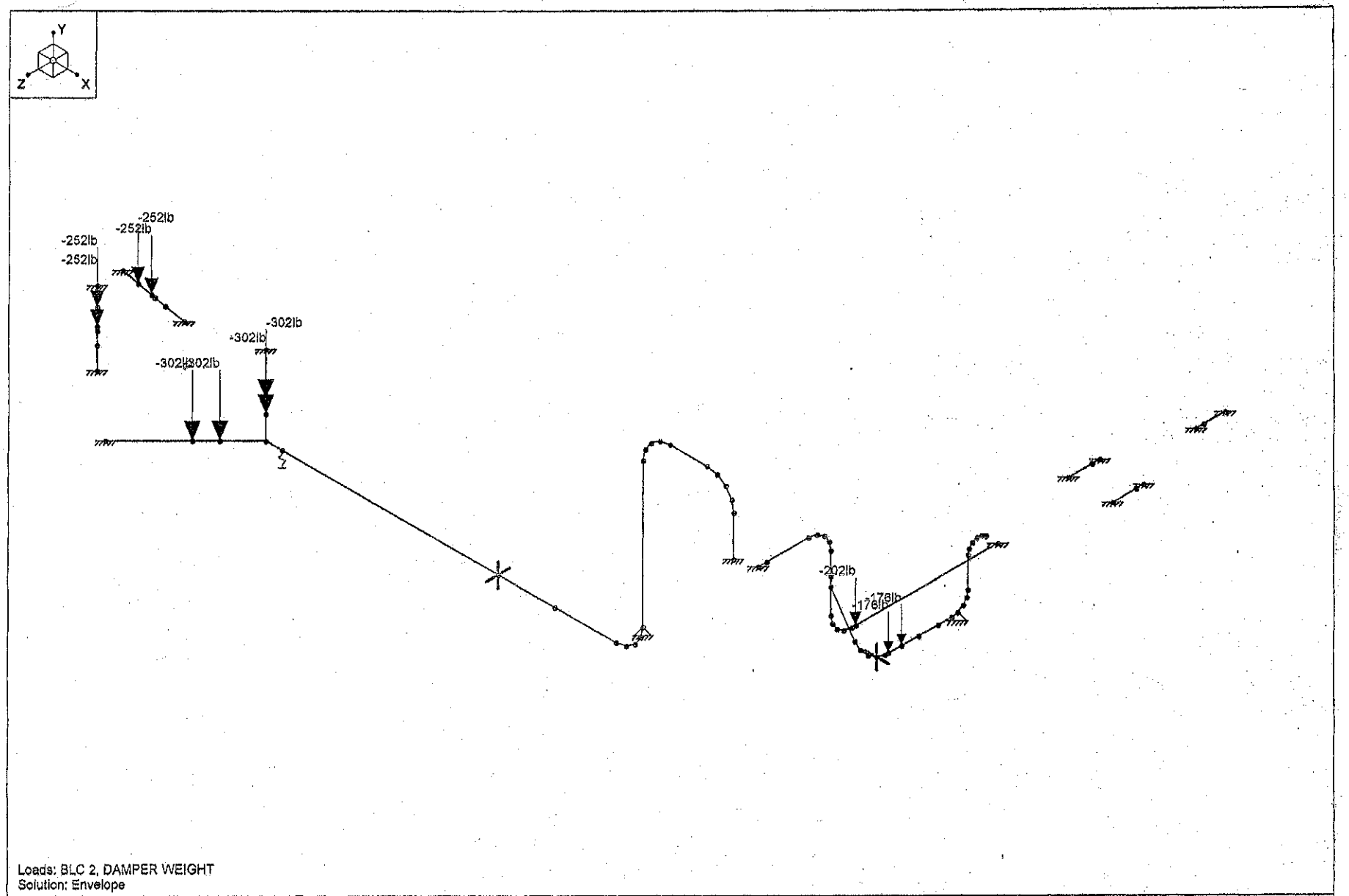
Solution: Envelope

DMJM H&N	DBVS Off-Gas Treatment Duct Analysis	
Kevin M. Jones		Feb 24, 2006 at 7:42 AM
145579-V-CA-005 Model 5	Members	145579-V-CA-005 Model 5.r3d



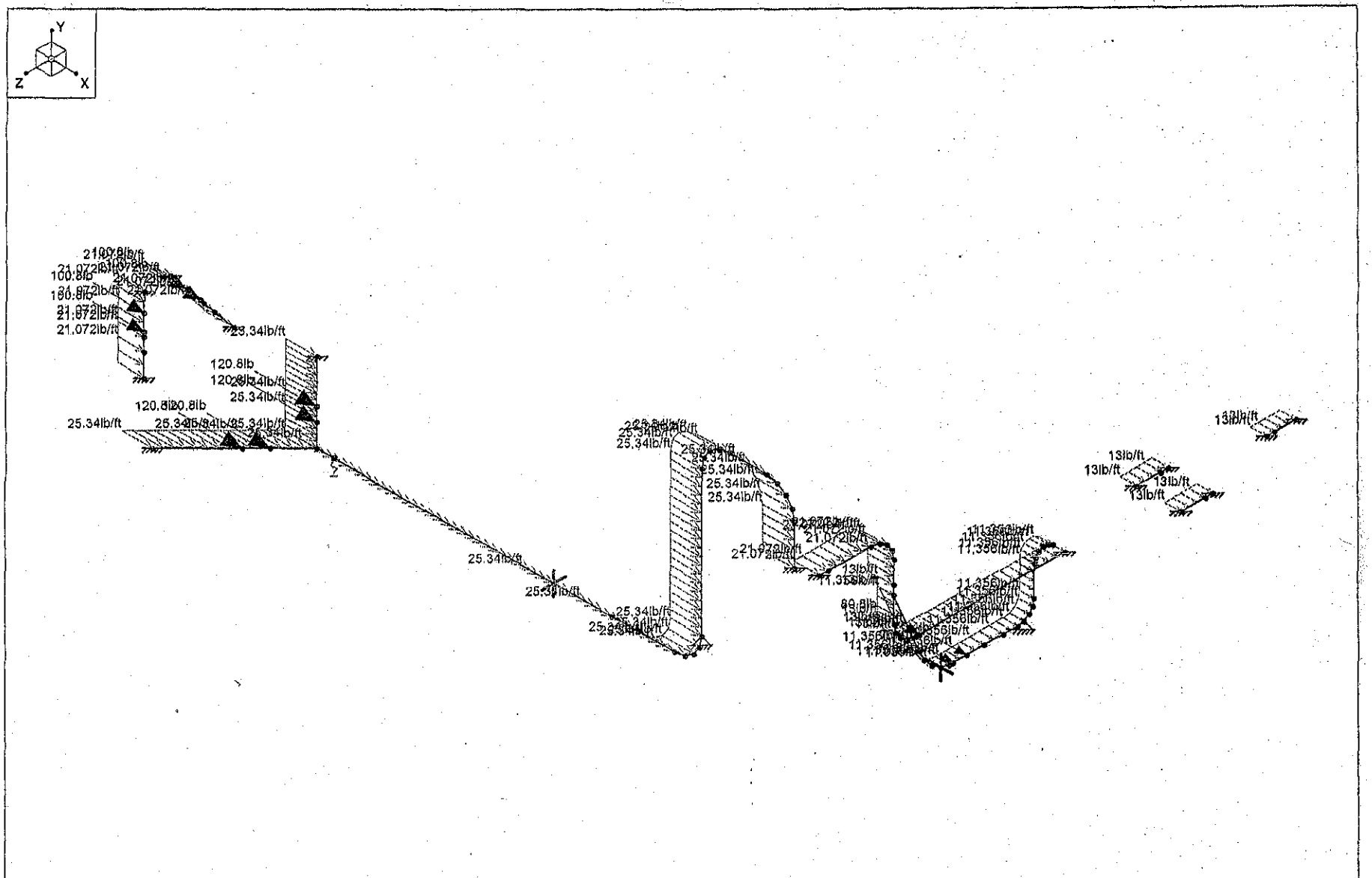
Loads: BLC 1, SELFWEIGHT
Solution: Envelope

DMJM H&N	DBVS Off-Gas Treatment Duct Analysis	
Kevin M. Jones		Feb 24, 2006 at 7:44 AM
145579-V-CA-005 Model 5	BLC - Selfweight	145579-V-CA-005 Model 5.r3d



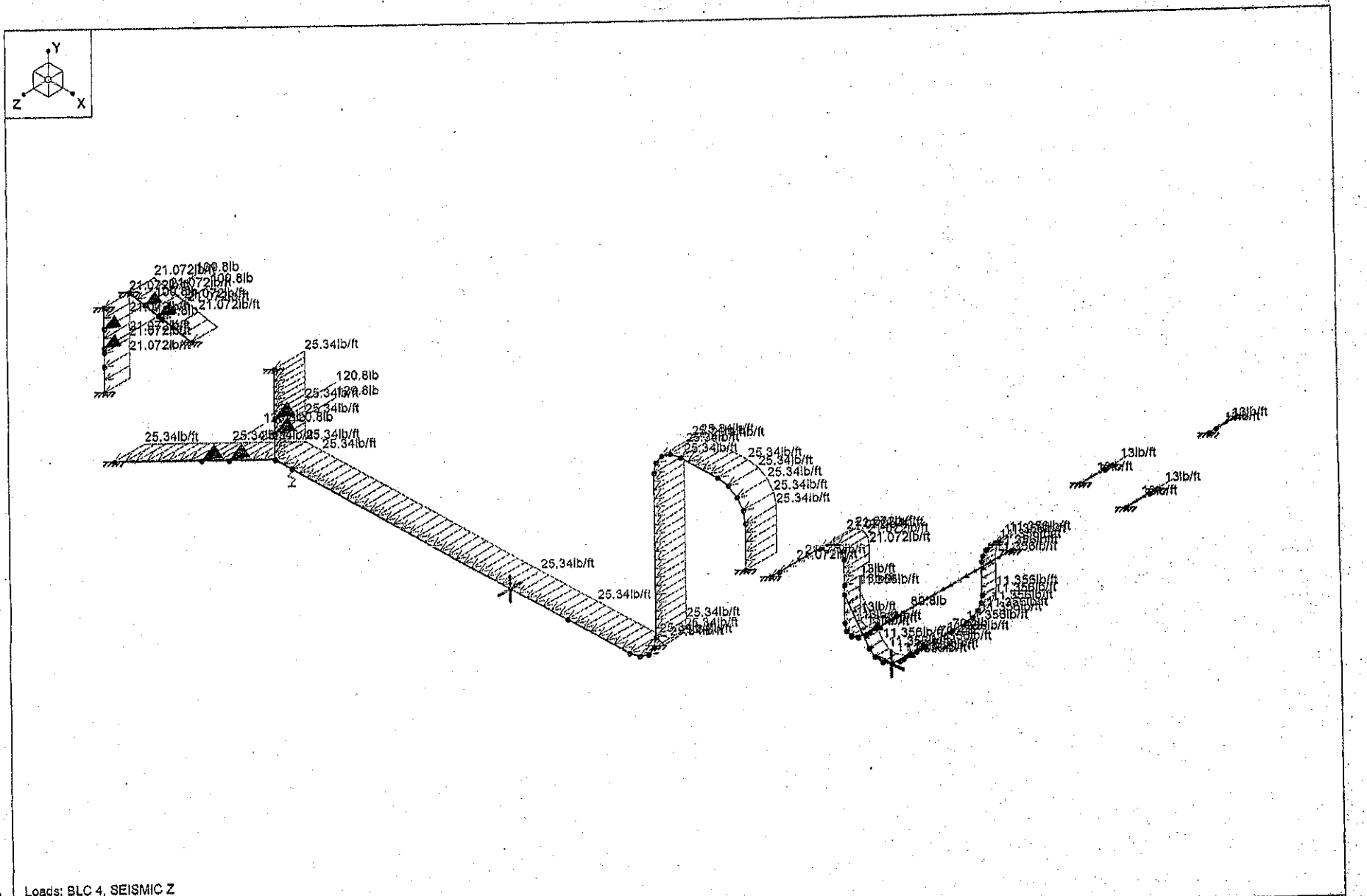
Loads: BLC 2, DAMPER WEIGHT
Solution: Envelope

DMJM H&N	DBVS Off-Gas Treatment Duct Analysis	
Kevin M. Jones		Feb 24, 2006 at 7:44 AM
145579-V-CA-005 Model 5	BLC - Dampers	145579-V-CA-005 Model 5.r3d



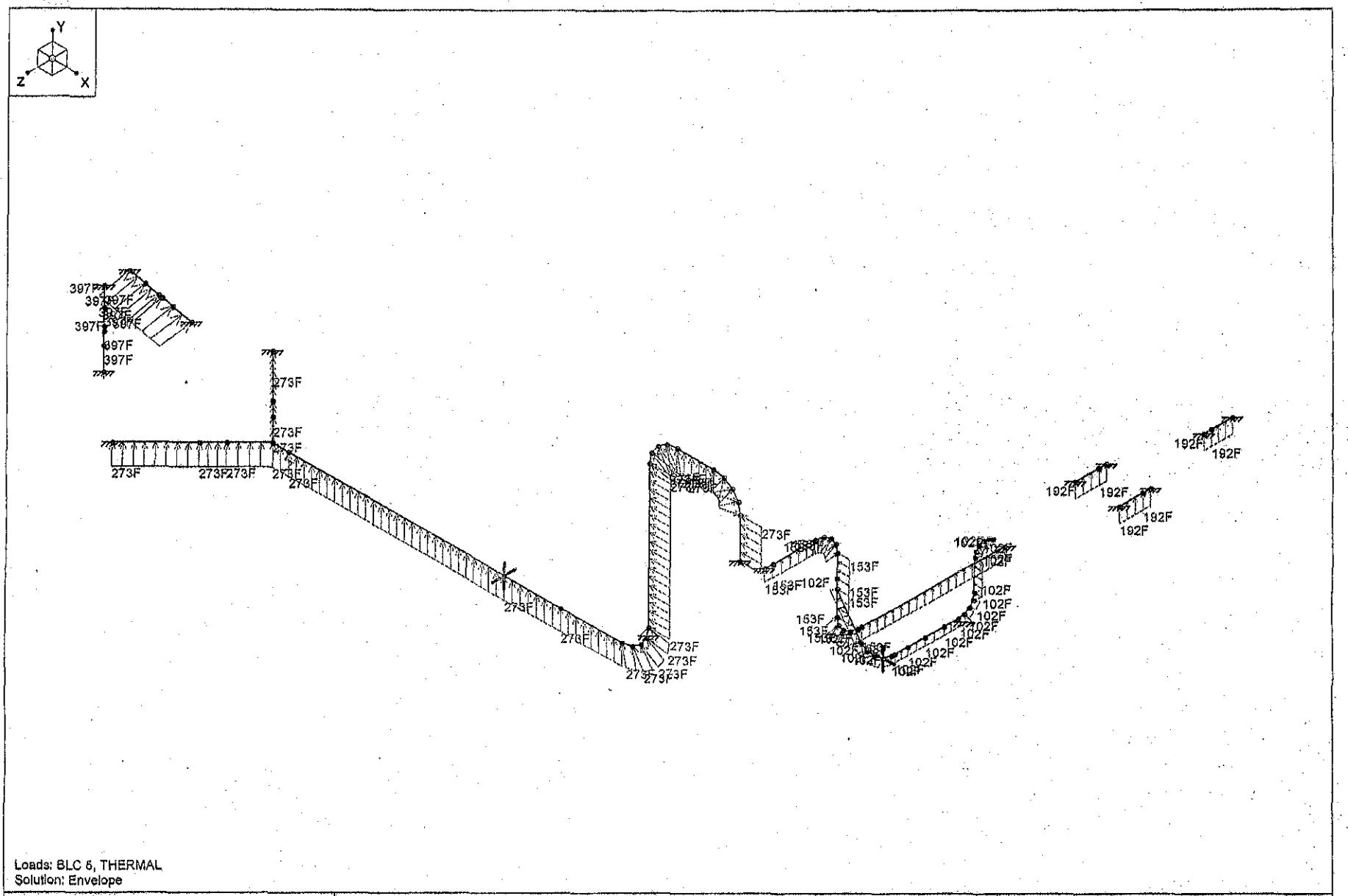
Loads: BLC 3, SEISMIC X
Solution: Envelope

DMJM H&N	DBVS Off-Gas Treatment Duct Analysis	
Kevin M. Jones		Feb 24, 2006 at 7:45 AM
145579-V-CA-005 Model 5	BLC - Seismic X	145579-V-CA-005 Model 5.r3d



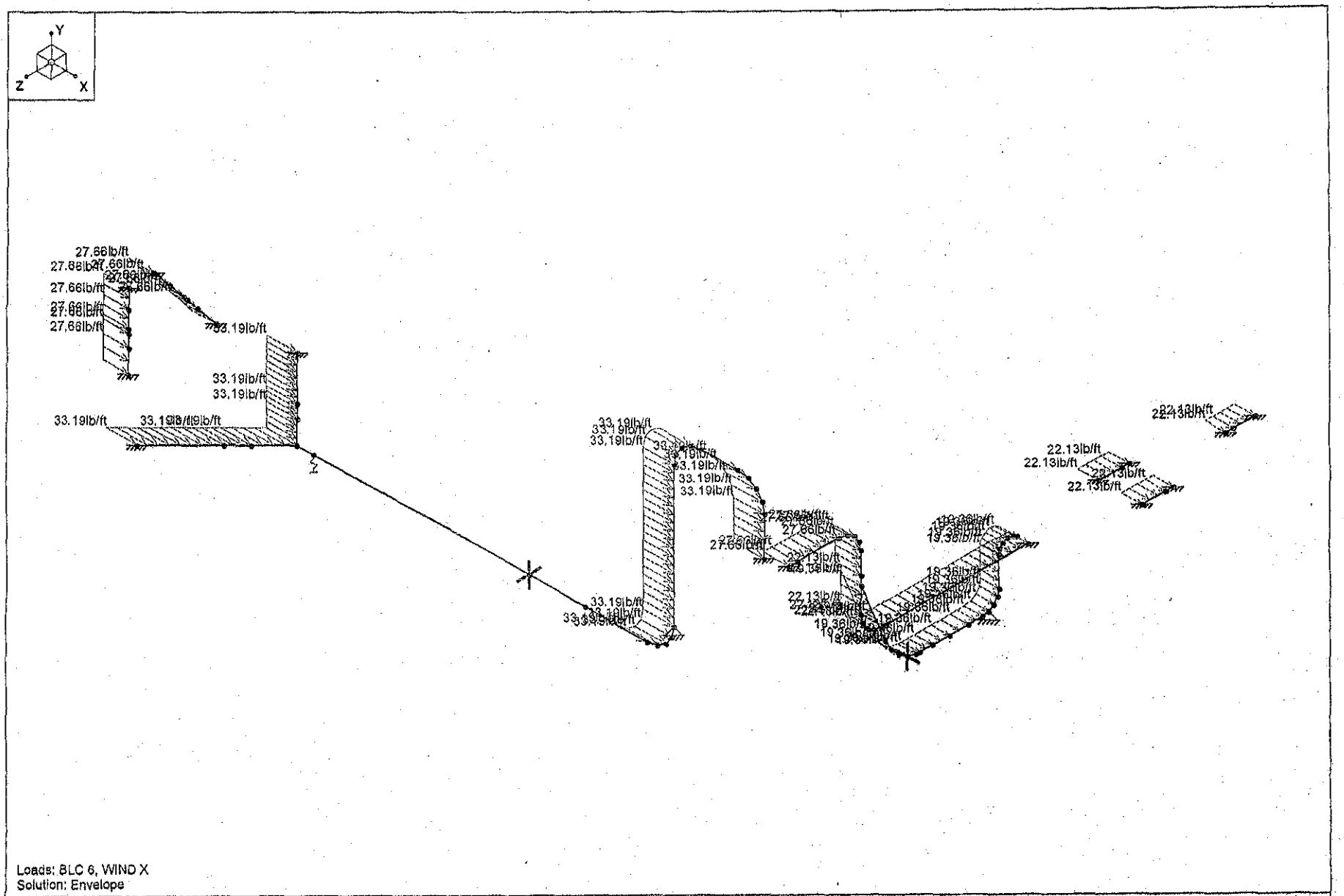
Loads: BLC 4, SEISMIC Z
Solution: Envelope

DMJM H&N	DBVS Off-Gas Treatment Duct Analysis	Feb 24, 2006 at 7:46 AM
Kevin M. Jones	BLC - Seismic Z	145579-V-CA-005 Model 5.r3d
145579-V-CA-005 Model 5		

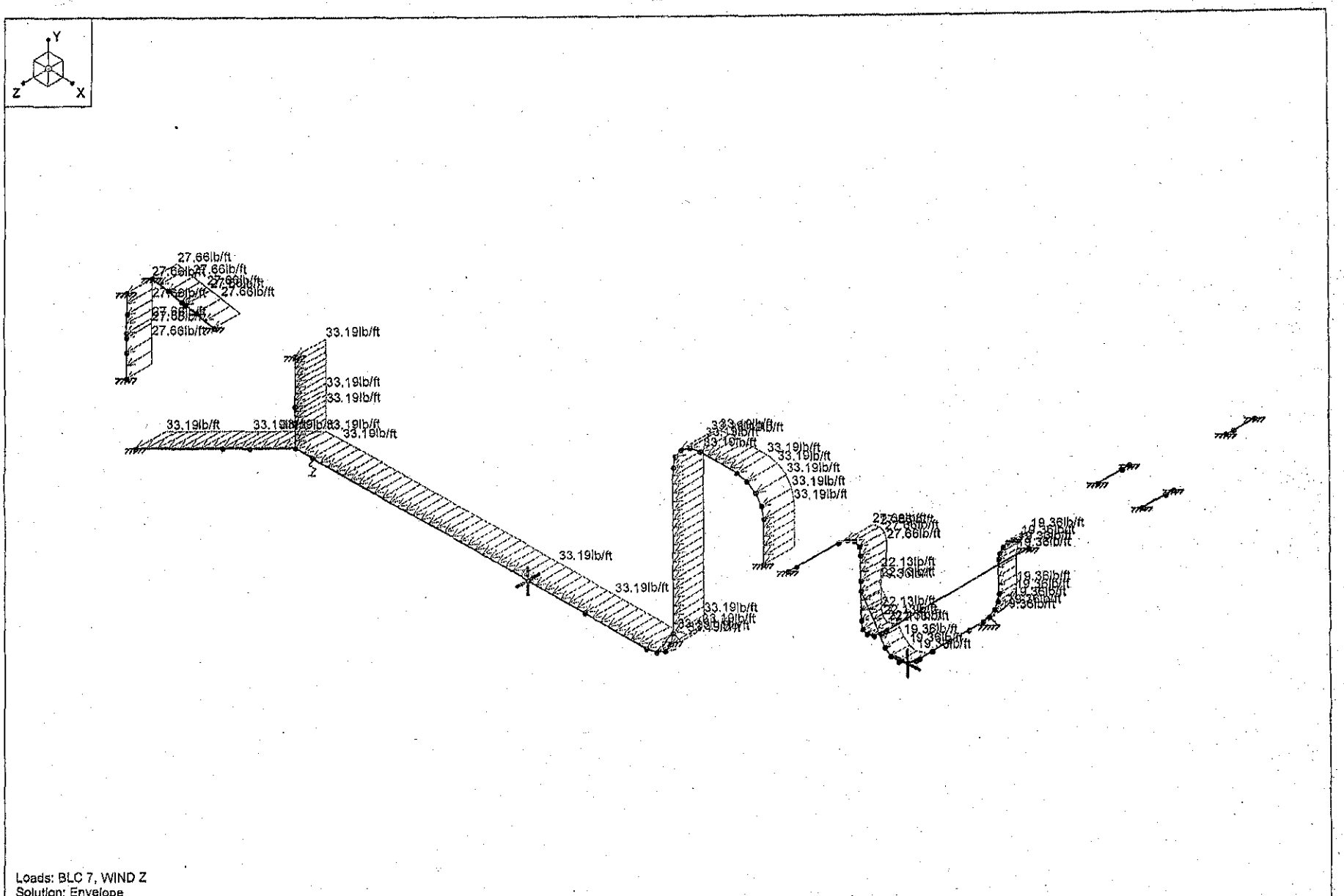


Loads: BLC 5, THERMAL
Solution: Envelope

DMJM H&N	DBVS Off-Gas Treatment Duct Analysis	
Kevin M. Jones		Feb 24, 2006 at 7:52 AM
145579-V-CA-005 Model 5	BLC - Thermal	145579-V-CA-005 Model 5.r3d

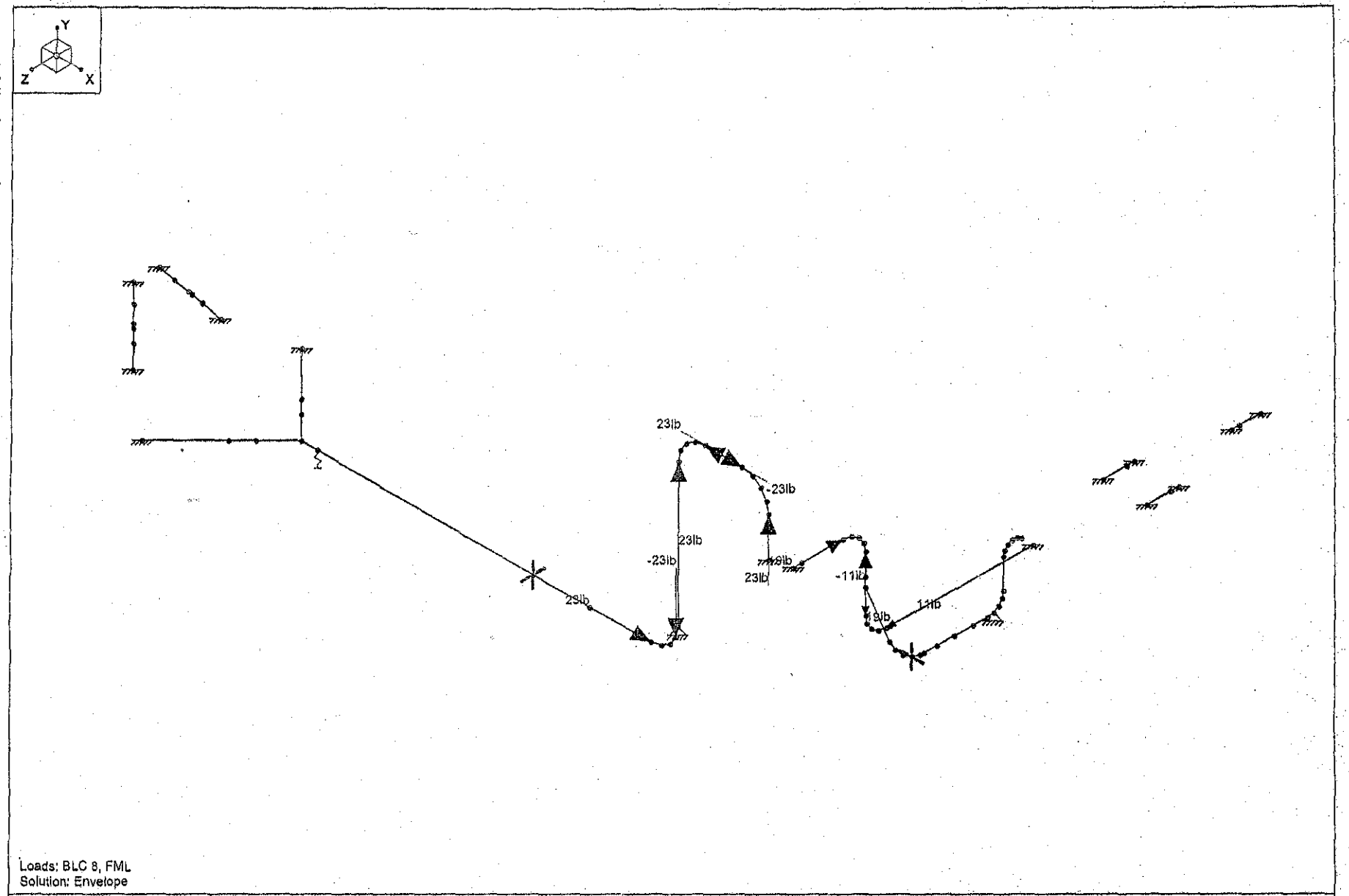


DMJM H&N	DBVS Off-Gas Treatment Duct Analysis	
Kevin M. Jones		Feb 24, 2006 at 7:52 AM
145579-V-CA-005 Model 5	BLC - Wind X	145579-V-CA-005 Model 5.r3d



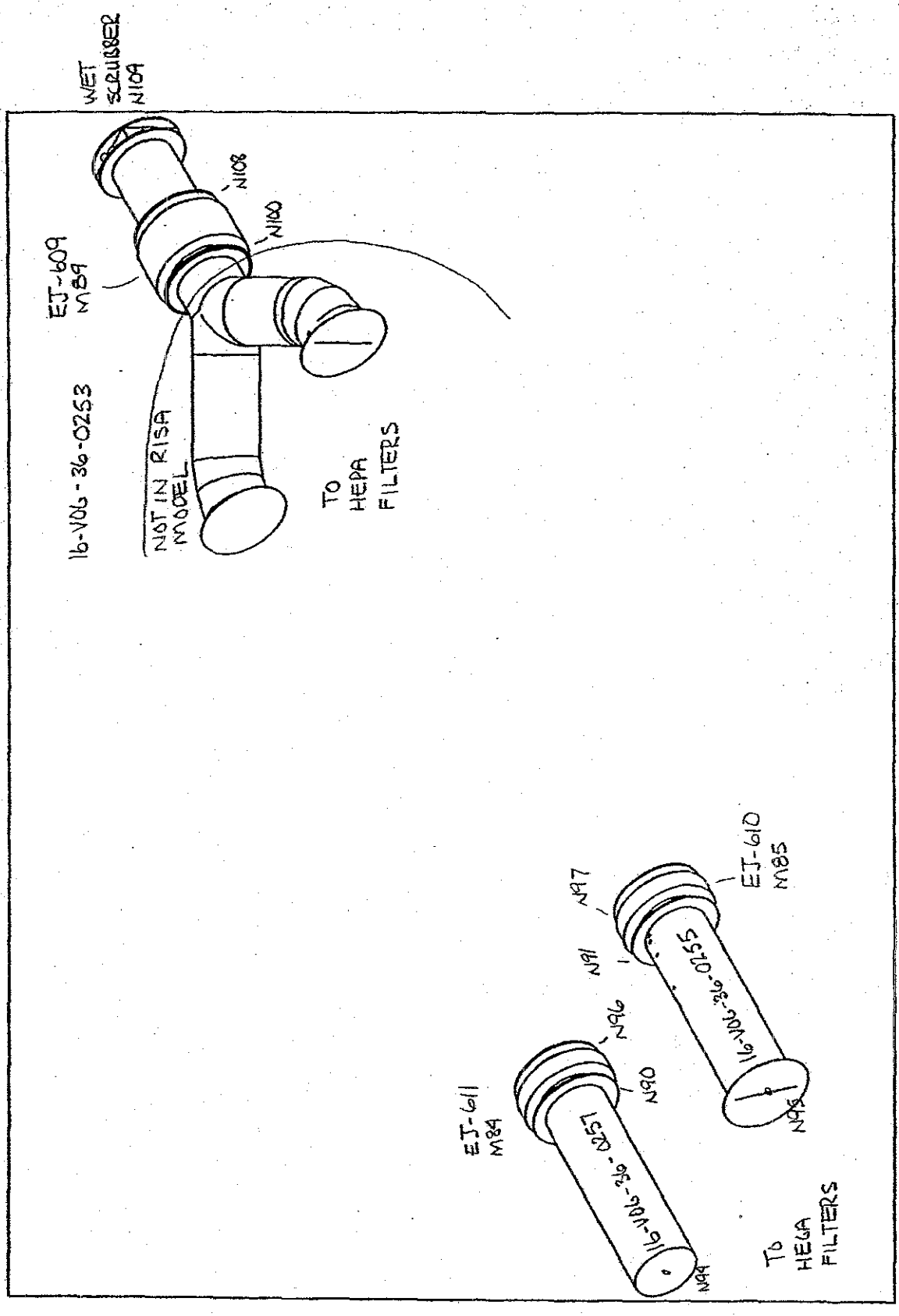
Loads: BLC 7, WIND Z
Solution: Envelope

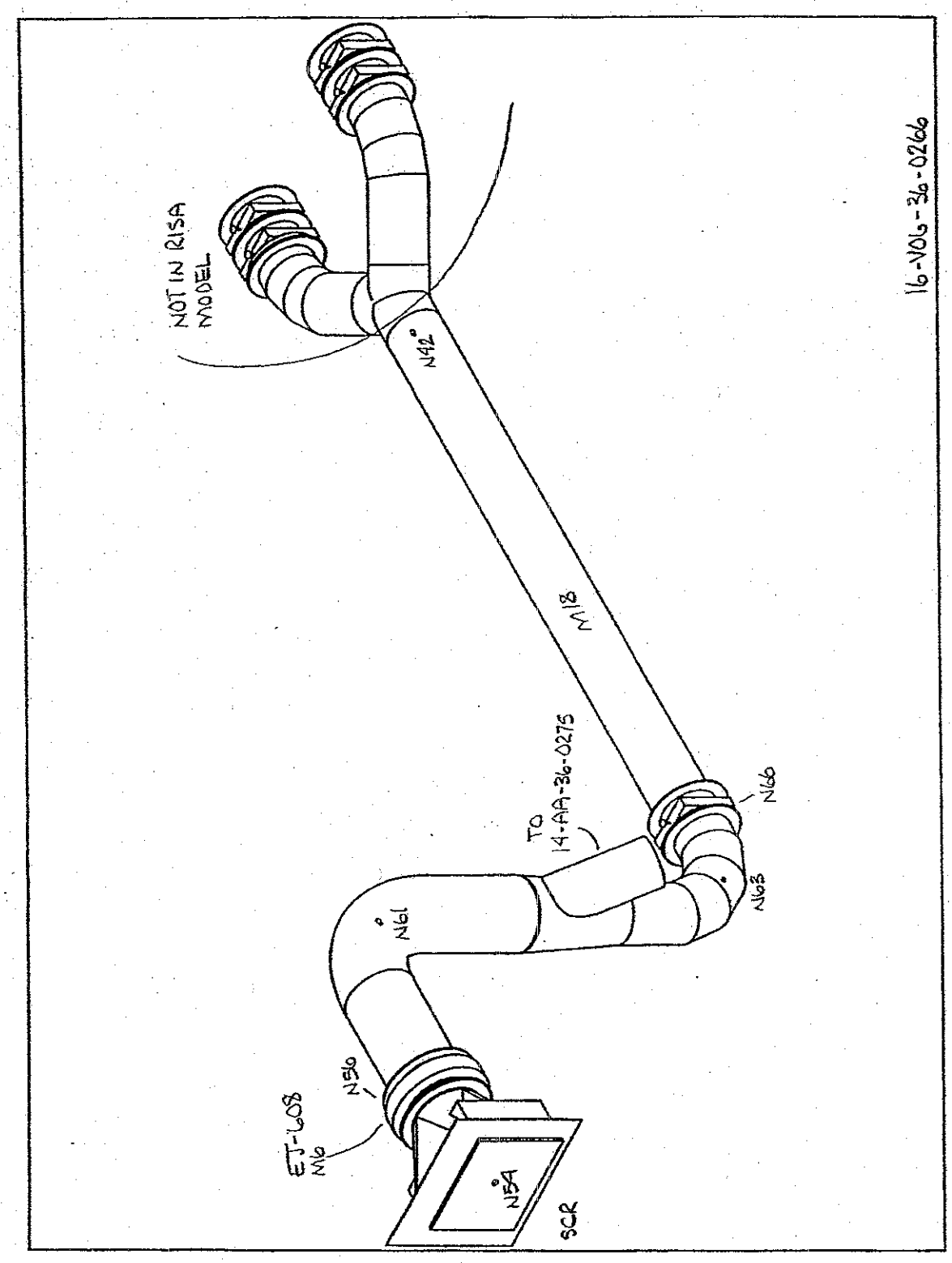
DMJM H&N	DBVS Off-Gas Treatment Duct Analysis	
Kevin M. Jones		Feb 24, 2006 at 7:53 AM
145579-V-CA-005 Model 5	BLC - Wind Z	145579-V-CA-005 Model 5.r3d

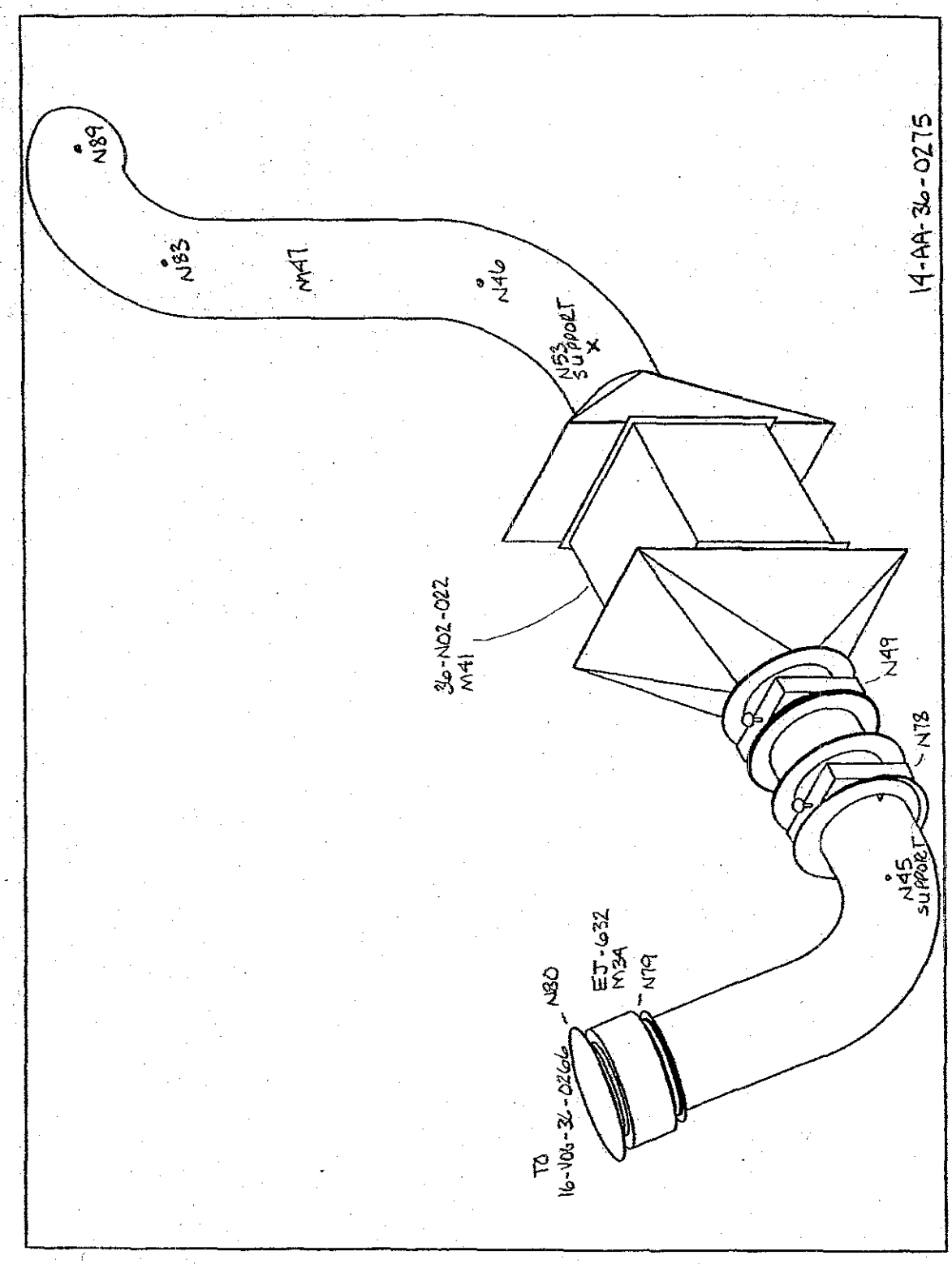


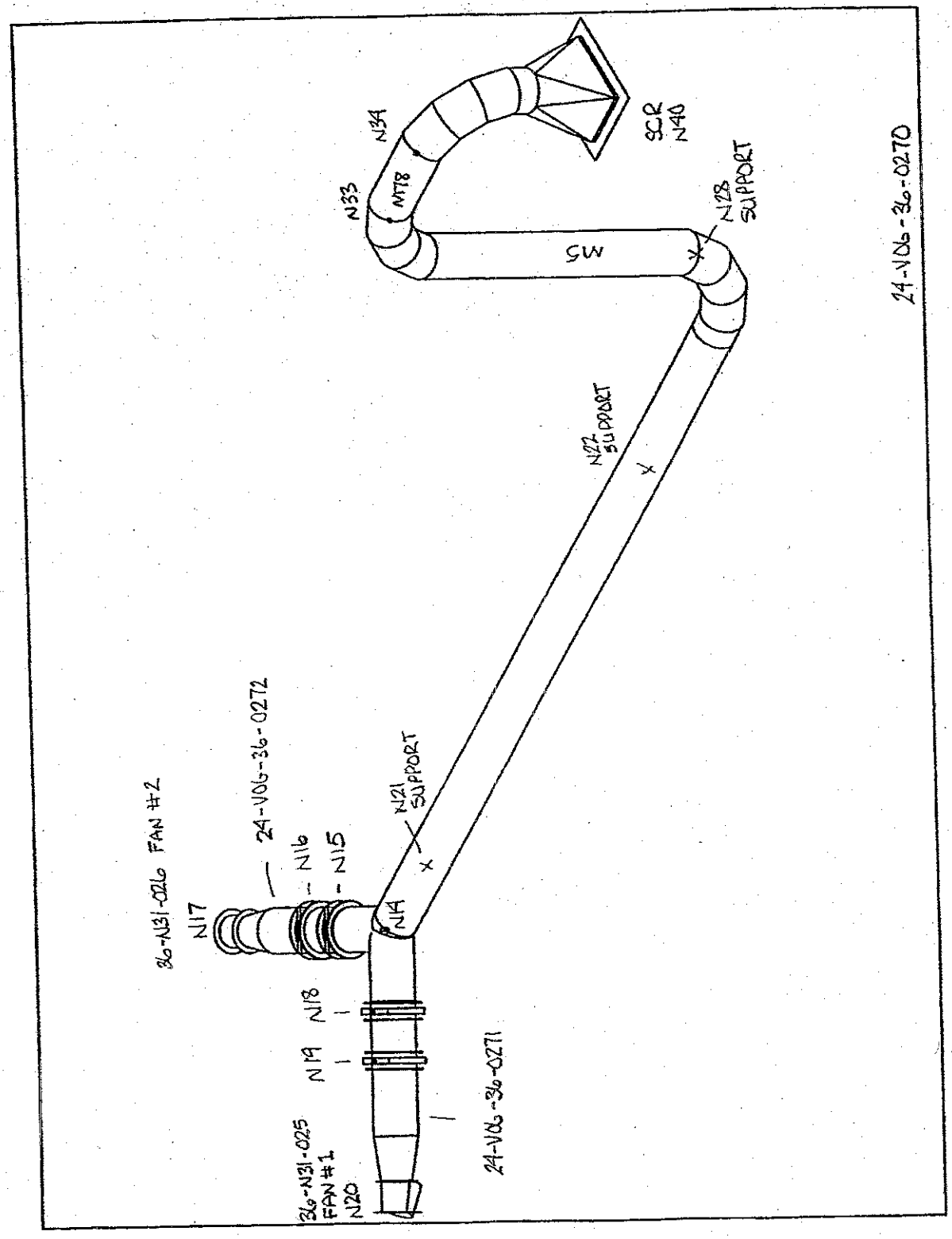
Loads: BLC 8, FML
Solution: Envelope

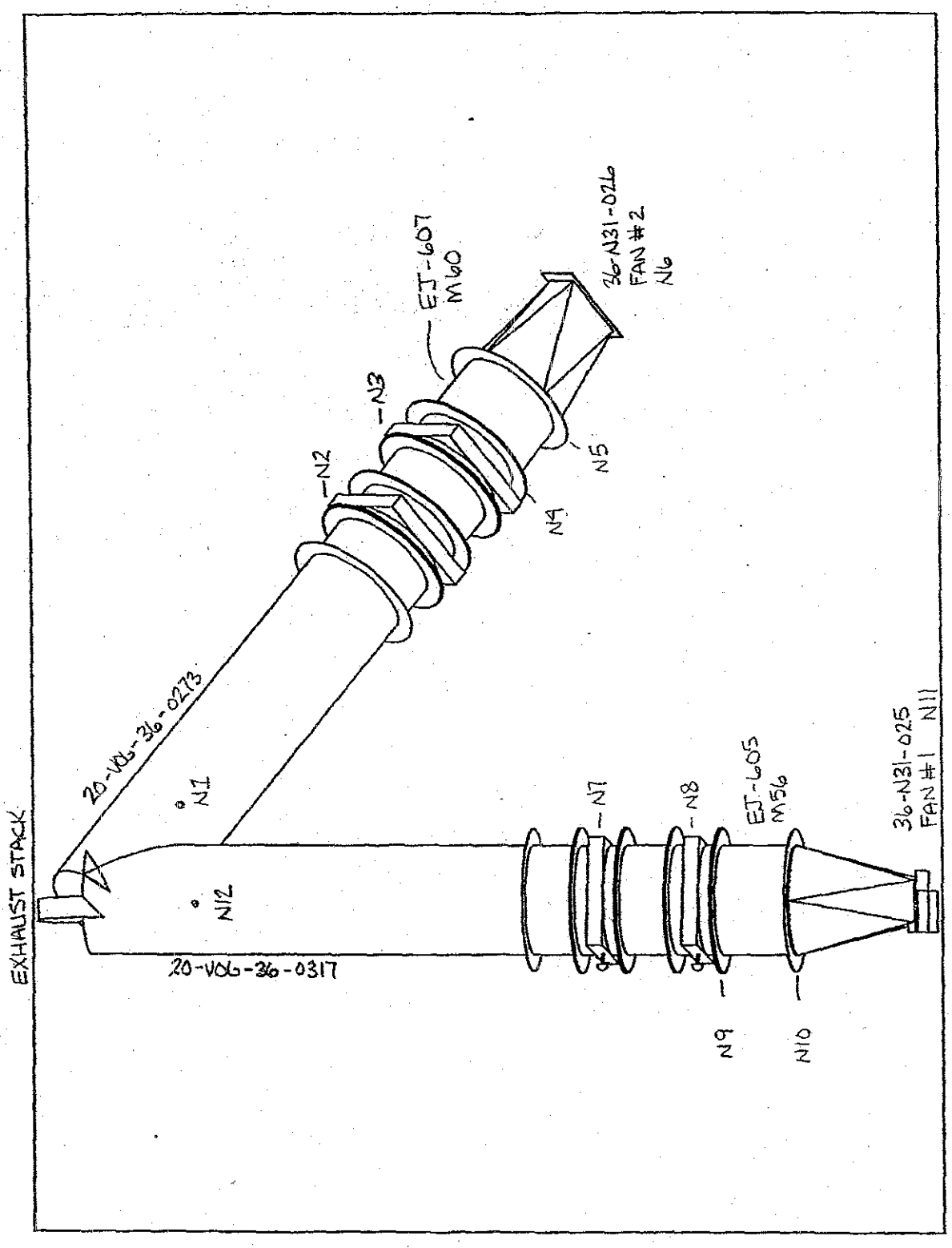
DMJM H&N	DBVS Off-Gas Treatment Duct Analysis	
Kevin M. Jones		Feb 24, 2006 at 7:54 AM
145579-V-CA-005 Model 5	BLC - FML	145579-V-CA-005 Model 5.r3d


WET SCRUBBER N109
N108
N110
EJ-609 M89
16-VOL-36-0253
NOT IN RISA MODEL
TO HEPA FILTERS
EJ-610 M85
N97
N91
16-VOL-36-0255
N96
N90
EJ-611 M84
16-VOL-36-0257
N94
TO HEGA FILTERS


NOT IN RISA MODEL
N42
M18
TO 14-AA-36-0275
N66
N63
N61
N56
ET-L08
M6
N54
SCR
16-V06-36-0266


N89
N83
N47
N46
N53
SUPPORT
14-AA-36-0275
36-N02-022
N41
N49
N78
N45
SUPPORT
EJ-632
N34
N79
N80
TO
16-V06-36-0266


24-V06-36-0270
SCR
N40
N34
N33
N18
M5
N28
SUPPORT
N27
SUPPORT
N21
SUPPORT
24-V06-36-0272
36-N31-026 FAN #2
N17
N16
N15
N14
N18
N19
24-V06-36-0271
36-N31-025
FAN #1
N20


EXHAUST STACK
20-VOL-36-0273
20-VOL-36-0317
N1
N2
N3
N4
N5
N6
N7
N8
N9
N10
N11
N12
EJ-607
M60
36-N31-026
FAN #2
EJ-605
M56
36-N31-025
FAN #1

Global

Display Sections for Member Calcs	5
Max Internal Sections for Member Calcs	97
Include Shear Deformation	Yes
Include Warping	Yes
Area Load Mesh (in^2)	144
Merge Tolerance (in)	.12
P-Delta Analysis Tolerance	0.50%
Vertical Axis	Y

Hot Rolled Steel Code	AISC: ASD 9th
Cold Formed Steel Code	AISI 99: ASD
NDS Wood Code	NDS 91: ASD
NDS Temperature	<100F
Concrete Code	ACI 1999

Number of Shear Regions	4
Region Spacing Increment (in)	4
Biaxial Column Method	PCA Load Contour
Parme Beta Factor (PCA)	.65
Concrete Stress Block	Rectangular
Use Cracked Sections	Yes
Bad Framing Warnings	No
Unused Force Warnings	Yes

Joint Coordinates and Temperatures

	Label	X [in]	Y [in]	Z [in]	Temp [F]	Detach From Diaphragm
1	N1	16.971	85.75	-16.971	0	
2	N2	27.286	71.162	-27.286	0	
3	N3	36.411	58.257	-36.411	0	
4	N4	38.724	54.987	-38.723	0	
5	N5	45.724	45.087	-45.723	0	Yes
6	N6	58.192	27.454	-58.192	0	
7	N7	27.286	71.162	27.286	0	
8	N8	36.411	58.257	36.411	0	
9	N9	38.724	54.987	38.724	0	
10	N10	45.724	45.087	45.724	0	
11	N11	58.192	27.454	58.192	0	
12	N12	16.971	85.75	16.971	0	
13	N14	224.482	0	0	0	
14	N15	194.079	0	-30.403	0	
15	N16	175.96	0	-48.522	0	
16	N17	118.118	0	-106.364	0	
17	N18	194.079	0	30.403	0	
18	N19	175.96	0	48.522	0	
19	N20	118.118	0	106.364	0	
20	N21	246.48	0	0	0	
21	N22	533.169	0	0	0	
22	N23	608.607	0	0	0	
23	N24	690.997	0	0	0	
24	N25	704.774	2.74	0	0	
25	N26	716.453	10.544	0	0	
26	N27	724.257	22.223	0	0	
27	N28	726.997	36	0	0	
28	N29	726.997	228.125	0	0	
29	N30	729.737	241.901	0	0	
30	N31	737.541	253.58	0	0	
31	N32	749.22	261.384	0	0	

Joint Coordinates and Temperatures (Continued)

	Label	X [in]	Y [in]	Z [in]	Temp [F]	Detach From Diaphragm
32	N33	762.997	264.125	0	0	
33	N34	811.997	264.125	0	0	
34	N35	825.773	261.385	0	0	
35	N36	837.452	253.581	0	0	
36	N37	845.256	241.902	0	0	
37	N39	847.997	228.125	0	0	
38	N40	847.997	174.5	0	0	
39	N42	847.997	16.625	-350.625	0	
40	N45	893.27	10.158	-145.627	0	
41	N46	894.372	29.75	-265	0	
42	N47	847.997	78.25	-129.5	0	
43	N48	894.372	8.5	-155.625	0	
44	N49	894.372	8.5	-177.375	0	
45	N50	894.372	8.5	-200.125	0	
46	N51	894.372	8.5	-225.25	0	
47	N52	894.372	8.5	-243.75	0	
48	N53	894.372	10.118	-251.882	0	
49	N54	847.997	149.5	-33	0	
50	N55	847.997	149.5	-99.625	0	
51	N56	847.997	149.5	-44	0	
52	N57	847.997	131.058	-127.226	0	
53	N58	847.997	119.625	-129.5	0	
54	N59	847.997	89.937	-129.5	0	
55	N60	847.997	147.226	-111.058	0	
56	N61	847.997	140.75	-120.75	0	
57	N62	847.997	44.625	-129.5	0	
58	N63	847.997	24.826	-137.701	0	
59	N64	847.997	33.91	-131.631	0	
60	N65	847.997	18.756	-146.785	0	
61	N66	847.997	16.625	-162.5	0	
62	N67	847.997	16.625	-157.5	0	
63	N78	894.372	8.5	-160.125	0	
64	N79	885.452	21.938	-131.489	0	
65	N80	879.924	30.268	-129.5	0	
66	N81	890.139	14.876	-137.152	0	
67	N82	894.372	14.724	-258.776	0	
68	N83	894.372	69.476	-265	0	
69	N84	894.372	21.618	-263.382	0	
70	N85	894.372	75.832	-266.526	0	
71	N86	894.372	80.802	-270.771	0	
72	N87	894.372	83.304	-276.81	0	
73	N88	894.372	82.791	-283.326	0	
74	N89	894.372	79.375	-288.899	0	
75	N90	818.872	16.625	-503.75	0	
76	N91	877.122	16.625	-503.75	0	
77	N94	818.872	16.625	-472.375	0	
78	N95	877.122	16.625	-472.375	0	
79	N96	818.872	16.625	-513.75	0	
80	N97	877.122	16.625	-513.75	0	
81	N100	847.997	16.625	-612.875	0	
82	N108	847.997	16.625	-622.875	0	
83	N109	847.997	16.625	-650.875	0	

Joint Boundary Conditions

	Joint Label	X [lb/in]	Y [lb/in]	Z [lb/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
1	N21		CS1e+6				
2	N22		Reaction	Reaction			
3	N54	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
4	N56						
5	N45	Reaction	Reaction				
6	N46						
7	N53	Reaction	Reaction	Reaction			
8	N17	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
9	N20	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
10	N7						
11	N8						
12	N9						
13	N10						
14	N11	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
15	N2						
16	N3						
17	N4						
18	N5						
19	N6	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
20	N12	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
21	N1	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
22	N28	Reaction	Reaction	Reaction			
23	N40	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
24	N95	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
25	N94	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
26	N97	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
27	N96	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
28	N100	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
29	N108						
30	N109	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
31	N42	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
32	N64	Reaction	Reaction				

General Material Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (\1E5 F)	Density[lb/in^3]
1	RIGID	1e+7		0	0	0

General Section Sets

	Label	Shape	Type	Material	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	GEN1A	RE4X4	Beam	RIGID	16	21.333	21.333	36.053
2	RIGID		None	RIGID	1e+6	1e+8	1e+8	1e+6

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (\1E5 F)	Density[lb/in^3]	Yield[ksi]
1	A36	29000	11154	.3	.65	.283	36
2	A312TP316L	29000	11154	.3	1.013	.29	25
3	A312TP316	29000	11154	.3	1.013	.29	30
4	A53	29000	11154	.3	.779	.283	30

Hot Rolled Steel Section Sets

	Label	Shape	Design List	Type	Material	Design Rules	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	14DIADUCTSS	14 in Sch 1...	Pipe	Beam	A312TP316L	Typical	6.746	161.657	161.657	323.315
2	16DIADUCTSS	16 in dia Sc...	Pipe	Beam	A312TP316L	Typical	7.721	242.316	242.316	484.632
3	20DIADUCTSS	20 in dia Sc...	Pipe	Beam	A312TP316L	Typical	11.196	549.806	549.806	1099.612
4	20DIADUCT	20 in dia Sc...	Pipe	Beam	A53	Typical	12.367	606.17	606.17	1212.34
5	24DIADUCT	24 in dia Sc...	Pipe	Beam	A53	Typical	14.865	1052.696	1052.696	2105.393

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(de...	Section/Shape	Design List	Type	Material	Design Rules
1	M1	N14	N21			24DIADUCT	Pipe	Beam	A53	Typical
2	M2	N21	N22			24DIADUCT	Pipe	Beam	A53	Typical
3	M4	N23	N24			24DIADUCT	Pipe	Beam	A53	Typical
4	M5	N28	N29			24DIADUCT	Pipe	Beam	A53	Typical
5	M6	N54	N56			20DIADUCTSS	Pipe	Beam	A312TP3...	Typical
6	M7	N56	N55			20DIADUCTSS	Pipe	Beam	A312TP3...	Typical
7	M8	N55	N60			20DIADUCTSS	Pipe	Beam	A312TP3...	Typical
8	M9	N60	N61			20DIADUCTSS	Pipe	Beam	A312TP3...	Typical
9	M10	N61	N57			20DIADUCTSS	Pipe	Beam	A312TP3...	Typical
10	M11	N57	N58			20DIADUCTSS	Pipe	Beam	A312TP3...	Typical
11	M12	N58	N59			20DIADUCTSS	Pipe	Beam	A312TP3...	Typical
12	M13	N59	N47			16DIADUCTSS	Pipe	Beam	A312TP3...	Typical
13	M14	N64	N63			16DIADUCTSS	Pipe	Beam	A312TP3...	Typical
14	M15	N63	N65			16DIADUCTSS	Pipe	Beam	A312TP3...	Typical
15	M16	N65	N67			16DIADUCTSS	Pipe	Beam	A312TP3...	Typical
16	M17	N67	N66			16DIADUCTSS	Pipe	Beam	A312TP3...	Typical
17	M18	N66	N42			16DIADUCTSS	Pipe	Beam	A312TP3...	Typical
18	M31	N47	N62			16DIADUCTSS	Pipe	Beam	A312TP3...	Typical
19	M32	N62	N64			16DIADUCTSS	Pipe	Beam	A312TP3...	Typical
20	M33	N47	N80			14DIADUCTSS	Pipe	Beam	A312TP3...	Typical
21	M34	N80	N79			14DIADUCTSS	Pipe	Beam	A312TP3...	Typical
22	M35	N79	N81			14DIADUCTSS	Pipe	Beam	A312TP3...	Typical
23	M36	N81	N45			14DIADUCTSS	Pipe	Beam	A312TP3...	Typical
24	M37	N45	N48			14DIADUCTSS	Pipe	Beam	A312TP3...	Typical
25	M38	N48	N78			14DIADUCTSS	Pipe	Beam	A312TP3...	Typical
26	M39	N78	N49			14DIADUCTSS	Pipe	Beam	A312TP3...	Typical
27	M40	N49	N50			14DIADUCTSS	Pipe	Beam	A312TP3...	Typical
28	M41	N50	N51			RIGID	None	None	RIGID	Typical
29	M42	N51	N52			14DIADUCTSS	Pipe	Beam	A312TP3...	Typical
30	M43	N52	N53			14DIADUCTSS	Pipe	Beam	A312TP3...	Typical
31	M44	N53	N82			14DIADUCTSS	Pipe	Beam	A312TP3...	Typical
32	M45	N82	N84			14DIADUCTSS	Pipe	Beam	A312TP3...	Typical
33	M46	N84	N46			14DIADUCTSS	Pipe	Beam	A312TP3...	Typical
34	M47	N46	N83			14DIADUCTSS	Pipe	Beam	A312TP3...	Typical
35	M48	N83	N85			14DIADUCTSS	Pipe	Beam	A312TP3...	Typical
36	M49	N85	N86			14DIADUCTSS	Pipe	Beam	A312TP3...	Typical
37	M50	N86	N87			14DIADUCTSS	Pipe	Beam	A312TP3...	Typical
38	M51	N87	N88			14DIADUCTSS	Pipe	Beam	A312TP3...	Typical
39	M52	N88	N89			14DIADUCTSS	Pipe	Beam	A312TP3...	Typical
40	M53	N22	N23			24DIADUCT	Pipe	Beam	A53	Typical
41	M54	N7	N8			20DIADUCT	Pipe	Beam	A53	Typical
42	M55	N8	N9			20DIADUCT	Pipe	Beam	A53	Typical
43	M56	N9	N10			20DIADUCT	Pipe	Beam	A53	Typical
44	M57	N10	N11			20DIADUCT	Pipe	Beam	A53	Typical
45	M58	N2	N3			20DIADUCT	Pipe	Beam	A53	Typical
46	M59	N3	N4			20DIADUCT	Pipe	Beam	A53	Typical
47	M60	N4	N5			20DIADUCT	Pipe	Beam	A53	Typical

Member Primary Data (Continued)

	Label	I Joint	J Joint	K Joint	Rotate(de...	Section/Shape	Design List	Type	Material	Design Rules
48	M61	N5	N6			20DIADUCT	Pipe	Beam	A53	Typical
49	M62	N20	N19			24DIADUCT	Pipe	Beam	A53	Typical
50	M63	N19	N18			24DIADUCT	Pipe	Beam	A53	Typical
51	M64	N18	N14			24DIADUCT	Pipe	Beam	A53	Typical
52	M65	N17	N16			24DIADUCT	Pipe	Beam	A53	Typical
53	M66	N16	N15			24DIADUCT	Pipe	Beam	A53	Typical
54	M67	N15	N14			24DIADUCT	Pipe	Beam	A53	Typical
55	M68	N1	N2			20DIADUCT	Pipe	Beam	A53	Typical
56	M69	N12	N7			20DIADUCT	Pipe	Beam	A53	Typical
57	M70	N24	N25			24DIADUCT	Pipe	Beam	A53	Typical
58	M71	N25	N26			24DIADUCT	Pipe	Beam	A53	Typical
59	M72	N26	N27			24DIADUCT	Pipe	Beam	A53	Typical
60	M73	N27	N28			24DIADUCT	Pipe	Beam	A53	Typical
61	M74	N29	N30			24DIADUCT	Pipe	Beam	A53	Typical
62	M75	N30	N31			24DIADUCT	Pipe	Beam	A53	Typical
63	M76	N31	N32			24DIADUCT	Pipe	Beam	A53	Typical
64	M77	N32	N33			24DIADUCT	Pipe	Beam	A53	Typical
65	M78	N33	N34			24DIADUCT	Pipe	Beam	A53	Typical
66	M79	N34	N35			24DIADUCT	Pipe	Beam	A53	Typical
67	M80	N35	N36			24DIADUCT	Pipe	Beam	A53	Typical
68	M81	N36	N37			24DIADUCT	Pipe	Beam	A53	Typical
69	M82	N37	N39			24DIADUCT	Pipe	Beam	A53	Typical
70	M83	N39	N40			24DIADUCT	Pipe	Beam	A53	Typical
71	M84	N90	N96			16DIADUCTSS	Pipe	Beam	A312TP3...	Typical
72	M85	N91	N97			16DIADUCTSS	Pipe	Beam	A312TP3...	Typical
73	M87	N94	N90			16DIADUCTSS	Pipe	Beam	A312TP3...	Typical
74	M88	N95	N91			16DIADUCTSS	Pipe	Beam	A312TP3...	Typical
75	M89	N100	N108			16DIADUCTSS	Pipe	Beam	A312TP3...	Typical
76	M90	N108	N109			16DIADUCTSS	Pipe	Beam	A312TP3...	Typical

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed	Area (Me...	Surface (...
1	SELFWEIGHT	DL						76		
2	DAMPER WEIGHT	DL				11				
3	SEISMIC X	ELX				11		76		
4	SEISMIC Z	ELZ				11		76		
5	THERMAL	None						76		
6	WIND X	WLX						70		
7	WIND Z	WLZ						58		
8	FML	DL				10				

Joint Loads and Enforced Displacements (BLC 2 : DAMPER WEIGHT)

	Joint Label	L,D,M	Direction	Magnitude[lb,lb-ft in,rad lb*s^2/in]
1	N2	L	Y	-252
2	N3	L	Y	-252
3	N7	L	Y	-252
4	N8	L	Y	-252
5	N15	L	Y	-302
6	N16	L	Y	-302
7	N18	L	Y	-302
8	N19	L	Y	-302
9	N49	L	Y	-176
10	N66	L	Y	-202
11	N78	L	Y	-176

Joint Loads and Enforced Displacements (BLC 3 : SEISMIC X)

	Joint Label	L,D,M	Direction	Magnitude[lb,lb-ft in,rad lb*s^2/in]
1	N2	L	X	100.8
2	N3	L	X	100.8
3	N7	L	X	100.8
4	N8	L	X	100.8
5	N15	L	X	120.8
6	N16	L	X	120.8
7	N18	L	X	120.8
8	N19	L	X	120.8
9	N49	L	X	70.4
10	N66	L	X	80.8
11	N78	L	X	70.4

Joint Loads and Enforced Displacements (BLC 4 : SEISMIC Z)

	Joint Label	L,D,M	Direction	Magnitude[lb,lb-ft in,rad lb*s^2/in]
1	N2	L	Z	100.8
2	N3	L	Z	100.8
3	N7	L	Z	100.8
4	N8	L	Z	100.8
5	N15	L	Z	120.8
6	N16	L	Z	120.8
7	N18	L	Z	120.8
8	N19	L	Z	120.8
9	N49	L	Z	70.4
10	N66	L	Z	80.8
11	N78	L	Z	70.4

Joint Loads and Enforced Displacements (BLC 8 : FML)

	Joint Label	L,D,M	Direction	Magnitude[lb,lb-ft in,rad lb*s^2/in]
1	N24	L	X	23
2	N34	L	X	23
3	N27	L	Y	-23
4	N29	L	Y	23
5	N39	L	Y	23
6	N33	L	X	-23
7	N67	L	Z	11
8	N62	L	Y	-11
9	N58	L	Y	19
10	N55	L	Z	-19

Member Distributed Loads (BLC 1 : SELFWEIGHT)

	Member Label	Direction	Start Magnitude[lb/ft,deg]	End Magnitude[lb/ft,deg]	Start Location[i...	End Location[i...
1	M1	Y	-63.35	-63.35	0	0
2	M2	Y	-63.35	-63.35	0	0
3	M4	Y	-63.35	-63.35	0	0
4	M5	Y	-63.35	-63.35	0	0
5	M53	Y	-63.35	-63.35	0	0
6	M6	Y	-52.68	-52.68	0	0
7	M7	Y	-52.68	-52.68	0	0
8	M8	Y	-52.68	-52.68	0	0
9	M9	Y	-52.68	-52.68	0	0
10	M10	Y	-52.68	-52.68	0	0
11	M11	Y	-52.68	-52.68	0	0
12	M12	Y	-52.68	-52.68	0	0
13	M13	Y	-32.5	-32.5	0	0
14	M14	Y	-32.5	-32.5	0	0

Member Distributed Loads (BLC 1 : SELFWEIGHT) (Continued)

	Member Label	Direction	Start Magnitude[lb/ft,deg]	End Magnitude[lb/ft,deg]	Start Location[i...	End Location[i...
15	M15	Y	-32.5	-32.5	0	0
16	M16	Y	-32.5	-32.5	0	0
17	M17	Y	-32.5	-32.5	0	0
18	M18	Y	-32.5	-32.5	0	0
19	M31	Y	-32.5	-32.5	0	0
20	M32	Y	-32.5	-32.5	0	0
21	M33	Y	-28.39	-28.39	0	0
22	M34	Y	-28.39	-28.39	0	0
23	M35	Y	-28.39	-28.39	0	0
24	M36	Y	-28.39	-28.39	0	0
25	M37	Y	-28.39	-28.39	0	0
26	M38	Y	-28.39	-28.39	0	0
27	M39	Y	-28.39	-28.39	0	0
28	M40	Y	-28.39	-28.39	0	0
29	M41	Y	-28.39	-28.39	0	0
30	M42	Y	-28.39	-28.39	0	0
31	M43	Y	-28.39	-28.39	0	0
32	M44	Y	-28.39	-28.39	0	0
33	M45	Y	-28.39	-28.39	0	0
34	M46	Y	-28.39	-28.39	0	0
35	M47	Y	-28.39	-28.39	0	0
36	M48	Y	-28.39	-28.39	0	0
37	M49	Y	-28.39	-28.39	0	0
38	M50	Y	-28.39	-28.39	0	0
39	M51	Y	-28.39	-28.39	0	0
40	M52	Y	-28.39	-28.39	0	0
41	M62	Y	-63.35	-63.35	0	0
42	M63	Y	-63.35	-63.35	0	0
43	M64	Y	-63.35	-63.35	0	0
44	M65	Y	-63.35	-63.35	0	0
45	M66	Y	-63.35	-63.35	0	0
46	M67	Y	-63.35	-63.35	0	0
47	M70	Y	-63.35	-63.35	0	0
48	M71	Y	-63.35	-63.35	0	0
49	M72	Y	-63.35	-63.35	0	0
50	M73	Y	-63.35	-63.35	0	0
51	M74	Y	-63.35	-63.35	0	0
52	M75	Y	-63.35	-63.35	0	0
53	M76	Y	-63.35	-63.35	0	0
54	M77	Y	-63.35	-63.35	0	0
55	M78	Y	-63.35	-63.35	0	0
56	M79	Y	-63.35	-63.35	0	0
57	M80	Y	-63.35	-63.35	0	0
58	M81	Y	-63.35	-63.35	0	0
59	M82	Y	-63.35	-63.35	0	0
60	M83	Y	-63.35	-63.35	0	0
61	M54	Y	-52.68	-52.68	0	0
62	M55	Y	-52.68	-52.68	0	0
63	M56	Y	-52.68	-52.68	0	0
64	M57	Y	-52.68	-52.68	0	0
65	M58	Y	-52.68	-52.68	0	0
66	M59	Y	-52.68	-52.68	0	0
67	M60	Y	-52.68	-52.68	0	0
68	M61	Y	-52.68	-52.68	0	0
69	M68	Y	-52.68	-52.68	0	0
70	M69	Y	-52.68	-52.68	0	0
71	M87	Y	-32.5	-32.5	0	0

Member Distributed Loads (BLC 1 : SELFWEIGHT) (Continued)

	Member Label	Direction	Start Magnitude[lb/ft,deg]	End Magnitude[lb/ft,deg]	Start Location[i...	End Location[i...
72	M88	Y	-32.5	-32.5	0	0
73	M89	Y	-32.5	-32.5	0	0
74	M90	Y	-32.5	-32.5	0	0
75	M84	Y	-32.5	-32.5	0	10
76	M85	Y	-32.5	-32.5	0	10

Member Distributed Loads (BLC 3 : SEISMIC X)

	Member Label	Direction	Start Magnitude[lb/ft,deg]	End Magnitude[lb/ft,deg]	Start Location[i...	End Location[i...
1	M1	X	25.34	25.34	0	0
2	M2	X	25.34	25.34	0	0
3	M4	X	25.34	25.34	0	0
4	M5	X	25.34	25.34	0	0
5	M53	X	25.34	25.34	0	0
6	M6	X	21.072	21.072	0	0
7	M7	X	21.072	21.072	0	0
8	M8	X	21.072	21.072	0	0
9	M9	X	21.072	21.072	0	0
10	M10	X	21.072	21.072	0	0
11	M11	X	21.072	21.072	0	0
12	M12	X	21.072	21.072	0	0
13	M13	X	13	13	0	0
14	M14	X	13	13	0	0
15	M15	X	13	13	0	0
16	M16	X	13	13	0	0
17	M17	X	13	13	0	0
18	M18	X	13	13	0	0
19	M31	X	13	13	0	0
20	M32	X	13	13	0	0
21	M33	X	11.356	11.356	0	0
22	M34	X	11.356	11.356	0	0
23	M35	X	11.356	11.356	0	0
24	M36	X	11.356	11.356	0	0
25	M37	X	11.356	11.356	0	0
26	M38	X	11.356	11.356	0	0
27	M39	X	11.356	11.356	0	0
28	M40	X	11.356	11.356	0	0
29	M41	X	11.356	11.356	0	0
30	M42	X	11.356	11.356	0	0
31	M43	X	11.356	11.356	0	0
32	M44	X	11.356	11.356	0	0
33	M45	X	11.356	11.356	0	0
34	M46	X	11.356	11.356	0	0
35	M47	X	11.356	11.356	0	0
36	M48	X	11.356	11.356	0	0
37	M49	X	11.356	11.356	0	0
38	M50	X	11.356	11.356	0	0
39	M51	X	11.356	11.356	0	0
40	M52	X	11.356	11.356	0	0
41	M62	X	25.34	25.34	0	0
42	M63	X	25.34	25.34	0	0
43	M64	X	25.34	25.34	0	0
44	M65	X	25.34	25.34	0	0
45	M66	X	25.34	25.34	0	0
46	M67	X	25.34	25.34	0	0
47	M70	X	25.34	25.34	0	0
48	M71	X	25.34	25.34	0	0
49	M72	X	25.34	25.34	0	0

Member Distributed Loads (BLC 3 : SEISMIC X) (Continued)

	Member Label	Direction	Start Magnitude[lb/ft,deg]	End Magnitude[lb/ft,deg]	Start Location[i...	End Location[i...
50	M73	X	25.34	25.34	0	0
51	M74	X	25.34	25.34	0	0
52	M75	X	25.34	25.34	0	0
53	M76	X	25.34	25.34	0	0
54	M77	X	25.34	25.34	0	0
55	M78	X	25.34	25.34	0	0
56	M79	X	25.34	25.34	0	0
57	M80	X	25.34	25.34	0	0
58	M81	X	25.34	25.34	0	0
59	M82	X	25.34	25.34	0	0
60	M83	X	25.34	25.34	0	0
61	M54	X	21.072	21.072	0	0
62	M55	X	21.072	21.072	0	0
63	M56	X	21.072	21.072	0	0
64	M57	X	21.072	21.072	0	0
65	M58	X	21.072	21.072	0	0
66	M59	X	21.072	21.072	0	0
67	M60	X	21.072	21.072	0	0
68	M61	X	21.072	21.072	0	0
69	M68	X	21.072	21.072	0	0
70	M69	X	21.072	21.072	0	0
71	M87	X	13	13	0	0
72	M88	X	13	13	0	0
73	M89	X	13	13	0	0
74	M90	X	13	13	0	0
75	M84	X	13	13	0	10
76	M85	X	13	13	0	10

Member Distributed Loads (BLC 4 : SEISMIC Z)

	Member Label	Direction	Start Magnitude[lb/ft,deg]	End Magnitude[lb/ft,deg]	Start Location[i...	End Location[i...
1	M1	Z	25.34	25.34	0	0
2	M2	Z	25.34	25.34	0	0
3	M4	Z	25.34	25.34	0	0
4	M5	Z	25.34	25.34	0	0
5	M53	Z	25.34	25.34	0	0
6	M6	Z	21.072	21.072	0	0
7	M7	Z	21.072	21.072	0	0
8	M8	Z	21.072	21.072	0	0
9	M9	Z	21.072	21.072	0	0
10	M10	Z	21.072	21.072	0	0
11	M11	Z	21.072	21.072	0	0
12	M12	Z	21.072	21.072	0	0
13	M13	Z	13	13	0	0
14	M14	Z	13	13	0	0
15	M15	Z	13	13	0	0
16	M16	Z	13	13	0	0
17	M17	Z	13	13	0	0
18	M18	Z	13	13	0	0
19	M31	Z	13	13	0	0
20	M32	Z	13	13	0	0
21	M33	Z	11.356	11.356	0	0
22	M34	Z	11.356	11.356	0	0
23	M35	Z	11.356	11.356	0	0
24	M36	Z	11.356	11.356	0	0
25	M37	Z	11.356	11.356	0	0
26	M38	Z	11.356	11.356	0	0
27	M39	Z	11.356	11.356	0	0

Member Distributed Loads (BLC 4 : SEISMIC Z) (Continued)

	Member Label	Direction	Start Magnitude[lb/ft,deg]	End Magnitude[lb/ft,deg]	Start Location[i...	End Location[i...
28	M40	Z	11.356	11.356	0	0
29	M41	Z	11.356	11.356	0	0
30	M42	Z	11.356	11.356	0	0
31	M43	Z	11.356	11.356	0	0
32	M44	Z	11.356	11.356	0	0
33	M45	Z	11.356	11.356	0	0
34	M46	Z	11.356	11.356	0	0
35	M47	Z	11.356	11.356	0	0
36	M48	Z	11.356	11.356	0	0
37	M49	Z	11.356	11.356	0	0
38	M50	Z	11.356	11.356	0	0
39	M51	Z	11.356	11.356	0	0
40	M52	Z	11.356	11.356	0	0
41	M62	Z	25.34	25.34	0	0
42	M63	Z	25.34	25.34	0	0
43	M64	Z	25.34	25.34	0	0
44	M65	Z	25.34	25.34	0	0
45	M66	Z	25.34	25.34	0	0
46	M67	Z	25.34	25.34	0	0
47	M70	Z	25.34	25.34	0	0
48	M71	Z	25.34	25.34	0	0
49	M72	Z	25.34	25.34	0	0
50	M73	Z	25.34	25.34	0	0
51	M74	Z	25.34	25.34	0	0
52	M75	Z	25.34	25.34	0	0
53	M76	Z	25.34	25.34	0	0
54	M77	Z	25.34	25.34	0	0
55	M78	Z	25.34	25.34	0	0
56	M79	Z	25.34	25.34	0	0
57	M80	Z	25.34	25.34	0	0
58	M81	Z	25.34	25.34	0	0
59	M82	Z	25.34	25.34	0	0
60	M83	Z	25.34	25.34	0	0
61	M54	Z	21.072	21.072	0	0
62	M55	Z	21.072	21.072	0	0
63	M56	Z	21.072	21.072	0	0
64	M57	Z	21.072	21.072	0	0
65	M58	Z	21.072	21.072	0	0
66	M59	Z	21.072	21.072	0	0
67	M60	Z	21.072	21.072	0	0
68	M61	Z	21.072	21.072	0	0
69	M68	Z	21.072	21.072	0	0
70	M69	Z	21.072	21.072	0	0
71	M87	Z	13	13	0	0
72	M88	Z	13	13	0	0
73	M89	Z	13	13	0	0
74	M90	Z	13	13	0	0
75	M84	Z	13	13	0	10
76	M85	Z	13	13	0	10

Member Distributed Loads (BLC 5 : THERMAL)

	Member Label	Direction	Start Magnitude[lb/ft,deg]	End Magnitude[lb/ft,deg]	Start Location[i...	End Location[i...
1	M6	T	153	153	0	0
2	M7	T	153	153	0	0
3	M8	T	153	153	0	0
4	M9	T	153	153	0	0
5	M10	T	153	153	0	0

Member Distributed Loads (BLC 5 : THERMAL) (Continued)

	Member Label	Direction	Start Magnitude[lb/ft,deg]	End Magnitude[lb/ft,deg]	Start Location[i...	End Location[i...
6	M11	T	153	153	0	0
7	M12	T	153	153	0	0
8	M13	T	153	153	0	0
9	M14	T	153	153	0	0
10	M15	T	153	153	0	0
11	M16	T	153	153	0	0
12	M17	T	153	153	0	0
13	M18	T	153	153	0	0
14	M31	T	153	153	0	0
15	M32	T	153	153	0	0
16	M1	T	273	273	0	0
17	M2	T	273	273	0	0
18	M4	T	273	273	0	0
19	M5	T	273	273	0	0
20	M33	T	102	102	0	0
21	M34	T	102	102	0	0
22	M35	T	102	102	0	0
23	M36	T	102	102	0	0
24	M37	T	102	102	0	0
25	M38	T	102	102	0	0
26	M39	T	102	102	0	0
27	M40	T	102	102	0	0
28	M41	T	102	102	0	0
29	M42	T	102	102	0	0
30	M43	T	102	102	0	0
31	M44	T	102	102	0	0
32	M45	T	102	102	0	0
33	M46	T	102	102	0	0
34	M47	T	102	102	0	0
35	M48	T	102	102	0	0
36	M49	T	102	102	0	0
37	M50	T	102	102	0	0
38	M51	T	102	102	0	0
39	M52	T	102	102	0	0
40	M53	T	273	273	0	0
41	M62	T	273	273	0	0
42	M63	T	273	273	0	0
43	M64	T	273	273	0	0
44	M65	T	273	273	0	0
45	M66	T	273	273	0	0
46	M67	T	273	273	0	0
47	M70	T	273	273	0	0
48	M71	T	273	273	0	0
49	M72	T	273	273	0	0
50	M73	T	273	273	0	0
51	M74	T	273	273	0	0
52	M75	T	273	273	0	0
53	M76	T	273	273	0	0
54	M77	T	273	273	0	0
55	M78	T	273	273	0	0
56	M79	T	273	273	0	0
57	M80	T	273	273	0	0
58	M81	T	273	273	0	0
59	M82	T	273	273	0	0
60	M83	T	273	273	0	0
61	M54	T	397	397	0	0
62	M55	T	397	397	0	0

Member Distributed Loads (BLC 5 : THERMAL) (Continued)

	Member Label	Direction	Start Magnitude[lb/ft,deg]	End Magnitude[lb/ft,deg]	Start Location[i...	End Location[i...
63	M56	T	397	397	0	0
64	M57	T	397	397	0	0
65	M58	T	397	397	0	0
66	M59	T	397	397	0	0
67	M60	T	397	397	0	0
68	M61	T	397	397	0	0
69	M68	T	397	397	0	0
70	M69	T	397	397	0	0
71	M87	T	192	192	0	0
72	M88	T	192	192	0	0
73	M89	T	192	192	0	0
74	M90	T	192	192	0	0
75	M84	T	192	192	0	10
76	M85	T	192	192	0	10

Member Distributed Loads (BLC 6 : WIND X)

	Member Label	Direction	Start Magnitude[lb/ft,deg]	End Magnitude[lb/ft,deg]	Start Location[i...	End Location[i...
1	M69	X	27.66	27.66	0	0
2	M54	X	27.66	27.66	0	0
3	M55	X	27.66	27.66	0	0
4	M56	X	27.66	27.66	0	0
5	M57	X	27.66	27.66	0	0
6	M68	X	27.66	27.66	0	0
7	M58	X	27.66	27.66	0	0
8	M59	X	27.66	27.66	0	0
9	M60	X	27.66	27.66	0	0
10	M61	X	27.66	27.66	0	0
11	M12	X	27.66	27.66	0	0
12	M11	X	27.66	27.66	0	0
13	M10	X	27.66	27.66	0	0
14	M9	X	27.66	27.66	0	0
15	M8	X	27.66	27.66	0	0
16	M7	X	27.66	27.66	0	0
17	M6	X	27.66	27.66	0	0
18	M62	X	33.19	33.19	0	0
19	M63	X	33.19	33.19	0	0
20	M64	X	33.19	33.19	0	0
21	M67	X	33.19	33.19	0	0
22	M66	X	33.19	33.19	0	0
23	M65	X	33.19	33.19	0	0
24	M70	X	33.19	33.19	0	0
25	M71	X	33.19	33.19	0	0
26	M72	X	33.19	33.19	0	0
27	M73	X	33.19	33.19	0	0
28	M5	X	33.19	33.19	0	0
29	M74	X	33.19	33.19	0	0
30	M75	X	33.19	33.19	0	0
31	M76	X	33.19	33.19	0	0
32	M79	X	33.19	33.19	0	0
33	M80	X	33.19	33.19	0	0
34	M81	X	33.19	33.19	0	0
35	M82	X	33.19	33.19	0	0
36	M83	X	33.19	33.19	0	0
37	M13	X	22.13	22.13	0	0
38	M31	X	22.13	22.13	0	0
39	M32	X	22.13	22.13	0	0
40	M14	X	22.13	22.13	0	0

Member Distributed Loads (BLC 6 : WIND X) (Continued)

	Member Label	Direction	Start Magnitude[lb/ft,deg]	End Magnitude[lb/ft,deg]	Start Location[i...	End Location[i...
41	M15	X	22.13	22.13	0	0
42	M16	X	22.13	22.13	0	0
43	M17	X	22.13	22.13	0	0
44	M18	X	22.13	22.13	0	0
45	M33	X	19.36	19.36	0	0
46	M34	X	19.36	19.36	0	0
47	M35	X	19.36	19.36	0	0
48	M36	X	19.36	19.36	0	0
49	M37	X	19.36	19.36	0	0
50	M38	X	19.36	19.36	0	0
51	M39	X	19.36	19.36	0	0
52	M40	X	19.36	19.36	0	0
53	M41	X	19.36	19.36	0	0
54	M42	X	19.36	19.36	0	0
55	M43	X	19.36	19.36	0	0
56	M44	X	19.36	19.36	0	0
57	M45	X	19.36	19.36	0	0
58	M46	X	19.36	19.36	0	0
59	M47	X	19.36	19.36	0	0
60	M48	X	19.36	19.36	0	0
61	M49	X	19.36	19.36	0	0
62	M50	X	19.36	19.36	0	0
63	M51	X	19.36	19.36	0	0
64	M52	X	19.36	19.36	0	0
65	M87	X	22.13	22.13	0	0
66	M88	X	22.13	22.13	0	0
67	M89	X	22.13	22.13	0	0
68	M90	X	22.13	22.13	0	0
69	M84	X	22.13	22.13	0	10
70	M85	X	22.13	22.13	0	10

Member Distributed Loads (BLC 7 : WIND Z)

	Member Label	Direction	Start Magnitude[lb/ft,deg]	End Magnitude[lb/ft,deg]	Start Location[i...	End Location[i...
1	M9	Z	27.66	27.66	0	0
2	M10	Z	27.66	27.66	0	0
3	M11	Z	27.66	27.66	0	0
4	M12	Z	27.66	27.66	0	0
5	M68	Z	27.66	27.66	0	0
6	M58	Z	27.66	27.66	0	0
7	M59	Z	27.66	27.66	0	0
8	M60	Z	27.66	27.66	0	0
9	M61	Z	27.66	27.66	0	0
10	M57	Z	27.66	27.66	0	0
11	M56	Z	27.66	27.66	0	0
12	M55	Z	27.66	27.66	0	0
13	M54	Z	27.66	27.66	0	0
14	M69	Z	27.66	27.66	0	0
15	M83	Z	33.19	33.19	0	0
16	M82	Z	33.19	33.19	0	0
17	M81	Z	33.19	33.19	0	0
18	M80	Z	33.19	33.19	0	0
19	M79	Z	33.19	33.19	0	0
20	M78	Z	33.19	33.19	0	0
21	M77	Z	33.19	33.19	0	0
22	M76	Z	33.19	33.19	0	0
23	M75	Z	33.19	33.19	0	0
24	M74	Z	33.19	33.19	0	0

Company : **DMJM H&N**
Designer : **Kevin M. Jones**
Job Number : **145579-V-CA-005** **DBVS Off-Gas Treatment Duct Analysis**

Mar 26, 2006
12:41 PM
Checked By:_____

Member Distributed Loads (BLC 7 : WIND Z) (Continued)

	Member Label	Direction	Start Magnitude[lb/ft,deg]	End Magnitude[lb/ft,deg]	Start Location[i...	End Location[i...
25	M5	Z	33.19	33.19	0	0
26	M73	Z	33.19	33.19	0	0
27	M72	Z	33.19	33.19	0	0
28	M71	Z	33.19	33.19	0	0
29	M70	Z	33.19	33.19	0	0
30	M4	Z	33.19	33.19	0	0
31	M53	Z	33.19	33.19	0	0
32	M2	Z	33.19	33.19	0	0
33	M1	Z	33.19	33.19	0	0
34	M67	Z	33.19	33.19	0	0
35	M65	Z	33.19	33.19	0	0
36	M66	Z	33.19	33.19	0	0
37	M64	Z	33.19	33.19	0	0
38	M63	Z	33.19	33.19	0	0
39	M62	Z	33.19	33.19	0	0
40	M13	Z	22.13	22.13	0	0
41	M31	Z	22.13	22.13	0	0
42	M32	Z	22.13	22.13	0	0
43	M14	Z	22.13	22.13	0	0
44	M15	Z	22.13	22.13	0	0
45	M16	Z	22.13	22.13	0	0
46	M33	Z	19.36	19.36	0	0
47	M34	Z	19.36	19.36	0	0
48	M35	Z	19.36	19.36	0	0
49	M36	Z	19.36	19.36	0	0
50	M43	Z	19.36	19.36	0	0
51	M44	Z	19.36	19.36	0	0
52	M45	Z	19.36	19.36	0	0
53	M46	Z	19.36	19.36	0	0
54	M47	Z	19.36	19.36	0	0
55	M48	Z	19.36	19.36	0	0
56	M49	Z	19.36	19.36	0	0
57	M50	Z	19.36	19.36	0	0
58	M52	Z	19.36	19.36	0	0

Member Point Loads

Member Label	Direction	Magnitude[lb,lb-ft]	Location[in,%]
No Data to Print ...			

Load Combinations

	Description	Sol...	PD...	SR...	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
1	Normal Load	Yes			DL	1														
2	Normal + Wind(+X) + Thermal	Yes			DL	1	WLX	1	5	1										
3	Normal + Wind (-X) + Thermal	Yes			DL	1	WLX	-1	5	1										
4	Normal + Wind (+Z) + Thermal	Yes			DL	1	WLZ	1	5	1										
5	Normal + Wind (-Z) + Thermal	Yes			DL	1	WLZ	-1	5	1										
6	Normal + Seismic (+X)(+Z) + ...	Yes			DL	1	ELX	1	ELZ	1	5	1								
7	Normal + Seismic(+X)(-Z) + ...	Yes			DL	1	ELX	1	ELZ	-1	5	1								
8	Normal + Seismic(-X)(+Z) + ...	Yes			DL	1	ELX	-1	ELZ	1	5	1								
9	Normal + Seismic(-X)(-Z) + T...	Yes			DL	1	ELX	-1	ELZ	-1	5	1								

Envelope Joint Reactions

	Joint		X [lb]	lc	Y [lb]	lc	Z [lb]	lc	MX [lb-ft]	lc	MY [lb-ft]	lc	MZ [lb-ft]	lc
1	N21	max	0	1	3914.599	1	0	1	0	1	0	1	0	1
2		min	0	1	3143.772	7	0	1	0	1	0	1	0	1
3	N22	max	0	1	5370.453	7	3374.651	9	0	1	0	1	0	1
4		min	0	1	1090.279	1	-3374.651	6	0	1	0	1	0	1
5	N54	max	0	1	0	1	0	1	-101.546	9	567.633	3	2939.238	2
6		min	0	1	0	1	0	1	-2726.827	6	-570.041	2	-2652.532	3
7	N45	max	181.655	9	564.802	4	0	1	0	1	0	1	0	1
8		min	-179.259	6	391.308	5	0	1	0	1	0	1	0	1
9	N53	max	264.699	3	515.414	5	362.688	7	0	1	0	1	0	1
10		min	-267.096	2	341.92	4	-362.689	8	0	1	0	1	0	1
11	N17	max	0	1	0	1	0	1	2564.806	5	11176.972	7	-4439.303	1
12		min	0	1	0	1	0	1	1731.102	4	-11176.972	8	-6190.644	7
13	N20	max	0	1	0	1	0	1	-1731.102	5	11176.972	9	-4439.303	1
14		min	0	1	0	1	0	1	-2564.806	4	-11176.972	6	-6190.644	6
15	N11	max	197.964	8	305.31	9	197.964	7	403.696	9	207.9	7	-109.673	6
16		min	-77.057	7	207.536	6	-77.057	8	109.673	6	-207.9	8	-403.696	9
17	N6	max	197.964	9	305.31	8	77.058	9	-109.679	7	207.907	9	-109.672	7
18		min	-77.057	6	207.537	7	-197.963	6	-403.704	8	-207.9	6	-403.69	8
19	N12	max	182.972	9	658.387	6	182.972	9	-144.531	8	260.358	8	512.748	8
20		min	-303.88	6	560.613	9	-303.88	6	-512.748	7	-260.358	7	144.531	7
21	N1	max	182.972	8	658.386	7	303.878	7	512.749	6	260.358	6	512.746	9
22		min	-303.879	7	560.612	8	-182.973	8	144.534	9	-260.36	9	144.531	6
23	N28	max	9592.999	8	13112.748	8	1086.127	6	0	1	0	1	0	1
24		min	-43.999	1	1973.738	1	-1086.127	9	0	1	0	1	0	1
25	N40	max	20.999	1	703.273	1	948.351	5	5645.924	5	3675.459	5	100604.133	2
26		min	-7495.479	2	-13448.54	8	-948.351	4	-5645.924	4	-3675.459	4	-460.846	1
27	N95	max	57.861	3	84.974	1	33.99	7	82.098	1	55.902	2	0	1
28		min	-57.861	2	84.974	1	-33.99	6	82.098	1	-55.902	3	0	1
29	N94	max	57.861	3	84.974	1	33.99	7	82.098	1	55.902	2	0	1
30		min	-57.861	2	84.974	1	-33.99	6	82.098	1	-55.902	3	0	1
31	N97	max	18.442	3	27.083	1	10.833	7	17.703	1	12.055	2	0	1
32		min	-18.442	2	27.083	1	-10.833	6	17.703	1	-12.055	3	0	1
33	N96	max	18.442	3	27.083	1	10.833	7	17.703	1	12.055	2	0	1
34		min	-18.442	2	27.083	1	-10.833	6	17.703	1	-12.055	3	0	1
35	N100	max	0	1	0	1	0	1	-54.317	1	36.986	3	0	1
36		min	0	1	0	1	0	1	-54.317	1	-36.986	2	0	1
37	N109	max	70.078	3	102.917	1	41.167	7	-108.634	1	73.972	3	0	1
38		min	-70.078	2	102.917	1	-41.167	6	-108.634	1	-73.972	2	0	1
39	N42	max	203.504	3	567.735	9	699.992	7	-1275.669	1	490.81	3	741.516	2
40		min	-200.784	2	359.359	1	-683.992	6	-3176.564	9	-459.979	2	-667.887	3
41	N64	max	739.263	3	1362.62	1	0	1	0	1	0	1	0	1
42		min	-741.983	2	1154.245	9	0	1	0	1	0	1	0	1
43	Totals:	max	4937.187	8	12369.466	7	4968.186	7						
44		min	-4983.187	7	12369.466	1	-4952.187	8						

Envelope Joint Displacements

	Joint		X [in]	lc	Y [in]	lc	Z [in]	lc	X Rotation ...	lc	Y Rotation ...	lc	Z Rotation ...	lc
1	N1	max	0	7	0	8	0	8	0	9	0	9	0	6
2		min	0	8	0	7	0	7	0	6	0	6	0	9
3	N2	max	.032	6	0	1	0	1	-7.31e-7	9	1.284e-6	9	-7.31e-7	6
4		min	0	1	-.045	8	-.032	9	-2.548e-6	6	-1.284e-6	6	-2.548e-6	9
5	N3	max	.06	6	0	1	0	1	2.224e-7	8	1.366e-7	6	2.225e-7	8
6		min	0	1	-.085	8	-.06	9	2.935e-8	7	-1.365e-7	9	2.939e-8	7
7	N4	max	.067	6	0	1	0	1	1.088e-6	8	5.791e-7	6	1.088e-6	8
8		min	0	1	-.095	8	-.067	9	2.696e-7	7	-5.79e-7	9	2.696e-7	7

Envelope Joint Displacements (Continued)

	Joint		X [in]	lc	Y [in]	lc	Z [in]	lc	X Rotation ...	lc	Y Rotation ...	lc	Z Rotation ...	lc
9	N5	max	0	1	.054	7	.039	6	2.634e-6	8	1.365e-6	6	2.634e-6	8
10		min	-.039	9	0	1	0	1	7.032e-7	7	-1.365e-6	9	7.032e-7	7
11	N6	max	0	6	0	7	0	6	0	8	0	6	0	8
12		min	0	9	0	8	0	9	0	7	0	9	0	7
13	N7	max	.032	7	0	1	.032	8	2.548e-6	7	1.284e-6	7	-7.31e-7	7
14		min	0	1	-.045	9	0	1	7.31e-7	8	-1.284e-6	8	-2.548e-6	8
15	N8	max	.06	7	0	1	.06	8	-2.937e-8	6	1.366e-7	8	2.225e-7	9
16		min	0	1	-.085	9	0	1	-2.225e-7	9	-1.366e-7	7	2.937e-8	6
17	N9	max	.067	7	0	1	.067	8	-2.696e-7	6	5.791e-7	8	1.089e-6	9
18		min	0	1	-.095	9	0	1	-1.089e-6	9	-5.791e-7	7	2.696e-7	6
19	N10	max	0	1	.054	6	0	1	-7.032e-7	6	1.365e-6	8	2.634e-6	9
20		min	-.039	8	0	1	-.039	7	-2.634e-6	9	-1.365e-6	7	7.032e-7	6
21	N11	max	0	7	0	6	0	8	0	6	0	8	0	9
22		min	0	8	0	9	0	7	0	9	0	7	0	6
23	N12	max	0	6	0	9	0	6	0	7	0	7	0	7
24		min	0	9	0	6	0	9	0	8	0	8	0	8
25	N14	max	0	1	-.008	1	.293	6	2.786e-5	4	5.87e-4	6	3.06e-4	7
26		min	-1.058	8	-.011	7	-.293	9	-2.786e-5	5	-5.87e-4	9	1.924e-4	1
27	N15	max	0	1	-.016	1	.245	8	-1.846e-5	4	4.499e-4	8	2.569e-4	7
28		min	-1.139	8	-.021	7	-.374	7	-5.825e-5	5	-4.499e-4	7	1.757e-4	1
29	N16	max	0	1	-.019	1	.214	8	-2.389e-5	4	3.505e-4	8	2.054e-4	7
30		min	-1.185	8	-.027	7	-.42	7	-5.419e-5	5	-3.505e-4	7	1.437e-4	1
31	N17	max	0	1	0	1	0	1	0	4	0	8	0	7
32		min	0	1	0	1	0	1	0	5	0	7	0	1
33	N18	max	0	1	-.016	1	.374	6	5.825e-5	4	4.499e-4	6	2.569e-4	7
34		min	-1.139	9	-.021	6	-.245	9	1.846e-5	5	-4.499e-4	9	1.757e-4	1
35	N19	max	0	1	-.019	1	.42	6	5.419e-5	4	3.505e-4	6	2.054e-4	7
36		min	-1.185	9	-.027	6	-.214	9	2.389e-5	5	-3.505e-4	9	1.437e-4	1
37	N20	max	0	1	0	1	0	1	0	4	0	6	0	6
38		min	0	1	0	1	0	1	0	5	0	9	0	1
39	N21	max	0	1	-.003	7	.279	6	3.723e-5	4	7.225e-4	6	2.944e-4	7
40		min	-1.011	8	-.004	1	-.279	9	-3.723e-5	5	-7.225e-4	9	1.515e-4	1
41	N22	max	0	1	0	1	0	6	1.594e-4	4	5.288e-4	6	-8.413e-6	1
42		min	-.4	8	0	7	0	9	-1.594e-4	5	-5.288e-4	9	-5.201e-4	7
43	N23	max	0	1	-.002	1	.019	9	1.915e-4	4	6.684e-5	6	-1.127e-5	1
44		min	-.24	8	-.052	7	-.019	6	-1.915e-4	5	-6.684e-5	9	-6.412e-4	7
45	N24	max	0	1	-.001	1	.013	9	2.266e-4	4	1.31e-4	9	2.152e-5	1
46		min	-.064	8	-.086	7	-.013	6	-2.266e-4	5	-1.31e-4	6	-6.159e-5	8
47	N25	max	0	1	0	1	.011	9	2.315e-4	4	1.354e-4	9	1.942e-4	7
48		min	-.035	8	-.079	7	-.011	6	-2.315e-4	5	-1.354e-4	6	2.415e-5	1
49	N26	max	0	1	0	1	.007	9	2.338e-4	4	1.323e-4	9	3.92e-4	7
50		min	-.011	8	-.06	7	-.007	6	-2.338e-4	5	-1.323e-4	6	2.48e-5	1
51	N27	max	.004	7	0	1	.004	5	2.316e-4	4	1.231e-4	9	5.938e-4	7
52		min	0	1	-.031	7	-.004	4	-2.316e-4	5	-1.231e-4	6	2.358e-5	1
53	N28	max	0	1	0	1	0	9	2.232e-4	4	1.095e-4	9	7.901e-4	7
54		min	0	8	0	8	0	6	-2.232e-4	5	-1.095e-4	6	2.107e-5	1
55	N29	max	0	1	.402	7	.025	4	6.007e-5	4	1.377e-4	4	-6.224e-6	1
56		min	-.164	3	0	1	-.025	5	-6.007e-5	5	-1.377e-4	5	-6.164e-4	7
57	N30	max	0	1	.429	2	.026	4	5.774e-5	4	1.524e-4	4	-6.983e-6	1
58		min	-.148	3	0	1	-.026	5	-5.774e-5	5	-1.524e-4	5	-1.034e-3	3
59	N31	max	0	1	.443	2	.025	4	5.848e-5	4	1.652e-4	4	-6.836e-6	1
60		min	-.117	3	0	1	-.025	5	-5.848e-5	5	-1.652e-4	5	-1.46e-3	3
61	N32	max	0	1	.439	2	.023	4	6.119e-5	4	1.748e-4	4	-5.449e-6	1
62		min	-.079	3	0	1	-.023	5	-6.119e-5	5	-1.748e-4	5	-1.852e-3	3
63	N33	max	0	1	.416	2	.021	4	6.46e-5	4	1.81e-4	4	-2.933e-6	1
64		min	-.044	3	0	1	-.021	5	-6.46e-5	5	-1.81e-4	5	-2.176e-3	3
65	N34	max	.063	2	.286	2	.012	4	7.68e-5	4	1.743e-4	4	8.422e-6	1

Company : **DMJM H&N**
Designer : **Kevin M. Jones**
Job Number : **145579-V-CA-005** **DBVS Off-Gas Treatment Duct Analysis**

Mar 26, 2006
12:41 PM
Checked By:_____

Envelope Joint Displacements (Continued)

	Joint		X [in]	Ic	Y [in]	Ic	Z [in]	Ic	X Rotation ...	Ic	Y Rotation ...	Ic	Z Rotation ...	Ic
66		min	0	1	0	1	-.012	5	-7.68e-5	5	-1.743e-4	5	-2.62e-3	2
67	N35	max	.085	2	.242	2	.009	4	8.036e-5	4	1.633e-4	4	1.044e-5	1
68		min	0	1	0	1	-.009	5	-8.036e-5	5	-1.633e-4	5	-2.547e-3	2
69	N36	max	.089	2	.195	2	.007	4	8.313e-5	4	1.471e-4	4	1.113e-5	1
70		min	0	1	0	1	-.007	5	-8.313e-5	5	-1.471e-4	5	-2.375e-3	2
71	N37	max	.078	2	.151	2	.004	4	8.273e-5	4	1.258e-4	4	1.042e-5	1
72		min	0	1	0	1	-.004	5	-8.273e-5	5	-1.258e-4	5	-2.111e-3	2
73	N39	max	.055	2	.116	8	.003	4	7.667e-5	4	1.007e-4	4	8.725e-6	1
74		min	0	1	0	1	-.003	5	-7.667e-5	5	-1.007e-4	5	-1.77e-3	2
75	N40	max	0	2	0	8	0	4	0	4	0	4	0	1
76		min	0	1	0	1	0	5	0	5	0	5	0	2
77	N42	max	0	2	0	1	0	6	0	9	0	2	0	3
78		min	0	3	0	9	0	7	0	1	0	3	0	2
79	N45	max	0	6	0	5	.084	8	1.24e-5	6	2.565e-5	8	4.48e-4	3
80		min	0	9	0	4	0	1	-4.522e-5	9	-6.055e-6	7	-5.082e-4	2
81	N46	max	.013	2	.021	4	0	1	4.508e-5	4	1.573e-5	7	6.217e-4	3
82		min	-.012	3	0	1	-.014	5	-5.102e-5	5	-8.891e-8	1	-6.826e-4	2
83	N47	max	.018	2	.069	9	.355	6	1.754e-4	6	1.841e-5	9	3.367e-4	3
84		min	-.016	3	0	1	-.003	1	-7.481e-5	9	-1.905e-5	6	-3.791e-4	2
85	N48	max	.002	3	0	1	.074	8	-1.206e-6	6	2.499e-5	8	4.653e-4	3
86		min	0	1	-.003	7	0	1	-4.012e-5	9	-4.859e-6	7	-5.263e-4	2
87	N49	max	.001	3	-.001	1	.051	8	-2.941e-6	2	1.481e-5	8	5.037e-4	3
88		min	0	1	-.003	7	0	1	-1.284e-5	3	1.26e-8	1	-5.647e-4	2
89	N50	max	.001	3	0	1	.028	8	2.206e-5	7	1.916e-5	7	5.439e-4	3
90		min	0	2	-.003	7	0	1	3.349e-6	8	-6.878e-8	1	-6.048e-4	2
91	N51	max	.001	3	0	1	.028	8	2.206e-5	7	1.916e-5	7	5.439e-4	3
92		min	0	2	-.002	4	0	1	3.349e-6	8	-6.878e-8	1	-6.048e-4	2
93	N52	max	.001	3	0	1	.008	5	2.493e-5	4	1.95e-5	7	5.766e-4	3
94		min	0	2	-.002	4	0	1	-3.045e-6	5	-8.7e-8	1	-6.375e-4	2
95	N53	max	0	2	0	4	0	8	2.961e-5	4	1.804e-5	7	5.911e-4	3
96		min	0	3	0	5	0	7	-1.734e-5	5	-8.891e-8	1	-6.52e-4	2
97	N54	max	0	1	0	1	0	1	0	6	0	2	0	3
98		min	0	1	0	1	0	1	0	9	0	3	0	2
99	N55	max	.04	2	.18	9	.413	6	1.232e-4	6	2.146e-5	2	1.729e-4	3
100		min	-.036	3	-.001	1	-.001	1	-8.479e-6	9	-2.134e-5	3	-1.916e-4	2
101	N56	max	.041	2	.179	9	.499	6	2.251e-5	6	4.687e-6	2	2.855e-5	3
102		min	-.037	3	-.003	1	-.001	1	7.796e-7	9	-4.667e-6	3	-3.163e-5	2
103	N57	max	.035	2	.151	9	.367	6	1.602e-4	6	1.048e-5	2	2.536e-4	3
104		min	-.032	3	0	1	-.002	1	-3.622e-5	9	-1.113e-5	3	-2.813e-4	2
105	N58	max	.032	2	.133	9	.362	6	1.668e-4	6	6.341e-6	7	2.735e-4	3
106		min	-.029	3	0	1	-.002	1	-4.69e-5	9	-7.108e-6	8	-3.037e-4	2
107	N59	max	.022	2	.087	9	.357	6	1.753e-4	6	9.946e-6	9	3.126e-4	3
108		min	-.02	3	0	1	-.003	1	-6.634e-5	9	-1.064e-5	6	-3.492e-4	2
109	N60	max	.04	2	.176	9	.395	6	1.386e-4	6	2.057e-5	2	2.027e-4	3
110		min	-.036	3	0	1	-.002	1	-1.589e-5	9	-2.058e-5	3	-2.246e-4	2
111	N61	max	.038	2	.166	9	.379	6	1.51e-4	6	1.622e-5	2	2.3e-4	3
112		min	-.034	3	0	1	-.002	1	-2.543e-5	9	-1.655e-5	3	-2.55e-4	2
113	N62	max	.004	2	.017	9	.348	6	1.868e-4	6	4.038e-5	3	3.48e-4	3
114		min	-.004	3	0	1	-.002	1	-7.576e-5	9	-4.242e-5	2	-3.86e-4	2
115	N63	max	.003	3	0	1	.332	6	1.639e-4	6	5.689e-5	3	3.185e-4	3
116		min	-.003	2	-.014	9	0	1	-6.541e-5	1	-5.951e-5	2	-3.535e-4	2
117	N64	max	0	2	0	9	.343	6	1.777e-4	6	4.976e-5	3	3.351e-4	3
118		min	0	3	0	1	-.001	1	-6.495e-5	9	-5.217e-5	2	-3.716e-4	2
119	N65	max	.004	3	-.001	1	.317	6	1.508e-4	6	6.099e-5	3	3.026e-4	3
120		min	-.004	2	-.024	9	0	1	-7.076e-5	1	-6.375e-5	2	-3.359e-4	2
121	N66	max	.003	3	-.002	1	.292	6	1.387e-4	6	6.357e-5	3	2.789e-4	3
122		min	-.004	2	-.028	9	0	1	-6.744e-5	1	-6.662e-5	2	-3.097e-4	2

Envelope Joint Displacements (Continued)

	Joint		X [in]	Ic	Y [in]	Ic	Z [in]	Ic	X Rotation ...	Ic	Y Rotation ...	Ic	Z Rotation ...	Ic
123	N67	max	.004	3	-.002	1	.3	6	1.413e-4	6	6.314e-5	3	2.863e-4	3
124		min	-.004	2	-.028	9	0	1	-6.991e-5	1	-6.609e-5	2	-3.179e-4	2
125	N78	max	.002	3	0	1	.069	8	-4.11e-6	6	2.351e-5	8	4.732e-4	3
126		min	0	1	-.003	7	0	1	-3.559e-5	9	-3.164e-6	7	-5.342e-4	2
127	N79	max	0	1	.016	2	.099	8	4.811e-5	6	2.085e-5	8	4.159e-4	3
128		min	-.013	3	0	1	0	1	-4.926e-5	9	-4.296e-6	7	-4.76e-4	2
129	N80	max	.035	3	.03	3	.349	6	6.619e-5	6	2.062e-5	9	4.01e-4	3
130		min	0	1	0	1	-.002	1	-5.207e-5	9	-6.58e-6	6	-4.615e-4	2
131	N81	max	0	1	.007	2	.093	8	3.045e-5	6	2.366e-5	8	4.316e-4	3
132		min	-.005	3	0	1	0	1	-4.694e-5	9	-5.166e-6	7	-4.912e-4	2
133	N82	max	.003	2	.005	4	0	1	3.44e-5	4	1.682e-5	7	6.038e-4	3
134		min	-.003	3	0	1	-.007	5	-3.178e-5	5	-8.891e-8	1	-6.647e-4	2
135	N83	max	.041	2	.062	4	0	1	5.254e-5	4	2.122e-5	3	6.386e-4	3
136		min	-.037	3	0	1	-.017	5	-7.142e-5	5	-8.891e-8	1	-6.995e-4	2
137	N84	max	.008	2	.012	4	0	1	4.e-5	4	1.63e-5	7	6.139e-4	3
138		min	-.007	3	0	1	-.012	5	-4.273e-5	5	-8.891e-8	1	-6.748e-4	2
139	N85	max	.045	2	.068	4	0	1	5.191e-5	4	2.205e-5	3	6.391e-4	3
140		min	-.042	3	0	1	-.019	5	-7.277e-5	5	-8.891e-8	1	-7.e-4	2
141	N86	max	.049	2	.074	4	0	1	5.127e-5	4	2.262e-5	3	6.392e-4	3
142		min	-.045	3	0	1	-.024	5	-7.363e-5	5	-6.31e-7	2	-7.001e-4	2
143	N87	max	.05	2	.077	4	0	1	5.084e-5	4	2.292e-5	3	6.392e-4	3
144		min	-.047	3	0	1	-.03	5	-7.404e-5	5	-9.312e-7	2	-7.001e-4	2
145	N88	max	.05	2	.076	4	0	1	5.066e-5	4	2.303e-5	3	6.391e-4	3
146		min	-.046	3	0	1	-.037	5	-7.417e-5	5	-1.036e-6	2	-7.001e-4	2
147	N89	max	.048	2	.073	4	0	1	5.063e-5	4	2.304e-5	3	6.391e-4	3
148		min	-.044	3	0	1	-.042	5	-7.418e-5	5	-1.049e-6	2	-7.001e-4	2
149	N90	max	0	2	0	1	0	1	-4.308e-7	1	2.933e-7	3	0	1
150		min	0	3	0	1	-.061	7	-4.308e-7	1	-2.933e-7	2	0	1
151	N91	max	0	2	0	1	0	1	-4.308e-7	1	2.933e-7	3	0	1
152		min	0	3	0	1	-.061	7	-4.308e-7	1	-2.933e-7	2	0	1
153	N94	max	0	2	0	1	0	6	0	1	0	3	0	1
154		min	0	3	0	1	0	7	0	1	0	2	0	1
155	N95	max	0	2	0	1	0	6	0	1	0	3	0	1
156		min	0	3	0	1	0	7	0	1	0	2	0	1
157	N96	max	0	2	0	1	0	6	0	1	0	3	0	1
158		min	0	3	0	1	0	7	0	1	0	2	0	1
159	N97	max	0	2	0	1	0	6	0	1	0	3	0	1
160		min	0	3	0	1	0	7	0	1	0	2	0	1
161	N100	max	0	1	0	1	0	1	0	1	0	2	0	1
162		min	0	1	0	1	0	1	0	1	0	3	0	1
163	N108	max	0	2	0	1	.054	6	8.633e-7	1	5.879e-7	2	0	1
164		min	0	3	0	1	0	1	8.633e-7	1	-5.879e-7	3	0	1
165	N109	max	0	2	0	1	0	6	0	1	0	2	0	1
166		min	0	3	0	1	0	7	0	1	0	3	0	1

Envelope Member Section Stresses

	Member	Sec		Axial[...	Ic	y Shear[...	Ic	z Shear[k...	Ic	y-T...	Ic	y-Bot[ksi]	Ic	z-Top[ksi]	Ic	z-Bot[ksi]	Ic
1	M1	1	...	.075	6	-.376	1	.15	6	.173	7	.292	1	2.285	9	2.285	6
2			...	-.075	8	-.376	5	-.15	7	-.292	1	-.173	7	-2.285	6	-2.285	9
3		2	...	.076	6	-.38	1	.152	6	-.003	7	.468	1	2.214	9	2.214	6
4			...	-.076	8	-.38	5	-.152	7	-.468	1	.003	7	-2.214	6	-2.214	9
5		3	...	.077	6	-.384	1	.154	6	-.181	7	.646	1	2.143	9	2.143	6
6			...	-.077	8	-.384	5	-.154	7	-.646	1	.181	7	-2.143	6	-2.143	9
7		4	...	.078	6	-.388	1	.155	6	-.361	7	.826	1	2.071	9	2.071	6
8			...	-.078	8	-.388	5	-.155	7	-.826	1	.361	7	-2.071	6	-2.071	9
9		5	...	.078	6	-.392	1	.157	6	-.543	7	1.007	1	1.998	9	1.998	8

Company : **DMJM H&N**
Designer : **Kevin M. Jones**
Job Number : **145579-V-CA-005** **DBVS Off-Gas Treatment Duct Analysis**

Mar 26, 2006
12:41 PM
Checked By:_____

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[...	lc	y Shear[...	lc	z Shear[k...	lc	y-T...	lc	y-Bot[ksi]	lc	z-Top[ksi]	lc	z-Bot[ksi]	lc
10			...	-.078	8	-.392	5	-.157	7	-1.0...	1	.543	7	-1.998	8	-1.998	9
11	M2	1	...	.078	7	.135	1	.157	6	-.543	7	1.007	1	1.998	9	1.998	6
12			...	-.078	8	.031	7	-.157	9	-1.0...	1	.543	7	-1.998	6	-1.998	9
13		2	...	.089	7	.084	1	.177	6	-.343	1	.508	7	.985	9	.985	6
14			...	-.089	8	-.02	7	-.177	9	-.508	7	.343	1	-.985	6	-.985	9
15		3	...	.099	7	.033	1	.197	6	.012	1	.783	7	.153	6	.153	9
16			...	-.099	8	-.071	7	-.197	9	-.783	7	-.012	1	-.153	9	-.153	6
17		4	...	.109	7	-.018	1	.218	6	.058	1	1.366	7	1.414	6	1.414	9
18			...	-.109	8	-.122	7	-.218	9	-1.3...	7	-.058	1	-1.414	9	-1.414	6
19		5	...	.119	7	-.069	1	.238	6	-.205	1	2.259	7	2.798	6	2.798	9
20			...	-.119	8	-.172	7	-.238	9	-2.2...	7	.205	1	-2.798	9	-2.798	6
21	M4	1	...	.13	7	.496	7	.194	9	1.0...	7	-.122	1	1.487	6	1.487	9
22			...	-.13	8	.024	1	-.194	6	.122	1	-1.085	7	-1.487	9	-1.487	6
23		2	...	.133	7	.482	7	.189	9	1.9...	7	-.151	1	1.153	6	1.153	9
24			...	-.133	8	.01	1	-.189	6	.151	1	-1.939	7	-1.153	9	-1.153	6
25		3	...	.136	7	.467	7	.183	9	2.7...	7	-.156	1	.829	6	.829	9
26			...	-.136	8	-.005	1	-.183	6	.156	1	-2.767	7	-.829	9	-.829	6
27		4	...	.139	7	.453	7	.177	9	3.57	7	-.134	1	.515	6	.515	9
28			...	-.139	8	-.02	1	-.177	6	.134	1	-3.57	7	-.515	9	-.515	6
29		5	...	.142	7	.438	7	.171	9	4.3...	7	-.087	1	.211	6	.211	9
30			...	-.142	8	-.034	1	-.171	6	.087	1	-4.347	7	-.211	9	-.211	6
31	M5	1	...	1.046	9	.003	1	.024	5	5.6...	8	.072	1	.381	9	.381	6
32			...	.094	1	-.995	8	-.024	4	-.072	1	-5.611	8	-.381	6	-.381	9
33		2	...	1.029	9	.003	1	.006	5	1.59	8	.061	1	.39	9	.39	6
34			...	.077	1	-.981	8	-.006	4	-.061	1	-1.59	8	-.39	6	-.39	9
35		3	...	1.012	9	.003	1	.018	6	-.049	1	2.511	7	.344	5	.344	4
36			...	.06	1	-.967	8	-.018	9	-2.5...	7	.049	1	-.344	4	-.344	5
37		4	...	.995	9	.003	1	.032	6	-.038	1	6.34	3	.259	5	.259	4
38			...	.043	1	-.954	8	-.032	9	-6.34	3	.038	1	-.259	4	-.259	5
39		5	...	.978	9	.003	1	.048	4	-.026	1	10.138	8	.102	5	.102	4
40			...	.026	1	-.952	2	-.048	5	-10...	8	.026	1	-.102	4	-.102	5
41	M6	1	...	0	1	0	1	0	1	.595	6	-.022	9	.124	3	.124	2
42			...	0	1	0	1	0	1	.022	9	-.595	6	-.124	2	-.124	3
43		2	...	0	7	-.002	1	.001	2	.595	6	-.022	9	.124	3	.124	2
44			...	0	6	-.002	1	-.001	3	.022	9	-.595	6	-.124	2	-.124	3
45		3	...	0	7	-.004	1	.002	2	.594	6	-.021	9	.123	3	.124	2
46			...	0	6	-.004	1	-.002	3	.021	9	-.594	6	-.124	2	-.123	3
47		4	...	.001	7	-.006	1	.003	2	.592	6	-.019	9	.122	3	.123	2
48			...	-.001	6	-.006	1	-.003	3	.019	9	-.592	6	-.123	2	-.122	3
49		5	...	.002	7	-.009	1	.005	2	.59	6	-.017	9	.121	3	.122	2
50			...	-.002	6	-.009	1	-.005	3	.017	9	-.59	6	-.122	2	-.121	3
51	M7	1	...	.002	7	-.009	7	.005	2	.59	6	-.017	9	.121	3	.122	2
52			...	-.002	6	-.009	8	-.005	3	.017	9	-.59	6	-.122	2	-.121	3
53		2	...	.004	7	-.02	7	.01	2	.57	6	.003	9	.111	3	.111	2
54			...	-.004	6	-.02	8	-.01	3	-.003	9	-.57	6	-.111	2	-.111	3
55		3	...	.006	7	-.03	7	.016	2	.535	6	.038	9	.092	3	.093	2
56			...	-.006	6	-.03	8	-.016	3	-.038	9	-.535	6	-.093	2	-.092	3
57		4	...	.008	7	-.041	7	.022	2	.484	6	.089	9	.066	3	.066	2
58			...	-.008	6	-.041	8	-.022	3	-.089	9	-.484	6	-.066	2	-.066	3
59		5	...	.01	7	-.052	7	.027	2	.418	6	.155	9	.031	3	.031	2
60			...	-.01	6	-.052	8	-.027	3	-.155	9	-.418	6	-.031	2	-.031	3
61	M8	1	...	.017	9	-.047	7	.027	2	.418	6	.155	9	.143	3	.156	2
62			...	-.003	6	-.055	6	-.027	3	-.155	9	-.418	6	-.156	2	-.143	3
63		2	...	.018	9	-.049	7	.029	2	.401	6	.169	9	.135	3	.148	2
64			...	-.004	6	-.057	6	-.029	3	-.169	9	-.401	6	-.148	2	-.135	3
65		3	...	.018	9	-.051	7	.03	2	.384	6	.184	9	.126	3	.139	2
66			...	-.004	6	-.059	6	-.03	3	-.184	9	-.384	6	-.139	2	-.126	3

Company : **DMJM H&N**
Designer : **Kevin M. Jones**
Job Number : **145579-V-CA-005 DBVS Off-Gas Treatment Duct Analysis**

Mar 26, 2006
12:41 PM
Checked By:_____

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[...	Ic	y Shear[...	Ic	z Shear[k...	Ic	y-T...	Ic	y-Bot[ksi]	Ic	z-Top[ksi]	Ic	z-Bot[ksi]	Ic
67		4	...	.019	9	-.053	7	.031	2	.366	6	.199	9	.117	3	.13	2
68			...	-.004	6	-.062	6	-.031	3	-.199	9	-.366	6	-.13	2	-.117	3
69		5	...	.02	9	-.055	7	.032	2	.347	6	.215	9	.108	3	.121	2
70			...	-.004	6	-.064	6	-.032	3	-.215	9	-.347	6	-.121	2	-.108	3
71	M9	1	...	.029	7	-.036	7	.032	2	.347	6	.215	9	.315	3	.35	2
72			...	.008	8	-.063	8	-.032	3	-.215	9	-.347	6	-.35	2	-.315	3
73		2	...	.03	7	-.037	7	.033	2	.328	6	.226	9	.305	3	.34	2
74			...	.009	8	-.065	8	-.033	3	-.226	9	-.328	6	-.34	2	-.305	3
75		3	...	.031	7	-.038	7	.035	2	.309	6	.237	9	.295	3	.33	2
76			...	.009	8	-.068	8	-.035	3	-.237	9	-.309	6	-.33	2	-.295	3
77		4	...	.032	7	-.04	7	.036	2	.288	6	.249	9	.284	3	.319	2
78			...	.009	8	-.07	8	-.036	3	-.249	9	-.288	6	-.319	2	-.284	3
79		5	...	.033	7	-.041	7	.037	2	.267	6	.261	9	.273	3	.309	2
80			...	.009	8	-.072	8	-.037	3	-.261	9	-.267	6	-.309	2	-.273	3
81	M10	1	...	.038	7	-.013	9	.037	2	.267	6	.261	9	.435	3	.488	2
82			...	.022	8	-.06	6	-.037	3	-.261	9	-.267	6	-.488	2	-.435	3
83		2	...	.039	7	-.013	9	.038	2	.249	6	.265	9	.424	3	.477	2
84			...	.023	8	-.062	6	-.038	3	-.265	9	-.249	6	-.477	2	-.424	3
85		3	...	.041	7	-.014	9	.039	2	.23	6	.269	9	.413	3	.465	2
86			...	.024	8	-.064	6	-.039	3	-.269	9	-.23	6	-.465	2	-.413	3
87		4	...	.042	7	-.014	9	.041	2	.211	6	.273	9	.401	3	.453	2
88			...	.025	8	-.066	6	-.041	3	-.273	9	-.211	6	-.453	2	-.401	3
89		5	...	.043	7	-.015	9	.042	2	.191	6	.277	9	.389	3	.441	2
90			...	.025	8	-.068	6	-.042	3	-.277	9	-.191	6	-.441	2	-.389	3
91	M11	1	...	.043	9	.019	9	.042	2	.191	6	.277	9	.488	3	.549	2
92			...	.036	8	-.043	8	-.042	3	-.277	9	-.191	6	-.549	2	-.488	3
93		2	...	.044	9	.019	9	.043	2	.178	6	.271	9	.475	3	.537	2
94			...	.037	8	-.045	8	-.043	3	-.271	9	-.178	6	-.537	2	-.475	3
95		3	...	.045	9	.02	9	.044	2	.165	6	.266	9	.462	3	.524	2
96			...	.038	8	-.046	8	-.044	3	-.266	9	-.165	6	-.524	2	-.462	3
97		4	...	.046	9	.02	9	.045	2	.151	6	.26	9	.449	3	.511	2
98			...	.039	8	-.047	8	-.045	3	-.26	9	-.151	6	-.511	2	-.449	3
99		5	...	.047	9	.021	9	.047	2	.136	6	.253	9	.435	3	.497	2
100			...	.04	8	-.049	8	-.047	3	-.253	9	-.136	6	-.497	2	-.435	3
101	M12	1	...	.043	2	.047	3	.039	7	.521	2	.459	3	.136	6	.253	9
102			...	.043	1	-.047	2	-.032	6	-.459	3	-.521	2	-.253	9	-.136	6
103		2	...	.046	2	.05	3	.041	7	.485	2	.422	3	.111	6	.223	9
104			...	.046	1	-.05	2	-.034	6	-.422	3	-.485	2	-.223	9	-.111	6
105		3	...	.049	2	.053	3	.044	7	.446	2	.384	3	.084	6	.191	9
106			...	.049	1	-.053	2	-.037	6	-.384	3	-.446	2	-.191	9	-.084	6
107		4	...	.051	2	.056	3	.046	7	.405	2	.343	3	.056	6	.157	9
108			...	.051	1	-.056	2	-.039	6	-.343	3	-.405	2	-.157	9	-.056	6
109		5	...	.054	2	.059	3	.048	7	.362	2	.299	3	.037	4	.153	1
110			...	.054	1	-.059	2	-.041	6	-.299	3	-.362	2	-.153	1	-.037	4
111	M13	1	...	.079	8	.085	3	.07	9	.657	2	.543	3	.067	4	.277	1
112			...	.079	1	-.085	2	-.06	8	-.543	3	-.657	2	-.277	1	-.067	4
113		2	...	.08	8	.087	3	.071	9	.625	2	.511	3	.054	4	.275	1
114			...	.08	1	-.087	2	-.061	8	-.511	3	-.625	2	-.275	1	-.054	4
115		3	...	.081	8	.088	3	.072	9	.592	2	.479	3	.041	4	.273	1
116			...	.081	1	-.088	2	-.062	8	-.479	3	-.592	2	-.273	1	-.041	4
117		4	...	.082	8	.09	3	.072	9	.559	2	.446	3	.027	4	.271	1
118			...	.082	1	-.09	2	-.063	8	-.446	3	-.559	2	-.271	1	-.027	4
119		5	...	.083	8	.091	3	.073	9	.526	2	.412	3	.012	4	.27	1
120			...	.083	1	-.091	2	-.063	8	-.412	3	-.526	2	-.27	1	-.012	4
121	M14	1	...	.001	9	.118	7	.055	3	.265	9	.284	6	.443	2	.414	3
122			...	-.073	6	-.01	8	-.056	2	-.284	6	-.265	9	-.414	3	-.443	2
123		2	...	.002	9	.118	7	.054	3	.307	9	.288	6	.424	2	.395	3

Company : **DMJM H&N**
Designer : **Kevin M. Jones**
Job Number : **145579-V-CA-005** **DBVS Off-Gas Treatment Duct Analysis**

Mar 26, 2006
12:41 PM
Checked By:_____

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[...	Ic	y Shear[...	Ic	z Shear[k...	Ic	y-T...	Ic	y-Bot[ksi]	Ic	z-Top[ksi]	Ic	z-Bot[ksi]	Ic
124			...	-.073	6	-.012	8	-.055	2	-.288	6	-.307	9	-.395	3	-.424	2
125		3	...	.003	9	.118	7	.053	3	.348	9	.293	6	.405	2	.376	3
126			...	-.072	6	-.014	8	-.053	2	-.293	6	-.348	9	-.376	3	-.405	2
127		4	...	.004	9	.117	7	.051	3	.388	9	.298	6	.387	2	.358	3
128			...	-.072	6	-.015	8	-.052	2	-.298	6	-.388	9	-.358	3	-.387	2
129		5	...	.005	9	.117	5	.05	3	.429	9	.304	6	.369	2	.34	3
130			...	-.071	6	-.017	4	-.051	2	-.304	6	-.429	9	-.34	3	-.369	2
131	M15	1	...	.027	9	.107	5	.05	3	.429	9	.304	6	.316	2	.294	3
132			...	-.069	6	.036	4	-.051	2	-.304	6	-.429	9	-.294	3	-.316	2
133		2	...	.028	9	.106	5	.049	3	.465	9	.291	6	.299	2	.277	3
134			...	-.069	6	.033	4	-.049	2	-.291	6	-.465	9	-.277	3	-.299	2
135		3	...	.029	9	.105	5	.047	3	.501	9	.278	6	.282	2	.26	3
136			...	-.068	6	.031	4	-.048	2	-.278	6	-.501	9	-.26	3	-.282	2
137		4	...	.03	9	.104	5	.046	3	.536	9	.267	6	.266	2	.244	3
138			...	-.068	6	.029	4	-.047	2	-.267	6	-.536	9	-.244	3	-.266	2
139		5	...	.031	9	.103	5	.045	8	.57	9	.256	6	.249	2	.228	3
140			...	-.068	6	.026	4	-.046	7	-.256	6	-.57	9	-.228	3	-.249	2
141	M16	1	...	.047	9	.101	1	.045	8	.57	9	.256	6	.154	2	.142	3
142			...	-.057	6	.068	9	-.046	7	-.256	6	-.57	9	-.142	3	-.154	2
143		2	...	.048	9	.1	1	.044	8	.594	9	.228	6	.138	2	.127	3
144			...	-.057	6	.066	9	-.045	7	-.228	6	-.594	9	-.127	3	-.138	2
145		3	...	.048	9	.098	1	.043	8	.617	9	.201	6	.123	2	.112	3
146			...	-.057	6	.065	9	-.044	7	-.201	6	-.617	9	-.112	3	-.123	2
147		4	...	.049	9	.096	1	.043	8	.639	9	.175	6	.108	2	.097	3
148			...	-.058	6	.063	9	-.043	7	-.175	6	-.639	9	-.097	3	-.108	2
149		5	...	.05	5	.094	1	.042	8	.661	9	.15	6	.094	2	.083	3
150			...	-.058	4	.061	9	-.043	7	-.15	6	-.661	9	-.083	3	-.094	2
151	M17	1	...	.054	5	.095	1	.042	8	.661	9	.15	6	.037	2	.032	3
152			...	-.052	4	.041	9	-.043	7	-.15	6	-.661	9	-.032	3	-.037	2
153		2	...	.054	5	.094	1	.042	8	.667	9	.135	6	.031	2	.026	3
154			...	-.052	4	.04	9	-.042	7	-.135	6	-.667	9	-.026	3	-.031	2
155		3	...	.054	5	.093	1	.041	8	.673	9	.12	6	.037	9	.032	6
156			...	-.052	4	.039	9	-.042	7	-.12	6	-.673	9	-.032	6	-.037	9
157		4	...	.054	5	.092	1	.041	8	.679	9	.106	6	.043	9	.038	6
158			...	-.052	4	.038	9	-.042	7	-.106	6	-.679	9	-.038	6	-.043	9
159		5	...	.054	7	.091	1	.041	8	.685	9	.091	6	.049	9	.045	6
160			...	-.052	6	.037	9	-.041	7	-.091	6	-.685	9	-.045	6	-.049	9
161	M18	1	...	.064	7	.039	1	.037	3	.685	9	.091	6	.049	9	.045	6
162			...	-.062	6	-.015	9	-.038	2	-.091	6	-.685	9	-.045	6	-.049	9
163		2	...	.071	7	.006	1	.015	3	.496	9	-.034	6	.147	3	.147	2
164			...	-.069	6	-.048	9	-.015	2	.034	6	-.496	9	-.147	2	-.147	3
165		3	...	.077	7	-.027	1	.007	6	.215	1	.039	6	.168	3	.172	2
166			...	-.075	6	-.081	9	-.008	9	-.039	6	-.215	1	-.172	2	-.168	3
167		4	...	.084	7	-.06	1	.03	2	-.046	1	.476	9	.054	3	.062	2
168			...	-.082	6	-.114	9	-.03	3	-.476	9	.046	1	-.062	2	-.054	3
169		5	...	.091	7	-.093	1	.052	2	-.505	1	1.258	9	.182	2	.194	3
170			...	-.089	6	-.147	9	-.053	3	-1.2...	9	.505	1	-.194	3	-.182	2
171	M31	1	...	.101	6	.115	3	.087	9	.306	2	.336	3	.292	4	.241	5
172			...	.101	1	-.115	2	-.078	8	-.336	3	-.306	2	-.241	5	-.292	4
173		2	...	.104	6	.119	3	.09	9	.18	2	.211	3	.222	4	.231	1
174			...	.104	1	-.119	2	-.08	8	-.211	3	-.18	2	-.231	1	-.222	4
175		3	...	.106	6	.123	3	.092	9	.051	2	.081	3	.147	4	.226	1
176			...	.106	1	-.123	2	-.082	8	-.081	3	-.051	2	-.226	1	-.147	4
177		4	...	.109	6	.127	3	.094	9	.053	8	.083	7	.092	9	.221	1
178			...	.109	1	-.127	2	-.085	8	-.083	7	-.053	8	-.221	1	-.092	9
179		5	...	.112	6	.131	3	.097	9	.191	3	.222	2	.194	9	.215	1
180			...	.112	1	-.131	2	-.087	8	-.222	2	-.191	3	-.215	1	-.194	9

Company : **DMJM H&N**
Designer : **Kevin M. Jones**
Job Number : **145579-V-CA-005 DBVS Off-Gas Treatment Duct Analysis**

Mar 26, 2006
12:41 PM
Checked By:_____

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[...	Ic	y Shear[..	Ic	z Shear[k...	Ic	y-T...	Ic	y-Bot[ksi]	Ic	z-Top[ksi]	Ic	z-Bot[ksi]	Ic
181	M32	1	...	.121	7	.051	7	.131	2	.194	9	.215	1	.248	2	.216	3
182			...	.103	6	-.13	6	-.131	3	-.215	1	-.194	9	-.216	3	-.248	2
183		2	...	.122	7	.051	7	.132	2	.212	9	.229	1	.294	2	.262	3
184			...	.104	6	-.131	6	-.132	3	-.229	1	-.212	9	-.262	3	-.294	2
185		3	...	.123	7	.051	7	.134	2	.229	9	.243	1	.34	2	.309	3
186			...	.105	6	-.132	6	-.134	3	-.243	1	-.229	9	-.309	3	-.34	2
187		4	...	.124	7	.052	7	.135	2	.247	9	.257	1	.387	2	.355	3
188			...	.106	6	-.133	6	-.135	3	-.257	1	-.247	9	-.355	3	-.387	2
189		5	...	.125	7	.052	7	.136	2	.265	9	.284	6	.434	2	.403	3
190			...	.107	6	-.134	6	-.136	3	-.284	6	-.265	9	-.403	3	-.434	2
191	M33	1	...	-.009	3	.045	3	.028	5	.099	3	.289	2	.346	8	.122	7
192			...	-.024	2	0	2	-.028	4	-.289	2	-.099	3	-.122	7	-.346	8
193		2	...	-.007	3	.034	3	.021	5	.183	3	.29	2	.317	8	.092	7
194			...	-.018	2	0	2	-.021	4	-.29	2	-.183	3	-.092	7	-.317	8
195		3	...	-.005	3	.023	3	.014	5	.243	3	.29	2	.295	8	.071	7
196			...	-.012	2	0	2	-.014	4	-.29	2	-.243	3	-.071	7	-.295	8
197		4	...	-.002	3	.011	3	.007	5	.278	3	.291	2	.283	8	.058	7
198			...	-.006	2	0	2	-.007	4	-.291	2	-.278	3	-.058	7	-.283	8
199		5	...	0	1	0	1	0	1	.29	3	.291	2	.278	8	.053	7
200			...	0	1	0	1	0	1	-.291	2	-.29	3	-.053	7	-.278	8
201	M34	1	...	0	1	0	1	0	1	.225	3	.319	2	.3	8	.093	7
202			...	0	1	0	1	0	1	-.319	2	-.225	3	-.093	7	-.3	8
203		2	...	.001	2	0	2	.001	4	.224	3	.319	2	.3	8	.093	7
204			...	0	3	-.002	3	-.001	5	-.319	2	-.224	3	-.093	7	-.3	8
205		3	...	.002	2	0	2	.002	4	.223	3	.319	2	.3	8	.094	7
206			...	0	3	-.004	3	-.002	5	-.319	2	-.223	3	-.094	7	-.3	8
207		4	...	.003	2	0	2	.003	4	.221	3	.32	2	.301	8	.094	7
208			...	.001	3	-.006	3	-.003	5	-.32	2	-.221	3	-.094	7	-.301	8
209		5	...	.004	2	0	2	.005	4	.219	3	.32	2	.301	8	.095	7
210			...	.002	3	-.008	3	-.005	5	-.32	2	-.219	3	-.095	7	-.301	8
211	M35	1	...	.004	7	-.002	7	.004	6	.145	9	.365	6	.228	3	.116	2
212			...	.001	8	-.008	8	-.004	9	-.365	6	-.145	9	-.116	2	-.228	3
213		2	...	.005	7	-.003	7	.005	6	.143	9	.367	6	.228	8	.116	7
214			...	.001	8	-.01	8	-.005	9	-.367	6	-.143	9	-.116	7	-.228	8
215		3	...	.006	7	-.004	7	.006	6	.141	9	.37	6	.228	8	.116	7
216			...	.002	8	-.012	8	-.006	9	-.37	6	-.141	9	-.116	7	-.228	8
217		4	...	.007	7	-.004	7	.007	6	.138	9	.373	6	.227	8	.115	7
218			...	.002	8	-.014	8	-.007	9	-.373	6	-.138	9	-.115	7	-.227	8
219		5	...	.008	7	-.005	7	.008	6	.134	9	.377	6	.227	8	.115	7
220			...	.002	8	-.016	8	-.008	9	-.377	6	-.134	9	-.115	7	-.227	8
221	M36	1	...	.007	5	-.008	5	.009	2	.1	9	.387	6	.152	3	.123	2
222			...	0	4	-.017	4	-.009	3	-.387	6	-.1	9	-.123	2	-.152	3
223		2	...	.008	5	-.009	5	.01	2	.096	9	.392	6	.148	3	.12	2
224			...	0	4	-.019	4	-.01	3	-.392	6	-.096	9	-.12	2	-.148	3
225		3	...	.009	5	-.011	5	.011	2	.091	9	.398	6	.144	3	.116	2
226			...	0	4	-.021	4	-.011	3	-.398	6	-.091	9	-.116	2	-.144	3
227		4	...	.01	5	-.012	5	.013	2	.086	9	.405	6	.14	3	.111	2
228			...	-.001	4	-.023	4	-.013	3	-.405	6	-.086	9	-.111	2	-.14	3
229		5	...	.011	5	-.013	5	.014	2	.08	9	.413	6	.135	3	.106	2
230			...	-.001	4	-.025	4	-.014	3	-.413	6	-.08	9	-.106	2	-.135	3
231	M37	1	...	0	5	.142	4	.045	8	.05	9	.393	6	.041	3	.052	2
232			...	-.019	4	.096	5	-.044	7	-.393	6	-.05	9	-.052	2	-.041	3
233		2	...	0	5	.14	4	.044	8	.086	9	.342	6	.048	3	.058	2
234			...	-.019	4	.094	5	-.044	7	-.342	6	-.086	9	-.058	2	-.048	3
235		3	...	0	5	.138	4	.044	8	.122	9	.291	6	.054	3	.064	2
236			...	-.019	4	.092	5	-.043	7	-.291	6	-.122	9	-.064	2	-.054	3
237		4	...	0	9	.136	4	.043	8	.157	9	.241	6	.066	8	.076	7

Company : **DMJM H&N**
Designer : **Kevin M. Jones**
Job Number : **145579-V-CA-005 DBVS Off-Gas Treatment Duct Analysis**

Mar 26, 2006
12:41 PM
Checked By:_____

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[...	lc	y Shear[...	lc	z Shear[k...	lc	y-T...	lc	y-Bot[ksi]	lc	z-Top[ksi]	lc	z-Bot[ksi]	lc
238			...	-.019	6	.09	5	-.042	7	-.241	6	-.157	9	-.076	7	-.066	8
239		5	...	0	9	.135	4	.042	8	.191	9	.192	6	.082	8	.091	7
240			...	-.019	6	.089	5	-.042	7	-.192	6	-.191	9	-.091	7	-.082	8
241	M38	1	...	.007	5	.139	4	.042	9	.179	7	.179	8	.053	8	.063	7
242			...	-.007	4	.087	5	-.042	6	-.179	8	-.179	7	-.063	7	-.053	8
243		2	...	.007	5	.138	4	.042	9	.193	7	.157	8	.06	8	.07	7
244			...	-.007	4	.087	5	-.041	6	-.157	8	-.193	7	-.07	7	-.06	8
245		3	...	.007	5	.137	4	.042	9	.208	7	.135	8	.067	8	.076	7
246			...	-.007	4	.086	5	-.041	6	-.135	8	-.208	7	-.076	7	-.067	8
247		4	...	.007	5	.136	4	.041	9	.222	7	.113	8	.073	8	.083	7
248			...	-.007	4	.085	5	-.041	6	-.113	8	-.222	7	-.083	7	-.073	8
249		5	...	.007	5	.136	4	.041	9	.237	7	.091	8	.08	8	.09	7
250			...	-.007	4	.084	5	-.04	6	-.091	8	-.237	7	-.09	7	-.08	8
251	M39	1	...	.017	7	.084	4	.02	9	.237	7	.091	8	.08	8	.09	7
252			...	-.017	6	.032	5	-.02	6	-.091	8	-.237	7	-.09	7	-.08	8
253		2	...	.017	7	.08	4	.019	9	.258	7	.041	8	.092	8	.101	7
254			...	-.017	6	.029	5	-.018	6	-.041	8	-.258	7	-.101	7	-.092	8
255		3	...	.018	7	.077	4	.018	9	.276	7	-.008	8	.103	8	.111	7
256			...	-.018	6	.026	5	-.017	6	.008	8	-.276	7	-.111	7	-.103	8
257		4	...	.019	7	.074	4	.017	9	.294	7	-.054	8	.113	8	.121	7
258			...	-.019	6	.023	5	-.016	6	.054	8	-.294	7	-.121	7	-.113	8
259		5	...	.019	7	.071	4	.015	9	.309	7	-.098	8	.123	8	.13	7
260			...	-.019	6	.02	5	-.015	6	.098	8	-.309	7	-.13	7	-.123	8
261	M40	1	...	.03	7	.019	4	.007	7	.309	7	-.098	8	.123	8	.13	7
262			...	-.03	8	-.032	5	-.006	8	.098	8	-.309	7	-.13	7	-.123	8
263		2	...	.03	7	.015	4	.009	7	.282	7	-.11	8	.117	8	.124	7
264			...	-.03	8	-.036	5	-.008	8	.11	8	-.282	7	-.124	7	-.117	8
265		3	...	.031	7	.011	4	.01	7	.253	7	-.119	8	.109	8	.116	7
266			...	-.031	8	-.04	5	-.01	8	.119	8	-.253	7	-.116	7	-.109	8
267		4	...	.032	7	.007	4	.012	7	.224	1	-.125	8	.101	8	.107	7
268			...	-.032	8	-.044	5	-.011	8	.125	8	-.224	1	-.107	7	-.101	8
269		5	...	.033	7	.003	4	.013	7	.207	4	-.104	5	.091	8	.096	7
270			...	-.033	8	-.048	5	-.013	8	.104	5	-.207	4	-.096	7	-.091	8
271	M41	1	...	0	7	0	1	0	1	0	1	0	1	0	1	0	1
272			...	0	6	0	1	0	1	0	1	0	1	0	1	0	1
273		2	...	0	7	0	1	0	1	0	1	0	1	0	1	0	1
274			...	0	6	0	1	0	1	0	1	0	1	0	1	0	1
275		3	...	0	7	0	1	0	1	0	1	0	1	0	1	0	1
276			...	0	6	0	1	0	1	0	1	0	1	0	1	0	1
277		4	...	0	7	0	1	0	1	0	1	0	1	0	1	0	1
278			...	0	6	0	1	0	1	0	1	0	1	0	1	0	1
279		5	...	0	7	0	1	0	1	0	1	0	1	0	1	0	1
280			...	0	6	0	1	0	1	0	1	0	1	0	1	0	1
281	M42	1	...	.036	7	-.014	4	.021	7	.186	4	.105	5	.031	8	.034	7
282			...	-.036	8	-.066	5	-.02	8	-.105	5	-.186	4	-.034	7	-.031	8
283		2	...	.037	7	-.018	4	.022	2	.175	4	.15	5	.017	8	.019	7
284			...	-.037	8	-.069	5	-.021	3	-.15	5	-.175	4	-.019	7	-.017	8
285		3	...	.038	7	-.021	4	.024	2	.163	4	.198	5	.031	2	.033	3
286			...	-.038	8	-.072	5	-.024	3	-.198	5	-.163	4	-.033	3	-.031	2
287		4	...	.038	7	-.024	4	.026	2	.147	4	.248	5	.048	2	.05	3
288			...	-.038	8	-.076	5	-.026	3	-.248	5	-.147	4	-.05	3	-.048	2
289		5	...	.039	7	-.027	4	.029	2	.13	4	.3	5	.067	2	.068	3
290			...	-.039	8	-.079	5	-.028	3	-.3	5	-.13	4	-.068	3	-.067	2
291	M43	1	...	.031	9	-.014	8	.029	2	.13	4	.3	5	.119	2	.12	3
292			...	-.041	6	-.09	7	-.028	3	-.3	5	-.13	4	-.12	3	-.119	2
293		2	...	.031	9	-.015	8	.03	2	.123	4	.325	5	.128	2	.129	3
294			...	-.042	6	-.092	7	-.029	3	-.325	5	-.123	4	-.129	3	-.128	2

Company : **DMJM H&N**
Designer : **Kevin M. Jones**
Job Number : **145579-V-CA-005** **DBVS Off-Gas Treatment Duct Analysis**

Mar 26, 2006
12:41 PM
Checked By:_____

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[...	lc	y Shear[...	lc	z Shear[k...	lc	y-T...	lc	y-Bot[ksi]	lc	z-Top[ksi]	lc	z-Bot[ksi]	lc
295		3	...	.031	9	-.017	8	.031	2	.115	4	.35	5	.137	2	.138	3
296			...	-.042	6	-.093	7	-.03	3	-.35	5	-.115	4	-.138	3	-.137	2
297		4	...	.031	9	-.018	8	.032	2	.107	4	.375	5	.147	2	.147	3
298			...	-.042	6	-.095	7	-.031	3	-.375	5	-.107	4	-.147	3	-.147	2
299		5	...	.031	9	-.019	8	.033	2	.098	4	.401	5	.157	2	.157	3
300			...	-.043	6	-.096	7	-.032	3	-.401	5	-.098	4	-.157	3	-.157	2
301	M44	1	...	.037	4	.081	5	.047	3	.098	4	.401	5	.243	2	.243	3
302			...	0	5	.033	4	-.047	2	-.401	5	-.098	4	-.243	3	-.243	2
303		2	...	.036	4	.079	5	.046	3	.108	4	.377	5	.229	2	.229	3
304			...	0	5	.032	4	-.046	2	-.377	5	-.108	4	-.229	3	-.229	2
305		3	...	.035	4	.077	5	.045	3	.117	4	.353	5	.216	2	.216	3
306			...	0	5	.031	4	-.045	2	-.353	5	-.117	4	-.216	3	-.216	2
307		4	...	.035	4	.076	5	.044	3	.127	4	.33	5	.202	2	.202	3
308			...	0	5	.031	4	-.044	2	-.33	5	-.127	4	-.202	3	-.202	2
309		5	...	.034	4	.074	5	.043	3	.136	4	.308	5	.189	2	.189	3
310			...	0	5	.03	4	-.043	2	-.308	5	-.136	4	-.189	3	-.189	2
311	M45	1	...	.037	4	.067	5	.043	3	.136	4	.308	5	.243	2	.243	3
312			...	.015	5	.002	4	-.043	2	-.308	5	-.136	4	-.243	3	-.243	2
313		2	...	.036	4	.066	5	.042	3	.136	4	.287	5	.23	2	.23	3
314			...	.015	5	.002	4	-.042	2	-.287	5	-.136	4	-.23	3	-.23	2
315		3	...	.035	4	.064	5	.041	3	.137	4	.268	5	.218	2	.218	3
316			...	.014	5	.002	4	-.041	2	-.268	5	-.137	4	-.218	3	-.218	2
317		4	...	.034	4	.063	5	.04	3	.138	4	.248	5	.205	2	.205	3
318			...	.014	5	.002	4	-.04	2	-.248	5	-.138	4	-.205	3	-.205	2
319		5	...	.033	4	.061	5	.039	3	.138	4	.23	5	.194	2	.194	3
320			...	.014	5	.002	4	-.039	2	-.23	5	-.138	4	-.194	3	-.194	2
321	M46	1	...	.031	4	.046	5	.039	3	.138	4	.23	5	.214	2	.214	3
322			...	.024	5	-.024	4	-.039	2	-.23	5	-.138	4	-.214	3	-.214	2
323		2	...	.03	4	.045	5	.038	3	.131	4	.216	5	.203	2	.203	3
324			...	.024	5	-.023	4	-.038	2	-.216	5	-.131	4	-.203	3	-.203	2
325		3	...	.03	4	.043	5	.037	3	.124	4	.203	5	.191	2	.191	3
326			...	.023	5	-.022	4	-.037	2	-.203	5	-.124	4	-.191	3	-.191	2
327		4	...	.029	4	.042	5	.036	3	.118	4	.19	5	.18	2	.18	3
328			...	.022	5	-.022	4	-.036	2	-.19	5	-.118	4	-.18	3	-.18	2
329		5	...	.028	4	.041	5	.035	3	.111	4	.177	5	.17	2	.17	3
330			...	.022	5	-.021	4	-.035	2	-.177	5	-.111	4	-.17	3	-.17	2
331	M47	1	...	.025	4	.035	2	.032	5	.169	3	.169	2	.111	4	.177	5
332			...	.025	1	-.035	3	-.032	4	-.169	2	-.169	3	-.177	5	-.111	4
333		2	...	.022	4	.03	2	.027	5	.122	3	.122	2	.069	4	.135	5
334			...	.022	1	-.03	3	-.027	4	-.122	2	-.122	3	-.135	5	-.069	4
335		3	...	.018	4	.025	2	.022	5	.082	3	.082	2	.034	4	.1	5
336			...	.018	1	-.025	3	-.022	4	-.082	2	-.082	3	-.1	5	-.034	4
337		4	...	.015	4	.02	2	.017	5	.049	3	.049	2	.005	4	.071	5
338			...	.015	1	-.02	3	-.017	4	-.049	2	-.049	3	-.071	5	-.005	4
339		5	...	.011	4	.016	2	.013	5	.023	3	.023	2	-.017	4	.05	5
340			...	.011	1	-.016	3	-.013	4	-.023	2	-.023	3	-.05	5	.017	4
341	M48	1	...	.013	4	.018	5	.016	3	-.017	4	.05	5	.027	2	.027	3
342			...	.01	5	-.007	4	-.016	2	-.05	5	.017	4	-.027	3	-.027	2
343		2	...	.012	4	.016	5	.015	3	-.018	4	.046	5	.024	2	.024	3
344			...	.009	5	-.006	4	-.015	2	-.046	5	.018	4	-.024	3	-.024	2
345		3	...	.011	4	.015	5	.014	3	-.02	4	.042	5	.02	2	.02	3
346			...	.009	5	-.006	4	-.014	2	-.042	5	.02	4	-.02	3	-.02	2
347		4	...	.011	4	.014	5	.013	3	-.021	4	.038	5	.017	2	.017	3
348			...	.008	5	-.005	4	-.013	2	-.038	5	.021	4	-.017	3	-.017	2
349		5	...	.01	4	.013	5	.013	3	-.022	4	.035	5	.014	2	.014	3
350			...	.008	5	-.005	4	-.013	2	-.035	5	.022	4	-.014	3	-.014	2
351	M49	1	...	.01	4	.019	5	.013	3	-.022	4	.035	5	.02	2	.02	3

Company : **DMJM H&N**
Designer : **Kevin M. Jones**
Job Number : **145579-V-CA-005** **DBVS Off-Gas Treatment Duct Analysis**

Mar 26, 2006
12:41 PM
Checked By:_____

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[...	Ic	y Shear[...	Ic	z Shear[k...	Ic	y-T...	Ic	y-Bot[ksi]	Ic	z-Top[ksi]	Ic	z-Bot[ksi]	Ic
352			...	.004	5	.005	4	-.013	2	-.035	5	.022	4	-.02	3	-.02	2
353		2	...	.009	4	.018	5	.012	3	-.021	4	.03	5	.017	2	.017	3
354			...	.004	5	.005	4	-.012	2	-.03	5	.021	4	-.017	3	-.017	2
355		3	...	.009	4	.016	5	.011	3	-.02	4	.026	5	.014	2	.014	3
356			...	.004	5	.004	4	-.011	2	-.026	5	.02	4	-.014	3	-.014	2
357		4	...	.008	4	.015	5	.01	3	-.019	6	.023	7	.012	2	.012	3
358			...	.003	5	.004	4	-.01	2	-.023	7	.019	6	-.012	3	-.012	2
359		5	...	.007	4	.014	5	.009	3	-.018	6	.02	7	.01	2	.01	3
360			...	.003	5	.004	4	-.009	2	-.02	7	.018	6	-.01	3	-.01	2
361	M50	1	...	.006	4	.015	5	.009	3	-.018	8	.02	7	.012	2	.012	3
362			...	0	5	.01	4	-.009	2	-.02	7	.018	8	-.012	3	-.012	2
363		2	...	.005	4	.014	5	.009	3	-.015	8	.016	7	.01	2	.01	3
364			...	0	5	.01	4	-.009	2	-.016	7	.015	8	-.01	3	-.01	2
365		3	...	.004	4	.012	5	.008	3	-.013	5	.013	4	.008	2	.008	3
366			...	0	5	.009	4	-.008	2	-.013	4	.013	5	-.008	3	-.008	2
367		4	...	.004	8	.011	9	.007	3	-.01	5	.011	4	.006	2	.006	3
368			...	0	9	.008	6	-.007	2	-.011	4	.01	5	-.006	3	-.006	2
369		5	...	.003	8	.01	9	.006	3	-.007	5	.009	4	.005	2	.005	3
370			...	0	9	.007	6	-.006	2	-.009	4	.007	5	-.005	3	-.005	2
371	M51	1	...	.001	6	.009	6	.006	3	-.007	5	.009	4	.006	2	.006	3
372			...	-.002	9	.009	7	-.006	2	-.009	4	.007	5	-.006	3	-.006	2
373		2	...	.001	6	.008	6	.005	3	-.005	5	.007	4	.004	2	.004	3
374			...	-.002	9	.008	7	-.005	2	-.007	4	.005	5	-.004	3	-.004	2
375		3	...	.001	4	.007	4	.005	3	-.004	5	.005	4	.003	2	.003	3
376			...	-.002	5	.007	5	-.005	2	-.005	4	.004	5	-.003	3	-.003	2
377		4	...	.001	4	.006	4	.004	3	-.002	5	.004	4	.002	2	.002	3
378			...	-.002	5	.005	5	-.004	2	-.004	4	.002	5	-.002	3	-.002	2
379		5	...	.001	4	.005	4	.003	3	-.001	5	.003	4	.001	2	.001	3
380			...	-.002	5	.004	5	-.003	2	-.003	4	.001	5	-.001	3	-.001	2
381	M52	1	...	0	4	.006	4	.003	3	-.001	5	.003	4	.001	2	.001	3
382			...	-.003	5	.002	5	-.003	2	-.003	4	.001	5	-.001	3	-.001	2
383		2	...	0	4	.004	4	.002	3	0	5	.001	4	0	2	0	3
384			...	-.002	5	.002	5	-.002	2	-.001	4	0	5	0	3	0	2
385		3	...	0	4	.003	4	.002	3	0	5	0	4	0	2	0	3
386			...	-.001	5	.001	5	-.002	2	0	4	0	5	0	3	0	2
387		4	...	0	4	.001	4	0	3	0	5	0	4	0	2	0	3
388			...	0	5	0	5	0	2	0	4	0	5	0	3	0	2
389		5	...	0	1	0	1	0	1	0	1	0	1	0	1	0	1
390			...	0	1	0	1	0	1	0	1	0	1	0	1	0	1
391	M53	1	...	.119	7	.55	7	.216	9	-.205	1	2.259	7	2.798	6	2.798	9
392			...	-.119	8	.078	1	-.216	6	-2.2...	7	.205	1	-2.798	9	-2.798	6
393		2	...	.122	7	.537	7	.21	9	-.091	1	1.391	7	2.457	6	2.457	9
394			...	-.122	8	.065	1	-.21	6	-1.3...	7	.091	1	-2.457	9	-2.457	6
395		3	...	.124	7	.523	7	.205	9	.001	1	.571	8	2.125	6	2.125	9
396			...	-.124	8	.051	1	-.205	6	-.571	8	-.001	1	-2.125	9	-2.125	6
397		4	...	.127	7	.51	7	.2	9	.281	7	-.072	1	1.802	6	1.802	9
398			...	-.127	8	.038	1	-.2	6	.072	1	-.281	7	-1.802	9	-1.802	6
399		5	...	.13	7	.496	7	.194	9	1.0...	7	-.122	1	1.487	6	1.487	9
400			...	-.13	8	.024	1	-.194	6	.122	1	-1.085	7	-1.487	9	-1.487	6
401	M54	1	...	-.009	9	.032	9	.016	7	.037	9	-.01	6	.019	7	.019	8
402			...	-.032	6	.009	6	-.016	8	.01	6	-.037	9	-.019	8	-.019	7
403		2	...	-.008	9	.029	9	.015	7	.051	9	-.014	6	.026	7	.026	8
404			...	-.03	6	.008	6	-.015	8	.014	6	-.051	9	-.026	8	-.026	7
405		3	...	-.008	9	.025	9	.013	7	.063	9	-.017	6	.033	7	.033	8
406			...	-.028	6	.007	6	-.013	8	.017	6	-.063	9	-.033	8	-.033	7
407		4	...	-.007	9	.022	9	.011	7	.074	9	-.02	6	.038	7	.038	8
408			...	-.026	6	.006	6	-.011	8	.02	6	-.074	9	-.038	8	-.038	7

Company : DMJM H&N
Designer : Kevin M. Jones
Job Number : 145579-V-CA-005 DBVS Off-Gas Treatment Duct Analysis

Mar 26, 2006
12:41 PM
Checked By:_____

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[...	Ic	y Shear[...	Ic	z Shear[k...	Ic	y-T...	Ic	y-Bot[ksi]	Ic	z-Top[ksi]	Ic	z-Bot[ksi]	Ic
409		5	...	-.007	9	.018	9	.009	7	.083	9	-.023	6	.043	7	.043	8
410			...	-.024	6	.005	6	-.009	8	.023	6	-.083	9	-.043	8	-.043	7
411	M55	1	...	0	9	-.007	6	.014	8	.083	9	-.023	6	.043	7	.043	8
412			...	-.002	6	-.027	9	-.014	7	.023	6	-.083	9	-.043	8	-.043	7
413		2	...	0	9	-.008	6	.014	8	.08	9	-.022	6	.041	7	.041	8
414			...	-.001	6	-.028	9	-.014	7	.022	6	-.08	9	-.041	8	-.041	7
415		3	...	0	9	-.008	6	.015	8	.077	9	-.021	6	.039	7	.039	8
416			...	0	6	-.029	9	-.015	7	.021	6	-.077	9	-.039	8	-.039	7
417		4	...	0	9	-.008	6	.015	8	.073	9	-.02	6	.037	7	.037	8
418			...	0	6	-.03	9	-.015	7	.02	6	-.073	9	-.037	8	-.037	7
419		5	...	0	6	-.008	6	.016	8	.07	9	-.019	6	.036	7	.036	8
420			...	0	9	-.031	9	-.016	7	.019	6	-.07	9	-.036	8	-.036	7
421	M56	1	...	0	1	-.008	6	.016	8	.07	9	-.019	6	.036	7	.036	8
422			...	0	1	-.031	9	-.016	7	.019	6	-.07	9	-.036	8	-.036	7
423		2	...	.001	6	-.009	6	.017	8	.058	9	-.016	6	.03	7	.03	8
424			...	0	9	-.033	9	-.017	7	.016	6	-.058	9	-.03	8	-.03	7
425		3	...	.003	6	-.01	6	.019	8	.046	9	-.013	6	.023	7	.023	8
426			...	0	9	-.036	9	-.019	7	.013	6	-.046	9	-.023	8	-.023	7
427		4	...	.004	6	-.011	6	.02	8	.032	9	-.009	6	.016	7	.016	8
428			...	.001	9	-.039	9	-.02	7	.009	6	-.032	9	-.016	8	-.016	7
429		5	...	.006	6	-.011	6	.021	8	.018	9	-.005	6	.009	7	.009	8
430			...	.002	9	-.042	9	-.021	7	.005	6	-.018	9	-.009	8	-.009	7
431	M57	1	...	.006	6	-.011	6	.021	8	.018	9	-.005	6	.009	7	.009	8
432			...	.002	9	-.042	9	-.021	7	.005	6	-.018	9	-.009	8	-.009	7
433		2	...	.008	6	-.013	6	.024	8	-.002	6	.01	9	.005	8	.005	7
434			...	.002	9	-.047	9	-.024	7	-.01	9	.002	6	-.005	7	-.005	8
435		3	...	.01	6	-.014	6	.026	8	-.011	6	.041	9	.021	8	.021	7
436			...	.003	9	-.052	9	-.026	7	-.041	9	.011	6	-.021	7	-.021	8
437		4	...	.013	6	-.016	6	.029	8	-.02	6	.076	9	.039	8	.039	7
438			...	.004	9	-.056	9	-.029	7	-.076	9	.02	6	-.039	7	-.039	8
439		5	...	.015	6	-.017	6	.031	8	-.031	6	.113	9	.058	8	.058	7
440			...	.004	9	-.061	9	-.031	7	-.113	9	.031	6	-.058	7	-.058	8
441	M58	1	...	-.009	8	.032	8	.016	9	.037	8	-.01	7	.019	9	.019	6
442			...	-.032	7	.009	7	-.016	6	.01	7	-.037	8	-.019	6	-.019	9
443		2	...	-.008	8	.029	8	.015	9	.051	8	-.014	7	.026	9	.026	6
444			...	-.03	7	.008	7	-.015	6	.014	7	-.051	8	-.026	6	-.026	9
445		3	...	-.008	8	.025	8	.013	9	.063	8	-.017	7	.033	9	.033	6
446			...	-.028	7	.007	7	-.013	6	.017	7	-.063	8	-.033	6	-.033	9
447		4	...	-.007	8	.022	8	.011	9	.074	8	-.02	7	.038	9	.038	6
448			...	-.026	7	.006	7	-.011	6	.02	7	-.074	8	-.038	6	-.038	9
449		5	...	-.007	8	.018	8	.009	9	.083	8	-.023	7	.043	9	.043	6
450			...	-.024	7	.005	7	-.009	6	.023	7	-.083	8	-.043	6	-.043	9
451	M59	1	...	0	8	-.007	7	.014	6	.083	8	-.023	7	.043	9	.043	6
452			...	-.002	7	-.027	8	-.014	9	.023	7	-.083	8	-.043	6	-.043	9
453		2	...	0	8	-.008	7	.014	6	.08	8	-.022	7	.041	9	.041	6
454			...	-.001	7	-.028	8	-.014	9	.022	7	-.08	8	-.041	6	-.041	9
455		3	...	0	8	-.008	7	.015	6	.077	8	-.021	7	.039	9	.039	6
456			...	0	7	-.029	8	-.015	9	.021	7	-.077	8	-.039	6	-.039	9
457		4	...	0	8	-.008	7	.015	6	.073	8	-.02	7	.037	9	.038	6
458			...	0	7	-.03	8	-.015	9	.02	7	-.073	8	-.038	6	-.037	9
459		5	...	0	6	-.008	7	.016	6	.07	8	-.019	7	.036	9	.036	6
460			...	0	9	-.031	8	-.016	9	.019	7	-.07	8	-.036	6	-.036	9
461	M60	1	...	0	1	-.008	7	.016	6	.07	8	-.019	7	.036	9	.036	6
462			...	0	1	-.031	8	-.016	9	.019	7	-.07	8	-.036	6	-.036	9
463		2	...	.001	7	-.009	7	.017	6	.058	8	-.016	7	.03	9	.03	6
464			...	0	8	-.033	8	-.017	9	.016	7	-.058	8	-.03	6	-.03	9
465		3	...	.003	7	-.01	7	.019	6	.046	8	-.013	7	.023	9	.023	6

Company : **DMJM H&N**
Designer : **Kevin M. Jones**
Job Number : **145579-V-CA-005** **DBVS Off-Gas Treatment Duct Analysis**

Mar 26, 2006
12:41 PM
Checked By:_____

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[...	lc	y Shear[...	lc	z Shear[k...	lc	y-T...	lc	y-Bot[ksi]	lc	z-Top[ksi]	lc	z-Bot[ksi]	lc
466			...	0	8	-.036	8	-.019	9	.013	7	-.046	8	-.023	6	-.023	9
467		4	...	.004	7	-.011	7	.02	6	.032	8	-.009	7	.016	9	.016	6
468			...	.001	8	-.039	8	-.02	9	.009	7	-.032	8	-.016	6	-.016	9
469		5	...	.006	7	-.011	7	.021	6	.018	8	-.005	7	.009	9	.009	6
470			...	.002	8	-.042	8	-.021	9	.005	7	-.018	8	-.009	6	-.009	9
471	M61	1	...	.006	7	-.011	7	.021	6	.018	8	-.005	7	.009	9	.009	6
472			...	.002	8	-.042	8	-.021	9	.005	7	-.018	8	-.009	6	-.009	9
473		2	...	.008	7	-.013	7	.024	6	-.002	7	.01	8	.005	6	.005	9
474			...	.002	8	-.047	8	-.024	9	-.01	8	.002	7	-.005	9	-.005	6
475		3	...	.01	7	-.014	7	.026	6	-.011	7	.041	8	.021	6	.021	9
476			...	.003	8	-.052	8	-.026	9	-.041	8	.011	7	-.021	9	-.021	6
477		4	...	.013	7	-.016	7	.029	6	-.02	7	.076	8	.039	6	.039	9
478			...	.004	8	-.056	8	-.029	9	-.076	8	.02	7	-.039	9	-.039	6
479		5	...	.015	7	-.017	7	.031	6	-.031	7	.113	8	.058	6	.058	9
480			...	.004	8	-.061	8	-.031	9	-.113	8	.031	7	-.058	9	-.058	6
481	M62	1	...	0	1	0	1	0	1	.846	6	-.617	1	1.529	9	1.529	6
482			...	0	1	0	1	0	1	.617	1	-.846	6	-1.529	6	-1.529	9
483		2	...	.004	7	-.015	1	.008	6	.834	6	-.604	1	1.522	9	1.522	6
484			...	-.004	8	-.015	1	-.008	9	.604	1	-.834	6	-1.522	6	-1.522	9
485		3	...	.008	7	-.029	1	.016	6	.796	6	-.566	1	1.5	9	1.5	6
486			...	-.008	8	-.029	1	-.016	9	.566	1	-.796	6	-1.5	6	-1.5	9
487		4	...	.012	7	-.044	1	.025	6	.733	6	-.503	1	1.465	9	1.465	6
488			...	-.012	8	-.044	1	-.025	9	.503	1	-.733	6	-1.465	6	-1.465	9
489		5	...	.016	7	-.058	1	.033	6	.645	6	-.415	1	1.415	9	1.415	6
490			...	-.016	8	-.058	1	-.033	9	.415	1	-.645	6	-1.415	6	-1.415	9
491	M63	1	...	.028	7	-.099	4	.056	6	.645	6	-.415	1	1.415	9	1.415	6
492			...	-.028	8	-.099	2	-.056	9	.415	1	-.645	6	-1.415	6	-1.415	9
493		2	...	.029	7	-.103	4	.058	6	.59	6	-.361	1	1.384	9	1.384	6
494			...	-.029	8	-.103	2	-.058	9	.361	1	-.59	6	-1.384	6	-1.384	9
495		3	...	.031	7	-.108	4	.061	6	.533	6	-.303	1	1.358	7	1.358	8
496			...	-.031	8	-.108	2	-.061	9	.303	1	-.533	6	-1.358	8	-1.358	7
497		4	...	.032	7	-.112	4	.064	6	.473	6	-.243	1	1.358	7	1.358	8
498			...	-.032	8	-.112	2	-.064	9	.243	1	-.473	6	-1.358	8	-1.358	7
499		5	...	.033	7	-.117	4	.066	6	.411	6	-.181	1	1.358	7	1.358	8
500			...	-.033	8	-.117	2	-.066	9	.181	1	-.411	6	-1.358	8	-1.358	7
501	M64	1	...	.045	7	-.158	1	.089	6	.411	6	-.181	1	1.358	7	1.358	8
502			...	-.045	8	-.158	4	-.089	9	.181	1	-.411	6	-1.358	8	-1.358	7
503		2	...	.047	7	-.165	1	.093	6	.264	6	-.034	1	1.358	7	1.358	8
504			...	-.047	8	-.165	4	-.093	9	.034	1	-.264	6	-1.358	8	-1.358	7
505		3	...	.049	7	-.173	1	.098	6	.11	6	.12	1	1.358	7	1.358	8
506			...	-.049	8	-.173	4	-.098	9	-.12	1	-.11	6	-1.358	8	-1.358	7
507		4	...	.051	7	-.18	1	.102	6	-.051	6	.281	1	1.358	7	1.358	8
508			...	-.051	8	-.18	4	-.102	9	-.281	1	.051	6	-1.358	8	-1.358	7
509		5	...	.053	7	-.188	1	.106	6	-.219	6	.448	1	1.358	7	1.358	8
510			...	-.053	8	-.188	4	-.106	9	-.448	1	.219	6	-1.358	8	-1.358	7
511	M65	1	...	0	1	0	1	0	1	.846	7	-.617	1	1.529	7	1.529	8
512			...	0	1	0	1	0	1	.617	1	-.846	7	-1.529	8	-1.529	7
513		2	...	.004	6	-.015	1	.008	8	.834	7	-.604	1	1.522	7	1.522	8
514			...	-.004	9	-.015	1	-.008	7	.604	1	-.834	7	-1.522	8	-1.522	7
515		3	...	.008	6	-.029	1	.016	8	.796	7	-.566	1	1.5	7	1.5	8
516			...	-.008	9	-.029	1	-.016	7	.566	1	-.796	7	-1.5	8	-1.5	7
517		4	...	.012	6	-.044	1	.025	8	.733	7	-.503	1	1.465	7	1.465	8
518			...	-.012	9	-.044	1	-.025	7	.503	1	-.733	7	-1.465	8	-1.465	7
519		5	...	.016	6	-.058	1	.033	8	.645	7	-.415	1	1.415	7	1.415	8
520			...	-.016	9	-.058	1	-.033	7	.415	1	-.645	7	-1.415	8	-1.415	7
521	M66	1	...	.028	6	-.099	6	.056	8	.645	7	-.415	1	1.415	7	1.415	8
522			...	-.028	9	-.099	2	-.056	7	.415	1	-.645	7	-1.415	8	-1.415	7

Company : **DMJM H&N**
Designer : **Kevin M. Jones**
Job Number : **145579-V-CA-005** **DBVS Off-Gas Treatment Duct Analysis**

Mar 26, 2006
12:41 PM
Checked By:_____

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[...	lc	y Shear[...	lc	z Shear[k...	lc	y-T...	lc	y-Bot[ksi]	lc	z-Top[ksi]	lc	z-Bot[ksi]	lc
523		2	...	.029	6	-.103	6	.058	8	.59	7	-.361	1	1.384	7	1.384	8
524			...	-.029	9	-.103	2	-.058	7	.361	1	-.59	7	-1.384	8	-1.384	7
525		3	...	.031	6	-.108	6	.061	8	.533	7	-.303	1	1.358	9	1.358	6
526			...	-.031	9	-.108	2	-.061	7	.303	1	-.533	7	-1.358	6	-1.358	9
527		4	...	.032	6	-.112	6	.064	8	.473	7	-.243	1	1.358	9	1.358	6
528			...	-.032	9	-.112	2	-.064	7	.243	1	-.473	7	-1.358	6	-1.358	9
529		5	...	.033	6	-.117	6	.066	8	.411	7	-.181	1	1.358	9	1.358	6
530			...	-.033	9	-.117	2	-.066	7	.181	1	-.411	7	-1.358	6	-1.358	9
531	M67	1	...	.045	6	-.158	1	.089	8	.411	7	-.181	1	1.358	9	1.358	6
532			...	-.045	9	-.158	3	-.089	7	.181	1	-.411	7	-1.358	6	-1.358	9
533		2	...	.047	6	-.165	1	.093	8	.264	7	-.034	1	1.358	9	1.358	6
534			...	-.047	9	-.165	3	-.093	7	.034	1	-.264	7	-1.358	6	-1.358	9
535		3	...	.049	6	-.173	1	.098	8	.11	7	.12	1	1.358	9	1.358	6
536			...	-.049	9	-.173	3	-.098	7	-.12	1	-.11	7	-1.358	6	-1.358	9
537		4	...	.051	6	-.18	1	.102	8	-.051	7	.281	1	1.358	9	1.358	6
538			...	-.051	9	-.18	3	-.102	7	-.281	1	.051	7	-1.358	6	-1.358	9
539		5	...	.053	6	-.188	1	.106	8	-.219	7	.448	1	1.358	9	1.358	6
540			...	-.053	9	-.188	3	-.106	7	-.448	1	.219	7	-1.358	6	-1.358	9
541	M68	1	...	-.017	8	.094	8	.048	9	-.04	7	.144	8	.073	6	.073	9
542			...	-.062	7	.026	7	-.048	6	-.144	8	.04	7	-.073	9	-.073	6
543		2	...	-.017	8	.09	8	.046	9	-.027	7	.095	8	.048	6	.048	9
544			...	-.06	7	.025	7	-.046	6	-.095	8	.027	7	-.048	9	-.048	6
545		3	...	-.016	8	.086	8	.044	9	-.014	7	.049	8	.025	6	.025	9
546			...	-.058	7	.024	7	-.044	6	-.049	8	.014	7	-.025	9	-.025	6
547		4	...	-.016	8	.082	8	.042	9	-.002	7	.005	8	.002	6	.002	9
548			...	-.056	7	.023	7	-.042	6	-.005	8	.002	7	-.002	9	-.002	6
549		5	...	-.015	8	.077	8	.039	9	.037	8	-.01	7	.019	9	.019	6
550			...	-.054	7	.022	7	-.039	6	.01	7	-.037	8	-.019	6	-.019	9
551	M69	1	...	-.017	9	.094	9	.048	7	-.04	6	.144	9	.073	8	.073	7
552			...	-.062	6	.026	6	-.048	8	-.144	9	.04	6	-.073	7	-.073	8
553		2	...	-.017	9	.09	9	.046	7	-.027	6	.095	9	.048	8	.048	7
554			...	-.06	6	.025	6	-.046	8	-.095	9	.027	6	-.048	7	-.048	8
555		3	...	-.016	9	.086	9	.044	7	-.014	6	.049	9	.025	8	.025	7
556			...	-.058	6	.024	6	-.044	8	-.049	9	.014	6	-.025	7	-.025	8
557		4	...	-.016	9	.082	9	.042	7	-.002	6	.005	9	.002	8	.002	7
558			...	-.056	6	.023	6	-.042	8	-.005	9	.002	6	-.002	7	-.002	8
559		5	...	-.015	9	.077	9	.039	7	.037	9	-.01	6	.019	7	.019	8
560			...	-.054	6	.022	6	-.039	8	.01	6	-.037	9	-.019	8	-.019	7
561	M70	1	...	.183	7	.419	8	.171	9	4.3...	7	-.087	1	.229	6	.229	9
562			...	-.101	8	-.034	1	-.171	6	.087	1	-4.347	7	-.229	9	-.229	6
563		2	...	.183	7	.416	8	.17	9	4.4...	7	-.077	1	.178	6	.178	9
564			...	-.102	8	-.037	1	-.17	6	.077	1	-4.458	7	-.178	9	-.178	6
565		3	...	.184	7	.414	8	.169	9	4.5...	7	-.065	1	.128	6	.128	9
566			...	-.103	8	-.039	1	-.169	6	.065	1	-4.568	7	-.128	9	-.128	6
567		4	...	.184	7	.412	8	.168	9	4.6...	7	-.053	1	.077	6	.077	9
568			...	-.103	8	-.041	1	-.168	6	.053	1	-4.677	7	-.077	9	-.077	6
569		5	...	.184	7	.41	8	.167	9	4.7...	7	-.041	1	.028	6	.028	9
570			...	-.104	8	-.044	1	-.167	6	.041	1	-4.785	7	-.028	9	-.028	6
571	M71	1	...	.24	7	.458	8	.167	9	4.7...	7	-.041	1	.051	6	.051	9
572			...	-.018	8	-.038	1	-.167	6	.041	1	-4.785	7	-.051	9	-.051	6
573		2	...	.239	7	.457	8	.166	9	4.8...	7	-.029	1	.028	5	.028	4
574			...	-.019	8	-.041	1	-.166	6	.029	1	-4.843	7	-.028	4	-.028	5
575		3	...	.239	7	.455	8	.165	9	4.9	7	-.017	1	.069	5	.069	4
576			...	-.02	8	-.043	1	-.165	6	.017	1	-4.9	7	-.069	4	-.069	5
577		4	...	.239	7	.453	8	.164	9	4.9...	7	-.004	1	.111	5	.111	4
578			...	-.021	8	-.045	1	-.164	6	.004	1	-4.956	7	-.111	4	-.111	5
579		5	...	.238	7	.452	8	.163	9	5.0...	7	.01	1	.151	5	.151	4

Company : **DMJM H&N**
Designer : **Kevin M. Jones**
Job Number : **145579-V-CA-005** **DBVS Off-Gas Treatment Duct Analysis**

Mar 26, 2006
12:41 PM
Checked By:_____

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[...	Ic	y Shear[...	Ic	z Shear[k...	Ic	y-T...	Ic	y-Bot[ksi]	Ic	z-Top[ksi]	Ic	z-Bot[ksi]	Ic
580			...	-.022	8	-.047	1	-.163	6	-.01	1	-5.011	7	-.151	4	-.151	5
581	M72	1	...	.255	7	.435	8	.163	9	5.0...	7	.01	1	.115	9	.115	6
582			...	-.022	1	-.033	1	-.163	6	-.01	1	-5.011	7	-.115	6	-.115	9
583		2	...	.255	7	.434	8	.162	9	5.0...	7	.02	1	.163	9	.163	6
584			...	-.023	1	-.034	1	-.162	6	-.02	1	-5.007	7	-.163	6	-.163	9
585		3	...	.254	7	.433	8	.161	9	5.0...	3	.03	1	.212	9	.212	6
586			...	-.024	1	-.035	1	-.161	6	-.03	1	-5.015	3	-.212	6	-.212	9
587		4	...	.253	7	.433	8	.16	9	5.1...	3	.041	1	.259	9	.259	6
588			...	-.025	1	-.037	1	-.16	6	-.041	1	-5.106	3	-.259	6	-.259	9
589		5	...	.252	7	.432	8	.159	9	5.1...	3	.052	1	.307	9	.307	6
590			...	-.026	1	-.038	1	-.159	6	-.052	1	-5.197	3	-.307	6	-.307	9
591	M73	1	...	.228	7	.352	8	.159	9	5.1...	3	.052	1	.244	9	.244	6
592			...	-.033	1	-.213	7	-.159	6	-.052	1	-5.197	3	-.244	6	-.244	9
593		2	...	.227	7	.353	8	.158	9	5.2...	8	.057	1	.291	9	.291	6
594			...	-.034	1	-.215	7	-.158	6	-.057	1	-5.295	8	-.291	6	-.291	9
595		3	...	.225	7	.353	8	.157	9	5.4	8	.062	1	.338	9	.338	6
596			...	-.035	1	-.216	7	-.157	6	-.062	1	-5.4	8	-.338	6	-.338	9
597		4	...	.224	7	.354	8	.156	9	5.5...	8	.067	1	.385	9	.385	6
598			...	-.036	1	-.218	7	-.156	6	-.067	1	-5.505	8	-.385	6	-.385	9
599		5	...	.223	7	.354	8	.155	9	5.6...	8	.072	1	.431	9	.431	6
600			...	-.038	1	-.219	7	-.155	6	-.072	1	-5.611	8	-.431	6	-.431	9
601	M74	1	...	1.052	8	.013	1	.048	4	-.026	1	10.138	8	.157	5	.157	4
602			...	.027	1	-.558	2	-.048	5	-10...	8	.026	1	-.157	4	-.157	5
603		2	...	1.051	8	.013	1	.049	4	-.023	1	10.299	8	.143	5	.143	4
604			...	.025	1	-.56	2	-.049	5	-10...	8	.023	1	-.143	4	-.143	5
605		3	...	1.05	8	.013	1	.05	4	-.019	1	10.459	8	.128	5	.128	4
606			...	.024	1	-.561	2	-.05	5	-10...	8	.019	1	-.128	4	-.128	5
607		4	...	1.048	8	.012	1	.052	4	-.015	1	10.619	8	.113	5	.113	4
608			...	.023	1	-.563	2	-.052	5	-10...	8	.015	1	-.113	4	-.113	5
609		5	...	1.047	8	.012	1	.053	4	-.012	1	10.78	9	.098	5	.098	4
610			...	.022	1	-.565	2	-.053	5	-10...	9	.012	1	-.098	4	-.098	5
611	M75	1	...	1.07	9	.319	3	.053	4	-.012	1	10.78	8	.192	5	.192	4
612			...	.018	1	.027	1	-.053	5	-10...	8	.012	1	-.192	4	-.192	5
613		2	...	1.069	9	.319	3	.054	4	-.004	1	10.689	8	.177	5	.177	4
614			...	.017	1	.026	1	-.054	5	-10...	8	.004	1	-.177	4	-.177	5
615		3	...	1.068	9	.318	3	.055	4	.004	1	10.599	8	.16	5	.16	4
616			...	.016	1	.025	1	-.055	5	-10...	8	-.004	1	-.16	4	-.16	5
617		4	...	1.066	9	.318	3	.057	4	.011	1	10.509	8	.144	5	.144	4
618			...	.015	1	.023	1	-.057	5	-10...	8	-.011	1	-.144	4	-.144	5
619		5	...	1.065	9	.318	3	.058	4	.018	1	10.419	8	.127	5	.127	4
620			...	.014	1	.022	1	-.058	5	-10...	8	-.018	1	-.127	4	-.127	5
621	M76	1	...	.93	2	1.102	3	.058	4	.018	1	10.419	8	.197	5	.197	4
622			...	.009	1	.031	1	-.058	5	-10...	8	-.018	1	-.197	4	-.197	5
623		2	...	.929	2	1.1	3	.059	4	.027	1	10.093	8	.18	5	.18	4
624			...	.008	1	.029	1	-.059	5	-10...	8	-.027	1	-.18	4	-.18	5
625		3	...	.929	2	1.099	3	.061	4	.035	1	9.768	9	.162	5	.162	4
626			...	.007	1	.027	1	-.061	5	-9.7...	9	-.035	1	-.162	4	-.162	5
627		4	...	.929	2	1.098	3	.062	4	.042	1	9.444	9	.144	5	.144	4
628			...	.006	1	.024	1	-.062	5	-9.4...	9	-.042	1	-.144	4	-.144	5
629		5	...	.929	2	1.096	3	.063	4	.049	1	9.12	9	.125	9	.125	6
630			...	.006	1	.022	1	-.063	5	-9.12	9	-.049	1	-.125	6	-.125	9
631	M77	1	...	.66	2	1.711	8	.063	4	.049	1	9.12	8	.176	9	.176	6
632			...	.001	1	.025	1	-.063	5	-9.12	8	-.049	1	-.176	6	-.176	9
633		2	...	.659	2	1.709	8	.065	4	.056	1	8.612	2	.159	9	.159	6
634			...	0	1	.023	1	-.065	5	-8.6...	2	-.056	1	-.159	6	-.159	9
635		3	...	.659	2	1.706	8	.066	4	.063	1	8.116	2	.141	9	.141	6
636			...	0	1	.02	1	-.066	5	-8.1...	2	-.063	1	-.141	6	-.141	9

Company : **DMJM H&N**
Designer : **Kevin M. Jones**
Job Number : **145579-V-CA-005 DBVS Off-Gas Treatment Duct Analysis**

Mar 26, 2006
12:41 PM
Checked By:_____

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[...	lc	y Shear[...	lc	z Shear[k...	lc	y-T...	lc	y-Bot[ksi]	lc	z-Top[ksi]	lc	z-Bot[ksi]	lc
637		4	...	.659	2	1.704	8	.067	4	.068	1	7.621	2	.123	9	.123	6
638			...	0	1	.018	1	-.067	5	-7.6...	2	-.068	1	-.123	6	-.123	9
639		5	...	.659	2	1.702	8	.068	4	.073	1	7.126	2	.105	7	.105	6
640			...	0	1	.015	1	-.068	5	-7.1...	2	-.073	1	-.105	6	-.105	7
641	M78	1	...	.482	2	1.919	8	.068	4	.073	1	7.126	2	.122	9	.122	6
642			...	-.003	1	.015	1	-.068	5	-7.1...	2	-.073	1	-.122	6	-.122	9
643		2	...	.482	2	1.91	8	.073	4	.085	1	5.173	2	.056	9	.056	6
644			...	-.003	1	.006	1	-.073	5	-5.1...	2	-.085	1	-.056	6	-.056	9
645		3	...	.482	2	1.902	8	.078	4	.087	1	3.229	2	.044	4	.044	5
646			...	-.003	1	-.002	1	-.078	5	-3.2...	2	-.087	1	-.044	5	-.044	4
647		4	...	.482	2	1.893	8	.082	4	.08	1	1.294	2	.127	4	.127	5
648			...	-.003	1	-.011	1	-.082	5	-1.2...	2	-.08	1	-.127	5	-.127	4
649		5	...	.482	2	1.884	8	.087	4	.846	3	-.064	1	.215	4	.215	5
650			...	-.003	1	-.02	1	-.087	5	.064	1	-.846	3	-.215	5	-.215	4
651	M79	1	...	.294	2	2.026	8	.087	4	.846	3	-.064	1	.197	4	.197	5
652			...	0	1	-.02	1	-.087	5	.064	1	-.846	3	-.197	5	-.197	4
653		2	...	.295	2	2.023	8	.088	4	1.4...	3	-.058	1	.223	4	.223	5
654			...	0	1	-.022	1	-.088	5	.058	1	-1.446	3	-.223	5	-.223	4
655		3	...	.296	2	2.02	8	.089	4	2.0...	3	-.05	1	.25	4	.25	5
656			...	.001	1	-.025	1	-.089	5	.05	1	-2.045	3	-.25	5	-.25	4
657		4	...	.297	2	2.018	8	.091	4	2.6...	3	-.043	1	.277	4	.277	5
658			...	.001	1	-.027	1	-.091	5	.043	1	-2.643	3	-.277	5	-.277	4
659		5	...	.297	2	2.015	8	.092	4	3.2...	3	-.034	1	.304	4	.304	5
660			...	.002	1	-.03	1	-.092	5	.034	1	-3.241	3	-.304	5	-.304	4
661	M80	1	...	.007	1	2.072	2	.092	4	3.2...	3	-.034	1	.24	4	.24	5
662			...	-.145	3	-.026	1	-.092	5	.034	1	-3.241	3	-.24	5	-.24	4
663		2	...	.008	1	2.07	2	.093	4	3.8...	3	-.026	1	.267	4	.267	5
664			...	-.145	3	-.028	1	-.093	5	.026	1	-3.851	3	-.267	5	-.267	4
665		3	...	.008	1	2.069	2	.095	4	4.46	3	-.017	1	.295	4	.295	5
666			...	-.145	3	-.03	1	-.095	5	.017	1	-4.46	3	-.295	5	-.295	4
667		4	...	.009	1	2.068	2	.096	4	5.0...	3	-.008	1	.323	4	.323	5
668			...	-.145	3	-.032	1	-.096	5	.008	1	-5.068	3	-.323	5	-.323	4
669		5	...	.01	1	2.066	2	.097	4	5.6...	3	.002	1	.352	4	.352	5
670			...	-.145	3	-.035	1	-.097	5	-.002	1	-5.676	3	-.352	5	-.352	4
671	M81	1	...	.016	1	1.831	2	.097	4	5.6...	3	.002	1	.243	4	.243	5
672			...	-.524	9	-.024	1	-.097	5	-.002	1	-5.676	3	-.243	5	-.243	4
673		2	...	.017	1	1.83	2	.098	4	6.2...	3	.009	1	.272	4	.272	5
674			...	-.524	9	-.026	1	-.098	5	-.009	1	-6.203	3	-.272	5	-.272	4
675		3	...	.018	1	1.83	2	.1	4	6.73	3	.017	1	.302	4	.302	5
676			...	-.523	9	-.027	1	-.1	5	-.017	1	-6.73	3	-.302	5	-.302	4
677		4	...	.019	1	1.83	2	.101	4	7.2...	3	.026	1	.331	4	.331	5
678			...	-.522	9	-.029	1	-.101	5	-.026	1	-7.256	3	-.331	5	-.331	4
679		5	...	.02	1	1.83	2	.102	4	7.7...	3	.034	1	.362	4	.362	5
680			...	-.521	3	-.03	1	-.102	5	-.034	1	-7.782	3	-.362	5	-.362	4
681	M82	1	...	.024	1	1.32	2	.102	4	7.7...	3	.034	1	.206	4	.206	5
682			...	-.822	9	-.012	1	-.102	5	-.034	1	-7.782	3	-.206	5	-.206	4
683		2	...	.025	1	1.321	2	.104	4	8.1...	8	.038	1	.237	4	.237	5
684			...	-.821	9	-.013	1	-.104	5	-.038	1	-8.148	8	-.237	5	-.237	4
685		3	...	.027	1	1.321	2	.105	4	8.5...	8	.042	1	.268	4	.268	5
686			...	-.819	9	-.013	1	-.105	5	-.042	1	-8.517	8	-.268	5	-.268	4
687		4	...	.028	1	1.322	2	.106	4	8.8...	8	.046	1	.3	4	.3	5
688			...	-.818	9	-.014	1	-.106	5	-.046	1	-8.886	8	-.3	5	-.3	4
689		5	...	.029	1	1.323	2	.108	4	9.2...	8	.05	1	.331	4	.331	5
690			...	-.817	9	-.014	1	-.108	5	-.05	1	-9.254	8	-.331	5	-.331	4
691	M83	1	...	.028	1	.003	1	.108	5	.05	1	9.254	8	.238	5	.238	4
692			...	-.924	8	-.989	2	-.108	4	-9.2...	8	-.05	1	-.238	4	-.238	5
693		2	...	.033	1	.003	1	.113	5	.053	1	10.351	2	.363	5	.363	4

Company : **DMJM H&N**
Designer : **Kevin M. Jones**
Job Number : **145579-V-CA-005 DBVS Off-Gas Treatment Duct Analysis**

Mar 26, 2006
12:41 PM
Checked By:_____

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[...	lc	y Shear[...	lc	z Shear[k...	lc	y-T...	lc	y-Bot[ksi]	lc	z-Top[ksi]	lc	z-Bot[ksi]	lc
694			...	-.919	8	-.994	2	-.113	4	-10...	2	-.053	1	-.363	4	-.363	5
695		3	...	.038	1	.003	1	.118	5	.057	1	11.482	2	.494	5	.494	4
696			...	-.914	8	-.998	2	-.118	4	-11...	2	-.057	1	-.494	4	-.494	5
697		4	...	.043	1	.003	1	.123	5	.06	1	12.619	2	.63	5	.63	4
698			...	-.909	8	-1.003	2	-.123	4	-12...	2	-.06	1	-.63	4	-.63	5
699		5	...	.047	1	.003	1	.128	5	.063	1	13.762	2	.772	5	.772	4
700			...	-.905	8	-1.008	2	-.128	4	-13...	2	-.063	1	-.772	4	-.772	5
701	M84	1	...	0	1	0	1	0	1	.011	1	-.011	1	.008	3	.008	2
702			...	0	1	0	1	0	1	.011	1	-.011	1	-.008	2	-.008	3
703		2	...	0	7	-.002	1	.001	2	.011	1	-.011	1	.008	3	.008	2
704			...	0	6	-.002	1	-.001	3	.011	1	-.011	1	-.008	2	-.008	3
705		3	...	0	7	-.004	1	.002	2	.01	1	-.01	1	.007	3	.007	2
706			...	0	6	-.004	1	-.002	3	.01	1	-.01	1	-.007	2	-.007	3
707		4	...	.001	7	-.005	1	.004	2	.009	1	-.009	1	.006	3	.006	2
708			...	-.001	6	-.005	1	-.004	3	.009	1	-.009	1	-.006	2	-.006	3
709		5	...	.001	7	-.007	1	.005	2	.007	1	-.007	1	.005	3	.005	2
710			...	-.001	6	-.007	1	-.005	3	.007	1	-.007	1	-.005	2	-.005	3
711	M85	1	...	0	1	0	1	0	1	.011	1	-.011	1	.008	3	.008	2
712			...	0	1	0	1	0	1	.011	1	-.011	1	-.008	2	-.008	3
713		2	...	0	7	-.002	1	.001	2	.011	1	-.011	1	.008	3	.008	2
714			...	0	6	-.002	1	-.001	3	.011	1	-.011	1	-.008	2	-.008	3
715		3	...	0	7	-.004	1	.002	2	.01	1	-.01	1	.007	3	.007	2
716			...	0	6	-.004	1	-.002	3	.01	1	-.01	1	-.007	2	-.007	3
717		4	...	.001	7	-.005	1	.004	2	.009	1	-.009	1	.006	3	.006	2
718			...	-.001	6	-.005	1	-.004	3	.009	1	-.009	1	-.006	2	-.006	3
719		5	...	.001	7	-.007	1	.005	2	.007	1	-.007	1	.005	3	.005	2
720			...	-.001	6	-.007	1	-.005	3	.007	1	-.007	1	-.005	2	-.005	3
721	M87	1	...	.004	6	.022	1	.015	3	-.033	1	.033	1	.022	2	.022	3
722			...	-.004	7	.022	1	-.015	2	-.033	1	.033	1	-.022	3	-.022	2
723		2	...	.003	6	.017	1	.011	3	-.013	1	.013	1	.009	2	.009	3
724			...	-.003	7	.017	1	-.011	2	-.013	1	.013	1	-.009	3	-.009	2
725		3	...	.002	6	.011	1	.007	3	0	1	0	1	0	3	0	2
726			...	-.002	7	.011	1	-.007	2	0	1	0	1	0	2	0	3
727		4	...	.001	6	.006	1	.004	3	.009	1	-.009	1	.006	3	.006	2
728			...	-.001	7	.006	1	-.004	2	.009	1	-.009	1	-.006	2	-.006	3
729		5	...	0	1	0	1	0	1	.011	1	-.011	1	.008	3	.008	2
730			...	0	1	0	1	0	1	.011	1	-.011	1	-.008	2	-.008	3
731	M88	1	...	.004	6	.022	1	.015	3	-.033	1	.033	1	.022	2	.022	3
732			...	-.004	7	.022	1	-.015	2	-.033	1	.033	1	-.022	3	-.022	2
733		2	...	.003	6	.017	1	.011	3	-.013	1	.013	1	.009	2	.009	3
734			...	-.003	7	.017	1	-.011	2	-.013	1	.013	1	-.009	3	-.009	2
735		3	...	.002	6	.011	1	.007	3	0	1	0	1	0	3	0	2
736			...	-.002	7	.011	1	-.007	2	0	1	0	1	0	2	0	3
737		4	...	.001	6	.006	1	.004	3	.009	1	-.009	1	.006	3	.006	2
738			...	-.001	7	.006	1	-.004	2	.009	1	-.009	1	-.006	2	-.006	3
739		5	...	0	1	0	1	0	1	.011	1	-.011	1	.008	3	.008	2
740			...	0	1	0	1	0	1	.011	1	-.011	1	-.008	2	-.008	3
741	M89	1	...	0	1	0	1	0	1	.022	1	-.022	1	.015	3	.015	2
742			...	0	1	0	1	0	1	.022	1	-.022	1	-.015	2	-.015	3
743		2	...	0	7	-.002	1	.001	2	.021	1	-.021	1	.014	3	.014	2
744			...	0	6	-.002	1	-.001	3	.021	1	-.021	1	-.014	2	-.014	3
745		3	...	0	7	-.004	1	.002	2	.02	1	-.02	1	.014	3	.014	2
746			...	0	6	-.004	1	-.002	3	.02	1	-.02	1	-.014	2	-.014	3
747		4	...	.001	7	-.005	1	.004	2	.019	1	-.019	1	.013	3	.013	2
748			...	-.001	6	-.005	1	-.004	3	.019	1	-.019	1	-.013	2	-.013	3
749		5	...	.001	7	-.007	1	.005	2	.017	1	-.017	1	.012	3	.012	2
750			...	-.001	6	-.007	1	-.005	3	.017	1	-.017	1	-.012	2	-.012	3

Company : **DMJM H&N**
Designer : **Kevin M. Jones**
Job Number : **145579-V-CA-005 DBVS Off-Gas Treatment Duct Analysis**

Mar 26, 2006
12:41 PM
Checked By:_____

Envelope Member Section Stresses (Continued)

	Member	Sec		Axial[...	Ic	y Shear[...	Ic	z Shear[k...	Ic	y-T...	Ic	y-Bot[ksi]	Ic	z-Top[ksi]	Ic	z-Bot[ksi]	Ic
751	M90	1	...	.001	7	-.007	1	.005	2	.017	1	-.017	1	.012	3	.012	2
752			...	-.001	6	-.007	1	-.005	3	.017	1	-.017	1	-.012	2	-.012	3
753		2	...	.002	7	-.012	1	.008	2	.009	1	-.009	1	.006	3	.006	2
754			...	-.002	6	-.012	1	-.008	3	.009	1	-.009	1	-.006	2	-.006	3
755		3	...	.003	7	-.017	1	.011	2	-.004	1	.004	1	.003	2	.003	3
756			...	-.003	6	-.017	1	-.011	3	-.004	1	.004	1	-.003	3	-.003	2
757		4	...	.004	7	-.022	1	.015	2	-.021	1	.021	1	.015	2	.015	3
758			...	-.004	6	-.022	1	-.015	3	-.021	1	.021	1	-.015	3	-.015	2
759		5	...	.005	7	-.027	1	.018	2	-.043	1	.043	1	.029	2	.029	3
760			...	-.005	6	-.027	1	-.018	3	-.043	1	.043	1	-.029	3	-.029	2

Envelope Member Section Torsion

	Member	Sec		Torque[l...	Ic	Torsion Shear[ksi]	Ic	y-y Warp...	Ic	z-z Warp Shear[ksi]	Ic	z-Top W...	Ic	z-Bot Wa...	Ic
1	M1	1	max	833.704	5	.057	5	NC		NC		NC		NC	
2			min	-833.704	4	-.057	4	NC		NC		NC		NC	
3		2	max	833.704	5	.057	5	NC		NC		NC		NC	
4			min	-833.704	4	-.057	4	NC		NC		NC		NC	
5		3	max	833.704	5	.057	5	NC		NC		NC		NC	
6			min	-833.704	4	-.057	4	NC		NC		NC		NC	
7		4	max	833.704	5	.057	5	NC		NC		NC		NC	
8			min	-833.704	4	-.057	4	NC		NC		NC		NC	
9		5	max	833.704	5	.057	5	NC		NC		NC		NC	
10			min	-833.704	4	-.057	4	NC		NC		NC		NC	
11	M2	1	max	833.704	5	.057	5	NC		NC		NC		NC	
12			min	-833.704	4	-.057	4	NC		NC		NC		NC	
13		2	max	833.704	5	.057	5	NC		NC		NC		NC	
14			min	-833.704	4	-.057	4	NC		NC		NC		NC	
15		3	max	833.704	5	.057	5	NC		NC		NC		NC	
16			min	-833.704	4	-.057	4	NC		NC		NC		NC	
17		4	max	833.704	5	.057	5	NC		NC		NC		NC	
18			min	-833.704	4	-.057	4	NC		NC		NC		NC	
19		5	max	833.704	5	.057	5	NC		NC		NC		NC	
20			min	-833.704	4	-.057	4	NC		NC		NC		NC	
21	M4	1	max	833.704	5	.057	5	NC		NC		NC		NC	
22			min	-833.704	4	-.057	4	NC		NC		NC		NC	
23		2	max	833.704	5	.057	5	NC		NC		NC		NC	
24			min	-833.704	4	-.057	4	NC		NC		NC		NC	
25		3	max	833.704	5	.057	5	NC		NC		NC		NC	
26			min	-833.704	4	-.057	4	NC		NC		NC		NC	
27		4	max	833.704	5	.057	5	NC		NC		NC		NC	
28			min	-833.704	4	-.057	4	NC		NC		NC		NC	
29		5	max	833.704	5	.057	5	NC		NC		NC		NC	
30			min	-833.704	4	-.057	4	NC		NC		NC		NC	
31	M5	1	max	2141.32	5	.146	5	NC		NC		NC		NC	
32			min	-2141.32	4	-.146	4	NC		NC		NC		NC	
33		2	max	2141.32	5	.146	5	NC		NC		NC		NC	
34			min	-2141.32	4	-.146	4	NC		NC		NC		NC	
35		3	max	2141.32	5	.146	5	NC		NC		NC		NC	
36			min	-2141.32	4	-.146	4	NC		NC		NC		NC	
37		4	max	2141.32	5	.146	5	NC		NC		NC		NC	
38			min	-2141.32	4	-.146	4	NC		NC		NC		NC	
39		5	max	2141.32	5	.146	5	NC		NC		NC		NC	
40			min	-2141.32	4	-.146	4	NC		NC		NC		NC	
41	M6	1	max	2652.532	3	.289	3	NC		NC		NC		NC	
42			min	-2939.238	2	-.32	2	NC		NC		NC		NC	
43		2	max	2652.532	3	.289	3	NC		NC		NC		NC	

Company : **DMJM H&N**
Designer : **Kevin M. Jones**
Job Number : **145579-V-CA-005** **DBVS Off-Gas Treatment Duct Analysis**

Mar 26, 2006
12:41 PM
Checked By:_____

Envelope Member Section Torsion (Continued)

	Member	Sec		Torque[l...	lc	Torsion Shear[ksi]	lc	y-y Warp...	lc	z-z Warp Shear[ksi]	lc	z-Top W...	lc	z-Bot Wa...	lc
44			min	-2939.238	2	-.32	2	NC		NC		NC		NC	
45		3	max	2652.532	3	.289	3	NC		NC		NC		NC	
46			min	-2939.238	2	-.32	2	NC		NC		NC		NC	
47		4	max	2652.532	3	.289	3	NC		NC		NC		NC	
48			min	-2939.238	2	-.32	2	NC		NC		NC		NC	
49		5	max	2652.532	3	.289	3	NC		NC		NC		NC	
50			min	-2939.238	2	-.32	2	NC		NC		NC		NC	
51	M7	1	max	2652.532	3	.289	3	NC		NC		NC		NC	
52			min	-2939.238	2	-.32	2	NC		NC		NC		NC	
53		2	max	2652.532	3	.289	3	NC		NC		NC		NC	
54			min	-2939.238	2	-.32	2	NC		NC		NC		NC	
55		3	max	2652.532	3	.289	3	NC		NC		NC		NC	
56			min	-2939.238	2	-.32	2	NC		NC		NC		NC	
57		4	max	2652.532	3	.289	3	NC		NC		NC		NC	
58			min	-2939.238	2	-.32	2	NC		NC		NC		NC	
59		5	max	2652.532	3	.289	3	NC		NC		NC		NC	
60			min	-2939.238	2	-.32	2	NC		NC		NC		NC	
61	M8	1	max	2574.005	3	.281	3	NC		NC		NC		NC	
62			min	-2854.732	2	-.311	2	NC		NC		NC		NC	
63		2	max	2574.005	3	.281	3	NC		NC		NC		NC	
64			min	-2854.732	2	-.311	2	NC		NC		NC		NC	
65		3	max	2574.005	3	.281	3	NC		NC		NC		NC	
66			min	-2854.732	2	-.311	2	NC		NC		NC		NC	
67		4	max	2574.005	3	.281	3	NC		NC		NC		NC	
68			min	-2854.732	2	-.311	2	NC		NC		NC		NC	
69		5	max	2574.005	3	.281	3	NC		NC		NC		NC	
70			min	-2854.732	2	-.311	2	NC		NC		NC		NC	
71	M9	1	max	2189.074	3	.239	3	NC		NC		NC		NC	
72			min	-2426.123	2	-.264	2	NC		NC		NC		NC	
73		2	max	2189.074	3	.239	3	NC		NC		NC		NC	
74			min	-2426.123	2	-.264	2	NC		NC		NC		NC	
75		3	max	2189.074	3	.239	3	NC		NC		NC		NC	
76			min	-2426.123	2	-.264	2	NC		NC		NC		NC	
77		4	max	2189.074	3	.239	3	NC		NC		NC		NC	
78			min	-2426.123	2	-.264	2	NC		NC		NC		NC	
79		5	max	2189.074	3	.239	3	NC		NC		NC		NC	
80			min	-2426.123	2	-.264	2	NC		NC		NC		NC	
81	M10	1	max	1542.956	3	.168	3	NC		NC		NC		NC	
82			min	-1700.239	2	-.185	2	NC		NC		NC		NC	
83		2	max	1542.956	3	.168	3	NC		NC		NC		NC	
84			min	-1700.239	2	-.185	2	NC		NC		NC		NC	
85		3	max	1542.956	3	.168	3	NC		NC		NC		NC	
86			min	-1700.239	2	-.185	2	NC		NC		NC		NC	
87		4	max	1542.956	3	.168	3	NC		NC		NC		NC	
88			min	-1700.239	2	-.185	2	NC		NC		NC		NC	
89		5	max	1542.956	3	.168	3	NC		NC		NC		NC	
90			min	-1700.239	2	-.185	2	NC		NC		NC		NC	
91	M11	1	max	743.957	3	.081	3	NC		NC		NC		NC	
92			min	-797.525	2	-.087	2	NC		NC		NC		NC	
93		2	max	743.957	3	.081	3	NC		NC		NC		NC	
94			min	-797.525	2	-.087	2	NC		NC		NC		NC	
95		3	max	743.957	3	.081	3	NC		NC		NC		NC	
96			min	-797.525	2	-.087	2	NC		NC		NC		NC	
97		4	max	743.957	3	.081	3	NC		NC		NC		NC	
98			min	-797.525	2	-.087	2	NC		NC		NC		NC	
99		5	max	743.957	3	.081	3	NC		NC		NC		NC	
100			min	-797.525	2	-.087	2	NC		NC		NC		NC	

Company : **DMJM H&N**
Designer : **Kevin M. Jones**
Job Number : **145579-V-CA-005** **DBVS Off-Gas Treatment Duct Analysis**

Mar 26, 2006
12:41 PM
Checked By:_____

Envelope Member Section Torsion (Continued)

	Member	Sec		Torque[l...	lc	Torsion Shear[ksi]	lc	y-y Warp...	lc	z-z Warp Shear[ksi]	lc	z-Top W...	lc	z-Bot Wa...	lc
101	M12	1	max	340.435	3	.037	3	NC		NC		NC		NC	
102			min	-338.027	2	-.037	2	NC		NC		NC		NC	
103		2	max	340.435	3	.037	3	NC		NC		NC		NC	
104			min	-338.027	2	-.037	2	NC		NC		NC		NC	
105		3	max	340.435	3	.037	3	NC		NC		NC		NC	
106			min	-338.027	2	-.037	2	NC		NC		NC		NC	
107		4	max	340.435	3	.037	3	NC		NC		NC		NC	
108			min	-338.027	2	-.037	2	NC		NC		NC		NC	
109		5	max	340.435	3	.037	3	NC		NC		NC		NC	
110			min	-338.027	2	-.037	2	NC		NC		NC		NC	
111	M13	1	max	340.435	3	.067	3	NC		NC		NC		NC	
112			min	-338.027	2	-.067	2	NC		NC		NC		NC	
113		2	max	340.435	3	.067	3	NC		NC		NC		NC	
114			min	-338.027	2	-.067	2	NC		NC		NC		NC	
115		3	max	340.435	3	.067	3	NC		NC		NC		NC	
116			min	-338.027	2	-.067	2	NC		NC		NC		NC	
117		4	max	340.435	3	.067	3	NC		NC		NC		NC	
118			min	-338.027	2	-.067	2	NC		NC		NC		NC	
119		5	max	340.435	3	.067	3	NC		NC		NC		NC	
120			min	-338.027	2	-.067	2	NC		NC		NC		NC	
121	M14	1	max	162.198	2	.032	2	NC		NC		NC		NC	
122			min	-134.756	3	-.027	3	NC		NC		NC		NC	
123		2	max	162.198	2	.032	2	NC		NC		NC		NC	
124			min	-134.756	3	-.027	3	NC		NC		NC		NC	
125		3	max	162.198	2	.032	2	NC		NC		NC		NC	
126			min	-134.756	3	-.027	3	NC		NC		NC		NC	
127		4	max	162.198	2	.032	2	NC		NC		NC		NC	
128			min	-134.756	3	-.027	3	NC		NC		NC		NC	
129		5	max	162.198	2	.032	2	NC		NC		NC		NC	
130			min	-134.756	3	-.027	3	NC		NC		NC		NC	
131	M15	1	max	506.361	2	.1	2	NC		NC		NC		NC	
132			min	-453.283	3	-.09	3	NC		NC		NC		NC	
133		2	max	506.361	2	.1	2	NC		NC		NC		NC	
134			min	-453.283	3	-.09	3	NC		NC		NC		NC	
135		3	max	506.361	2	.1	2	NC		NC		NC		NC	
136			min	-453.283	3	-.09	3	NC		NC		NC		NC	
137		4	max	506.361	2	.1	2	NC		NC		NC		NC	
138			min	-453.283	3	-.09	3	NC		NC		NC		NC	
139		5	max	506.361	2	.1	2	NC		NC		NC		NC	
140			min	-453.283	3	-.09	3	NC		NC		NC		NC	
141	M16	1	max	708.83	2	.14	2	NC		NC		NC		NC	
142			min	-639.14	3	-.127	3	NC		NC		NC		NC	
143		2	max	708.83	2	.14	2	NC		NC		NC		NC	
144			min	-639.14	3	-.127	3	NC		NC		NC		NC	
145		3	max	708.83	2	.14	2	NC		NC		NC		NC	
146			min	-639.14	3	-.127	3	NC		NC		NC		NC	
147		4	max	708.83	2	.14	2	NC		NC		NC		NC	
148			min	-639.14	3	-.127	3	NC		NC		NC		NC	
149		5	max	708.83	2	.14	2	NC		NC		NC		NC	
150			min	-639.14	3	-.127	3	NC		NC		NC		NC	
151	,M17	1	max	741.516	2	.147	2	NC		NC		NC		NC	
152			min	-667.887	3	-.132	3	NC		NC		NC		NC	
153		2	max	741.516	2	.147	2	NC		NC		NC		NC	
154			min	-667.887	3	-.132	3	NC		NC		NC		NC	
155		3	max	741.516	2	.147	2	NC		NC		NC		NC	
156			min	-667.887	3	-.132	3	NC		NC		NC		NC	
157		4	max	741.516	2	.147	2	NC		NC		NC		NC	

Company : **DMJM H&N**
Designer : **Kevin M. Jones**
Job Number : **145579-V-CA-005** **DBVS Off-Gas Treatment Duct Analysis**

Mar 26, 2006
12:41 PM
Checked By:_____

Envelope Member Section Torsion (Continued)

	Member	Sec		Torque[l...	lc	Torsion Shear[ksi]	lc	y-y Warp...	lc	z-z Warp Shear[ksi]	lc	z-Top W...	lc	z-Bot Wa...	lc
158			min	-667.887	3	-.132	3	NC		NC		NC		NC	
159		5	max	741.516	2	.147	2	NC		NC		NC		NC	
160			min	-667.887	3	-.132	3	NC		NC		NC		NC	
161	M18	1	max	741.516	2	.147	2	NC		NC		NC		NC	
162			min	-667.887	3	-.132	3	NC		NC		NC		NC	
163		2	max	741.516	2	.147	2	NC		NC		NC		NC	
164			min	-667.887	3	-.132	3	NC		NC		NC		NC	
165		3	max	741.516	2	.147	2	NC		NC		NC		NC	
166			min	-667.887	3	-.132	3	NC		NC		NC		NC	
167		4	max	741.516	2	.147	2	NC		NC		NC		NC	
168			min	-667.887	3	-.132	3	NC		NC		NC		NC	
169		5	max	741.516	2	.147	2	NC		NC		NC		NC	
170			min	-667.887	3	-.132	3	NC		NC		NC		NC	
171	M31	1	max	376.38	3	.075	3	NC		NC		NC		NC	
172			min	-395.194	2	-.078	2	NC		NC		NC		NC	
173		2	max	376.38	3	.075	3	NC		NC		NC		NC	
174			min	-395.194	2	-.078	2	NC		NC		NC		NC	
175		3	max	376.38	3	.075	3	NC		NC		NC		NC	
176			min	-395.194	2	-.078	2	NC		NC		NC		NC	
177		4	max	376.38	3	.075	3	NC		NC		NC		NC	
178			min	-395.194	2	-.078	2	NC		NC		NC		NC	
179		5	max	376.38	3	.075	3	NC		NC		NC		NC	
180			min	-395.194	2	-.078	2	NC		NC		NC		NC	
181	M32	1	max	275.104	3	.055	3	NC		NC		NC		NC	
182			min	-278.429	2	-.055	2	NC		NC		NC		NC	
183		2	max	275.104	3	.055	3	NC		NC		NC		NC	
184			min	-278.429	2	-.055	2	NC		NC		NC		NC	
185		3	max	275.104	3	.055	3	NC		NC		NC		NC	
186			min	-278.429	2	-.055	2	NC		NC		NC		NC	
187		4	max	275.104	3	.055	3	NC		NC		NC		NC	
188			min	-278.429	2	-.055	2	NC		NC		NC		NC	
189		5	max	275.104	3	.055	3	NC		NC		NC		NC	
190			min	-278.429	2	-.055	2	NC		NC		NC		NC	
191	M33	1	max	369.464	6	.096	6	NC		NC		NC		NC	
192			min	-56.085	9	-.015	9	NC		NC		NC		NC	
193		2	max	369.464	6	.096	6	NC		NC		NC		NC	
194			min	-56.085	9	-.015	9	NC		NC		NC		NC	
195		3	max	369.464	6	.096	6	NC		NC		NC		NC	
196			min	-56.085	9	-.015	9	NC		NC		NC		NC	
197		4	max	369.464	6	.096	6	NC		NC		NC		NC	
198			min	-56.085	9	-.015	9	NC		NC		NC		NC	
199		5	max	369.464	6	.096	6	NC		NC		NC		NC	
200			min	-56.085	9	-.015	9	NC		NC		NC		NC	
201	M34	1	max	420.267	8	.109	8	NC		NC		NC		NC	
202			min	-113.722	7	-.03	7	NC		NC		NC		NC	
203		2	max	420.267	8	.109	8	NC		NC		NC		NC	
204			min	-113.722	7	-.03	7	NC		NC		NC		NC	
205		3	max	420.267	8	.109	8	NC		NC		NC		NC	
206			min	-113.722	7	-.03	7	NC		NC		NC		NC	
207		4	max	420.267	8	.109	8	NC		NC		NC		NC	
208			min	-113.722	7	-.03	7	NC		NC		NC		NC	
209		5	max	420.267	8	.109	8	NC		NC		NC		NC	
210			min	-113.722	7	-.03	7	NC		NC		NC		NC	
211	M35	1	max	470.213	8	.122	8	NC		NC		NC		NC	
212			min	-215.224	7	-.056	7	NC		NC		NC		NC	
213		2	max	470.213	8	.122	8	NC		NC		NC		NC	
214			min	-215.224	7	-.056	7	NC		NC		NC		NC	

Company : **DMJM H&N**
Designer : **Kevin M. Jones**
Job Number : **145579-V-CA-005** **DBVS Off-Gas Treatment Duct Analysis**

Mar 26, 2006
12:41 PM
Checked By:_____

Envelope Member Section Torsion (Continued)

	Member	Sec		Torque[l...	lc	Torsion Shear[ksi]	lc	y-y Warp...	lc	z-z Warp Shear[ksi]	lc	z-Top W...	lc	z-Bot Wa...	lc
215		3	max	470.213	8	.122	8	NC		NC		NC		NC	
216			min	-215.224	7	-.056	7	NC		NC		NC		NC	
217		4	max	470.213	8	.122	8	NC		NC		NC		NC	
218			min	-215.224	7	-.056	7	NC		NC		NC		NC	
219		5	max	470.213	8	.122	8	NC		NC		NC		NC	
220			min	-215.224	7	-.056	7	NC		NC		NC		NC	
221	M36	1	max	510.983	3	.133	3	NC		NC		NC		NC	
222			min	-359.432	2	-.093	2	NC		NC		NC		NC	
223		2	max	510.983	3	.133	3	NC		NC		NC		NC	
224			min	-359.432	2	-.093	2	NC		NC		NC		NC	
225		3	max	510.983	3	.133	3	NC		NC		NC		NC	
226			min	-359.432	2	-.093	2	NC		NC		NC		NC	
227		4	max	510.983	3	.133	3	NC		NC		NC		NC	
228			min	-359.432	2	-.093	2	NC		NC		NC		NC	
229		5	max	510.983	3	.133	3	NC		NC		NC		NC	
230			min	-359.432	2	-.093	2	NC		NC		NC		NC	
231	M37	1	max	514.798	3	.134	3	NC		NC		NC		NC	
232			min	-511.23	2	-.133	2	NC		NC		NC		NC	
233		2	max	514.798	3	.134	3	NC		NC		NC		NC	
234			min	-511.23	2	-.133	2	NC		NC		NC		NC	
235		3	max	514.798	3	.134	3	NC		NC		NC		NC	
236			min	-511.23	2	-.133	2	NC		NC		NC		NC	
237		4	max	514.798	3	.134	3	NC		NC		NC		NC	
238			min	-511.23	2	-.133	2	NC		NC		NC		NC	
239		5	max	514.798	3	.134	3	NC		NC		NC		NC	
240			min	-511.23	2	-.133	2	NC		NC		NC		NC	
241	M38	1	max	530.767	3	.138	3	NC		NC		NC		NC	
242			min	-530.444	2	-.138	2	NC		NC		NC		NC	
243		2	max	530.767	3	.138	3	NC		NC		NC		NC	
244			min	-530.444	2	-.138	2	NC		NC		NC		NC	
245		3	max	530.767	3	.138	3	NC		NC		NC		NC	
246			min	-530.444	2	-.138	2	NC		NC		NC		NC	
247		4	max	530.767	3	.138	3	NC		NC		NC		NC	
248			min	-530.444	2	-.138	2	NC		NC		NC		NC	
249		5	max	530.767	3	.138	3	NC		NC		NC		NC	
250			min	-530.444	2	-.138	2	NC		NC		NC		NC	
251	M39	1	max	530.767	3	.138	3	NC		NC		NC		NC	
252			min	-530.444	2	-.138	2	NC		NC		NC		NC	
253		2	max	530.767	3	.138	3	NC		NC		NC		NC	
254			min	-530.444	2	-.138	2	NC		NC		NC		NC	
255		3	max	530.767	3	.138	3	NC		NC		NC		NC	
256			min	-530.444	2	-.138	2	NC		NC		NC		NC	
257		4	max	530.767	3	.138	3	NC		NC		NC		NC	
258			min	-530.444	2	-.138	2	NC		NC		NC		NC	
259		5	max	530.767	3	.138	3	NC		NC		NC		NC	
260			min	-530.444	2	-.138	2	NC		NC		NC		NC	
261	M40	1	max	530.767	3	.138	3	NC		NC		NC		NC	
262			min	-530.444	2	-.138	2	NC		NC		NC		NC	
263		2	max	530.767	3	.138	3	NC		NC		NC		NC	
264			min	-530.444	2	-.138	2	NC		NC		NC		NC	
265		3	max	530.767	3	.138	3	NC		NC		NC		NC	
266			min	-530.444	2	-.138	2	NC		NC		NC		NC	
267		4	max	530.767	3	.138	3	NC		NC		NC		NC	
268			min	-530.444	2	-.138	2	NC		NC		NC		NC	
269		5	max	530.767	3	.138	3	NC		NC		NC		NC	
270			min	-530.444	2	-.138	2	NC		NC		NC		NC	
271	M41	1	max	530.767	3	0	1	NC		NC		NC		NC	

Company : DMJM H&N
Designer : Kevin M. Jones
Job Number : 145579-V-CA-005 DBVS Off-Gas Treatment Duct Analysis

Mar 26, 2006
12:41 PM
Checked By:_____

Envelope Member Section Torsion (Continued)

	Member	Sec		Torque[l...	lc	Torsion Shear[ksi]	lc	y-y Warp...	lc	z-z Warp Shear[ksi]	lc	z-Top W...	lc	z-Bot Wa...	lc
272			min	-530.444	2	0	1	NC		NC		NC		NC	
273		2	max	530.767	3	0	1	NC		NC		NC		NC	
274			min	-530.444	2	0	1	NC		NC		NC		NC	
275		3	max	530.767	3	0	1	NC		NC		NC		NC	
276			min	-530.444	2	0	1	NC		NC		NC		NC	
277		4	max	530.767	3	0	1	NC		NC		NC		NC	
278			min	-530.444	2	0	1	NC		NC		NC		NC	
279		5	max	530.767	3	0	1	NC		NC		NC		NC	
280			min	-530.444	2	0	1	NC		NC		NC		NC	
281	M42	1	max	530.767	3	.138	3	NC		NC		NC		NC	
282			min	-530.444	2	-.138	2	NC		NC		NC		NC	
283		2	max	530.767	3	.138	3	NC		NC		NC		NC	
284			min	-530.444	2	-.138	2	NC		NC		NC		NC	
285		3	max	530.767	3	.138	3	NC		NC		NC		NC	
286			min	-530.444	2	-.138	2	NC		NC		NC		NC	
287		4	max	530.767	3	.138	3	NC		NC		NC		NC	
288			min	-530.444	2	-.138	2	NC		NC		NC		NC	
289		5	max	530.767	3	.138	3	NC		NC		NC		NC	
290			min	-530.444	2	-.138	2	NC		NC		NC		NC	
291	M43	1	max	495.111	3	.129	3	NC		NC		NC		NC	
292			min	-495.111	2	-.129	2	NC		NC		NC		NC	
293		2	max	495.111	3	.129	3	NC		NC		NC		NC	
294			min	-495.111	2	-.129	2	NC		NC		NC		NC	
295		3	max	495.111	3	.129	3	NC		NC		NC		NC	
296			min	-495.111	2	-.129	2	NC		NC		NC		NC	
297		4	max	495.111	3	.129	3	NC		NC		NC		NC	
298			min	-495.111	2	-.129	2	NC		NC		NC		NC	
299		5	max	495.111	3	.129	3	NC		NC		NC		NC	
300			min	-495.111	2	-.129	2	NC		NC		NC		NC	
301	M44	1	max	342.156	3	.089	3	NC		NC		NC		NC	
302			min	-342.156	2	-.089	2	NC		NC		NC		NC	
303		2	max	342.156	3	.089	3	NC		NC		NC		NC	
304			min	-342.156	2	-.089	2	NC		NC		NC		NC	
305		3	max	342.156	3	.089	3	NC		NC		NC		NC	
306			min	-342.156	2	-.089	2	NC		NC		NC		NC	
307		4	max	342.156	3	.089	3	NC		NC		NC		NC	
308			min	-342.156	2	-.089	2	NC		NC		NC		NC	
309		5	max	342.156	3	.089	3	NC		NC		NC		NC	
310			min	-342.156	2	-.089	2	NC		NC		NC		NC	
311	M45	1	max	176.771	3	.046	3	NC		NC		NC		NC	
312			min	-176.771	2	-.046	2	NC		NC		NC		NC	
313		2	max	176.771	3	.046	3	NC		NC		NC		NC	
314			min	-176.771	2	-.046	2	NC		NC		NC		NC	
315		3	max	176.771	3	.046	3	NC		NC		NC		NC	
316			min	-176.771	2	-.046	2	NC		NC		NC		NC	
317		4	max	176.771	3	.046	3	NC		NC		NC		NC	
318			min	-176.771	2	-.046	2	NC		NC		NC		NC	
319		5	max	176.771	3	.046	3	NC		NC		NC		NC	
320			min	-176.771	2	-.046	2	NC		NC		NC		NC	
321	M46	1	max	20.738	3	.005	3	NC		NC		NC		NC	
322			min	-20.738	2	-.005	2	NC		NC		NC		NC	
323		2	max	20.738	3	.005	3	NC		NC		NC		NC	
324			min	-20.738	2	-.005	2	NC		NC		NC		NC	
325		3	max	20.738	3	.005	3	NC		NC		NC		NC	
326			min	-20.738	2	-.005	2	NC		NC		NC		NC	
327		4	max	20.738	3	.005	3	NC		NC		NC		NC	
328			min	-20.738	2	-.005	2	NC		NC		NC		NC	

Company : DMJM H&N
Designer : Kevin M. Jones
Job Number : 145579-V-CA-005 DBVS Off-Gas Treatment Duct Analysis

Mar 26, 2006
12:41 PM
Checked By:_____

Envelope Member Section Torsion (Continued)

	Member	Sec		Torque[l...	lc	Torsion Shear[ksi]	lc	y-y Warp...	lc	z-z Warp Shear[ksi]	lc	z-Top W...	lc	z-Bot Wa...	lc
329		5	max	20.738	3	.005	3	NC		NC		NC		NC	
330			min	-20.738	2	-.005	2	NC		NC		NC		NC	
331	M47	1	max	43.397	2	.011	2	NC		NC		NC		NC	
332			min	-43.397	3	-.011	3	NC		NC		NC		NC	
333		2	max	43.397	2	.011	2	NC		NC		NC		NC	
334			min	-43.397	3	-.011	3	NC		NC		NC		NC	
335		3	max	43.397	2	.011	2	NC		NC		NC		NC	
336			min	-43.397	3	-.011	3	NC		NC		NC		NC	
337		4	max	43.397	2	.011	2	NC		NC		NC		NC	
338			min	-43.397	3	-.011	3	NC		NC		NC		NC	
339		5	max	43.397	2	.011	2	NC		NC		NC		NC	
340			min	-43.397	3	-.011	3	NC		NC		NC		NC	
341	M48	1	max	31.986	2	.008	2	NC		NC		NC		NC	
342			min	-31.986	3	-.008	3	NC		NC		NC		NC	
343		2	max	31.986	2	.008	2	NC		NC		NC		NC	
344			min	-31.986	3	-.008	3	NC		NC		NC		NC	
345		3	max	31.986	2	.008	2	NC		NC		NC		NC	
346			min	-31.986	3	-.008	3	NC		NC		NC		NC	
347		4	max	31.986	2	.008	2	NC		NC		NC		NC	
348			min	-31.986	3	-.008	3	NC		NC		NC		NC	
349		5	max	31.986	2	.008	2	NC		NC		NC		NC	
350			min	-31.986	3	-.008	3	NC		NC		NC		NC	
351	M49	1	max	16.326	2	.004	2	NC		NC		NC		NC	
352			min	-16.326	3	-.004	3	NC		NC		NC		NC	
353		2	max	16.326	2	.004	2	NC		NC		NC		NC	
354			min	-16.326	3	-.004	3	NC		NC		NC		NC	
355		3	max	16.326	2	.004	2	NC		NC		NC		NC	
356			min	-16.326	3	-.004	3	NC		NC		NC		NC	
357		4	max	16.326	2	.004	2	NC		NC		NC		NC	
358			min	-16.326	3	-.004	3	NC		NC		NC		NC	
359		5	max	16.326	2	.004	2	NC		NC		NC		NC	
360			min	-16.326	3	-.004	3	NC		NC		NC		NC	
361	M50	1	max	6.236	2	.002	2	NC		NC		NC		NC	
362			min	-6.236	3	-.002	3	NC		NC		NC		NC	
363		2	max	6.236	2	.002	2	NC		NC		NC		NC	
364			min	-6.236	3	-.002	3	NC		NC		NC		NC	
365		3	max	6.236	2	.002	2	NC		NC		NC		NC	
366			min	-6.236	3	-.002	3	NC		NC		NC		NC	
367		4	max	6.236	2	.002	2	NC		NC		NC		NC	
368			min	-6.236	3	-.002	3	NC		NC		NC		NC	
369		5	max	6.236	2	.002	2	NC		NC		NC		NC	
370			min	-6.236	3	-.002	3	NC		NC		NC		NC	
371	M51	1	max	1.304	2	0	2	NC		NC		NC		NC	
372			min	-1.304	3	0	3	NC		NC		NC		NC	
373		2	max	1.304	2	0	2	NC		NC		NC		NC	
374			min	-1.304	3	0	3	NC		NC		NC		NC	
375		3	max	1.304	2	0	2	NC		NC		NC		NC	
376			min	-1.304	3	0	3	NC		NC		NC		NC	
377		4	max	1.304	2	0	2	NC		NC		NC		NC	
378			min	-1.304	3	0	3	NC		NC		NC		NC	
379		5	max	1.304	2	0	2	NC		NC		NC		NC	
380			min	-1.304	3	0	3	NC		NC		NC		NC	
381	M52	1	max	0	1	0	1	NC		NC		NC		NC	
382			min	0	1	0	1	NC		NC		NC		NC	
383		2	max	0	1	0	1	NC		NC		NC		NC	
384			min	0	1	0	1	NC		NC		NC		NC	
385		3	max	0	1	0	1	NC		NC		NC		NC	

Envelope Member Section Torsion (Continued)

	Member	Sec		Torque[l...	lc	Torsion Shear[ksi]	lc	y-y Warp...	lc	z-z Warp Shear[ksi]	lc	z-Top W...	lc	z-Bot Wa...	lc
386			min	0	1	0	1	NC		NC		NC		NC	
387		4	max	0	1	0	1	NC		NC		NC		NC	
388			min	0	1	0	1	NC		NC		NC		NC	
389		5	max	0	1	0	1	NC		NC		NC		NC	
390			min	0	1	0	1	NC		NC		NC		NC	
391	M53	1	max	833.704	5	.057	5	NC		NC		NC		NC	
392			min	-833.704	4	-.057	4	NC		NC		NC		NC	
393		2	max	833.704	5	.057	5	NC		NC		NC		NC	
394			min	-833.704	4	-.057	4	NC		NC		NC		NC	
395		3	max	833.704	5	.057	5	NC		NC		NC		NC	
396			min	-833.704	4	-.057	4	NC		NC		NC		NC	
397		4	max	833.704	5	.057	5	NC		NC		NC		NC	
398			min	-833.704	4	-.057	4	NC		NC		NC		NC	
399		5	max	833.704	5	.057	5	NC		NC		NC		NC	
400			min	-833.704	4	-.057	4	NC		NC		NC		NC	
401	M54	1	max	.003	8	0	8	NC		NC		NC		NC	
402			min	-.003	7	0	7	NC		NC		NC		NC	
403		2	max	.003	8	0	8	NC		NC		NC		NC	
404			min	-.003	7	0	7	NC		NC		NC		NC	
405		3	max	.003	8	0	8	NC		NC		NC		NC	
406			min	-.003	7	0	7	NC		NC		NC		NC	
407		4	max	.003	8	0	8	NC		NC		NC		NC	
408			min	-.003	7	0	7	NC		NC		NC		NC	
409		5	max	.003	8	0	8	NC		NC		NC		NC	
410			min	-.003	7	0	7	NC		NC		NC		NC	
411	M55	1	max	.035	7	0	7	NC		NC		NC		NC	
412			min	-.035	8	0	8	NC		NC		NC		NC	
413		2	max	.035	7	0	7	NC		NC		NC		NC	
414			min	-.035	8	0	8	NC		NC		NC		NC	
415		3	max	.035	7	0	7	NC		NC		NC		NC	
416			min	-.035	8	0	8	NC		NC		NC		NC	
417		4	max	.035	7	0	7	NC		NC		NC		NC	
418			min	-.035	8	0	8	NC		NC		NC		NC	
419		5	max	.035	7	0	7	NC		NC		NC		NC	
420			min	-.035	8	0	8	NC		NC		NC		NC	
421	M56	1	max	.001	7	0	7	NC		NC		NC		NC	
422			min	-.001	8	0	8	NC		NC		NC		NC	
423		2	max	.001	7	0	7	NC		NC		NC		NC	
424			min	-.001	8	0	8	NC		NC		NC		NC	
425		3	max	.001	7	0	7	NC		NC		NC		NC	
426			min	-.001	8	0	8	NC		NC		NC		NC	
427		4	max	.001	7	0	7	NC		NC		NC		NC	
428			min	-.001	8	0	8	NC		NC		NC		NC	
429		5	max	.001	7	0	7	NC		NC		NC		NC	
430			min	-.001	8	0	8	NC		NC		NC		NC	
431	M57	1	max	.002	7	0	7	NC		NC		NC		NC	
432			min	-.002	8	0	8	NC		NC		NC		NC	
433		2	max	.002	7	0	7	NC		NC		NC		NC	
434			min	-.002	8	0	8	NC		NC		NC		NC	
435		3	max	.002	7	0	7	NC		NC		NC		NC	
436			min	-.002	8	0	8	NC		NC		NC		NC	
437		4	max	.002	7	0	7	NC		NC		NC		NC	
438			min	-.002	8	0	8	NC		NC		NC		NC	
439		5	max	.002	7	0	7	NC		NC		NC		NC	
440			min	-.002	8	0	8	NC		NC		NC		NC	
441	M58	1	max	.004	8	0	8	NC		NC		NC		NC	
442			min	.001	7	0	7	NC		NC		NC		NC	

Envelope Member Section Torsion (Continued)

	Member	Sec		Torque[l...	lc	Torsion Shear[ksi]	lc	y-y Warp...	lc	z-z Warp Shear[ksi]	lc	z-Top W...	lc	z-Bot Wa...	lc
443		2	max	.004	8	0	8	NC		NC		NC		NC	
444			min	.001	7	0	7	NC		NC		NC		NC	
445		3	max	.004	8	0	8	NC		NC		NC		NC	
446			min	.001	7	0	7	NC		NC		NC		NC	
447		4	max	.004	8	0	8	NC		NC		NC		NC	
448			min	.001	7	0	7	NC		NC		NC		NC	
449		5	max	.004	8	0	8	NC		NC		NC		NC	
450			min	.001	7	0	7	NC		NC		NC		NC	
451	M59	1	max	-.017	7	0	7	NC		NC		NC		NC	
452			min	-.061	8	0	8	NC		NC		NC		NC	
453		2	max	-.017	7	0	7	NC		NC		NC		NC	
454			min	-.061	8	0	8	NC		NC		NC		NC	
455		3	max	-.017	7	0	7	NC		NC		NC		NC	
456			min	-.061	8	0	8	NC		NC		NC		NC	
457		4	max	-.017	7	0	7	NC		NC		NC		NC	
458			min	-.061	8	0	8	NC		NC		NC		NC	
459		5	max	-.017	7	0	7	NC		NC		NC		NC	
460			min	-.061	8	0	8	NC		NC		NC		NC	
461	M60	1	max	-.002	7	0	7	NC		NC		NC		NC	
462			min	-.007	8	0	8	NC		NC		NC		NC	
463		2	max	-.002	7	0	7	NC		NC		NC		NC	
464			min	-.007	8	0	8	NC		NC		NC		NC	
465		3	max	-.002	7	0	7	NC		NC		NC		NC	
466			min	-.007	8	0	8	NC		NC		NC		NC	
467		4	max	-.002	7	0	7	NC		NC		NC		NC	
468			min	-.007	8	0	8	NC		NC		NC		NC	
469		5	max	-.002	7	0	7	NC		NC		NC		NC	
470			min	-.007	8	0	8	NC		NC		NC		NC	
471	M61	1	max	-.001	7	0	7	NC		NC		NC		NC	
472			min	-.004	8	0	8	NC		NC		NC		NC	
473		2	max	-.001	7	0	7	NC		NC		NC		NC	
474			min	-.004	8	0	8	NC		NC		NC		NC	
475		3	max	-.001	7	0	7	NC		NC		NC		NC	
476			min	-.004	8	0	8	NC		NC		NC		NC	
477		4	max	-.001	7	0	7	NC		NC		NC		NC	
478			min	-.004	8	0	8	NC		NC		NC		NC	
479		5	max	-.001	7	0	7	NC		NC		NC		NC	
480			min	-.004	8	0	8	NC		NC		NC		NC	
481	M62	1	max	3060.703	7	.209	7	NC		NC		NC		NC	
482			min	1769.815	1	.121	1	NC		NC		NC		NC	
483		2	max	3060.703	7	.209	7	NC		NC		NC		NC	
484			min	1769.815	1	.121	1	NC		NC		NC		NC	
485		3	max	3060.703	7	.209	7	NC		NC		NC		NC	
486			min	1769.815	1	.121	1	NC		NC		NC		NC	
487		4	max	3060.703	7	.209	7	NC		NC		NC		NC	
488			min	1769.815	1	.121	1	NC		NC		NC		NC	
489		5	max	3060.703	7	.209	7	NC		NC		NC		NC	
490			min	1769.815	1	.121	1	NC		NC		NC		NC	
491	M63	1	max	3060.703	7	.209	7	NC		NC		NC		NC	
492			min	1769.815	1	.121	1	NC		NC		NC		NC	
493		2	max	3060.703	7	.209	7	NC		NC		NC		NC	
494			min	1769.815	1	.121	1	NC		NC		NC		NC	
495		3	max	3060.703	7	.209	7	NC		NC		NC		NC	
496			min	1769.815	1	.121	1	NC		NC		NC		NC	
497		4	max	3060.703	7	.209	7	NC		NC		NC		NC	
498			min	1769.815	1	.121	1	NC		NC		NC		NC	
499		5	max	3060.703	7	.209	7	NC		NC		NC		NC	

Company : **DMJM H&N**
Designer : **Kevin M. Jones**
Job Number : **145579-V-CA-005** **DBVS Off-Gas Treatment Duct Analysis**

Mar 26, 2006
12:41 PM
Checked By:_____

Envelope Member Section Torsion (Continued)

	Member	Sec		Torque[l...	lc	Torsion Shear[ksi]	lc	y-y Warp...	lc	z-z Warp Shear[ksi]	lc	z-Top W...	lc	z-Bot Wa...	lc
500			min	1769.815	1	.121	1	NC		NC		NC		NC	
501	M64	1	max	3060.703	7	.209	7	NC		NC		NC		NC	
502			min	1769.815	1	.121	1	NC		NC		NC		NC	
503		2	max	3060.703	7	.209	7	NC		NC		NC		NC	
504			min	1769.815	1	.121	1	NC		NC		NC		NC	
505		3	max	3060.703	7	.209	7	NC		NC		NC		NC	
506			min	1769.815	1	.121	1	NC		NC		NC		NC	
507		4	max	3060.703	7	.209	7	NC		NC		NC		NC	
508			min	1769.815	1	.121	1	NC		NC		NC		NC	
509		5	max	3060.703	7	.209	7	NC		NC		NC		NC	
510			min	1769.815	1	.121	1	NC		NC		NC		NC	
511	M65	1	max	-1769.815	1	-.121	1	NC		NC		NC		NC	
512			min	-3060.703	6	-.209	6	NC		NC		NC		NC	
513		2	max	-1769.815	1	-.121	1	NC		NC		NC		NC	
514			min	-3060.703	6	-.209	6	NC		NC		NC		NC	
515		3	max	-1769.815	1	-.121	1	NC		NC		NC		NC	
516			min	-3060.703	6	-.209	6	NC		NC		NC		NC	
517		4	max	-1769.815	1	-.121	1	NC		NC		NC		NC	
518			min	-3060.703	6	-.209	6	NC		NC		NC		NC	
519		5	max	-1769.815	1	-.121	1	NC		NC		NC		NC	
520			min	-3060.703	6	-.209	6	NC		NC		NC		NC	
521	M66	1	max	-1769.815	1	-.121	1	NC		NC		NC		NC	
522			min	-3060.703	6	-.209	6	NC		NC		NC		NC	
523		2	max	-1769.815	1	-.121	1	NC		NC		NC		NC	
524			min	-3060.703	6	-.209	6	NC		NC		NC		NC	
525		3	max	-1769.815	1	-.121	1	NC		NC		NC		NC	
526			min	-3060.703	6	-.209	6	NC		NC		NC		NC	
527		4	max	-1769.815	1	-.121	1	NC		NC		NC		NC	
528			min	-3060.703	6	-.209	6	NC		NC		NC		NC	
529		5	max	-1769.815	1	-.121	1	NC		NC		NC		NC	
530			min	-3060.703	6	-.209	6	NC		NC		NC		NC	
531	M67	1	max	-1769.815	1	-.121	1	NC		NC		NC		NC	
532			min	-3060.703	6	-.209	6	NC		NC		NC		NC	
533		2	max	-1769.815	1	-.121	1	NC		NC		NC		NC	
534			min	-3060.703	6	-.209	6	NC		NC		NC		NC	
535		3	max	-1769.815	1	-.121	1	NC		NC		NC		NC	
536			min	-3060.703	6	-.209	6	NC		NC		NC		NC	
537		4	max	-1769.815	1	-.121	1	NC		NC		NC		NC	
538			min	-3060.703	6	-.209	6	NC		NC		NC		NC	
539		5	max	-1769.815	1	-.121	1	NC		NC		NC		NC	
540			min	-3060.703	6	-.209	6	NC		NC		NC		NC	
541	M68	1	max	.004	8	0	8	NC		NC		NC		NC	
542			min	.001	7	0	7	NC		NC		NC		NC	
543		2	max	.004	8	0	8	NC		NC		NC		NC	
544			min	.001	7	0	7	NC		NC		NC		NC	
545		3	max	.004	8	0	8	NC		NC		NC		NC	
546			min	.001	7	0	7	NC		NC		NC		NC	
547		4	max	.004	8	0	8	NC		NC		NC		NC	
548			min	.001	7	0	7	NC		NC		NC		NC	
549		5	max	.004	8	0	8	NC		NC		NC		NC	
550			min	.001	7	0	7	NC		NC		NC		NC	
551	M69	1	max	.003	8	0	8	NC		NC		NC		NC	
552			min	-.003	7	0	7	NC		NC		NC		NC	
553		2	max	.003	8	0	8	NC		NC		NC		NC	
554			min	-.003	7	0	7	NC		NC		NC		NC	
555		3	max	.003	8	0	8	NC		NC		NC		NC	
556			min	-.003	7	0	7	NC		NC		NC		NC	

Envelope Member Section Torsion (Continued)

	Member	Sec		Torque[l...	lc	Torsion Shear[ksi]	lc	y-y Warp...	lc	z-z Warp Shear[ksi]	lc	z-Top W...	lc	z-Bot Wa...	lc
557		4	max	.003	8	0	8	NC		NC		NC		NC	
558			min	-.003	7	0	7	NC		NC		NC		NC	
559		5	max	.003	8	0	8	NC		NC		NC		NC	
560			min	-.003	7	0	7	NC		NC		NC		NC	
561	M70	1	max	628.842	5	.043	5	NC		NC		NC		NC	
562			min	-628.842	4	-.043	4	NC		NC		NC		NC	
563		2	max	628.842	5	.043	5	NC		NC		NC		NC	
564			min	-628.842	4	-.043	4	NC		NC		NC		NC	
565		3	max	628.842	5	.043	5	NC		NC		NC		NC	
566			min	-628.842	4	-.043	4	NC		NC		NC		NC	
567		4	max	628.842	5	.043	5	NC		NC		NC		NC	
568			min	-628.842	4	-.043	4	NC		NC		NC		NC	
569		5	max	628.842	5	.043	5	NC		NC		NC		NC	
570			min	-628.842	4	-.043	4	NC		NC		NC		NC	
571	M71	1	max	636.828	5	.044	5	NC		NC		NC		NC	
572			min	-636.828	4	-.044	4	NC		NC		NC		NC	
573		2	max	636.828	5	.044	5	NC		NC		NC		NC	
574			min	-636.828	4	-.044	4	NC		NC		NC		NC	
575		3	max	636.828	5	.044	5	NC		NC		NC		NC	
576			min	-636.828	4	-.044	4	NC		NC		NC		NC	
577		4	max	636.828	5	.044	5	NC		NC		NC		NC	
578			min	-636.828	4	-.044	4	NC		NC		NC		NC	
579		5	max	636.828	5	.044	5	NC		NC		NC		NC	
580			min	-636.828	4	-.044	4	NC		NC		NC		NC	
581	M72	1	max	1011.873	5	.069	5	NC		NC		NC		NC	
582			min	-1011.873	4	-.069	4	NC		NC		NC		NC	
583		2	max	1011.873	5	.069	5	NC		NC		NC		NC	
584			min	-1011.873	4	-.069	4	NC		NC		NC		NC	
585		3	max	1011.873	5	.069	5	NC		NC		NC		NC	
586			min	-1011.873	4	-.069	4	NC		NC		NC		NC	
587		4	max	1011.873	5	.069	5	NC		NC		NC		NC	
588			min	-1011.873	4	-.069	4	NC		NC		NC		NC	
589		5	max	1011.873	5	.069	5	NC		NC		NC		NC	
590			min	-1011.873	4	-.069	4	NC		NC		NC		NC	
591	M73	1	max	1679.632	5	.115	5	NC		NC		NC		NC	
592			min	-1679.632	4	-.115	4	NC		NC		NC		NC	
593		2	max	1679.632	5	.115	5	NC		NC		NC		NC	
594			min	-1679.632	4	-.115	4	NC		NC		NC		NC	
595		3	max	1679.632	5	.115	5	NC		NC		NC		NC	
596			min	-1679.632	4	-.115	4	NC		NC		NC		NC	
597		4	max	1679.632	5	.115	5	NC		NC		NC		NC	
598			min	-1679.632	4	-.115	4	NC		NC		NC		NC	
599		5	max	1679.632	5	.115	5	NC		NC		NC		NC	
600			min	-1679.632	4	-.115	4	NC		NC		NC		NC	
601	M74	1	max	1976.337	9	.135	9	NC		NC		NC		NC	
602			min	-1976.337	6	-.135	6	NC		NC		NC		NC	
603		2	max	1976.337	9	.135	9	NC		NC		NC		NC	
604			min	-1976.337	6	-.135	6	NC		NC		NC		NC	
605		3	max	1976.337	9	.135	9	NC		NC		NC		NC	
606			min	-1976.337	6	-.135	6	NC		NC		NC		NC	
607		4	max	1976.337	9	.135	9	NC		NC		NC		NC	
608			min	-1976.337	6	-.135	6	NC		NC		NC		NC	
609		5	max	1976.337	9	.135	9	NC		NC		NC		NC	
610			min	-1976.337	6	-.135	6	NC		NC		NC		NC	
611	M75	1	max	1599.134	9	.109	9	NC		NC		NC		NC	
612			min	-1599.134	6	-.109	6	NC		NC		NC		NC	
613		2	max	1599.134	9	.109	9	NC		NC		NC		NC	

Company : DMJM H&N
Designer : Kevin M. Jones
Job Number : 145579-V-CA-005 DBVS Off-Gas Treatment Duct Analysis

Mar 26, 2006
12:41 PM
Checked By:_____

Envelope Member Section Torsion (Continued)

	Member	Sec		Torque[k...	lc	Torsion Shear[ksi]	lc	y-y Warp...	lc	z-z Warp Shear[ksi]	lc	z-Top W...	lc	z-Bot Wa...	lc
614			min	-1599.134	6	-.109	6	NC		NC		NC		NC	
615		3	max	1599.134	9	.109	9	NC		NC		NC		NC	
616			min	-1599.134	6	-.109	6	NC		NC		NC		NC	
617		4	max	1599.134	9	.109	9	NC		NC		NC		NC	
618			min	-1599.134	6	-.109	6	NC		NC		NC		NC	
619		5	max	1599.134	9	.109	9	NC		NC		NC		NC	
620			min	-1599.134	6	-.109	6	NC		NC		NC		NC	
621	M76	1	max	1150.53	9	.079	9	NC		NC		NC		NC	
622			min	-1150.53	6	-.079	6	NC		NC		NC		NC	
623		2	max	1150.53	9	.079	9	NC		NC		NC		NC	
624			min	-1150.53	6	-.079	6	NC		NC		NC		NC	
625		3	max	1150.53	9	.079	9	NC		NC		NC		NC	
626			min	-1150.53	6	-.079	6	NC		NC		NC		NC	
627		4	max	1150.53	9	.079	9	NC		NC		NC		NC	
628			min	-1150.53	6	-.079	6	NC		NC		NC		NC	
629		5	max	1150.53	9	.079	9	NC		NC		NC		NC	
630			min	-1150.53	6	-.079	6	NC		NC		NC		NC	
631	M77	1	max	712.022	9	.049	9	NC		NC		NC		NC	
632			min	-712.022	6	-.049	6	NC		NC		NC		NC	
633		2	max	712.022	9	.049	9	NC		NC		NC		NC	
634			min	-712.022	6	-.049	6	NC		NC		NC		NC	
635		3	max	712.022	9	.049	9	NC		NC		NC		NC	
636			min	-712.022	6	-.049	6	NC		NC		NC		NC	
637		4	max	712.022	9	.049	9	NC		NC		NC		NC	
638			min	-712.022	6	-.049	6	NC		NC		NC		NC	
639		5	max	712.022	9	.049	9	NC		NC		NC		NC	
640			min	-712.022	6	-.049	6	NC		NC		NC		NC	
641	M78	1	max	548.338	9	.038	9	NC		NC		NC		NC	
642			min	-548.338	6	-.038	6	NC		NC		NC		NC	
643		2	max	548.338	9	.038	9	NC		NC		NC		NC	
644			min	-548.338	6	-.038	6	NC		NC		NC		NC	
645		3	max	548.338	9	.038	9	NC		NC		NC		NC	
646			min	-548.338	6	-.038	6	NC		NC		NC		NC	
647		4	max	548.338	9	.038	9	NC		NC		NC		NC	
648			min	-548.338	6	-.038	6	NC		NC		NC		NC	
649		5	max	548.338	9	.038	9	NC		NC		NC		NC	
650			min	-548.338	6	-.038	6	NC		NC		NC		NC	
651	M79	1	max	784.068	5	.054	5	NC		NC		NC		NC	
652			min	-784.068	4	-.054	4	NC		NC		NC		NC	
653		2	max	784.068	5	.054	5	NC		NC		NC		NC	
654			min	-784.068	4	-.054	4	NC		NC		NC		NC	
655		3	max	784.068	5	.054	5	NC		NC		NC		NC	
656			min	-784.068	4	-.054	4	NC		NC		NC		NC	
657		4	max	784.068	5	.054	5	NC		NC		NC		NC	
658			min	-784.068	4	-.054	4	NC		NC		NC		NC	
659		5	max	784.068	5	.054	5	NC		NC		NC		NC	
660			min	-784.068	4	-.054	4	NC		NC		NC		NC	
661	M80	1	max	1574.144	5	.108	5	NC		NC		NC		NC	
662			min	-1574.144	4	-.108	4	NC		NC		NC		NC	
663		2	max	1574.144	5	.108	5	NC		NC		NC		NC	
664			min	-1574.144	4	-.108	4	NC		NC		NC		NC	
665		3	max	1574.144	5	.108	5	NC		NC		NC		NC	
666			min	-1574.144	4	-.108	4	NC		NC		NC		NC	
667		4	max	1574.144	5	.108	5	NC		NC		NC		NC	
668			min	-1574.144	4	-.108	4	NC		NC		NC		NC	
669		5	max	1574.144	5	.108	5	NC		NC		NC		NC	
670			min	-1574.144	4	-.108	4	NC		NC		NC		NC	

Company : **DMJM H&N**
Designer : **Kevin M. Jones**
Job Number : **145579-V-CA-005** **DBVS Off-Gas Treatment Duct Analysis**

Mar 26, 2006
12:41 PM
Checked By:_____

Envelope Member Section Torsion (Continued)

	Member	Sec		Torque[l...	lc	Torsion Shear[ksi]	lc	y-y Warp...	lc	z-z Warp Shear[ksi]	lc	z-Top W...	lc	z-Bot Wa...	lc
671	M81	1	max	2439.283	5	.167	5	NC		NC		NC		NC	
672			min	-2439.283	4	-.167	4	NC		NC		NC		NC	
673		2	max	2439.283	5	.167	5	NC		NC		NC		NC	
674			min	-2439.283	4	-.167	4	NC		NC		NC		NC	
675		3	max	2439.283	5	.167	5	NC		NC		NC		NC	
676			min	-2439.283	4	-.167	4	NC		NC		NC		NC	
677		4	max	2439.283	5	.167	5	NC		NC		NC		NC	
678			min	-2439.283	4	-.167	4	NC		NC		NC		NC	
679		5	max	2439.283	5	.167	5	NC		NC		NC		NC	
680			min	-2439.283	4	-.167	4	NC		NC		NC		NC	
681	M82	1	max	3265.402	5	.223	5	NC		NC		NC		NC	
682			min	-3265.402	4	-.223	4	NC		NC		NC		NC	
683		2	max	3265.402	5	.223	5	NC		NC		NC		NC	
684			min	-3265.402	4	-.223	4	NC		NC		NC		NC	
685		3	max	3265.402	5	.223	5	NC		NC		NC		NC	
686			min	-3265.402	4	-.223	4	NC		NC		NC		NC	
687		4	max	3265.402	5	.223	5	NC		NC		NC		NC	
688			min	-3265.402	4	-.223	4	NC		NC		NC		NC	
689		5	max	3265.402	5	.223	5	NC		NC		NC		NC	
690			min	-3265.402	4	-.223	4	NC		NC		NC		NC	
691	M83	1	max	3675.459	5	.251	5	NC		NC		NC		NC	
692			min	-3675.459	4	-.251	4	NC		NC		NC		NC	
693		2	max	3675.459	5	.251	5	NC		NC		NC		NC	
694			min	-3675.459	4	-.251	4	NC		NC		NC		NC	
695		3	max	3675.459	5	.251	5	NC		NC		NC		NC	
696			min	-3675.459	4	-.251	4	NC		NC		NC		NC	
697		4	max	3675.459	5	.251	5	NC		NC		NC		NC	
698			min	-3675.459	4	-.251	4	NC		NC		NC		NC	
699		5	max	3675.459	5	.251	5	NC		NC		NC		NC	
700			min	-3675.459	4	-.251	4	NC		NC		NC		NC	
701	M84	1	max	0	1	0	1	NC		NC		NC		NC	
702			min	0	1	0	1	NC		NC		NC		NC	
703		2	max	0	1	0	1	NC		NC		NC		NC	
704			min	0	1	0	1	NC		NC		NC		NC	
705		3	max	0	1	0	1	NC		NC		NC		NC	
706			min	0	1	0	1	NC		NC		NC		NC	
707		4	max	0	1	0	1	NC		NC		NC		NC	
708			min	0	1	0	1	NC		NC		NC		NC	
709		5	max	0	1	0	1	NC		NC		NC		NC	
710			min	0	1	0	1	NC		NC		NC		NC	
711	M85	1	max	0	1	0	1	NC		NC		NC		NC	
712			min	0	1	0	1	NC		NC		NC		NC	
713		2	max	0	1	0	1	NC		NC		NC		NC	
714			min	0	1	0	1	NC		NC		NC		NC	
715		3	max	0	1	0	1	NC		NC		NC		NC	
716			min	0	1	0	1	NC		NC		NC		NC	
717		4	max	0	1	0	1	NC		NC		NC		NC	
718			min	0	1	0	1	NC		NC		NC		NC	
719		5	max	0	1	0	1	NC		NC		NC		NC	
720			min	0	1	0	1	NC		NC		NC		NC	
721	M87	1	max	0	1	0	1	NC		NC		NC		NC	
722			min	0	1	0	1	NC		NC		NC		NC	
723		2	max	0	1	0	1	NC		NC		NC		NC	
724			min	0	1	0	1	NC		NC		NC		NC	
725		3	max	0	1	0	1	NC		NC		NC		NC	
726			min	0	1	0	1	NC		NC		NC		NC	
727		4	max	0	1	0	1	NC		NC		NC		NC	

Company : **DMJM H&N**
Designer : **Kevin M. Jones**
Job Number : **145579-V-CA-005** **DBVS Off-Gas Treatment Duct Analysis**

Mar 26, 2006
12:41 PM
Checked By:_____

Envelope Member Section Torsion (Continued)

	Member	Sec		Torque[l...	lc	Torsion Shear[ksi]	lc	y-y Warp...	lc	z-z Warp Shear[ksi]	lc	z-Top W...	lc	z-Bot Wa...	lc
728			min	0	1	0	1	NC		NC		NC		NC	
729		5	max	0	1	0	1	NC		NC		NC		NC	
730			min	0	1	0	1	NC		NC		NC		NC	
731	M88	1	max	0	1	0	1	NC		NC		NC		NC	
732			min	0	1	0	1	NC		NC		NC		NC	
733		2	max	0	1	0	1	NC		NC		NC		NC	
734			min	0	1	0	1	NC		NC		NC		NC	
735		3	max	0	1	0	1	NC		NC		NC		NC	
736			min	0	1	0	1	NC		NC		NC		NC	
737		4	max	0	1	0	1	NC		NC		NC		NC	
738			min	0	1	0	1	NC		NC		NC		NC	
739		5	max	0	1	0	1	NC		NC		NC		NC	
740			min	0	1	0	1	NC		NC		NC		NC	
741	M89	1	max	0	1	0	1	NC		NC		NC		NC	
742			min	0	1	0	1	NC		NC		NC		NC	
743		2	max	0	1	0	1	NC		NC		NC		NC	
744			min	0	1	0	1	NC		NC		NC		NC	
745		3	max	0	1	0	1	NC		NC		NC		NC	
746			min	0	1	0	1	NC		NC		NC		NC	
747		4	max	0	1	0	1	NC		NC		NC		NC	
748			min	0	1	0	1	NC		NC		NC		NC	
749		5	max	0	1	0	1	NC		NC		NC		NC	
750			min	0	1	0	1	NC		NC		NC		NC	
751	M90	1	max	0	1	0	1	NC		NC		NC		NC	
752			min	0	1	0	1	NC		NC		NC		NC	
753		2	max	0	1	0	1	NC		NC		NC		NC	
754			min	0	1	0	1	NC		NC		NC		NC	
755		3	max	0	1	0	1	NC		NC		NC		NC	
756			min	0	1	0	1	NC		NC		NC		NC	
757		4	max	0	1	0	1	NC		NC		NC		NC	
758			min	0	1	0	1	NC		NC		NC		NC	
759		5	max	0	1	0	1	NC		NC		NC		NC	
760			min	0	1	0	1	NC		NC		NC		NC	

amec

CALCULATION SHEET

CALC. NO.:	145579-V-CA-005	REV:	1	DATE:	March 26, 2006
CALC. TITLE:	Off-Gas Treatment System Pipe Stress Analysis				
PROJECT NO.:	145579	PROJECT TITLE:	Final DBVS Design		

Attachment 9: Excel Spreadsheet – Model 1 AG-1 Analysis and Unity Checks

NOTE: This cover sheet represents the approval signatures of the originator and checker for all pages of this attachment.

ORIGINATOR:	DATE:	CHECKER:	DATE:
Kevin M. Jones KMJ	3/26/06	J. Van Corbach JVC	3/26/06

Duct Size	σ_c (ksi) Eq. 1b	σ_b (ksi) Eq. 6 or 7	σ_b (ksi) Eq. 5	σ_r (ksi) Eq. 8	v_t (ksi) Eq. 9	σ_v (ksi) Eq. 10	Temp	Material
2in Dia. Duct	4.5	27.0	22.5	32.3	15.6	15.6	100	CS
3in Dia. Duct	8.6	22.5	18.8	35.7	13.0	13.0	100	SS
4in Dia. Duct	10.4	22.6	18.8	33.2	13.0	13.0	100	SS
5in Dia. Duct	8.6	12.6	10.5	28.5	7.3	7.3	876	SS
6in Dia. Duct	7.8	14.0	11.7	27.8	8.1	8.1	572	SS
8in Dia. Duct	6.3	14.0	11.7	10.3	8.1	8.1	572	SS
12in Dia. Duct	13.7	22.5	18.5	10.6	13.0	13.0	100	SS
16in Dia. Duct	6.9	14.0	11.7	8.7	8.1	8.1	572	SS
8in Dia. Duct	13.0	22.5	18.8	11.3	13.0	13.0	100	SS

Model 1

D-2250

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_c	f_{by}/σ_b	f_{bz}/σ_b	f_c (ksi)	f/v_t	f/σ_v
1	M1	RIGID	Sec 1 - max	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
2	M1	RIGID	Sec 1 - min	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
3	M1	RIGID	Sec 2 - max	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
4	M1	RIGID	Sec 2 - min	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
5	M1	RIGID	Sec 3 - max	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
6	M1	RIGID	Sec 3 - min	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
7	M1	RIGID	Sec 4 - max	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
8	M1	RIGID	Sec 4 - min	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
9	M1	RIGID	Sec 5 - max	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
10	M1	RIGID	Sec 5 - min	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
11	M2	RIGID	Sec 1 - max	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
12	M2	RIGID	Sec 1 - min	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
13	M2	RIGID	Sec 2 - max	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
14	M2	RIGID	Sec 2 - min	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
15	M2	RIGID	Sec 3 - max	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
16	M2	RIGID	Sec 3 - min	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
17	M2	RIGID	Sec 4 - max	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
18	M2	RIGID	Sec 4 - min	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
19	M2	RIGID	Sec 5 - max	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
20	M2	RIGID	Sec 5 - min	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
21	M3	RIGID	Sec 1 - max	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
22	M3	RIGID	Sec 1 - min	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
23	M3	RIGID	Sec 2 - max	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
24	M3	RIGID	Sec 2 - min	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
25	M3	RIGID	Sec 3 - max	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
26	M3	RIGID	Sec 3 - min	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
27	M3	RIGID	Sec 4 - max	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
28	M3	RIGID	Sec 4 - min	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
29	M3	RIGID	Sec 5 - max	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
30	M3	RIGID	Sec 5 - min	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
31	M4	RIGID	Sec 1 - max	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
32	M4	RIGID	Sec 1 - min	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
33	M4	RIGID	Sec 2 - max	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
34	M4	RIGID	Sec 2 - min	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
35	M4	RIGID	Sec 3 - max	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
36	M4	RIGID	Sec 3 - min	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
37	M4	RIGID	Sec 4 - max	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
38	M4	RIGID	Sec 4 - min	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
39	M4	RIGID	Sec 5 - max	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
40	M4	RIGID	Sec 5 - min	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
41	M5	RIGID	Sec 1 - max	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
42	M5	RIGID	Sec 1 - min	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
43	M5	RIGID	Sec 2 - max	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
44	M5	RIGID	Sec 2 - min	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
45	M5	RIGID	Sec 3 - max	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
46	M5	RIGID	Sec 3 - min	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
47	M5	RIGID	Sec 4 - max	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
48	M5	RIGID	Sec 4 - min	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
49	M5	RIGID	Sec 5 - max	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
50	M5	RIGID	Sec 5 - min	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
51	M6	RIGID	Sec 1 - max	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
52	M6	RIGID	Sec 1 - min	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
53	M6	RIGID	Sec 2 - max	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
54	M6	RIGID	Sec 2 - min	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
55	M6	RIGID	Sec 3 - max	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
56	M6	RIGID	Sec 3 - min	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
57	M6	RIGID	Sec 4 - max	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
58	M6	RIGID	Sec 4 - min	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
59	M6	RIGID	Sec 5 - max	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
60	M6	RIGID	Sec 5 - min	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
261	M29	RIGID	Sec 1 - max	0.000	6	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	4	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
262	M29	RIGID	Sec 1 - min	0.000	5	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
263	M29	RIGID	Sec 2 - max	0.000	6	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	4	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
264	M29	RIGID	Sec 2 - min	0.000	5	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
265	M29	RIGID	Sec 3 - max	0.000	6	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	4	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
266	M29	RIGID	Sec 3 - min	0.000	5	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
267	M29	RIGID	Sec 4 - max	0.000	8	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	4	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
268	M29	RIGID	Sec 4 - min	0.000	6	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
269	M29	RIGID	Sec 5 - max	0.000	6	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	4	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
270	M29	RIGID	Sec 5 - min	0.000	6	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
1551	M166	RIGID	Sec 1 - max	0.000	6	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	163.238	2	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
1552	M166	RIGID	Sec 1 - min	0.000	7	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	-153.910	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000

D-2250

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	fa/Fc	fb/Fb	fv/Fv	ft (ksi)	f/Fv	f/Ft
1553	M166	RIGID	Sec 2 - max	0.000	6	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	183.236	2	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
1554	M166	RIGID	Sec 2 - min	0.000	7	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	-153.910	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
1555	M166	RIGID	Sec 3 - max	0.000	6	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	183.236	2	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
1556	M166	RIGID	Sec 3 - min	0.000	7	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	-153.910	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
1557	M166	RIGID	Sec 4 - max	0.000	6	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	183.236	2	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
1558	M166	RIGID	Sec 4 - min	0.000	7	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	-153.910	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
1559	M166	RIGID	Sec 5 - max	0.000	6	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	183.236	2	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
1560	M166	RIGID	Sec 5 - min	0.000	7	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	-153.910	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
1561	M167	RIGID	Sec 1 - max	0.000	8	0.000	1	0.000	1	0.000	1	0.000	7	0.000	1	0.000	1	153.913	2	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
1562	M167	RIGID	Sec 1 - min	0.000	5	0.000	1	0.000	1	0.000	1	0.000	7	0.000	1	0.000	1	-183.235	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
1563	M167	RIGID	Sec 2 - max	0.000	8	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	153.913	2	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
1564	M167	RIGID	Sec 2 - min	0.000	5	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	-183.235	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
1565	M167	RIGID	Sec 3 - max	0.000	8	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	153.913	2	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
1566	M167	RIGID	Sec 3 - min	0.000	6	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	-183.235	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
1567	M167	RIGID	Sec 4 - max	0.000	8	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	153.913	2	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
1568	M167	RIGID	Sec 4 - min	0.000	5	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	-183.235	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
1569	M167	RIGID	Sec 5 - max	0.000	8	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	153.913	2	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
1570	M167	RIGID	Sec 5 - min	0.000	5	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	-183.235	1	0.000	1	0.000	0.000	0.000	0.000	0.000	0.000
2541	M265	2in Dia. Duct	Sec 1 - max	0.148	6	-0.117	8	-0.133	8	9.963	5	-4.040	8	12.276	5	-4.602	6	0.000	1	0.000	1	0.033	0.369	0.455	12.276	0.000	0.009
2542	M266	2in Dia. Duct	Sec 1 - min	0.066	8	-0.208	5	-0.331	5	4.048	8	-9.963	5	4.002	8	-12.276	5	0.000	1	0.000	1	0.015	0.369	0.455	12.276	0.000	0.021
479	M50	4in Dia. Duct	Sec 5 - max	0.276	5	-0.177	8	0.117	5	-2.430	5	3.495	8	1.429	5	7.414	6	115.607	7	0.101	7	0.033	0.250	0.530	7.414	0.012	0.022
770	M87	5in Dia. Duct	Sec 5 - min	-0.246	5	-0.152	7	-0.238	5	-5.448	7	-4.228	6	-4.302	8	-0.959	5	-562.573	6	-0.732	6	0.036	0.432	0.341	5.448	0.101	0.033
2531	M264	2in Dia. Duct	Sec 1 - max	0.170	6	-0.070	8	-0.111	8	6.535	5	-2.323	8	14.248	5	-3.825	6	0.000	1	0.000	1	0.038	0.242	0.526	14.248	0.000	0.007
788	M87	5in Dia. Duct	Sec 4 - min	-0.245	5	-0.152	7	-0.238	8	-5.376	7	-4.209	6	-4.189	8	-0.849	5	-562.573	6	-0.732	6	0.036	0.427	0.332	5.376	0.101	0.033
789	M87	5in Dia. Duct	Sec 5 - max	0.102	8	0.040	6	0.232	5	4.228	6	5.448	7	0.959	5	4.302	8	506.461	7	0.659	7	0.015	0.432	0.341	5.448	0.091	0.032
2532	M264	2in Dia. Duct	Sec 1 - min	0.064	8	-0.174	8	-0.386	5	2.323	8	-6.535	5	3.825	8	-14.248	5	0.000	1	0.000	1	0.015	0.242	0.526	14.248	0.000	0.025
480	M50	4in Dia. Duct	Sec 5 - min	0.039	8	-0.240	5	-0.291	8	-3.495	8	2.430	5	-7.414	5	-1.429	5	-140.129	6	-0.123	6	0.005	0.260	0.530	7.414	0.015	0.036
766	M87	5in Dia. Duct	Sec 3 - min	-0.245	5	-0.151	7	-0.238	8	-5.304	7	-4.189	6	-4.076	8	-0.739	5	-562.573	6	-0.732	6	0.036	0.421	0.323	5.304	0.101	0.033
767	M87	5in Dia. Duct	Sec 4 - max	0.102	8	0.040	6	0.232	5	4.209	6	5.376	7	0.849	5	4.189	8	506.461	7	0.659	7	0.015	0.427	0.332	5.376	0.091	0.032
1799	M190	5in Dia. Duct	Sec 5 - max	0.006	8	-0.023	1	0.011	5	-7.434	5	7.850	8	-1.464	7	1.833	6	160.961	6	0.210	6	0.001	0.623	0.145	7.850	0.029	0.003
1800	M190	5in Dia. Duct	Sec 5 - min	-0.006	5	-0.023	7	-0.011	7	-7.850	8	7.434	5	-1.833	6	1.464	7	-36.753	7	-0.048	7	0.001	0.623	0.145	7.850	0.007	0.003
764	M87	5in Dia. Duct	Sec 2 - min	-0.244	5	-0.151	7	-0.238	6	-5.232	7	-4.170	6	-3.997	8	-0.653	7	-562.573	6	-0.732	6	0.036	0.415	0.317	5.232	0.101	0.033
1797	M190	5in Dia. Duct	Sec 4 - max	0.005	8	-0.019	1	0.010	5	-7.393	5	7.809	8	-1.444	7	1.853	6	160.961	5	0.210	6	0.001	0.620	0.147	7.809	0.029	0.003
1798	M190	5in Dia. Duct	Sec 4 - min	-0.005	5	-0.019	7	-0.010	7	-7.809	8	7.393	5	-1.853	8	1.444	7	-36.753	7	-0.040	7	0.001	0.620	0.147	7.809	0.007	0.003
1795	M190	5in Dia. Duct	Sec 3 - max	0.004	8	-0.018	1	0.008	5	-7.359	6	7.775	8	-1.427	7	1.870	6	160.961	8	0.210	6	0.001	0.617	0.148	7.775	0.029	0.002
1796	M190	5in Dia. Duct	Sec 3 - min	-0.004	5	-0.018	7	-0.008	7	-7.775	8	7.369	5	-1.870	6	1.427	7	-36.753	7	-0.048	7	0.001	0.617	0.148	7.775	0.007	0.002
1793	M190	5in Dia. Duct	Sec 2 - max	0.003	8	-0.013	1	0.006	5	-7.332	5	7.748	8	-1.413	7	1.864	8	160.961	6	0.210	6	0.000	0.615	0.150	7.746	0.029	0.002
1794	M190	5in Dia. Duct	Sec 2 - min	-0.003	5	-0.013	7	-0.005	7	-7.746	8	7.332	5	-1.004	6	1.413	7	-36.753	7	-0.048	7	0.000	0.616	0.150	7.746	0.007	0.002
101	M11	5in Dia. Duct	Sec 1 - max	0.002	5	0.326	8	-0.046	8	-7.311	5	7.727	6	1.894	6	-1.403	7	160.961	6	0.210	6	0.000	0.613	0.150	7.727	0.029	0.046
102	M11	5in Dia. Duct	Sec 1 - min	-0.002	6	0.298	5	-0.073	7	-7.727	8	7.311	5	1.403	7	-1.894	6	-36.753	7	-0.048	7	0.000	0.613	0.150	7.727	0.007	0.041
1771	M188	6in Dia. Duct	Sec 1 - max	0.002	5	0.009	2	0.006	7	-7.311	5	7.727	8	-1.403	7	1.894	6	160.961	6	0.210	6	0.000	0.613	0.150	7.727	0.029	0.001
1772	M188	5in Dia. Duct	Sec 1 - min	-0.002	6	0.009	1	-0.005	5	-7.727	8	7.311	5	-1.694	8	1.403	7	-36.753	7	-0.048	7	0.000	0.613	0.150	7.727	0.007	0.001
1789	M189	6in Dia. Duct	Sec 5 - max	0.002	8	-0.009	1	0.005	5	-7.311	6	7.727	8	-1.403	7	1.894	6	160.961	6	0.210	6	0.000	0.613	0.150	7.727	0.029	0.001
1790	M189	5in Dia. Duct	Sec 5 - min	-0.002	5	-0.009	1	-0.005	7	-7.727	6	7.311	5	-1.894	6	1.403	7	-36.753	7	-0.048	7	0.000	0.613	0.150	7.727	0.007	0.001
1791	M190	5in Dia. Duct	Sec 1 - max	0.002	8	-0.009	1	0.005	5	-7.311	5	7.727	8	-1.403	7	1.894	6	160.961	6	0.210	6	0.000	0.613	0.150	7.727	0.029	0.001
1792	M190	5in Dia. Duct	Sec 1 - min	-0.002	5	-0.009	7	-0.005	7	-7.727	8	7.311	5	-1.894	8	1.403	7	-36.753	7	-0.046	7	0.000	0.613	0.150	7.727	0.007	0.001
1773	M188	5in Dia. Duct	Sec 2 - max	0.002	5	0.007	2	0.003	7	-7.301	5	7.717	8	-1.399	7	1.899	6	160.961	6	0.210	6	0.000	0.612	0.151	7.717	0.029	0.001
1774	M188	5in Dia. Duct	Sec 2 - min	-0.002	6	0.007	1	-0.003	5	-7.717	8	7.301	5	-1.899	6	1.398	7	-36.753	7	-0.048	7	0.000	0.612	0.161	7.717	0.007	0.001
1787	M189	5in Dia. Duct	Sec 4 - max	0.003	8	-0.007	1	0.003	5	-7.301	5	7.717	8	-1.398	7	1.899	8	160.961	6	0.210	6	0.000	0.612	0.151	7.717	0.029	0.001
1788	M189	5in Dia. Duct	Sec 4 - min	-0.002	5	-0.007	1	-0.003	7	-7.717	6	7.301	5	-1.899	6	1.398	7	-36.753	7	-0.048	7	0.000	0.612	0.151	7.717	0.007	0.001
1775	M188	5in Dia. Duct	Sec 3 - max	0.001	5	0.006	2	0.002	7	-7.294	5	7.710	8	-1.394	7	1.903	6	160.961	8	0.210	8	0.000	0.612	0.161	7.710	0.029	0.001
1776	M188	5in Dia. Duct	Sec 3 - min	-0.001	6	0.006	1	-0.002	5	-7.710	8	7.294	5	-1.903	6	1.394	7	-36.753	7	-0.046	7	0.000	0.612	0.151	7.710	0.007	0.001
1785	M189	5in Dia. Duct	Sec 3 - max	0.001	8	-0.005	1	0.002	5	-7.294	5	7.710	6	-1.394	7	1.903	6	160.961	6	0.210	6	0.000	0.612	0.151	7.710	0.029	0.001
1786	M189	5in Dia. Duct	Sec 3 - min	-0.001	5	-0.005	1	-0.002	7	-7.710	8	7.204	5	-1.903	6	1.394	7	-36.753	7	-0.048	7	0.000	0.612	0.151	7.710	0.007	0.001
702	M87	5in Dia. Duct	Sec 1 - min	-0.244	5	-0.151	7	-0.238	8	-5.161	7	-4.151	6	-3.099	6	-0.668	7	-562.573	6	-0.732	6	0.036	0.410	0.317	5.161	0.101	0.033
1777	M188	5in Dia. Duct	Sec 4 - max	0.000	5	0.002	2	0.001	7	-7.289	5	7.706	8	-1.392	7	1.905	6	160.961	6	0.210	6	0.000	0.612	0.151	7.706	0.029	0.000
1778	M188	5in Dia. Duct	Sec 4 - min	0.000	6	0.002	1	-0.001	5	-7.706	8	7.289	5	-1.905	8	1.392	7	-36.753	7	-0.048	7	0.000	0.612	0.151	7.706	0.007	0.000
1783	M189	5in Dia. Duct	Sec 2 - max	0.000	6	-0.002	1	0.001	5	-7.289	5	7.706	8	-1.392	7	1.905	6	160.961	6	0.210	6	0.000	0.612	0.151	7.706	0.029	0.000
1784	M189	5in Dia. Duct	Sec 2 - min	0.000	5	-0.002	1	-0.001	7	-7.706	8	7.289	5	-1.905	6	1.392	7	-36.753	7	-0.048	7	0.000	0.612	0.151	7.706	0.007	0.000
1779	M188	5in Dia. Duct	Sec 5 - max	0.000	1	0.000	1	0.000	1	-7.288	5	7.704	8	-1.391	7	1.906	6	160.961	6	0.210	6	0.000	0.611	0.151	7.704	0.029	0.000
1780	M188	5in Dia. Duct	Sec 5 - min	0.000	1	0.000	1	0.000	1	-7.704	8	7.288	5	-1.906	6	1.391	7	-36.753	7	-0.048	7	0.000	0.611	0.151	7.704	0.007	0.000
1781	M189	5in Dia. Duct	Sec 1 - max	0.000	1	0.000	1	0.000	1	-7.288	5	7.704	8	-1.391	7	1.906	8	160.961	6	0.210	6	0.000	0.611	0.151	7.704	0.029	0.000
1782	M189	5in Dia. Duct	Sec 1 - min	0.000	1	0.000	1	0.000	1	-7.704	8	7.288	5	-1.906	6	1.391	7	-36.753	7	-0.048	7	0.000	0.611	0.151	7.704	0.007	0.000
786	M87	6in Dia. Duct	Sec 3 - max	0.102	8	0.040	6	0.232	6	4.180	6	5.304	7	0.739	5	4.076	8	506.461	7	0.659	7	0.015	0.421	0.323	5.304	0.091	0.032
401	M43	6in Dia. Duct	Sec 1 - max	0.081	8	0.572	5	-0.061	8	-5.179	8	7.055	5	3.431	5	-0.600	6	414.335	5	0.347	5	0.010	0.504	0.245	7.059	0.043	0.071
402	M43	6in Dia. Duct	Sec 1 - min	-0.081	7	0.240	8	-0.189	5	-7.056	5	5.179	8	0.600	8	-3.431	6	85.662	8	0.072	8	0.010	0.504	0.246	7.055	0.009	0.030
1219	M132	6in Dia. Duct	Sec 5 - max	0.081	6	-0.333	8	0.303	5	-5.179	8	7.055	5	3.431	5	-0.600	6	414.335	5	0.347	5	0.010	0.504	0.245	7.055	0.043	0.041
1220	M132	6in Dia. Duct	Sec 5 - min	-0.081	7	-0.368	5	0.082	8	-7.055	5	5.179	6	0.600	8	-3.431	5	65.682	8	0.072	8	0.010	0.504	0.245	7.065	0.009	0.045
783	M87	5in Dia. Duct	Sec 2 - max	0.102	8	0.041	8	0.232	5	4.170	6	5.232	7	0.663	7	3.997	8	506.461	7	0.659	7	0.016	0.415	0.317	5.232	0.091	0.032
761	M87	5in Dia. Duct	Sec 1 - max	0.103	6	0.041	6	0.232	5	4.151	8	5.161	7	0.668	7	3.899	6	506.461	7	0.659	7	0.015	0.410	0.317	5.161	0.091	0.032
103	M11	5in Dia. Duct	Sec 2 - max	0.003	5	0.326	8	-0.049	8	-6.937	5	7.313	8	1.835	6	-1.311	7	160.961	6	0.210	6	0.000	0.580	0.145	7.313	0.029	0.045
104	M11	5in Dia. Duct	Sec 2 - min	-0.003	8	0.294	5	-0.072	7	-7.313	8	6.937	5	1.311	7	-1.835	8	-36.753	7	-0.048	7	0.000	0.580	0.145	7.313	0.007	0.041
329	M35	5in Dia. Duct	Sec 5 - max	0.038	7	0.150	6	0.357	5	1.727	6	4.762	7	3.036	5	4.289	8	1091.086	7	1.420	7	0.006	0.378	0.340	4.762	0.195	0.049
330	M35	5in Dia. Duct	Sec 5 - min	-0.038	8	0.150	7	-0.232	8	-4.762	7	-1.727	6	-4.289	6	-3.036	5	443.829	6	0.578	6	0.006	0.378	0.340	4.762	0.080	0.032
780	M88	5in Dia. Duct	Sec 5 - min	-0.203	6	-0.419	5	-0.233	8	-4.688	7	-4.650	8	-3.867	8	-0.033	5	-691.838	6	-0.901	6	0.030	0.386	0.307	4.659	0.124	0.056
776	M88	5in Dia. Duct	Sec 4 - min	-0.203	8	-0.419	5	-0.233	8	-4.060	7	-4.943	6	-3.756	8	-0.520	5	-691.838	6	-0.901	6	0.030	0.392	0.298	4.943	0.124	0.056
778	M88	5in Dia. Duct	Sec 3 - min	-0.203	6	-0.416	5	-0.233	6	-4.844	7	-5.027	8	-3.646	6	-0.408	5	-691.838	6	-0.901	6	0.030	0.399	0.289	5.027	0.124	0.058
774	M88	5in Dia. Duct	Sec 2 - min	-0.203	6	-0.418	5	-0.232	8	-4.823	7	-5.110	8	-3.636	6	-0.298	5	-691.838	6	-0.901	6	0.030	0.406	0.281	5.110	0.124	0.058
327	M35	5in Dia. Duct	Sec 4 - max	0.038	7	0.153	8	0.355	5	1.520	6	4.969	7	2.551	5	3.973	8	1091.086	7	1.420	7	0.006	0.394	0.315	4.969	0.195	0.049
328	M35	5in Dia. Duct	Sec 4 - min	-0.039	6	0.153	7	-0.231	8	-4.969	7	-1.620	6	-3.973	8	-2.551	5	443.829	6	0.578	6	0.006	0.394	0.315	4.969	0.080	0.032
772	M88	5in Dia. Duct	Sec 1 - min	-0.203	6	-0.416	5	-0.232	8	-4.802	7	-5.193	6	-3.426	8	-0.184	5	-691.838	6	-0.901	6	0.030	0.412	0.272	5.193	0.124	0.058
325	M35	5in Dia. Duct	Sec 3 - max	0.039	7	0.155	6	0.354	5	1.311	6	5.178	7	2.068	5	3.659	8	1091.086	7	1.420	7	0.006	0.411	0.290	5.178	0.195	0.049
326	M35	5in Dia. Duct	Sec 3 - min	-0.039	6	0.155	7	-0.230	8	-5.178	7	-1.311	6	-3.659	8	-2.068	5	443.829	6	0.578	6	0.006	0.411	0.290	5.178	0.080	0.032
779	M88	5in Dia. Duct	Sec 5 - max	0.097	7	0.195	8	0.237	5	4.859	6	4.688	7	0.633	5	3.867	8	1211.078	7	1.576	7	0.013	0.386	0.307	4.859	0.217	0.033
777	M88	5in Dia. Duct	Sec 4 - max	0.092	7	0.196	8	0.237	5	4.943	8	4.666	7	0.520	5	3.756	8	1211.078	7	1.576	7	0.014	0.392	0.298	4.943	0.217	0.033

D-2250

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_a	f_b/σ_b	f_v/σ_v	f_t (ksi)	f/γ_t	f/σ_s
775	M88	5in Dia. Duct	Sec 3 - max	0.092	7	0.197	8	0.236	5	5.027	6	4.644	7	0.408	5	3.646	8	1211.078	7	1.576	7	0.014	0.399	0.289	5.027	0.217	0.032
773	M88	5in Dia. Duct	Sec 2 - max	0.093	7	0.198	8	0.236	5	5.110	6	4.020	7	0.206	5	3.536	8	1211.078	7	1.576	7	0.014	0.406	0.281	5.110	0.217	0.033
323	M35	5in Dia. Duct	Sec 2 - max	0.039	7	0.158	6	0.353	6	1.096	6	5.391	7	1.587	5	3.347	6	1091.086	7	1.420	7	0.006	0.428	0.286	5.391	0.198	0.049
324	M36	5in Dia. Duct	Sec 2 - min	-0.039	6	0.158	7	-0.228	8	-5.391	7	-1.098	6	-0.347	8	-1.667	5	443.829	8	0.578	6	0.006	0.429	0.246	5.391	0.080	0.032
771	M88	5in Dia. Duct	Sec 1 - max	0.093	7	0.199	8	0.236	6	5.193	6	4.002	7	0.184	5	3.426	8	1211.078	7	1.576	7	0.014	0.412	0.272	5.193	0.217	0.033
321	M35	5in Dia. Duct	Sec 1 - max	0.040	7	0.160	8	0.352	5	0.881	6	5.608	7	1.107	5	3.037	8	1091.086	7	1.420	7	0.006	0.445	0.241	5.608	0.198	0.049
322	M35	5in Dia. Duct	Sec 1 - min	-0.040	6	0.160	7	-0.228	8	-5.808	7	-0.881	6	-3.037	8	-1.107	5	443.829	6	0.578	6	0.006	0.445	0.241	5.608	0.080	0.031
105	M11	5in Dia. Duct	Sec 3 - max	0.003	5	0.323	8	-0.049	6	-6.509	5	6.001	8	1.774	6	-1.220	7	160.961	6	0.210	6	0.000	0.549	0.141	6.901	0.029	0.045
106	M11	5in Dia. Duct	Sec 3 - min	-0.003	6	0.282	5	-0.071	7	-6.901	8	6.566	5	1.220	7	-1.774	6	-36.753	7	-0.048	7	0.000	0.648	0.141	6.901	0.007	0.040
2521	M283	2in Dia. Duct	Sec 1 - max	0.127	5	-0.063	8	-0.061	8	7.744	5	-2.004	8	9.807	5	-2.017	8	0.000	1	0.000	1	0.028	0.287	0.383	9.807	0.000	0.004
2522	M283	2in Dia. Duct	Sec 1 - min	0.043	8	-0.207	5	-0.264	5	2.084	8	-7.744	5	2.017	8	-9.807	5	0.000	1	0.000	1	0.010	0.287	0.383	9.807	0.000	0.017
1217	M132	6in Dia. Duct	Sec 4 - max	0.080	8	-0.328	8	0.301	5	-4.463	8	6.267	5	2.777	6	-0.419	8	414.335	5	0.347	5	0.010	0.448	0.195	6.267	0.043	0.040
1218	M132	6in Dia. Duct	Sec 4 - min	-0.080	7	-0.362	6	0.085	8	-6.267	5	4.463	8	0.419	8	-2.777	5	86.682	8	0.072	8	0.010	0.448	0.198	6.267	0.009	0.045
2543	M265	2in Dia. Duct	Sec 2 - max	0.152	5	-0.114	8	-0.130	8	7.513	5	-2.905	8	9.248	5	-3.411	8	0.000	1	0.000	1	0.034	0.278	0.343	9.248	0.000	0.008
107	M11	5in Dia. Duct	Sec 4 - max	0.004	5	0.321	8	-0.050	6	-6.197	5	6.493	8	1.711	6	-1.131	7	160.961	6	0.210	6	0.001	0.516	0.136	6.493	0.029	0.044
108	M11	5in Dia. Duct	Sec 4 - min	-0.004	6	0.289	5	-0.070	7	-6.493	8	6.197	5	1.131	7	-1.711	6	-36.753	7	-0.048	7	0.001	0.516	0.136	6.493	0.007	0.040
441	M47	6in Dia. Duct	Sec 1 - max	0.247	7	0.006	8	0.435	8	0.099	6	2.624	7	1.574	5	6.042	8	240.400	5	0.211	5	0.030	0.187	0.432	6.042	0.026	0.054
99	M10	3in Dia. Duct	Sec 5 - max	0.571	7	-0.046	1	-0.244	3	-1.331	1	1.711	2	-9.900	5	11.346	8	10.088	4	0.043	4	0.066	0.076	0.504	11.340	0.003	0.019
80	M8	6in Dia. Duct	Sec 5 - min	-0.331	1	-0.181	8	-0.224	8	-3.993	8	3.920	5	-4.335	8	1.160	5	83.143	7	0.070	7	0.042	0.285	0.310	4.335	0.009	0.026
2544	M265	2in Dia. Duct	Sec 2 - min	0.069	8	-0.271	5	-0.334	5	2.095	8	-7.513	5	3.411	6	-9.248	5	0.000	1	0.000	1	0.015	0.278	0.343	9.248	0.000	0.021
442	M47	6in Dia. Duct	Sec 1 - min	-0.134	8	-0.197	5	0.007	5	-2.624	7	-0.999	6	-6.042	8	-1.574	5	-1180.600	8	-1.036	8	0.016	0.187	0.432	6.042	0.128	0.024
443	M47	6in Dia. Duct	Sec 2 - max	0.246	7	0.004	8	0.433	8	0.963	6	2.745	7	1.580	5	5.690	8	240.400	5	0.211	5	0.030	0.196	0.406	5.690	0.026	0.053
2209	M231	2in Dia. Duct	Sec 5 - max	0.212	5	-0.131	8	0.045	5	-6.117	8	15.725	5	0.000	1	0.000	1	-10.064	6	-0.137	6	0.047	0.562	0.000	15.725	0.009	0.008
100	M10	3in Dia. Duct	Sec 5 - min	0.419	6	-0.077	2	-0.309	4	-1.711	2	1.331	1	-11.346	8	9.800	5	5.736	3	0.024	3	0.049	0.076	0.504	11.346	0.002	0.024
477	M50	6in Dia. Duct	Sec 4 - max	0.207	5	-0.173	6	0.124	5	-1.151	5	2.516	8	0.777	5	5.819	8	135.507	7	0.101	7	0.032	0.180	0.416	5.819	0.012	0.021
1200	M130	6in Dia. Duct	Sec 5 - min	-0.219	5	0.232	8	-0.136	6	1.137	6	-5.490	8	-2.848	6	2.381	7	-1415.751	5	-1.165	5	0.028	0.393	0.203	5.496	0.146	0.029
2469	M260	6in Dia. Duct	Sec 6 - max	0.087	6	-0.129	6	0.063	8	-4.137	6	6.500	7	1.852	6	2.065	7	-179.120	6	-0.150	8	0.011	0.465	0.148	6.506	0.019	0.016
2491	M260	6in Dia. Duct	Sec 1 - max	0.087	5	0.319	5	0.057	7	-4.137	8	6.506	7	1.852	6	2.065	7	-179.120	6	-0.150	6	0.011	0.465	0.148	6.506	0.019	0.039
432	M46	6in Dia. Duct	Sec 1 - min	-0.186	6	-0.317	6	0.106	5	-1.469	7	-2.423	6	-5.983	6	-0.022	5	-1940.300	8	-1.703	8	0.022	0.173	0.427	5.983	0.210	0.039
431	M46	6in Dia. Duct	Sec 1 - max	0.164	7	0.045	8	0.338	8	2.423	6	1.469	7	0.822	5	5.963	8	13.131	5	0.012	5	0.020	0.173	0.427	5.983	0.001	0.041
2533	M264	2in Dia. Duct	Sec 2 - max	0.173	5	-0.087	8	-0.108	8	4.942	5	-1.701	8	10.727	5	-2.628	8	0.000	1	0.000	1	0.038	0.183	0.397	10.727	0.000	0.007
1190	M129	6in Dia. Duct	Sec 5 - min	-0.256	5	0.084	7	-0.138	5	0.623	6	-5.055	8	-3.164	5	2.659	8	-751.656	5	-0.629	8	0.032	0.381	0.226	5.055	0.078	0.017
444	M47	6in Dia. Duct	Sec 2 - min	-0.133	8	-0.200	5	0.008	5	-2.745	7	-0.983	8	-5.600	8	-1.580	5	-1180.600	8	-1.036	8	0.016	0.196	0.406	5.690	0.128	0.025
445	M47	6in Dia. Duct	Sec 3 - max	0.248	7	0.002	8	0.432	8	0.926	6	2.868	7	1.587	5	5.340	8	240.400	5	0.211	5	0.030	0.205	0.381	5.340	0.026	0.053
2490	M259	6in Dia. Duct	Sec 6 - min	-0.028	8	-0.193	7	-0.032	7	-6.506	7	4.137	6	-2.065	7	-1.862	6	-325.274	7	-0.272	7	0.004	0.465	0.146	6.506	0.034	0.024
2492	M260	6in Dia. Duct	Sec 1 - min	-0.028	8	0.222	8	-0.034	6	-6.504	7	4.137	6	-2.065	7	-1.862	6	-325.274	7	-0.272	7	0.004	0.466	0.148	6.506	0.034	0.027
109	M11	5in Dia. Duct	Sec 5 - max	0.005	5	0.319	8	-0.051	8	-5.831	5	6.087	8	1.647	6	-1.043	7	160.961	6	0.210	6	0.001	0.483	0.131	6.087	0.029	0.044
110	M11	5in Dia. Duct	Sec 5 - min	-0.005	6	0.287	5	-0.069	7	-6.087	8	5.831	5	1.043	7	-1.647	8	-36.753	7	-0.048	7	0.001	0.483	0.131	6.087	0.007	0.040
1769	M187	5in Dia. Duct	Sec 5 - max	0.062	7	-0.380	5	-0.052	6	-5.830	6	6.081	8	-1.163	7	1.527	6	237.203	6	0.309	6	0.009	0.483	0.121	6.081	0.043	0.036
800	M96	5in Dia. Duct	Sec 5 - min	-0.071	8	-0.520	5	-0.202	8	-5.234	5	-4.409	8	-2.353	6	-0.895	5	-570.018	6	-0.742	6	0.010	0.416	0.187	5.234	0.102	0.072
1770	M187	5in Dia. Duct	Sec 6 - min	0.056	8	-0.298	8	-0.068	7	-6.081	8	5.830	5	-1.527	6	1.163	7	-31.177	7	-0.041	7	0.009	0.483	0.121	6.081	0.006	0.041
429	M45	6in Dia. Duct	Sec 5 - max	0.111	6	0.455	5	-0.109	6	6.326	8	-3.732	5	-1.691	7	2.049	8	-1531.361	8	-1.262	8	0.014	0.452	0.140	6.325	0.158	0.056
430	M45	6in Dia. Duct	Sec 5 - min	-0.111	7	0.123	8	-0.141	7	3.732	5	-6.325	8	-2.049	8	1.691	7	-2100.134	5	-1.768	5	0.014	0.452	0.146	6.325	0.217	0.017
1198	M130	6in Dia. Duct	Sec 4 - min	-0.219	5	0.333	8	-0.137	5	1.009	6	-5.386	8	-2.784	8	2.317	7	-1415.751	5	-1.165	5	0.028	0.385	0.200	5.386	0.146	0.029
769	M90	5in Dia. Duct	Sec 5 - max	0.063	5	0.182	6	0.212	5	4.409	8	5.234	5	0.895	5	2.353	8	1727.600	7	2.249	7	0.009	0.415	0.187	5.234	0.310	0.029
70	M6	6in Dia. Duct	Sec 5 - max	-0.113	2	-0.166	6	-0.026	5	-3.920	5	3.993	8	-1.160	5	4.335	8	139.532	8	0.117	8	0.014	0.285	0.310	4.335	0.014	0.020
454	M48	6in Dia. Duct	Sec 2 - min	-0.185	8	-0.319	5	0.106	5	-1.721	7	-2.454	6	-5.711	8	-0.909	5	-1940.300	8	-1.703	8	0.022	0.175	0.408	5.711	0.210	0.039
1188	M129	6in Dia. Duct	Sec 4 - min	-0.255	8	0.085	7	-0.139	5	0.883	6	-4.934	8	-3.088	5	2.607	8	-751.666	6	-0.629	5	0.032	0.352	0.221	4.934	0.078	0.017
433	M46	6in Dia. Duct	Sec 2 - max	0.164	7	0.043	8	0.335	8	2.454	6	1.721	7	0.909	5	5.711	8	13.131	5	0.012	6	0.020	0.175	0.408	5.711	0.001	0.041
1199	M130	6in Dia. Duct	Sec 5 - max	0.062	8	0.269	5	-0.114	8	6.494	8	-1.137	5	-2.381	7	2.846	6	-798.494	8	-0.668	8	0.007	0.393	0.203	5.496	0.062	0.033
446	M47	6in Dia. Duct	Sec 3 - min	-0.132	6	-0.202	5	0.010	5	-2.608	7	-0.926	6	-5.340	8	-1.567	5	-1180.600	8	-1.036	8	0.016	0.205	0.391	5.340	0.128	0.026
2210	M231	2in Dia. Duct	Sec 5 - min	0.084	8	-0.286	5	0.011	8	-15.725	5	6.117	8	0.000	1	0.000	1	-64.216	7	-0.876	7	0.020	0.582	0.000	15.725	0.056	0.019
1196	M130	6in Dia. Duct	Sec 3 - min	-0.219	5	0.233	8	-0.137	5	0.881	5	-5.276	8	-2.739	6	2.254	7	-1415.751	6	-1.165	5	0.028	0.377	0.196	5.276	0.146	0.029
447	M47	6in Dia. Duct	Sec 4 - max	0.246	7	0.000	8	0.430	8	0.888	6	2.993	7	1.696	5	4.991	8	240.400	5	0.211	5	0.030	0.214	0.357	4.991	0.026	0.053
476	M50	6in Dia. Duct	Sec 4 - min	0.031	8	-0.244	7	-0.299	8	-2.516	8	1.151	5	-5.819	8	-0.777	5	-140.129	6	-0.123	6	0.004	0.180	0.416	5.819	0.015	0.037
1767	M187	5in Dia. Duct	Sec 4 - max	0.062	7	-0.259	5	-0.051	8	-5.688	5	5.919	8	-1.126	7	1.499	6	237.203	6	0.309	6	0.009	0.470	0.119	5.919	0.043	0.036
1768	M187	5in Dia. Duct	Sec 4 - min	0.056	6	-0.290	8	-0.068	5	-5.919	8	5.888	5	-1.499	8	1.126	7	-31.177	7	-0.041	7	0.009	0.470	0.119	5.919	0.006	0.041
2534	M264	2in Dia. Duct	Sec 2 - min	0.072	8	-0.177	5	-0.389	5	1.701	8	-4.942	5	2.628	8	-10.727	5	0.000	1	0.000	1	0.018	0.183	0.397	10.727	0.000	0.025
427	M45	6in Dia. Duct	Sec 4 - max	0.110	6	0.457	5	-0.110	6	0.203	8	-3.283	5	-1.652	7	1.941	8	-1531.361	8	-1.282	8	0.014	0.443	0.139	6.203	0.158	0.056
428	M45	6in Dia. Duct	Sec 4 - min	-0.110	7	0.126	8	-0.140	7	3.283	5	-6.203	8	-1.941	6	1.652	7	-2100.134	5	-1.758	5	0.014	0.443	0.139	6.203	0.217	0.017
762	M89	5in Dia. Duct	Sec 1 - min	-0.142	6	-0.614	5	-0.214	8	-3.997	7	-4.763	6	-2.434	8	0.027	5	-676.104	5	-0.880	6	0.021	0.380	0.193	4.763	0.121	0.071
1939	M204	6in Dia. Duct	Sec 5 - max	0.271	1	-0.220	1	0.098	3	-0.136	1	6.738	2	8.145	5	-2.516	8	-935.258	8	-0.821	8	0.021	0.298	0.273	6.738	0.083	0.017
1369	M149	3in Dia. Duct	Sec 5 - max	0.507	7	-0.136	8	0.545	7	-2.806	8	3.355	7	8.642	7	-7.409	8	32.458	8	0.139	8	0.059	0.149	0.364	8.642	0.011	0.042
1168	M129	6in Dia. Duct	Sec 3 - min	-0.256	5	0.088	7	-0.139	5	0.542	5	-4.813	8	-3.022	5	2.554	8	-751.656	6	-0.629	5	0.032	0.344	0.210	4.813	0.078	0.017
1210	M131	6in Dia. Duct	Sec 5 - min	-0.152	6	0.171	8	-0.137	7	1.921	5	-5.824	8	-2.180	6	1.707	7	-1923.049	5	-1.610	5	0.019	0.416	0.156	5.824	0.199	0.021
1197	M130	6in Dia. Duct	Sec 4 - max	0.051	6	0.270	5	-0.113	8	5.386	6	-1.009	5	-2.317	7	2.794	6	-798.494	8	-0.668	8	0.006	0.365	0.200	5.386	0.082	0.033
764	M89	5in Dia. Duct	Sec 2 - min	-0.142	8	-0.515	5	-0.214	6	-3.960	7	-4.621	6	-2.540	8	-0.063	5	-676.104	6	-0.880	6	0.021	0.397	0.202	4.621	0.121	0.071
1194	M130	6in Dia. Duct	Sec 2 - min	-0.219	5	0.234	8	-0.138	5	0.762	6	-5.165	8	-2.684	6	2.191	7	-1416.751	5	-1.165	5	0.026	0.369	0.192	5.165	0.146	0.029
2199	M230	2in Dia. Duct	Sec 5 - max	0.196	5	-0.136	8	0.150	5	-4.347	8	14.606	5	0.000	1	0.000	1	-38.927	8	-0.531	8	0.044	0.544	0.000	14.696	0.034	0.010
436	M46	6in Dia. Duct	Sec 3 - min	-0.165	6	-0.322	5	0.109	5	-1.976	7	-2.482	6	-5.440	8	-0.997	5	-1940.300	8	-1.703	8	0.022	0.177	0.369	5.440	0.210	0.040
1189	M129	6in Dia. Duct	Sec 5 - max	0.001	8	0.255	8	-0.112	8	6.055	8	-0.623	5	-2.659	8	3.154	5	-205.860	8	-0.172	8	0.000	0.381	0.225	5.055	0.021	0.031
448	M47	6in Dia. Duct	Sec 4 - min	-0.130	6	-0.204	5	0.012	5	-2.993	7	-0.850	6	-4.991	8	-1.586	5	-1180.600	8	-1.036	8	0.016	0.214	0.357	4.991	0.128	0.025
435	M48	6in Dia. Duct	Sec 3 - max	0.183	7	0.041	8	0.333	8	2.482	6	1.976	7	0.997	5	5.440	8	13.131	6	0.012	6	0.020	0.177	0.369	5.440	0.001	0.041
765	M89	5in Dia. Duct	Sec 3 - min	-0.142	6	-0.515	5	-0.214	8	-3.084	7	-4.460	6	-2.646	8	-0.193	5	-676.104	6	-0.880	6	0.021	0.354	0.210	4.458	0.121	0.071
761	M89	5in Dia. Duct	Sec 1 - max	0.080	7	0.222	8	0.221	5	4.763	6	3.997	7	-0.027	5	2.434	8	1588.469	7	2.068	7	0.012	0.380	0.193	4.763	0.285	0.031
449	M47	6in Dia. Duct	Sec 5 - max	0.246	7	-0.002	8	0.428	8	0.848	8	3.121	7	1.006	5	4.643	8	240.400	5	0.211	5	0.030	0.223	0.332	4.643	0.026	0.033
1180	M128	6in Dia. Duct	Sec 5 - min	-0.254	6	-0.114	7	-0.140	5	0.459	5	-4.571	8	-3.151	5	2.395	8	-34.261	5	-0.029	5	0.032	0.327	0.225	4.571	0.004	0.017
1209	M131	6in Dia. Duct	Sec 5 - max	0.094	8	0.412	5	-0.113	6	5.824	8	-1.821	5	-1.707	7	2.180	6	-1317.657	8	-1.103	8	0.012	0.416	0.158	5.824	0.136	0.051
1765	M187	5in Dia. Duct	Sec 3 - max	0.062	7	-0.266	5	-0.061	8	-5.547	6	5.757	8	-1.090	7	1.470	6	237.203	6	0.309	6	0.009	0.457	0.117	5.757	0.043	0.036
1766	M187	5in Dia. Duct	Sec 3 - min	0.058	6	-0.295	8	-0.009	5	-5.757	8	5.547	5	-1.470	6	1.000	7	-31.177	7	-0.041	7	0.009	0.457	0.117	5.757	0.006	0.041
1940	M204	6in Dia. Duct	Sec 5 - min	0.121	2	-0.288	2	-0.098	4	-6.738	2	8.135	1	2.616	8	-6.146	5	-1045.519	5	-0.918	5	0.009	0.298	0.273	6.738	0.071	0.022
1208	M131	6in Dia. Duct	Sec 4 - min	-0.152	5	0.172	8	-0.138	7	1.726	5	-5.743	8	-2.127	6	1.842	7	-1923.049	6	-1.610	6	0.019	0.410	0.152	5.743	0.199	0.021
788	M89	6in Dia. Duct	Sec 4 - min	-0.142	6	-0.516	5	-0.216	8	-3.947	7	-4.294	6	-2.753	8	-0.303	5	-676.104	6	-0.880	6	0.021	0.341	0.216	4.294	0.121	0.071
783	M89	5in Dia. Duct	Sec 2 - max	0.080	7	0.221	8	0.221	5	4.621	6	3.980	7	0.083	5	2.540	8	1588.468	7	2.068	7	0.012	0.367	0.202	4.621	0.285	0.030
1367	M149	3in Dia. Duct	Sec 4 - max	0.507	7	-0.136	8	0.545	7	-2.848	8	3.280	7	8.442	7	-7.374	6	32.456	8	0.139	8	0.059	0.146	0.375	8.442	0.011	0.042

D-2250

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_a	f_b/σ_b	f_v/σ_v	f_t (ksi)	f_t/F_t	f_t/σ_t
425	M45	6in Dia. Duct	Sec 3 - max	0.110	8	0.469	5	-0.111	6	6.078	8	-2.831	5	-1.414	7	1.632	8	-1531.361	8	-1.282	8	0.014	0.434	0.131	6.079	0.168	0.057
426	M45	6in Dia. Duct	Sec 3 - min	-0.110	7	0.127	5	-0.130	7	2.831	5	-0.079	6	-1.832	6	1.414	7	-2100.134	5	-1.758	5	0.014	0.434	0.131	6.079	0.217	0.017
1195	M130	6in Dia. Duct	Sec 3 - max	0.061	6	0.271	5	-0.113	8	5.276	8	-0.661	5	-2.264	7	2.739	8	-758.494	8	-0.666	8	0.006	0.377	0.186	5.276	0.082	0.033
1184	M129	6in Dia. Duct	Sec 2 - min	-0.256	5	0.097	7	-0.140	5	0.601	5	-4.592	6	-2.956	5	2.502	6	-751.656	5	-0.629	5	0.032	0.335	0.211	4.592	0.076	0.017
1192	M130	6in Dia. Duct	Sec 1 - min	-0.220	5	0.234	6	-0.139	6	0.823	5	-5.055	6	-2.626	6	2.126	7	-1415.751	5	-1.165	5	0.026	0.361	0.188	5.055	0.146	0.029
780	M89	5in Dia. Duct	Sec 5 - min	-0.142	6	-0.617	5	-0.216	5	-3.931	7	-4.130	6	-2.860	6	-0.413	5	-676.104	6	-0.860	6	0.021	0.328	0.227	4.130	0.121	0.071
785	M89	6in Dia. Duct	Sec 3 - max	0.080	7	0.220	8	0.222	8	4.458	6	3.904	7	0.193	5	2.846	7	1588.466	7	2.068	7	0.012	0.354	0.210	4.458	0.285	0.031
1390	M149	3in Dia. Duct	Sec 5 - min	0.359	6	-0.204	7	0.342	6	-3.355	7	2.808	8	7.499	6	-6.642	7	28.546	5	0.122	5	0.042	0.149	0.384	8.642	0.009	0.028
1207	M131	6in Dia. Duct	Sec 4 - max	0.093	8	0.413	5	-0.114	6	5.743	8	-1.726	5	-1.642	7	2.127	6	-1317.657	8	-1.103	8	0.012	0.410	0.192	5.743	0.136	0.051
1197	M129	6in Dia. Duct	Sec 4 - max	0.000	8	0.255	6	-0.111	6	4.934	8	-0.603	5	-2.607	8	3.088	5	-205.860	6	-0.172	6	0.000	0.352	0.221	4.934	0.021	0.031
1208	M131	6in Dia. Duct	Sec 3 - min	-0.151	5	0.173	6	-0.136	5	1.530	5	-5.661	6	-2.073	6	1.578	7	-1923.049	5	-1.610	5	0.019	0.404	0.148	5.661	0.199	0.021
1178	M128	6in Dia. Duct	Sec 4 - min	-0.254	7	-0.114	7	-0.141	5	0.613	5	-4.460	6	-3.065	5	2.344	6	-34.251	5	-0.029	5	0.032	0.318	0.220	4.460	0.004	0.017
787	M89	5in Dia. Duct	Sec 4 - max	0.079	7	0.219	6	0.222	7	4.294	6	3.047	7	0.303	5	2.753	7	1568.468	7	2.068	7	0.012	0.341	0.216	4.294	0.285	0.031
435	M46	8in Dia. Duct	Sec 4 - min	-0.184	6	-0.324	5	0.111	6	-2.232	7	-2.509	6	-5.171	5	-1.066	5	-1940.300	8	-1.703	8	0.022	0.179	0.369	5.171	0.210	0.040
450	M47	8in Dia. Duct	Sec 5 - min	-0.129	6	-0.206	5	0.013	6	-3.121	7	-0.048	6	-4.643	5	-1.606	5	-1180.600	6	-1.036	6	0.016	0.223	0.332	4.643	0.128	0.026
437	M46	8in Dia. Duct	Sec 4 - max	0.163	7	0.036	8	0.332	8	2.509	6	2.232	7	1.086	5	5.171	6	13.131	5	0.012	5	0.020	0.179	0.369	5.171	0.001	0.041
1365	M149	3in Dia. Duct	Sec 3 - max	0.507	7	-0.136	8	0.646	7	-2.798	6	3.206	7	8.242	7	-7.249	6	32.456	6	0.139	6	0.059	0.142	0.356	8.242	0.011	0.042
1763	M187	5in Dia. Duct	Sec 2 - max	0.062	7	-0.256	5	-0.050	8	-5.406	5	5.596	6	-1.063	7	1.441	8	237.203	6	0.309	6	0.009	0.444	0.114	5.596	0.043	0.035
1193	M130	6in Dia. Duct	Sec 2 - max	0.050	8	0.272	5	-0.112	8	5.165	8	-0.752	5	-2.191	7	2.684	6	-798.494	8	-0.668	8	0.008	0.369	0.192	5.165	0.082	0.034
1754	M187	5in Dia. Duct	Sec 2 - min	0.057	6	-0.284	6	-0.069	5	-5.596	6	5.406	5	-1.441	6	1.053	7	-31.177	7	-0.041	7	0.008	0.444	0.114	5.596	0.006	0.041
789	M89	5in Dia. Duct	Sec 5 - max	0.079	7	0.218	6	0.222	5	4.130	6	3.931	7	0.413	5	2.860	8	1588.488	7	2.068	7	0.012	0.328	0.227	4.130	0.285	0.031
1182	M129	6in Dia. Duct	Sec 1 - min	-0.258	5	0.088	7	-0.140	5	0.459	5	-4.571	8	-2.690	6	2.450	8	-751.650	5	-0.629	6	0.032	0.327	0.206	4.571	0.078	0.017
1205	M131	6in Dia. Duct	Sec 3 - max	0.093	8	0.414	5	-0.114	6	5.601	6	-1.530	5	-1.578	7	2.073	6	-1317.657	6	-1.103	8	0.012	0.404	0.148	5.601	0.138	0.051
181	M20	5in Dia. Duct	Sec 1 - max	0.194	5	0.580	5	0.130	5	-3.293	6	4.098	8	-0.047	7	2.635	6	892.545	5	1.162	5	0.029	0.325	0.209	4.098	0.160	0.080
1368	M149	3in Dia. Duct	Sec 4 - min	0.358	8	-0.204	7	0.342	6	-3.280	7	2.648	6	7.374	6	-8.442	7	28.548	5	0.122	5	0.042	0.146	0.375	8.442	0.009	0.026
423	M45	6in Dia. Duct	Sec 2 - max	0.109	6	0.481	5	-0.112	6	5.953	8	-2.377	5	-1.276	7	1.722	6	-1531.361	8	-1.282	8	0.014	0.425	0.123	5.953	0.158	0.057
424	M45	6in Dia. Duct	Sec 2 - min	-0.109	7	0.129	8	-0.138	7	2.377	5	-5.953	8	-1.722	6	1.278	7	-2100.134	5	-1.758	5	0.014	0.425	0.123	5.953	0.217	0.017
1204	M131	6in Dia. Duct	Sec 2 - min	-0.161	5	0.174	6	-0.136	6	1.334	5	-5.579	8	-2.019	6	1.613	7	-1923.049	5	-1.610	5	0.018	0.399	0.144	5.579	0.199	0.021
111	M12	5in Dia. Duct	Sec 1 - max	0.102	6	0.239	8	-0.050	8	-5.221	5	5.379	8	1.507	5	-1.346	8	238.032	6	0.307	6	0.016	0.427	0.120	5.379	0.042	0.033
112	M12	5in Dia. Duct	Sec 1 - min	0.102	5	0.199	5	-0.067	5	-5.379	8	5.221	5	1.345	8	-1.507	5	-63.537	7	-0.083	7	0.016	0.427	0.120	5.379	0.011	0.027
2439	M254	6in Dia. Duct	Sec 5 - max	0.069	5	-0.063	5	0.156	7	0.335	6	3.764	7	3.954	7	-0.312	6	-206.352	6	-0.173	6	0.009	0.270	0.282	3.954	0.021	0.019
2440	M254	6in Dia. Duct	Sec 5 - min	-0.055	8	-0.159	8	-0.039	6	-3.784	7	-0.335	6	0.312	6	-3.954	7	-1666.024	7	-1.395	7	0.007	0.270	0.282	3.954	0.172	0.020
1185	M129	6in Dia. Duct	Sec 3 - max	0.000	8	0.256	6	-0.111	8	4.813	8	-0.542	5	-2.551	8	3.022	5	-205.860	8	-0.172	8	0.000	0.344	0.210	4.813	0.021	0.031
2200	M230	2in Dia. Duct	Sec 6 - min	0.004	8	-0.339	5	0.029	8	-14.696	5	4.347	8	0.000	1	0.000	1	-189.769	5	-2.724	5	0.014	0.544	0.000	14.696	0.175	0.022
1176	M128	6in Dia. Duct	Sec 3 - min	-0.255	5	-0.113	7	-0.141	6	0.587	5	-4.349	8	-3.018	5	2.292	8	-34.251	5	-0.029	5	0.032	0.311	0.216	4.349	0.004	0.017
1179	M128	6in Dia. Duct	Sec 5 - max	-0.050	8	0.235	6	-0.110	8	4.571	8	-0.459	5	-2.395	8	3.151	5	369.568	8	0.309	8	0.006	0.327	0.225	4.571	0.038	0.029
1383	M149	3in Dia. Duct	Sec 2 - max	0.607	7	-0.135	6	0.546	7	-2.748	6	3.131	7	8.042	7	-7.123	6	32.458	6	0.139	6	0.059	0.139	0.357	8.042	0.011	0.042
1191	M130	6in Dia. Duct	Sec 1 - max	0.050	6	0.274	5	-0.112	8	5.055	8	-0.623	5	-2.128	7	2.628	6	-798.494	8	-0.666	8	0.006	0.361	0.188	5.055	0.082	0.034
1215	M132	6in Dia. Duct	Sec 3 - max	0.079	8	-0.324	6	0.299	5	-3.740	6	5.501	7	2.128	6	-0.233	8	414.335	5	0.347	5	0.010	0.393	0.152	5.501	0.043	0.040
1216	M132	6in Dia. Duct	Sec 3 - min	-0.079	7	-0.367	5	0.087	8	-5.501	7	3.746	6	0.233	8	-2.128	5	65.682	8	0.072	8	0.010	0.393	0.152	5.501	0.009	0.044
1203	M131	6in Dia. Duct	Sec 2 - max	0.093	8	0.415	5	-0.114	8	5.579	8	-1.334	5	-1.513	7	2.019	8	-1317.657	8	-1.103	8	0.012	0.399	0.144	5.579	0.136	0.051
440	M46	8in Dia. Duct	Sec 6 - min	-0.183	6	-0.327	5	0.112	6	-2.491	7	-2.534	6	-4.902	8	-1.176	5	-1940.300	8	-1.703	8	0.022	0.181	0.350	4.902	0.310	0.040
193	M20	5in Dia. Duct	Sec 2 - max	0.194	6	0.576	5	0.133	5	-2.026	6	4.150	8	-0.036	7	2.460	8	892.545	5	1.162	5	0.029	0.329	0.195	4.150	0.160	0.079
1761	M187	5in Dia. Duct	Sec 1 - max	0.062	7	-0.255	5	-0.050	8	-5.206	5	5.435	6	-1.017	7	1.412	6	237.203	6	0.309	6	0.009	0.431	0.112	5.435	0.043	0.039
1202	M131	6in Dia. Duct	Sec 1 - min	-0.161	5	0.175	6	-0.136	5	1.137	5	-5.496	6	-1.964	6	1.449	7	-1923.049	5	-1.610	5	0.019	0.393	0.140	5.496	0.199	0.022
1762	M187	5in Dia. Duct	Sec 1 - min	0.067	6	-0.294	6	-0.069	5	-5.435	6	5.266	5	-1.412	6	1.017	7	-31.177	7	-0.041	7	0.008	0.431	0.112	5.435	0.006	0.041
798	M90	5in Dia. Duct	Sec 4 - min	-0.071	8	-0.518	5	-0.201	8	-4.682	5	-4.215	8	-2.138	8	-0.671	5	-570.018	6	-0.742	6	0.010	0.372	0.170	4.682	0.102	0.071
181	M18	5in Dia. Duct	Sec 1 - max	0.294	5	0.403	6	0.038	5	-0.155	6	2.324	7	-2.342	7	4.075	6	1003.349	5	1.306	6	0.043	0.184	0.323	4.075	0.180	0.056
439	M46	8in Dia. Duct	Sec 6 - max	0.182	7	0.036	8	0.331	8	2.534	6	2.491	7	1.176	6	4.902	8	13.131	5	0.012	6	0.020	0.181	0.350	4.902	0.001	0.041
707	M90	5in Dia. Duct	Sec 4 - max	0.063	5	0.183	8	0.211	5	4.215	8	4.682	5	0.671	5	2.138	8	1727.800	7	2.249	7	0.009	0.372	0.170	4.682	0.310	0.029
1386	M149	3in Dia. Duct	Sec 3 - min	0.358	6	-0.203	7	0.342	6	-3.206	7	2.798	6	7.249	8	-6.242	7	28.548	5	0.122	5	0.042	0.142	0.368	8.242	0.008	0.026
183	M19	6in Dia. Duct	Sec 2 - max	0.293	6	0.402	5	0.036	6	0.050	6	2.274	7	-2.328	7	4.099	6	1003.349	5	1.306	5	0.043	0.180	0.325	4.099	0.180	0.056
2437	M254	6in Dia. Duct	Sec 4 - max	0.069	5	-0.061	5	0.155	7	0.428	6	3.718	7	3.641	7	-0.340	6	-208.352	6	-0.173	6	0.009	0.265	0.274	3.841	0.021	0.019
2420	M252	6in Dia. Duct	Sec 6 - min	-0.085	8	-0.141	7	-0.033	6	-3.311	7	-0.883	8	0.001	6	-4.198	7	-287.881	7	-0.241	7	0.011	0.237	0.300	4.198	0.030	0.017
185	M19	5in Dia. Duct	Sec 3 - max	0.293	5	0.401	5	0.037	5	0.755	6	2.225	7	-2.313	7	4.123	6	1003.349	5	1.306	5	0.043	0.177	0.327	4.123	0.180	0.055
2438	M254	6in Dia. Duct	Sec 4 - min	-0.055	8	-0.158	8	-0.038	6	-3.715	7	-0.428	5	0.340	6	-3.841	7	-1666.024	7	-1.395	7	0.007	0.265	0.274	3.841	0.172	0.020
1163	M129	6in Dia. Duct	Sec 2 - max	0.000	8	0.255	6	-0.110	8	4.692	8	-0.501	5	-2.502	8	2.956	5	-205.680	6	-0.172	8	0.000	0.335	0.211	4.692	0.021	0.031
2197	M230	2in Dia. Duct	Sec 4 - max	0.190	5	-0.131	8	0.160	6	-3.537	6	12.655	5	-0.177	6	0.909	5	-38.927	8	-0.531	8	0.044	0.469	0.034	12.655	0.034	0.010
1174	M128	6in Dia. Duct	Sec 2 - min	-0.255	5	-0.112	7	-0.142	6	0.620	5	-4.236	8	-2.951	5	2.241	8	-34.251	5	-0.029	5	0.032	0.303	0.211	4.236	0.004	0.018
1177	M128	6in Dia. Duct	Sec 4 - max	-0.050	8	0.236	6	-0.109	8	4.460	8	-0.513	5	-2.344	8	3.085	5	369.568	6	0.309	6	0.006	0.319	0.220	4.460	0.035	0.029
187	M19	5in Dia. Duct	Sec 4 - max	0.293	5	0.400	5	0.037	5	0.458	6	2.178	7	-2.296	7	4.148	6	1003.349	6	1.306	5	0.043	0.173	0.329	4.148	0.160	0.055
421	M45	6in Dia. Duct	Sec 1 - max	0.109	6	0.463	5	-0.113	6	5.824	8	-1.921	6	-1.142	7	1.611	6	-1531.361	8	-1.282	8	0.014	0.416	0.116	5.824	0.158	0.057
422	M45	6in Dia. Duct	Sec 1 - min	-0.109	7	0.131	6	-0.137	7	1.921	5	-5.824	8	-1.611	6	1.142	7	-2100.134	5	-1.758	5	0.014	0.416	0.116	5.824	0.217	0.017
189	M19	5in Dia. Duct	Sec 5 - max	0.293	8	0.398	5	0.038	6	0.679	5	2.145	8	-2.282	7	4.173	6	1003.349	5	1.306	5	0.043	0.170	0.331	4.173	0.160	0.059
1201	M131	6in Dia. Duct	Sec 1 - max	0.092	8	0.416	5	-0.114	8	5.496	8	-1.137	5	-1.449	7	1.964	6	-1317.657	8	-1.103	8	0.012	0.393	0.140	5.496	0.136	0.051
2430	M253	6in Dia. Duct	Sec 5 - min	-0.068	8	-0.129	8	-0.036	8	-3.519	7	-0.098	8	0.479	6	-3.982	7	-1225.590	7	-1.026	7	0.009	0.251	0.264	3.982	0.127	0.016
195	M20	5in Dia. Duct	Sec 3 - max	0.194	6	0.573	5	0.135	6	-0.766	5	4.210	8	-0.026	7	2.284	6	892.545	5	1.162	5	0.029	0.334	0.181	4.210	0.160	0.079
2429	M253	6in Dia. Duct	Sec 6 - max	0.061	5	-0.082	5	0.193	7	0.698	6	3.518	7	3.982	7	-0.479	6	-153.457	6	-0.128	6	0.006	0.251	0.264	3.982	0.010	0.019
1381	M149	3in Dia. Duct	Sec 1 - max	0.507	7	-0.135	6	0.645	7	-2.690	6	3.057	7	7.643	7	-0.998	6	32.458	6	0.139	6	0.059	0.136	0.349	7.643	0.011	0.042
1379	M148	3in Dia. Duct	Sec 5 - max	0.294	7	-0.326	6	0.691	7	-3.601	6	4.106	7	7.347	7	-6.545	6	36.161	6	0.154	6	0.034	0.182	0.327	7.347	0.012	0.069
2419	M252	8in Dia. Duct	Sec 5 - max	0.041	5	-0.041	6	0.151	7	0.883	6	3.311	7	4.198	7	-0.601	6	-17.293	6	-0.014	6	0.005	0.237	0.300	4.198	0.002	0.019
451	M46	8in Dia. Duct	Sec 1 - max	0.207	7	0.123	8	0.447	8	-1.035	8	2.428	7	2.450	5	4.702	8	530.031	5	0.465	5	0.032	0.173	0.336	4.702	0.067	0.055
2239	M234	2in Dia. Duct	Sec 6 - max	0.331	5	-0.071	8	-0.060	8	-2.274	8	8.476	5	-1.506	8	4.096	5	8.063	5	0.110	5	0.074	0.314	0.152	8.476	0.107	0.005
1384	M149	3in Dia. Duct	Sec 2 - min	0.356	6	-0.203	7	0.342	8	-3.131	7	2.748	6	7.123	6	-8.042	7	28.546	5	0.122	5	0.042	0.139	0.357	8.042	0.009	0.026
2418	M252	8in Dia. Duct	Sec 4 - min	-0.085	8	-0.140	7	-0.033	8	-3.245	7	-0.902	6	0.617	6	-4.127	7	-287.881	7	-0.241	7	0.011	0.232	0.295	4.127	0.030	0.017
192	M20	5in Dia. Duct	Sec 1 - min	0.013	8	-0.022	8	-0.046	8	-4.088	8	3.293	5	-2.635	6	0.047	7	31.856	8	0.041	6	0.002	0.325	0.209	4.088	0.006	0.006
2435	M254	6in Dia. Duct	Sec 3 - max	0.068	5	-0.060	5	0.164	7	0.519	6	3.640	7	3.728	7	-0.307	6	-206.358	6	-0.173	6	0.009	0.261	0.250	3.728	0.021	0.019
2426	M253	6in Dia. Duct	Sec 4 - min	-0.067	6	-0.128	8	-0.035	6	-3.466	7	-0.745	6	0.496	6	-3.909	7	-1225.590	7	-1.026	7	0.008	0.248	0.279	3.909	0.127	0.016
197	M20	5in Dia. Duct	Sec 4 - max	0.194	6	0.570	5	0.138	5	0.487	5	4.277	8	-0.017	7	2.107	6	892.545	5	1.162	5	0.029	0.339	0.167	4.277	0.160	0.079
2427	M253	6in Dia. Duct	Sec 4 - max	0.061	5	-0.081	5	0.152	7	0.745	8	3.466	7	3.909	7	-0.496	6	-153.457	6	-0.128	6	0.008	0.248	0.279	3.909	0.016	0.019
1380	M148	3in Dia. Duct	Sec 5 - min	0.216	8	-0.476	7	0.592	6	-4.106	7	3.601	6	6.515	6	-7.347	7	33.102	7	0.141	7	0.026	0.162	0.327	7.347	0.011	0.046
2436	M254	6in Dia. Duct	Sec 3 - min	-0.055	8	-0.166	8	-0.037	6	-3.649	7	-0.519	6	0.367	6	-3.726	7	-1666.024	7	-1.395	7	0.007	0.261	0.288	3.726	0.172	0.019
1172	M128	6in Dia. Duct	Sec 1 - min	-0.256	5	-0.112	7	-0.142	5	0.673	5	-4.127	8	-2.803	5	2.190	8	-34.251	5	-0.029	5	0.032	0.295	0.206	4.127	0.004	0.018
1181	M129	6in Dia. Duct	Sec 1 - max	-0.001	8	0.256	6	-0.110	8	4.571	8	-0.469	5	-2.450	8	2.890	5	-205.860	8	-0.372	8	0.000	0.327	0.208	4.571	0.021	0.032
1175	M129	6in Dia. Duct	Sec 3 - max	-0.051	8	0.235	8	-0.109	8	4.349	8	-0.567	5	-2.292	8	3.018	5	369.568	8	0.309	8	0.000	0.311	0.218	4.349	0.038	0.028

D-2250

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_t	f_b/σ_a	f_{bt}/σ_a	f_r (ksi)	f_v/F_v	f_t/σ_v
2417	M252	6in Dia. Duct	Sec 4 - max	0.041	5	-0.041	8	0.150	7	0.602	6	3.245	7	4.127	7	-0.617	6	-17.293	6	-0.014	6	0.005	0.232	0.295	4.127	0.002	0.019
481	M51	6in Dia. Duct	Sec 1 - max	-0.046	1	-0.006	8	0.025	6	1.257	5	0.807	8	6.054	7	0.849	6	1313.892	4	1.153	4	0.006	0.080	0.432	6.054	0.142	0.003
482	M51	6in Dia. Duct	Sec 1 - min	-0.046	6	-0.035	6	-0.190	7	-0.807	8	-1.257	5	-0.649	6	-6.054	7	1103.694	3	0.969	3	0.006	0.080	0.432	6.054	0.120	0.025
420	M44	6in Dia. Duct	Sec 5 - min	-0.240	5	0.107	8	-0.208	7	2.027	8	-2.839	5	0.073	5	-4.127	8	294.382	7	0.246	7	0.030	0.203	0.296	4.127	0.030	0.026
2418	M252	6in Dia. Duct	Sec 3 - min	-0.084	6	-0.139	7	-0.032	5	-3.179	7	-0.921	6	0.633	6	-4.050	7	-287.681	7	-0.241	7	0.011	0.227	0.290	4.056	0.030	0.017
190	M20	6in Dia. Duct	Sec 5 - max	0.196	6	0.567	5	0.141	5	1.733	5	4.353	8	-0.009	7	1.929	6	892.645	5	1.162	5	0.029	0.345	0.153	4.353	0.160	0.078
1381	M150	3in Dia. Duct	Sec 1 - max	0.585	7	0.020	2	0.002	2	-0.923	6	1.110	7	9.200	7	-7.989	6	19.426	4	0.083	4	0.068	0.049	0.409	9.200	0.006	0.002
2426	M253	6in Dia. Duct	Sec 3 - min	-0.087	8	-0.127	8	-0.035	6	-3.414	7	-0.791	6	0.512	6	-3.837	7	-1225.590	7	-1.026	7	0.008	0.244	0.274	3.837	0.127	0.016
184	M20	5in Dia. Duct	Sec 2 - min	0.011	7	-0.026	8	-0.048	8	-4.150	8	2.028	5	-2.460	6	0.036	7	31.655	8	0.041	8	0.002	0.329	0.195	4.160	0.008	0.007
1383	M150	3in Dia. Duct	Sec 2 - max	0.585	7	0.019	2	0.002	2	-0.920	6	1.103	7	9.205	7	-7.975	6	19.426	4	0.083	4	0.068	0.049	0.409	9.205	0.006	0.001
1382	M149	3in Dia. Duct	Sec 1 - min	0.358	6	-0.202	7	0.242	5	-3.057	7	2.699	6	6.996	6	-7.643	7	28.548	5	0.122	5	0.042	0.136	0.348	7.643	0.009	0.026
1395	M150	3in Dia. Duct	Sec 3 - max	0.585	7	0.019	2	0.002	2	-0.917	6	1.097	7	9.205	7	-7.960	6	19.426	4	0.083	4	0.068	0.049	0.409	9.205	0.006	0.001
1397	M150	3in Dia. Duct	Sec 4 - max	0.585	7	0.018	2	0.002	2	-0.914	8	1.092	7	9.205	7	-7.940	6	19.426	4	0.083	4	0.068	0.049	0.409	9.205	0.006	0.001
2425	M253	6in Dia. Duct	Sec 3 - max	0.060	5	-0.079	5	0.152	7	0.791	6	3.414	7	3.837	7	-0.612	8	-193.457	6	-0.128	6	0.008	0.244	0.274	3.837	0.019	0.019
1398	M150	3in Dia. Duct	Sec 5 - max	0.585	7	0.018	2	0.002	2	-0.911	6	1.086	7	9.205	7	-7.931	6	19.426	4	0.083	4	0.066	0.048	0.409	9.205	0.006	0.001
403	M43	6in Dia. Duct	Sec 2 - max	0.084	6	0.563	5	-0.066	8	-4.152	8	4.560	5	2.519	5	-0.323	8	414.335	5	0.347	5	0.011	0.327	0.187	4.560	0.043	0.070
404	M43	6in Dia. Duct	Sec 2 - min	-0.084	7	0.231	6	-0.184	5	-4.560	5	4.152	8	-0.323	8	-2.619	5	85.682	8	0.072	8	0.011	0.327	0.187	4.560	0.009	0.029
782	M90	5in Dia. Duct	Sec 1 - min	-0.073	8	-0.612	5	-0.198	8	-3.392	7	-3.975	6	-2.490	6	-0.998	7	-570.018	8	-0.742	8	0.011	0.315	0.198	3.978	0.102	0.071
791	M90	5in Dia. Duct	Sec 1 - max	0.005	5	0.189	8	0.208	5	3.975	6	3.392	7	0.998	7	2.406	6	1727.800	7	2.248	7	0.010	0.315	0.198	3.975	0.310	0.029
2433	M254	6in Dia. Duct	Sec 2 - max	0.066	5	-0.058	6	0.154	7	0.609	6	3.583	7	3.616	7	-0.394	8	-206.352	8	-0.173	6	0.009	0.256	0.258	3.616	0.021	0.019
539	M56	6in Dia. Duct	Sec 5 - max	0.236	1	-0.108	1	0.067	5	-2.002	2	2.239	1	4.678	5	-3.884	8	-935.256	8	-0.821	8	0.029	0.160	0.334	4.678	0.101	0.024
2415	M252	6in Dia. Duct	Sec 3 - max	0.041	5	-0.040	8	0.150	7	0.921	6	3.179	7	4.056	7	-0.633	6	-17.293	8	-0.014	6	0.005	0.227	0.290	4.056	0.002	0.019
2434	M254	6in Dia. Duct	Sec 2 - min	-0.054	8	-0.165	8	-0.030	8	-3.583	7	-0.609	6	0.394	6	-3.616	7	-1666.024	7	-1.395	7	0.007	0.258	0.258	3.616	0.172	0.019
1377	M146	3in Dia. Duct	Sec 4 - max	0.294	7	-0.325	8	0.891	7	-3.541	6	3.932	7	7.020	7	-6.328	8	36.101	6	0.154	6	0.034	0.175	0.312	7.020	0.012	0.069
450	M46	8in Dia. Duct	Sec 2 - max	0.267	7	0.121	8	0.446	8	-1.019	6	2.452	7	2.367	5	4.388	8	530.031	5	0.465	5	0.032	0.175	0.313	4.388	0.057	0.055
1173	M126	6in Dia. Duct	Sec 2 - max	-0.051	8	0.234	6	-0.108	8	4.238	8	-0.020	5	-2.241	6	2.951	5	389.568	8	0.309	8	0.006	0.303	0.211	4.238	0.036	0.029
2523	M263	2in Dia. Duct	Sec 2 - max	0.130	6	-0.060	6	-0.058	8	5.849	5	-1.522	8	7.396	6	-1.472	8	0.000	1	0.000	1	0.029	0.217	0.274	7.396	0.000	0.004
2414	M252	6in Dia. Duct	Sec 2 - min	-0.084	8	-0.138	7	-0.032	6	-3.114	7	-0.940	6	0.646	6	-3.985	7	-287.661	7	-0.241	7	0.011	0.222	0.285	3.985	0.030	0.017
2424	M263	6in Dia. Duct	Sec 2 - min	-0.067	8	-0.126	8	-0.034	8	-3.362	7	-0.837	6	0.529	8	-3.766	7	-1225.590	7	-1.026	7	0.008	0.240	0.269	3.766	0.127	0.016
2198	M230	2in Dia. Duct	Sec 4 - min	0.065	8	-0.334	5	0.029	8	-12.656	6	3.637	8	-0.909	5	0.177	8	-198.789	5	-2.724	5	0.014	0.469	0.034	12.655	0.175	0.021
2423	M253	6in Dia. Duct	Sec 2 - max	0.060	5	-0.076	5	0.151	7	0.837	6	3.362	7	3.766	7	-0.529	8	-153.457	8	-0.128	8	0.006	0.240	0.269	3.766	0.018	0.019
196	M20	6in Dia. Duct	Sec 3 - min	0.009	7	-0.029	8	-0.051	8	-4.210	8	0.760	5	-2.284	6	0.020	7	31.655	8	0.041	8	0.001	0.334	0.161	4.210	0.006	0.007
1937	M204	6in Dia. Duct	Sec 4 - max	0.282	1	-0.214	1	0.092	3	-5.119	1	6.428	2	5.740	5	-2.922	8	-935.256	8	-0.821	8	0.020	0.241	0.255	5.740	0.063	0.016
452	M46	8in Dia. Duct	Sec 1 - min	-0.052	6	-0.132	5	-0.119	5	-2.428	7	1.036	5	-4.702	8	-2.450	5	-409.453	8	-0.359	8	0.006	0.173	0.336	4.702	0.044	0.016
1321	M143	8in Dia. Duct	Sec 1 - max	0.196	1	-0.146	2	0.094	6	1.499	7	-1.108	6	5.376	6	-3.466	7	-775.855	8	-0.681	8	0.024	0.107	0.384	5.376	0.084	0.018
1311	M142	8in Dia. Duct	Sec 1 - max	0.170	6	-0.176	2	-0.172	5	1.425	7	-0.637	6	5.477	6	-3.691	7	-338.465	8	-0.297	8	0.020	0.102	0.391	5.477	0.037	0.022
2413	M252	6in Dia. Duct	Sec 2 - max	0.041	6	-0.040	6	0.149	7	0.940	6	3.114	7	3.985	7	-0.646	6	-17.293	6	-0.014	6	0.005	0.222	0.285	3.985	0.002	0.018
1378	M146	3in Dia. Duct	Sec 4 - min	0.216	6	-0.476	7	0.692	8	-3.932	7	3.541	8	6.328	6	-7.020	7	33.102	7	0.141	7	0.025	0.175	0.312	7.020	0.011	0.046
1313	M142	8in Dia. Duct	Sec 2 - max	0.171	6	-0.177	2	0.173	5	1.369	7	-0.580	6	5.511	6	-3.730	7	-338.465	8	-0.297	8	0.021	0.098	0.394	5.511	0.037	0.022
1323	M143	8in Dia. Duct	Sec 2 - max	0.196	1	-0.147	2	0.094	5	1.454	7	-1.061	6	5.360	6	-3.509	7	-775.856	8	-0.681	8	0.024	0.104	0.384	5.380	0.084	0.018
1315	M142	8in Dia. Duct	Sec 3 - max	0.171	6	-0.178	2	0.173	5	1.314	7	-0.522	6	5.544	6	-3.769	7	-338.485	8	-0.297	8	0.021	0.094	0.395	5.544	0.037	0.022
2431	M254	6in Dia. Duct	Sec 1 - max	0.067	5	-0.056	5	0.153	7	0.696	6	3.519	7	3.505	7	-0.420	6	-206.352	6	-0.173	6	0.008	0.251	0.250	3.519	0.021	0.019
640	M56	6in Dia. Duct	Sec 5 - min	0.128	2	-0.217	2	-0.067	8	-2.239	1	2.002	2	3.984	8	-4.678	5	-1045.619	5	-0.918	5	0.015	0.160	0.334	4.676	0.113	0.027
1325	M143	8in Dia. Duct	Sec 3 - max	0.197	1	-0.148	2	0.085	5	1.409	7	-1.014	6	5.383	6	-3.532	7	-775.855	8	-0.681	8	0.024	0.101	0.385	5.383	0.084	0.018
1317	M142	8in Dia. Duct	Sec 4 - max	0.172	6	-0.179	2	0.174	5	1.257	7	-0.464	6	5.677	6	-3.606	7	-338.485	8	-0.297	8	0.021	0.090	0.398	5.577	0.037	0.022
182	M19	4in Dia. Duct	Sec 1 - min	-0.006	8	0.010	6	-0.051	8	-2.324	7	0.156	6	-4.075	6	2.342	7	869.702	8	1.132	8	0.001	0.184	0.323	4.075	0.156	0.007
2422	M253	6in Dia. Duct	Sec 1 - min	-0.056	8	-0.126	8	-0.033	8	-3.311	7	-0.883	6	0.545	6	-3.694	7	-1225.590	7	-1.026	7	0.008	0.237	0.264	3.694	0.127	0.015
2432	M254	6in Dia. Duct	Sec 1 - min	-0.054	6	-0.153	6	-0.036	6	-3.519	7	-0.698	6	0.420	6	-3.505	7	-1666.024	7	-1.395	7	0.007	0.251	0.250	3.519	0.172	0.019
281	M32	6in Dia. Duct	Sec 1 - max	0.092	8	0.040	6	0.081	8	4.522	6	2.975	7	1.794	6	2.431	7	0.000	1	0.000	1	0.012	0.323	0.174	4.522	0.000	0.010
2421	M253	6in Dia. Duct	Sec 1 - max	0.060	5	-0.077	5	0.151	7	0.883	6	3.311	7	3.694	7	-0.545	6	-153.457	6	-0.128	6	0.008	0.237	0.264	3.694	0.016	0.019
2412	M252	6in Dia. Duct	Sec 1 - min	-0.083	8	-0.136	7	-0.031	8	-3.049	7	-0.959	6	0.663	6	-3.914	7	-287.661	7	-0.241	7	0.011	0.218	0.280	3.914	0.030	0.017
198	M20	6in Dia. Duct	Sec 4 - min	0.007	7	-0.033	8	-0.053	8	-4.277	8	-0.487	6	-2.107	6	0.017	7	31.655	8	0.041	8	0.001	0.339	0.167	4.277	0.006	0.007
292	M32	5in Dia. Duct	Sec 1 - min	-0.060	5	-0.208	7	-0.086	5	-2.975	7	-4.522	6	-2.431	7	-1.794	6	0.000	1	0.000	1	0.011	0.323	0.174	4.522	0.000	0.028
1171	M126	6in Dia. Duct	Sec 1 - max	-0.052	8	0.234	6	-0.107	8	4.127	8	-0.073	5	-2.180	8	2.883	5	360.566	8	0.309	8	0.007	0.295	0.206	4.127	0.036	0.029
1319	M142	8in Dia. Duct	Sec 5 - max	0.172	6	-0.180	2	0.174	5	1.201	7	-0.408	8	5.611	6	-3.647	7	-338.485	8	-0.297	8	0.021	0.086	0.401	5.611	0.037	0.022
1322	M143	8in Dia. Duct	Sec 1 - min	0.133	2	-0.178	1	0.001	8	1.106	8	-1.499	7	3.466	7	-5.376	6	-878.231	5	-0.771	5	0.016	0.107	0.384	5.376	0.095	0.022
419	M44	6in Dia. Duct	Sec 5 - max	-0.074	8	0.142	5	0.209	6	2.839	5	-2.027	8	4.127	8	-0.673	5	626.635	6	0.524	6	0.009	0.203	0.295	4.127	0.065	0.026
184	M19	5in Dia. Duct	Sec 2 - min	-0.006	8	0.009	8	-0.052	8	-2.274	7	-0.050	8	-4.089	6	2.326	7	869.702	8	1.132	8	0.001	0.160	0.325	4.089	0.156	0.007
1327	M143	8in Dia. Duct	Sec 4 - max	0.197	1	-0.149	2	0.095	5	1.364	7	-0.988	6	5.387	6	-3.555	7	-776.855	8	-0.681	8	0.024	0.097	0.385	5.387	0.084	0.018
1312	M142	8in Dia. Duct	Sec 1 - min	0.107	7	-0.226	1	0.087	8	0.637	6	-1.425	7	3.691	7	-5.477	6	-409.274	5	-0.359	5	0.013	0.102	0.391	5.477	0.044	0.028
1938	M204	6in Dia. Duct	Sec 4 - min	0.123	2	-0.271	2	-0.092	4	-5.420	2	5.119	1	2.922	8	-5.740	5	-1045.519	5	-0.918	5	0.009	0.241	0.255	5.740	0.071	0.021
790	M90	5in Dia. Duct	Sec 3 - min	-0.072	8	-0.616	5	-0.200	8	-4.132	5	-4.019	8	-2.100	6	-0.626	7	-570.018	6	-0.742	6	0.011	0.328	0.167	4.132	0.102	0.071
1392	M150	3in Dia. Duct	Sec 1 - min	0.403	6	0.006	1	-0.042	1	-1.110	7	0.923	6	7.989	6	-9.206	7	15.164	3	0.065	3	0.047	0.049	0.409	9.206	0.005	0.003
1394	M150	3in Dia. Duct	Sec 2 - min	0.403	6	0.006	1	-0.042	1	-1.103	7	0.920	6	7.976	6	-9.206	7	15.154	3	0.065	3	0.047	0.049	0.408	9.205	0.003	0.003
2195	M230	2in Dia. Duct	Sec 3 - max	0.195	5	-0.126	8	0.160	5	-2.759	6	10.645	6	-0.354	8	1.816	5	-38.927	8	-0.531	8	0.043	0.394	0.067	10.645	0.034	0.010
186	M19	6in Dia. Duct	Sec 3 - min	-0.007	8	0.009	8	-0.052	8	-2.225	7	-0.255	6	-4.123	6	2.313	7	869.702	8	1.132	8	0.001	0.177	0.327	4.123	0.156	0.007
1396	M150	3in Dia. Duct	Sec 3 - min	0.403	6	0.006	1	-0.042	1	-1.097	7	0.917	6	7.960	6	-9.205	7	15.164	3	0.065	3	0.047	0.049	0.408	9.205	0.005	0.003
1398	M150	3in Dia. Duct	Sec 4 - min	0.403	6	0.005	1	-0.042	1	-1.092	7	0.914	6	7.946	6	-9.205	7	15.164	3	0.065	3	0.047	0.049	0.409	9.205	0.005	0.003
1314	M142	8in Dia. Duct	Sec 2 - min	0.107	7	-0.229	1	0.087	8	0.580	6	-1.369	7	3.730	7	-5.511	6	-409.274	5	-0.359	5	0.013	0.098	0.394	5.511	0.044	0.028
795	M90	5in Dia. Duct	Sec 3 - max	0.064	5	0.186	8	0.210	6	4.019	8	4.132	5	0.628	7	2.103	6	1727.800	7	2.249	7	0.009	0.328	0.167	4.132	0.310	0.029
1400	M150	3in Dia. Duct	Sec 5 - min	0.403	6	0.005	1	-0.042	1	-1.090	7	0.911	6	7.931	6	-9.205	7	15.154	3	0.065	3	0.047	0.048	0.409	9.205	0.005	0.003
1324	M143	8in Dia. Duct	Sec 2 - min	0.133	2	-0.179	1	0.000	8	1.061	6	-1.454	7	3.509	7	-5.360	6	-878.231	5	-0.771	5	0.016	0.104	0.384	5.380	0.095	0.022
291	M32	6in Dia. Duct	Sec 2 - max	0.091	8	0.035	8	0.083	8	4.606	6	3.451	7	1.030	6	2.288	7	0.000	1	0.000	1	0.012	0.329	0.163	4.606	0.000	0.010
2207	M231	2in Dia. Duct	Sec 4 - max	0.208	5	-0.120	8	0.046	6	-4.395	8	11.732	5	-0.148	6	0.617	5	-10.064	6	-0.137	6	0.046	0.435	0.023	11.732	0.009	0.008
294	M32	6in Dia. Duct	Sec 2 - min	-0.095	5	-0.213	7	-0.090	5	-3.451	7	-4.606	6	-2.288	7	-1.838	0	0.000	1	0.000	1	0.011	0.329	0.183	4.606	0.000	0.026
188	M19	5in Dia. Duct	Sec 4 - min	-0.008	8	0.009	8	-0.053	8	-2.176	7	-0.456	6	-4.148	6	2.298	7	869.702	8	1.132	8	0.001	0.173	0.329	4.146	0.158	0.007
1329	M143	8in Dia. Duct	Sec 5 - max	0.198	1	-0.150	2	0.095	5	1.318	7	-0.922	6	5.391	6	-3.578	7	-775.955	8	-0.681	8	0.024	0.094	0.385	5.391	0.094	0.018
1316	M142	8in Dia. Duct	Sec 3 - min	0.107	7	-0.229	1	0.086	8	0.522	6	-1.314	7	3.709	7	-5.644	6	-409.274	5	-0.359	6	0.013	0.094	0.398	5.644	0.044	0.028
190	M19	5in Dia. Duct	Sec 5 - min	-0.008	8	0.008	8	-0.053	8	-2.145	8	-0.679	5	-4.173	6	2.282	7	869.702	8	1.132	8	0.001	0.170	0.331	4.173	0.156	0.007
2411	M252	6in Dia. Duct	Sec 1 - max	0.041	5	-0.039	6	0.149	7	0.959	6	3.049	7	3.914	7	-0.663	6	-17.293	8	-0.014	6	0.006	0.216	0.260	3.914	0.002	0.018
1328	M143	8in Dia. Duct	Sec 3 - min	0.133	2	-0.179	1	0.000	8	1.014	6	-1.409	7	3.532	7	-5.383	6	-878.231	5	-0.771	5	0.016	0.101	0.385	5.383	0.095	0.022
1318	M142	8in Dia. Duct	Sec 4 - min	0.107	7	-0.230	1	0.086	8	0.484	6	-1.257	7	3.608	7	-5.577	6	-409.274	5	-0.359	5	0.013	0.090	0.398	5.577	0.044	0.028
2524	M263	2in Dia. Duct	Sec 2 - min	0.047	6	-0.210	5	-0.267	5	1.522	8	-5.849	5	1.472	8	-7.396	6	0.000	1	0.000	1	0.010	0.217	0.274	7.396	0.000	0.017
2410	M251	8in Dia. Duct	Sec 5 - min	-0.089	6	-0.149	7	-0.031	6	-3.049	7	-0.959	6	0.624	6	-3.801	7	135.563	6	0.113	6	0.011	0.218	0.272	3.801	0.014	0.018
455	M48	8in Dia. Duct	Sec 3 - max	0.267	7	0.119	8	0.445	8	-1.004	6	2.477	7	2.285	5	4.075	6	530.031	5	0.465	5	0.032	0.177	0.291	4.075	0.057	0.045

D-2250

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_c	f_{by}/σ_a	f_{bz}/σ_a		f_t (ksi)		f_v/v_t	f_t/σ_t	
1320	M142	8in Dia. Duct	Sec 5 - min	0.107	7	-0.230	1	0.085	6	0.406	6	-1.201	7	3.847	7	-5.611	6	-409.274	5	-0.358	5	0.013	0.086	0.401	[illegible]	5.611	[illegible]	0.044	0.028	[illegible]
200	M20	5in Dia. Duct	Sec 5 - min	0.005	7	-0.036	8	-0.056	8	-4.353	6	-1.733	5	-1.929	6	0.009	7	31.655	8	0.041	8	0.001	0.345	0.163	[illegible]	4.355	[illegible]	0.006	0.008	[illegible]
2240	M234	2in Dia. Duct	Sec 5 - min	0.150	6	-0.281	5	-0.183	7	-8.478	5	2.274	8	-4.095	5	1.588	8	-0.009	8	0.000	8	0.033	0.314	0.152	[illegible]	8.478	[illegible]	0.000	0.018	[illegible]
531	M56	8in Dia. Duct	Sec 1 - max	0.202	1	-0.145	2	0.045	5	1.391	2	-1.211	1	5.254	6	-3.408	7	-935.256	8	-0.821	8	0.024	0.099	0.379	[illegible]	5.254	[illegible]	0.101	0.016	[illegible]
1376	M148	3in Dia. Duct	Sec 3 - max	0.294	7	-0.325	6	0.892	7	-3.422	6	3.758	7	6.693	7	-6.111	8	35.181	8	0.154	6	0.034	0.167	0.297	[illegible]	6.693	[illegible]	0.012	0.069	[illegible]
295	M32	6in Dia. Duct	Sec 3 - max	0.090	8	0.030	6	0.085	6	4.679	6	3.937	7	1.471	6	2.140	7	0.000	1	0.000	1	0.011	0.334	0.153	[illegible]	4.679	[illegible]	0.000	0.011	[illegible]
1328	M143	8in Dia. Duct	Sec 4 - min	0.133	2	-0.179	1	0.000	8	0.968	6	-1.364	7	3.555	7	-5.387	6	-876.231	5	-0.771	5	0.016	0.087	0.365	[illegible]	5.387	[illegible]	0.095	0.022	[illegible]
298	M32	6in Dia. Duct	Sec 3 - min	-0.084	5	-0.218	7	-0.093	5	-3.937	7	-4.679	8	-2.140	7	-1.471	6	0.000	1	0.000	1	0.011	0.334	0.153	[illegible]	4.679	[illegible]	0.000	0.027	[illegible]
2188	M229	2in Dia. Duct	Sec 6 - max	0.166	5	-0.086	6	0.040	5	-2.900	8	12.411	5	0.000	1	0.000	1	10.134	6	0.136	6	0.037	0.460	0.000	[illegible]	12.411	[illegible]	0.008	0.006	[illegible]
794	M90	5in Dia. Duct	Sec 2 - min	-0.072	6	-0.514	5	-0.199	6	-3.583	5	-3.820	8	-2.300	6	-0.812	7	-570.018	6	-0.742	6	0.011	0.303	0.163	[illegible]	3.820	[illegible]	0.102	0.071	[illegible]
1330	M143	8in Dia. Duct	Sec 5 - min	0.133	2	-0.180	1	0.000	8	0.922	6	-1.318	7	3.570	7	-5.391	6	-876.231	5	-0.771	5	0.015	0.094	0.365	[illegible]	5.391	[illegible]	0.095	0.022	[illegible]
793	M90	5in Dia. Duct	Sec 2 - max	0.064	5	0.187	8	0.209	5	3.820	8	3.583	5	0.812	7	2.300	6	1727.800	7	2.249	7	0.009	0.303	0.163	[illegible]	3.820	[illegible]	0.310	0.029	[illegible]
454	M48	8in Dia. Duct	Sec 2 - min	-0.051	8	-0.133	5	-0.118	5	-2.452	7	1.019	6	-4.388	8	-2.367	6	-409.453	8	-0.359	8	0.006	0.175	0.313	[illegible]	4.388	[illegible]	0.044	0.016	[illegible]
299	M32	6in Dia. Duct	Sec 5 - max	0.087	8	0.020	6	0.090	8	4.793	6	4.943	7	1.127	6	1.828	7	0.000	1	0.000	1	0.011	0.353	0.131	[illegible]	4.943	[illegible]	0.000	0.011	[illegible]
301	M33	6in Dia. Duct	Sec 1 - max	0.087	8	0.271	6	0.090	8	4.793	8	4.943	7	1.127	6	1.828	7	0.000	1	0.000	1	0.011	0.353	0.131	[illegible]	4.943	[illegible]	0.000	0.033	[illegible]
300	M32	6in Dia. Duct	Sec 5 - min	-0.081	5	-0.228	7	-0.098	6	-4.943	7	-4.793	6	-1.828	7	-1.127	6	0.000	1	0.000	1	0.010	0.353	0.131	[illegible]	4.943	[illegible]	0.000	0.028	[illegible]
302	M33	6in Dia. Duct	Sec 1 - min	-0.081	5	-0.270	5	-0.098	5	-4.943	7	-4.793	6	-1.828	7	-1.127	6	0.000	1	0.000	1	0.010	0.353	0.131	[illegible]	4.943	[illegible]	0.000	0.033	[illegible]
81	M10	3in Dia. Duct	Sec 1 - max	0.564	7	0.018	2	-0.248	8	0.324	2	-0.291	1	9.264	7	-7.970	6	10.088	4	0.043	4	0.066	0.014	0.412	[illegible]	9.264	[illegible]	0.003	0.019	[illegible]
297	M32	6in Dia. Duct	Sec 4 - max	0.088	8	0.025	6	0.088	8	4.741	6	4.435	7	1.392	6	1.987	7	0.000	1	0.000	1	0.011	0.339	0.142	[illegible]	4.741	[illegible]	0.000	0.011	[illegible]
2409	M251	6in Dia. Duct	Sec 5 - max	0.016	5	0.020	6	0.149	7	0.959	8	3.049	7	3.801	7	-0.624	8	628.821	7	0.528	7	0.002	0.218	0.272	[illegible]	3.801	[illegible]	0.085	0.018	[illegible]
296	M32	6in Dia. Duct	Sec 4 - min	-0.082	5	-0.223	7	-0.095	5	-4.435	7	-4.741	6	-1.907	7	-1.302	6	0.000	1	0.000	1	0.010	0.339	0.142	[illegible]	4.741	[illegible]	0.000	0.025	[illegible]
532	M56	8in Dia. Duct	Sec 1 - min	0.135	2	-0.172	1	-0.046	5	1.211	1	-1.391	2	3.408	7	-5.254	6	-1045.519	5	-0.918	5	0.016	0.099	0.376	[illegible]	5.254	[illegible]	0.113	0.021	[illegible]
2408	M251	6in Dia. Duct	Sec 4 - min	-0.068	8	-0.146	7	-0.031	6	-2.978	7	-0.950	6	0.638	6	-3.731	7	135.563	6	0.113	6	0.011	0.213	0.267	[illegible]	3.731	[illegible]	0.014	0.016	[illegible]
1376	M148	3in Dia. Duct	Sec 3 - min	0.218	6	-0.475	7	0.592	8	-3.758	7	3.422	6	6.111	6	-6.693	7	33.102	7	0.141	7	0.025	0.167	0.297	[illegible]	6.693	[illegible]	0.011	0.046	[illegible]
2069	M217	3in Dia. Duct	Sec 5 - max	0.084	5	-0.062	8	-0.013	5	-1.000	8	1.011	5	-2.052	5	9.723	8	-0.980	8	-0.030	8	0.010	0.045	0.432	[illegible]	9.723	[illegible]	0.002	0.005	[illegible]
2071	M218	3in Dia. Duct	Sec 1 - max	0.084	5	0.056	5	0.471	6	-1.000	8	1.011	5	-2.052	5	9.723	8	-0.980	8	-0.030	8	0.010	0.045	0.432	[illegible]	9.723	[illegible]	0.002	0.036	[illegible]
1301	M141	8in Dia. Duct	Sec 1 - max	0.122	8	-0.217	2	0.221	1	1.245	7	-0.243	6	5.323	6	-3.690	7	207.770	2	0.182	2	0.015	0.089	0.380	[illegible]	5.323	[illegible]	0.022	0.027	[illegible]
1303	M141	8in Dia. Duct	Sec 2 - max	0.123	6	-0.218	2	0.221	1	1.178	7	-0.108	6	5.378	6	-3.738	7	207.770	2	0.182	2	0.015	0.084	0.384	[illegible]	5.378	[illegible]	0.022	0.027	[illegible]
1305	M141	8in Dia. Duct	Sec 3 - max	0.123	6	-0.219	2	0.222	1	1.110	7	-0.093	6	5.432	6	-3.786	7	207.770	2	0.182	2	0.015	0.079	0.388	[illegible]	5.432	[illegible]	0.022	0.027	[illegible]
2407	M251	6in Dia. Duct	Sec 4 - max	0.017	5	0.020	6	0.148	7	0.950	6	2.978	7	3.731	7	-0.638	6	628.821	7	0.528	7	0.002	0.213	0.267	[illegible]	3.731	[illegible]	0.065	0.018	[illegible]
1307	M141	6in Dia. Duct	Sec 4 - max	0.123	6	-0.220	2	0.223	1	1.042	7	-0.018	6	5.487	6	-3.834	7	207.770	2	0.182	2	0.015	0.074	0.392	[illegible]	5.487	[illegible]	0.022	0.028	[illegible]
1309	M141	8in Dia. Duct	Sec 5 - max	0.124	6	-0.221	2	0.223	1	0.973	7	0.058	6	5.542	8	-3.882	7	207.770	2	0.182	2	0.015	0.070	0.396	[illegible]	5.542	[illegible]	0.022	0.028	[illegible]
2406	M251	6in Dia. Duct	Sec 3 - min	-0.086	8	-0.147	7	-0.030	6	-2.908	7	-0.940	6	0.653	6	-3.660	7	135.563	6	0.113	6	0.011	0.208	0.261	[illegible]	3.660	[illegible]	0.014	0.018	[illegible]
457	M48	8in Dia. Duct	Sec 4 - max	0.268	7	0.117	8	0.443	8	-0.989	8	2.503	7	2.204	5	3.763	8	530.031	5	0.465	5	0.032	0.179	0.209	[illegible]	3.763	[illegible]	0.057	0.055	[illegible]
2070	M217	3in Dia. Duct	Sec 5 - min	-0.023	8	-0.062	5	-0.143	8	-1.011	5	1.000	8	-9.723	8	2.652	5	-7.691	5	-0.033	6	0.003	0.045	0.432	[illegible]	9.723	[illegible]	0.003	0.011	[illegible]
2072	M218	3in Dia. Duct	Sec 1 - min	-0.023	6	0.051	8	0.122	7	-1.011	5	1.000	8	-9.723	8	2.652	5	-7.691	5	-0.033	5	0.003	0.045	0.432	[illegible]	9.723	[illegible]	0.003	0.009	[illegible]
2206	M231	2in Dia. Duct	Sec 4 - min	0.092	8	-0.285	5	0.011	8	-11.732	5	4.395	8	-0.617	5	0.146	8	-64.216	7	-0.875	7	0.020	0.435	0.023	[illegible]	11.732	[illegible]	0.056	0.018	[illegible]
1302	M141	8in Dia. Duct	Sec 1 - min	0.082	7	-0.292	1	0.147	2	0.243	8	-1.245	7	3.690	7	-5.323	6	140.992	1	0.124	1	0.007	0.089	0.380	[illegible]	5.323	[illegible]	0.015	0.006	[illegible]
2190	M230	2in Dia. Duct	Sec 3 - min	0.067	8	-0.329	5	0.029	8	-10.645	5	2.768	8	-1.018	5	0.354	8	-199.789	6	-2.724	5	0.015	0.394	0.087	[illegible]	10.645	[illegible]	0.175	0.021	[illegible]
1373	M148	3in Dia. Duct	Sec 2 - max	0.294	7	-0.324	6	0.892	7	-3.300	6	3.564	7	6.366	7	-5.894	6	35.161	6	0.154	6	0.034	0.159	0.283	[illegible]	6.366	[illegible]	0.012	0.069	[illegible]
1304	M141	8in Dia. Duct	Sec 2 - min	0.062	7	-0.293	1	0.147	2	0.160	6	-1.178	7	3.738	7	-5.378	6	140.992	1	0.124	1	0.007	0.084	0.384	[illegible]	5.378	[illegible]	0.015	0.036	[illegible]
1306	M141	8in Dia. Duct	Sec 3 - min	0.062	7	-0.294	1	0.146	2	0.093	6	-1.110	7	3.788	7	-5.432	6	140.992	1	0.124	1	0.007	0.079	0.388	[illegible]	5.432	[illegible]	0.015	0.036	[illegible]
456	M48	8in Dia. Duct	Sec 3 - min	-0.040	8	-0.134	6	-0.116	5	-2.477	7	1.004	8	-4.075	8	-2.285	5	-409.453	8	-0.359	8	0.006	0.177	0.291	[illegible]	4.075	[illegible]	0.044	0.017	[illegible]
1092	M120	6in Dia. Duct	Sec 1 - min	-0.175	5	-0.108	6	-0.175	8	-2.531	5	-2.130	8	-3.793	5	-3.029	8	-422.130	6	-0.353	6	0.022	0.181	0.271	[illegible]	3.793	[illegible]	0.044	0.022	[illegible]
1308	M141	8in Dia. Duct	Sec 4 - min	0.062	7	-0.294	1	0.145	2	0.018	6	-1.042	7	3.834	7	-5.487	6	140.992	1	0.124	1	0.007	0.074	0.392	[illegible]	5.487	[illegible]	0.015	0.036	[illegible]
1090	M119	6in Dia. Duct	Sec 6 - min	-0.166	5	-0.239	6	-0.137	8	-3.845	5	-3.254	6	-2.494	5	-1.770	6	-302.094	6	-0.253	6	0.021	0.275	0.176	[illegible]	3.845	[illegible]	0.031	0.030	[illegible]
1310	M141	8in Dia. Duct	Sec 5 - min	0.062	7	-0.295	1	0.145	2	-0.058	6	-0.973	7	3.882	7	-5.542	6	140.992	1	0.124	1	0.007	0.070	0.396	[illegible]	5.542	[illegible]	0.015	0.036	[illegible]
1094	M120	6in Dia. Duct	Sec 2 - min	-0.176	5	-0.109	6	-0.175	6	-2.516	5	-2.104	8	-3.777	5	-3.008	8	-422.130	6	-0.353	6	0.022	0.180	0.270	[illegible]	3.777	[illegible]	0.044	0.022	[illegible]
1089	M119	6in Dia. Duct	Sec 5 - max	0.148	8	0.165	7	0.127	7	3.254	8	3.845	5	1.770	8	2.494	5	57.844	7	0.048	7	0.019	0.275	0.176	[illegible]	3.845	[illegible]	0.006	0.023	[illegible]
2405	M251	8in Dia. Duct	Sec 3 - max	0.017	5	0.020	6	0.148	7	0.940	6	2.908	7	3.660	7	-0.653	6	628.821	7	0.520	7	0.002	0.208	0.261	[illegible]	3.660	[illegible]	0.065	0.018	[illegible]
92	M10	3in Dia. Duct	Sec 1 - min	0.384	6	0.000	1	-0.305	7	0.291	1	-0.324	2	7.978	6	-9.264	7	5.736	3	0.024	3	0.045	0.014	0.412	[illegible]	9.264	[illegible]	0.002	0.023	[illegible]
2404	M251	8in Dia. Duct	Sec 2 - min	-0.087	8	-0.146	7	-0.030	8	-2.839	7	-0.931	6	0.667	6	-3.591	7	135.563	6	0.113	8	0.011	0.203	0.257	[illegible]	3.591	[illegible]	0.014	0.018	[illegible]
320	M34	6in Dia. Duct	Sec 5 - min	-0.208	5	-0.098	7	-0.118	8	-2.565	7	-0.864	6	-3.650	6	-2.302	7	-444.321	6	-0.372	5	0.026	0.183	0.261	[illegible]	3.650	[illegible]	0.048	0.014	[illegible]
1091	M120	6in Dia. Duct	Sec 1 - max	0.146	8	0.080	7	0.162	7	2.130	8	2.531	5	3.029	8	3.793	5	98.528	7	0.081	7	0.018	0.181	0.271	[illegible]	3.793	[illegible]	0.010	0.020	[illegible]
1096	M120	6in Dia. Duct	Sec 3 - min	-0.176	5	-0.106	6	-0.175	6	-2.501	5	-2.079	8	-3.761	5	-2.987	8	-422.130	6	-0.353	6	0.022	0.179	0.269	[illegible]	3.761	[illegible]	0.044	0.022	[illegible]
2190	M229	2in Dia. Duct	Sec 5 - min	0.044	6	-0.253	5	-0.001	8	-12.411	5	2.900	6	0.000	1	0.000	1	-61.838	7	-0.043	7	0.010	0.460	0.000	[illegible]	12.411	[illegible]	0.054	0.018	[illegible]
1088	M119	6in Dia. Duct	Sec 4 - min	-0.166	6	-0.238	6	-0.137	6	-3.804	5	-3.233	6	-2.471	5	-1.751	6	-302.094	6	-0.253	6	0.021	0.272	0.177	[illegible]	3.804	[illegible]	0.031	0.029	[illegible]
1093	M120	6in Dia. Duct	Sec 2 - max	0.146	8	0.079	7	0.161	7	2.104	8	2.516	5	3.008	8	3.777	5	98.528	7	0.081	7	0.018	0.180	0.270	[illegible]	3.777	[illegible]	0.010	0.020	[illegible]
1374	M148	3in Dia. Duct	Sec 2 - min	0.218	6	-0.475	7	0.402	6	-3.564	7	3.303	6	5.694	6	-6.366	7	33.102	7	0.141	7	0.025	0.159	0.283	[illegible]	6.366	[illegible]	0.011	0.046	[illegible]
1098	M120	6in Dia. Duct	Sec 4 - min	-0.178	5	-0.108	6	-0.175	6	-2.487	5	-2.063	8	-3.745	5	-2.960	8	-422.130	6	-0.353	6	0.022	0.178	0.266	[illegible]	3.745	[illegible]	0.044	0.022	[illegible]
1087	M119	6in Dia. Duct	Sec 4 - max	0.148	8	0.186	7	0.127	7	3.233	8	3.804	5	1.751	6	2.471	5	57.844	7	0.048	7	0.019	0.272	0.177	[illegible]	3.804	[illegible]	0.000	0.023	[illegible]
341	M37	5in Dia. Duct	Sec 1 - max	0.015	7	0.060	6	0.030	8	2.562	6	3.069	7	1.982	5	2.777	8	1207.213	7	1.571	7	0.002	0.244	0.220	[illegible]	3.069	[illegible]	0.217	0.009	[illegible]
342	M37	5in Dia. Duct	Sec 1 - min	-0.016	6	0.060	2	-0.030	5	-3.069	7	-2.562	6	-2.777	8	-1.982	6	606.010	6	0.894	6	0.002	0.244	0.220	[illegible]	3.069	[illegible]	0.123	0.008	[illegible]
1095	M120	6in Dia. Duct	Sec 3 - max	0.146	8	0.078	7	0.161	7	2.079	8	2.501	5	2.987	8	3.761	5	98.528	7	0.081	7	0.018	0.179	0.269	[illegible]	3.761	[illegible]	0.010	0.020	[illegible]
1100	M120	6in Dia. Duct	Sec 5 - min	-0.177	5	-0.108	6	-0.175	6	-2.473	5	-2.027	8	-3.730	5	-2.945	8	-422.130	6	-0.353	8	0.022	0.177	0.266	[illegible]	3.730	[illegible]	0.044	0.022	[illegible]
2193	M230	2in Dia. Duct	Sec 2 - max	0.193	5	-0.121	8	0.150	5	-2.009	8	8.060	5	-0.531	6	2.727	5	-38.927	8	-0.531	6	0.043	0.321	0.101	[illegible]	8.666	[illegible]	0.034	0.510	[illegible]
1086	M119	6in Dia. Duct	Sec 3 - min	-0.166	5	-0.238	6	-0.137	6	-3.764	5	-3.212	6	-2.440	5	-1.732	8	-302.094	6	-0.253	6	0.021	0.269	0.176	[illegible]	3.764	[illegible]	0.031	0.029	[illegible]
1097	M120	6in Dia. Duct	Sec 4 - max	0.145	8	0.078	7	0.161	7	2.053	8	2.487	5	2.966	8	3.745	5	98.528	7	0.081	7	0.018	0.178	0.268	[illegible]	3.745	[illegible]	0.010	0.020	[illegible]
1085	M119	6in Dia. Duct	Sec 3 - max	0.149	8	0.187	7	0.126	7	3.212	8	3.764	5	1.732	8	2.448	5	57.844	7	0.048	7	0.019	0.269	0.176	[illegible]	3.764	[illegible]	0.006	0.023	[illegible]
2403	M251	6in Dia. Duct	Sec 2 - max	0.017	5	0.020	6	0.147	7	0.931	6	2.839	7	3.591	7	-0.667	6	628.821	7	0.526	7	0.002	0.203	0.257	[illegible]	3.591	[illegible]	0.065	0.018	[illegible]
1099	M120	6in Dia. Duct	Sec 5 - max	0.145	8	0.077	7	0.161	7	2.027	6	2.473	5	2.945	8	3.730	5	98.528	7	0.081	7	0.018	0.177	0.266	[illegible]	3.730	[illegible]	0.010	0.020	[illegible]
2402	M251	6in Dia. Duct	Sec 1 - min	-0.087	8	-0.145	7	-0.029	6	-2.770	7	-0.921	6	0.681	6	-3.621	7	135.563	6	0.113	6	0.011	0.198	0.252	[illegible]	3.621	[illegible]	0.014	0.018	[illegible]
1084	M119	6in Dia. Duct	Sec 2 - min	-0.165	5	-0.236	6	-0.137	6	-3.723	5	-3.191	8	-2.425	5	-1.713	8	-302.094	6	-0.253	6	0.021	0.260	0.173	[illegible]	3.723	[illegible]	0.031	0.029	[illegible]
459	M48	8in Dia. Duct	Sec 6 - max	0.268	7	0.115	8	0.442	8	-0.974	6	2.532	7	2.124	5	3.453	8	530.031	5	0.465	5	0.032	0.181	0.247	[illegible]	3.453	[illegible]	0.057	0.055	[illegible]
1213	M132	6in Dia. Duct	Sec 2 - max	0.078	6	-0.319	8	0.298	5	-2.985	6	4.799	7	1.484	5	-0.042	8	414.335	5	0.347	5	0.010	0.343	0.106	[illegible]	4.799	[illegible]	0.043	0.039	[illegible]
1214	M132	6in Dia. Duct	Sec 2 - min	-0.078	7	-0.352	5	0.069	8	-1.799	7	2.985	6	0.042	8	-1.484	5	85.682	8	0.072	6	0.010	0.343	0.106	[illegible]	4.799	[illegible]	0.009	0.043	[illegible]
1083	M119	6in Dia. Duct	Sec 2 - max	0.149	8	0.188	7	0.126	7	3.191	8	3.723	5	1.713	8	2.425	5	57.844	7	0.048	7	0.019	0.260	0.173	[illegible]	3.723	[illegible]	0.006	0.023	[illegible]
1751	M186	5in Dia. Duct	Sec 1 - max	0.109	5	-0.020	5	-0.021	8	3.694	8	-1.007	5	1.858	5	-0.139	8	15.687	8	0.020	8	0.016	0.293	0.147	[illegible]	3.694	[illegible]	0.003	0.003	[illegible]
319	M34	6in Dia. Duct	Sec 5 - max	0.097	6	0.027	6	0.104	5	0.864	5	2.565	7	2.302	7	3.650	6	113.974	7	0.095	7	0.012	0.163	0.261	[illegible]	3.650	[illegible]	0.012	0.013	[illegible]
1752	M186	5in Dia. Duct	Sec 1 - min	0.103	6	-0.134	8	-0.097	5	1.007	5	-3.694	8	0.139	8	-1.858	5	-156.806	5	-0.204	5	0.015	0.293	0.147	[illegible]	3.694	[illegible]	0.028	0.018	[illegible]
1082	M119	6in Dia. Duct	Sec 1 - min	-0.165	5	-0.236	6	-0.138	6	-3.683	5	-3.169	8	-2.403	5	-1.695	8	-302.094	6	-0.253	6	0.021	0.263	0.172	[illegible]	3.683	[illegible]	0.031	0.029	[illegible]
1371	M148	3in Dia. Duct	Sec 1 - max	0.294	7	-0.324	6	0.892	7	-3.184	6	3.410	7	6.039	7	-5.677	6	35.161	6	0.154	6	0.034	0.152	0.268	[illegible]	6.039	[illegible]	0.012	0.089	[illegible]
1081	M119	6in Dia. Duct	Sec 1 - max	0.149	8	0.188	7	0.126	7	3.169	8	3.683	5	1.695	8	2.403	5	57.844	7	0.048	7	0.019	0.263	0.172	[illegible]	3.683	[illegible]	0.006	0.023	[illegible]
458	M48	8in Dia. Duct	Sec 4 - min	-0.046	6	-0.136	5	-0.115	5	-2.503	7	0.989	6	-3.763	8	-2.204	5	-409.453	8	-0.369	8	0.006	0.179	0.208	[illegible]	3.763	[illegible]	0.044	0.017	[illegible]
2467	M269	6in Dia. Duct	Sec 4 - max	0.093	5	-0.104	6	0.070	6	-2.784	6	4.400	7	0.958	6	1.771	7	-179.120	6	-0.150	6	0.012	0.315	0.127	[illegible]	4.406	[illegible]	0.019	0.013	[illegible]

D-2250

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_t/σ_y	f_b/σ_y	f_s/σ_y	f_t (ksi)	f_t/σ_y	f_t/σ_y
2491	M251	8in Dia. Duct	Sec 1 - max	0.017	6	0.020	6	0.147	7	0.921	6	2.770	7	3.521	7	-0.681	6	638.621	7	0.526	7	0.002	0.198	0.252	3.521	0.066	0.018
2545	M285	2in Dia. Duct	Sec 3 - max	0.156	5	-0.111	8	-0.127	6	5.036	5	-1.969	8	8.193	5	-2.247	8	0.000	1	0.000	1	0.015	0.187	0.229	8.193	0.000	0.008
343	M37	6in Dia. Duct	Sec 2 - max	0.014	7	0.055	5	0.029	8	2.700	6	2.931	7	1.913	5	2.708	8	1207.213	7	1.571	7	0.002	0.233	0.216	2.931	0.217	0.008
344	M37	6in Dia. Duct	Sec 2 - min	-0.014	6	0.055	2	-0.028	6	-2.931	7	-2.700	6	-2.708	8	-1.913	5	686.910	6	0.894	6	0.002	0.233	0.216	2.931	0.123	0.009
1753	M186	6in Dia. Duct	Sec 2 - max	0.110	5	-0.020	5	-0.021	8	3.820	8	-0.996	5	1.905	5	-0.126	8	15.687	8	0.020	8	0.016	0.267	0.143	3.820	0.003	0.003
600	M69	12in Dia. Duct	Sec 3 - min	-0.258	1	-0.192	2	-0.088	3	6.758	1	-6.860	2	-2.625	6	0.730	7	+1879.512	6	-0.616	6	0.019	0.311	0.117	6.990	0.017	0.015
1754	M186	6in Dia. Duct	Sec 2 - min	0.103	8	-0.134	8	-0.097	5	0.990	5	-3.520	6	0.126	8	-1.905	5	+156.808	5	-0.204	5	0.015	0.287	0.143	3.620	0.028	0.018
2488	M259	6in Dia. Duct	Sec 4 - min	-0.035	8	-0.188	7	-0.010	7	-4.406	7	2.784	6	-1.771	7	-0.958	6	-326.274	7	-0.272	7	0.004	0.315	0.127	4.406	0.034	0.021
1372	M148	3in Dia. Duct	Sec 1 - min	0.215	6	-0.474	7	0.592	8	-3.410	7	3.184	6	5.677	6	-0.039	7	33.102	7	0.141	7	0.026	0.152	0.265	5.039	0.011	0.046
2099	M220	3in Dia. Duct	Sec 5 - max	0.244	6	0.006	5	0.216	8	0.078	5	0.000	8	9.299	6	-2.592	7	-15.506	8	-0.066	8	0.028	0.003	0.413	9.299	0.005	0.017
2097	M220	3in Dia. Duct	Sec 4 - max	0.244	6	0.007	5	0.216	6	0.075	5	0.000	8	9.300	6	-2.530	7	-15.506	6	-0.066	8	0.028	0.003	0.413	9.300	0.005	0.017
2089	M219	3in Dia. Duct	Sec 5 - max	0.170	6	0.006	5	0.405	6	0.286	5	-0.090	8	9.300	6	-2.344	7	-11.397	8	-0.049	8	0.020	0.011	0.413	9.300	0.004	0.031
2095	M220	3in Dia. Duct	Sec 3 - max	0.244	6	0.007	5	0.216	8	0.071	5	0.002	8	9.300	6	-2.408	7	-15.506	8	-0.066	8	0.028	0.003	0.413	9.300	0.005	0.017
349	M37	6in Dia. Duct	Sec 5 - max	0.011	7	0.042	5	0.021	8	3.053	6	2.678	7	1.737	5	2.831	8	1207.213	7	1.571	7	0.002	0.242	0.201	3.053	0.217	0.006
350	M37	6in Dia. Duct	Sec 5 - min	-0.011	8	0.042	2	-0.021	8	-2.678	7	-3.053	6	-2.531	8	-1.737	5	686.910	6	0.894	6	0.002	0.242	0.201	3.053	0.123	0.006
2093	M220	3in Dia. Duct	Sec 2 - max	0.244	6	0.008	5	0.216	8	0.067	5	0.003	8	9.300	8	-2.409	7	-15.506	8	-0.066	8	0.028	0.003	0.413	9.300	0.005	0.017
1935	M204	6in Dia. Duct	Sec 3 - max	0.254	1	-0.208	1	0.060	3	-4.132	1	4.202	2	5.300	5	-3.302	8	-935.256	8	-0.821	8	0.020	0.187	0.234	5.369	0.003	0.016
2091	M220	3in Dia. Duct	Sec 1 - max	0.244	6	0.008	5	0.217	8	0.063	5	0.005	8	9.300	6	-2.344	7	-15.506	8	-0.066	8	0.028	0.003	0.413	9.300	0.005	0.017
537	M68	6in Dia. Duct	Sec 4 - max	0.228	1	-0.190	1	0.062	6	-1.028	2	1.335	1	4.502	6	-4.160	7	-935.256	8	-0.821	8	0.027	0.095	0.322	4.502	0.101	0.023
1050	M115	6in Dia. Duct	Sec 5 - min	-0.113	5	-0.252	5	-0.107	6	-3.869	5	-3.330	8	-2.141	5	-1.354	6	+108.093	6	-0.090	6	0.014	0.276	0.153	3.869	0.011	0.031
1079	M118	6in Dia. Duct	Sec 5 - max	0.111	8	0.193	8	0.098	7	3.330	6	3.869	5	1.354	6	2.141	5	16.797	7	0.014	7	0.014	0.276	0.153	3.869	0.002	0.024
76	M8	6in Dia. Duct	Sec 4 - min	-0.338	1	-0.165	8	-0.216	8	-2.820	1	2.709	2	-2.751	8	0.936	5	83.143	7	0.070	7	0.043	0.302	0.197	2.826	0.009	0.027
2101	M221	3in Dia. Duct	Sec 1 - max	0.225	6	0.006	5	0.066	8	-0.043	5	0.051	8	9.299	6	-2.592	7	-14.328	8	-0.061	8	0.026	0.002	0.413	9.299	0.005	0.006
672	M70	12in Dia. Duct	Sec 1 - min	-0.143	1	-0.373	2	-0.158	3	6.447	6	-6.527	7	-3.073	6	1.501	7	-2480.349	6	-0.115	6	0.010	0.295	0.137	6.627	0.009	0.029
69	M8	3in Dia. Duct	Sec 5 - max	0.154	7	-0.378	6	0.907	7	-3.337	6	3.562	7	5.952	7	-5.589	5	34.434	6	0.147	6	0.018	0.158	0.265	5.952	0.011	0.076
347	M37	6in Dia. Duct	Sec 4 - max	0.012	7	0.047	6	0.020	5	2.946	8	2.565	7	1.791	5	2.565	8	1207.213	7	1.571	7	0.002	0.234	0.205	2.946	0.217	0.006
346	M37	6in Dia. Duct	Sec 4 - min	-0.012	5	0.047	2	-0.023	6	-2.865	7	-2.946	6	-2.565	8	-1.791	5	686.910	6	0.894	6	0.002	0.234	0.205	2.946	0.123	0.009
303	M33	6in Dia. Duct	Sec 2 - max	0.008	5	0.284	8	0.094	8	4.211	6	4.376	7	0.882	6	1.606	7	0.000	1	0.000	1	0.011	0.313	0.115	4.376	0.000	0.033
304	M33	6in Dia. Duct	Sec 2 - min	-0.080	6	-0.277	6	-0.101	8	-4.376	7	-4.211	6	-1.606	7	-0.882	6	0.000	1	0.000	1	0.010	0.313	0.115	4.376	0.000	0.034
90	M9	2in Dia. Duct	Sec 5 - min	0.123	6	-0.545	7	0.865	8	-3.552	7	3.337	6	5.569	6	-5.952	7	30.854	7	0.132	7	0.014	0.158	0.265	5.952	0.010	0.051
2194	M230	2in Dia. Duct	Sec 2 - min	0.068	6	-0.324	6	0.029	8	-9.666	5	2.000	8	-2.727	5	0.531	6	+199.769	5	-2.724	5	0.015	0.321	0.101	8.666	0.175	0.021
1755	M186	6in Dia. Duct	Sec 3 - max	0.110	5	-0.021	5	-0.021	8	3.547	8	-0.904	5	1.752	5	-0.116	8	15.687	6	0.020	8	0.016	0.282	0.139	3.547	0.003	0.003
475	M50	6in Dia. Duct	Sec 3 - max	0.258	8	-0.165	6	0.133	6	0.084	5	1.495	8	0.081	5	4.100	8	115.687	7	0.101	7	0.021	0.107	0.292	4.180	0.012	0.020
2087	M219	3in Dia. Duct	Sec 4 - max	0.173	6	0.009	5	0.405	6	0.253	5	-0.088	8	9.112	6	-2.361	7	-11.397	8	-0.049	8	0.020	0.011	0.405	9.112	0.004	0.031
345	M37	6in Dia. Duct	Sec 3 - max	0.013	7	0.051	5	0.026	8	2.828	5	2.603	7	1.849	5	2.644	8	1207.213	7	1.571	7	0.002	0.224	0.210	2.828	0.217	0.007
345	M37	6in Dia. Duct	Sec 3 - min	-0.013	6	0.051	2	-0.026	8	-2.603	7	-2.828	5	-2.644	8	-1.849	5	686.910	6	0.894	6	0.002	0.224	0.210	2.828	0.123	0.007
2109	M221	3in Dia. Duct	Sec 5 - max	0.222	6	-0.013	5	0.074	8	-0.090	5	0.101	8	9.050	8	-0.882	5	-14.326	8	-0.061	8	0.026	0.008	0.402	9.050	0.005	0.006
2111	M222	3in Dia. Duct	Sec 1 - max	0.222	6	0.008	8	-0.016	5	-0.098	5	0.161	8	9.050	6	-0.882	5	-14.326	8	-0.061	8	0.026	0.008	0.402	9.050	0.005	0.001
2259	M236	6in Dia. Duct	Sec 5 - max	0.119	8	0.163	7	0.014	7	6.046	5	-2.084	8	0.231	5	0.847	8	-217.737	5	-0.182	5	0.015	0.350	0.061	6.045	0.022	0.020
1756	M186	6in Dia. Duct	Sec 3 - min	0.104	8	-0.134	6	-0.098	5	0.984	5	-3.547	8	0.115	8	-1.752	5	-156.808	5	-0.204	5	0.015	0.282	0.139	3.547	0.028	0.018
665	M69	12in Dia. Duct	Sec 3 - max	-0.112	2	-0.156	1	0.247	4	6.990	2	-6.758	1	-0.730	7	2.625	6	+1083.896	7	-0.355	7	0.006	0.311	0.117	6.990	0.027	0.019
668	M69	12in Dia. Duct	Sec 4 - min	-0.266	1	-0.195	2	-0.086	3	6.660	1	-6.869	2	-2.502	6	0.754	7	+1879.512	6	-0.616	6	0.019	0.305	0.111	6.869	0.047	0.018
664	M69	12in Dia. Duct	Sec 2 - min	-0.266	1	0.088	6	-0.297	8	6.485	1	-6.751	2	-2.519	6	0.684	7	-1879.512	6	-0.616	6	0.019	0.300	0.118	6.751	0.047	0.058
1935	M204	6in Dia. Duct	Sec 3 - min	0.128	2	-0.255	2	-0.080	4	-4.202	2	4.132	1	3.302	8	-5.360	5	-1045.519	5	-0.916	5	0.010	0.187	0.236	5.360	0.071	0.019
1078	M118	6in Dia. Duct	Sec 4 - min	-0.113	5	-0.251	5	-0.106	6	-3.774	5	-3.257	8	-2.104	5	-1.320	8	-108.093	6	-0.090	6	0.014	0.270	0.150	3.774	0.011	0.031
2249	M235	6in Dia. Duct	Sec 5 - max	0.069	5	0.207	5	0.048	7	4.815	5	-1.650	8	0.055	5	1.105	8	+231.213	6	-0.154	6	0.011	0.344	0.079	4.815	0.024	0.025
1077	M118	6in Dia. Duct	Sec 4 - max	0.111	8	0.194	8	0.098	7	3.257	8	3.774	5	1.320	8	2.104	5	16.797	7	0.014	7	0.014	0.270	0.150	3.774	0.002	0.024
460	M48	6in Dia. Duct	Sec 5 - min	-0.047	6	-0.137	5	-0.113	5	-2.532	7	0.974	5	-3.493	8	-2.124	5	-409.453	8	-0.355	8	0.005	0.181	0.247	3.453	0.044	0.017
671	M70	12in Dia. Duct	Sec 1 - max	0.022	2	-0.310	1	0.151	4	6.627	7	-6.447	6	-1.501	7	3.073	6	-1710.003	7	-0.662	7	0.002	0.295	0.137	6.627	0.043	0.024
518	M56	6in Dia. Duct	Sec 4 - min	0.130	2	-0.159	2	+0.062	6	-1.335	1	1.028	2	4.160	7	-4.502	6	-1045.519	5	-0.916	5	0.010	0.095	0.322	4.502	0.113	0.026
533	M58	6in Dia. Duct	Sec 2 - max	0.210	1	-0.163	2	0.051	5	0.068	2	-0.390	1	5.029	6	-3.633	7	+935.256	8	-0.821	8	0.025	0.048	0.359	5.029	0.101	0.020
2546	M285	2in Dia. Duct	Sec 3 - min	0.073	8	-0.274	5	-0.337	5	5.969	6	-5.030	5	2.247	8	-6.193	5	0.000	1	0.000	1	0.016	0.187	0.229	6.193	0.000	0.022
2257	M236	6in Dia. Duct	Sec 4 - max	0.120	5	0.164	7	0.015	7	4.989	5	-2.020	8	0.227	5	0.830	8	-217.737	5	-0.182	5	0.015	0.350	0.059	4.989	0.022	0.020
61	M7	6in Dia. Duct	Sec 1 - max	0.097	8	0.261	1	-0.251	2	-0.794	7	1.932	6	3.908	6	-1.976	7	353.378	6	0.296	6	0.012	0.138	0.279	3.908	0.037	0.032
2151	M226	6in Dia. Duct	Sec 1 - max	0.097	8	0.063	8	0.093	6	-0.794	7	1.932	6	-1.976	7	3.908	6	353.378	6	0.296	6	0.012	0.138	0.279	3.908	0.037	0.031
2535	M284	2in Dia. Duct	Sec 3 - max	0.177	5	-0.084	6	-0.105	8	3.222	5	-1.107	6	7.179	5	-1.658	8	0.000	1	0.000	1	0.009	0.123	0.268	7.179	0.000	0.007
2035	M219	3in Dia. Duct	Sec 3 - max	0.173	6	0.010	5	0.405	8	0.246	5	-0.065	8	6.925	6	-2.177	7	-11.397	8	-0.049	8	0.020	0.011	0.397	6.925	0.004	0.031
1291	M140	6in Dia. Duct	Sec 1 - max	0.050	8	-0.244	2	0.246	1	1.085	5	0.057	6	4.830	6	-3.338	7	607.590	2	0.709	2	0.006	0.078	0.345	4.830	0.098	0.031
1767	M188	6in Dia. Duct	Sec 4 - max	0.110	5	-0.022	5	-0.022	6	3.474	8	-0.973	5	1.699	5	-0.104	8	15.687	8	0.020	8	0.016	0.276	0.135	3.474	0.003	0.003
2191	M230	2in Dia. Duct	Sec 1 - max	0.192	5	-0.116	8	0.150	5	-1.290	8	8.716	5	-3.708	8	2.635	5	-38.527	8	-0.531	6	0.043	0.249	0.135	8.716	0.034	0.010
1768	M186	6in Dia. Duct	Sec 4 - min	0.105	8	-0.133	8	-0.096	5	0.973	5	-3.474	8	0.104	6	-1.699	5	+156.808	5	-0.204	5	0.015	0.276	0.135	3.474	0.028	0.018
2247	M235	6in Dia. Duct	Sec 4 - max	0.089	5	0.207	5	0.017	7	4.717	5	-1.763	8	0.050	5	1.087	8	-231.213	6	-0.194	6	0.011	0.337	0.076	4.717	0.024	0.026
2255	M236	6in Dia. Duct	Sec 3 - max	0.120	5	0.165	7	0.018	7	4.831	5	-1.966	5	0.222	5	0.812	8	-217.737	5	-0.182	5	0.015	0.352	0.065	4.831	0.022	0.020
1293	M140	6in Dia. Duct	Sec 2 - max	0.050	6	-0.246	2	0.250	1	0.959	5	0.147	8	4.911	6	-3.400	7	607.590	2	0.709	2	0.006	0.069	0.351	4.911	0.086	0.031
2090	M219	3in Dia. Duct	Sec 6 - min	-0.003	7	0.004	8	0.096	5	0.090	8	-0.256	5	2.344	7	-9.300	6	-18.617	5	-0.085	5	0.000	0.011	0.413	9.300	0.007	0.007
2260	M238	6in Dia. Duct	Sec 5 - min	0.032	8	0.072	6	-0.041	6	2.084	8	+5.048	5	-0.547	6	+0.231	5	-607.000	8	-0.508	6	0.004	0.360	0.061	5.046	0.083	0.010
1076	M118	6in Dia. Duct	Sec 3 - min	-0.113	5	-0.250	5	-0.106	6	-3.679	5	-3.184	8	-2.067	5	-1.286	8	-108.093	6	-0.090	6	0.014	0.263	0.146	3.679	0.011	0.031
597	M69	12in Dia. Duct	Sec 4 - max	-0.112	2	-0.159	1	0.245	4	6.869	2	-6.660	1	-0.754	7	2.602	6	-1083.896	7	-0.355	7	0.006	0.305	0.111	6.869	0.027	0.019
670	M69	12in Dia. Duct	Sec 6 - min	-0.258	1	-0.188	2	-0.084	3	6.556	6	-6.752	7	-2.378	6	0.777	7	+1879.512	6	-0.616	6	0.019	0.300	0.106	6.752	0.047	0.015
1075	M118	6in Dia. Duct	Sec 3 - max	0.112	8	0.195	8	0.098	7	3.184	8	3.679	5	1.286	8	2.067	5	16.797	7	0.014	7	0.014	0.263	0.146	3.679	0.002	0.024
683	M69	12in Dia. Duct	Sec 2 - max	-0.112	2	1.033	6	-0.042	5	6.751	2	-0.485	1	-0.684	7	2.610	6	+1083.896	7	-0.355	7	0.006	0.300	0.115	6.751	0.027	0.079
2102	M221	3in Dia. Duct	Sec 1 - min	0.076	7	0.001	8	-0.188	5	-0.051	8	0.043	5	2.592	7	-9.299	5	-36.188	6	-0.155	5	0.006	0.002	0.413	9.299	0.012	0.014
2230	M235	6in Dia. Duct	Sec 5 - min	0.068	8	0.141	8	-0.049	6	1.860	8	-4.815	6	-1.109	8	-0.055	5	-401.710	7	-0.306	7	0.001	0.344	0.079	4.815	0.041	0.017
1293	M140	6in Dia. Duct	Sec 3 - max	0.050	6	-0.246	2	0.251	1	0.854	5	0.239	8	4.992	6	-3.461	7	607.590	2	0.709	2	0.006	0.061	0.357	4.992	0.088	0.031
534	M58	6in Dia. Duct	Sec 2 - min	0.133	2	-0.178	1	-0.051	6	0.390	1	-0.668	2	3.633	7	-5.029	6	-1045.519	5	-0.916	5	0.010	0.048	0.359	5.029	0.113	0.022
2100	M220	3in Dia. Duct	Sec 5 - min	0.053	7	0.001	8	-0.104	5	0.000	8	-0.976	5	2.592	7	-9.299	5	-35.372	5	-0.151	5	0.006	0.003	0.413	9.299	0.012	0.006
2096	M220	3in Dia. Duct	Sec 4 - min	0.053	7	0.002	8	-0.104	5	0.000	8	-0.975	5	2.530	7	-9.300	5	-35.372	5	-0.151	5	0.006	0.003	0.413	9.300	0.012	0.006
2096	M220	3in Dia. Duct	Sec 3 - min	0.053	7	0.002	8	-0.104	6	-0.002	8	-0.971	5	2.488	7	-9.300	5	-35.372	5	-0.151	5	0.006	0.003	0.413	9.300	0.012	0.006
1781	M181	4in Dia. Duct	Sec 1 - max	0.529	5	0.181	5	-0.025	8	-2.897	7	5.270	6	-1.023	6	3.089	7	271.447	7	0.597	7	0.051	0.234	0.137	5.270	0.046	0.014
2094	M220	3in Dia. Duct	Sec 2 - min	0.053	7	0.003	8	-0.104	5	-0.003	8	-0.907	5	2.405	7	-9.300	5	-35.372	5	-0.151	5	0.006	0.003	0.413	9.300	0.012	0.006
2092	M220	3in Dia. Duct	Sec 1 - min	0.053	7	0.004	8	-0.103	5	-0.005	8	-0.903	5	2.344	7	-9.300	5	-35.372	5	-0.151	5	0.006	0.003	0.413	9.300	0.012	0.006
1297	M140	6in Dia. Duct	Sec 4 - max	0.051	5	-0.247	2	0.252	1	0.748	5	0.329	8	5.074	6	-3.522	7	607.590	2	0.709	2	0.006	0.053	0.362	5.074	0.088	0.031
1292	M140	6in Dia. Duct	Sec 1 - min	0.050	7	-0.333	1	0.172	2	-0.057	6	-1.005	5	3.339	7	-4.630	6	740.242	1	0.865	1	0.000	0.076	0.345	4.630	0.081	0.041
1299	M140	6in Dia. Duct	Sec 5 - max	0.051	6	-0.248	2	0.252	1	0.656	7	0.434	6	5.155	6	-3.562	7	607.590	2	0.709	2	0.006	0.047	0.366	5.155	0.088	0.031
1703	M181	4in Dia. Duct	Sec 2 - max	0.529	5	0.180	5	-0.026	8	-2.863	7	5.223	6	-1.034	6	3.106	7	271.447	7	0.597	7	0.051	0.232	0.136	5.223	0.046	0.014

D.2250

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_a	f_b/σ_b	f_b/σ_b	f_s (ksi)	f/v_t	f/σ_t
82	M7	6in Dia. Duct	Sec 1 - min	0.029	5	0.031	2	-0.692	1	-1.932	6	0.794	7	1.978	7	-3.908	6	326.161	7	0.273	7	0.004	0.138	0.279	3.908	0.034	0.085
2152	M226	6in Dia. Duct	Sec 1 - min	0.029	5	0.023	7	-0.007	7	-1.932	6	0.794	7	-3.908	6	1.978	7	326.161	7	0.273	7	0.004	0.138	0.279	3.908	0.034	0.003
289	M31	8in Dia. Duct	Sec 5 - max	0.126	6	0.177	6	0.012	6	2.794	6	0.747	7	2.349	6	2.072	7	0.000	1	0.000	1	0.018	0.200	0.205	2.872	0.000	0.022
2107	M221	3in Dia. Duct	Sec 4 - max	0.223	6	-0.008	5	0.072	6	-0.059	5	0.121	6	8.759	8	-1.663	5	-14.328	6	-0.061	6	0.026	0.005	0.359	6.759	0.005	0.005
2253	M236	6in Dia. Duct	Sec 2 - max	0.121	5	0.167	7	0.016	7	4.674	5	-1.909	8	0.216	5	0.794	8	-217.737	5	-0.182	5	0.015	0.348	0.057	4.674	0.022	0.021
290	M31	6in Dia. Duct	Sec 8 - min	-0.120	5	-0.071	7	-0.019	5	-0.747	7	-2.794	8	-2.672	7	-2.349	6	0.000	1	0.000	1	0.015	0.200	0.205	2.872	0.000	0.009
2256	M236	8in Dia. Duct	Sec 4 - min	0.032	6	0.080	6	-0.042	6	2.026	6	-4.989	5	-0.630	6	-0.227	6	-607.000	8	-0.508	8	0.004	0.350	0.059	4.989	0.063	0.010
1294	M140	8in Dia. Duct	Sec 2 - min	0.003	7	-0.334	1	0.171	2	-0.147	8	-0.959	5	3.400	7	-4.911	6	746.243	1	0.655	1	0.000	0.069	0.351	4.911	0.081	0.041
1705	M181	4in Dia. Duct	Sec 3 - max	0.528	6	0.180	5	-0.026	8	-2.860	7	5.169	6	-1.053	6	3.124	7	271.447	7	0.597	7	0.051	0.230	0.139	5.169	0.048	0.014
2063	M219	3in Dia. Duct	Sec 2 - max	0.173	8	0.010	5	0.405	8	0.243	6	-0.082	8	8.737	6	-2.094	7	-11.397	8	-0.049	8	0.020	0.011	0.388	8.737	0.004	0.031
2110	M221	3in Dia. Duct	Sec 6 - min	0.074	7	-0.017	6	-0.196	6	-0.161	8	0.098	5	0.882	5	-9.050	8	-36.188	5	-0.155	5	0.009	0.008	0.402	9.050	0.012	0.015
2112	M222	3in Dia. Duct	Sec 1 - min	0.074	7	0.008	5	-0.186	8	-0.161	6	0.098	5	0.862	5	-9.050	8	-36.188	5	-0.155	5	0.009	0.008	0.402	9.050	0.012	0.014
1296	M140	8in Dia. Duct	Sec 3 - min	0.003	7	-0.335	1	0.170	2	-0.236	8	-0.864	5	3.461	7	-4.992	6	746.243	1	0.655	1	0.000	0.061	0.357	4.992	0.061	0.041
1707	M181	4in Dia. Duct	Sec 4 - max	0.528	5	0.179	5	-0.026	8	-2.854	7	5.116	6	-1.068	6	3.141	7	271.447	7	0.597	7	0.051	0.227	0.140	5.116	0.048	0.014
2245	M235	6in Dia. Duct	Sec 3 - max	0.069	6	0.208	5	0.017	7	4.619	5	-1.715	8	0.044	5	1.058	8	-231.213	6	-0.194	6	0.011	0.330	0.076	4.619	0.024	0.026
461	M49	8in Dia. Duct	Sec 1 - max	0.261	7	0.171	5	0.339	8	-0.985	5	2.621	8	2.611	5	2.682	8	781.780	7	0.686	7	0.031	0.180	0.206	2.882	0.088	0.042
1759	M186	5in Dia. Duct	Sec 5 - max	0.111	5	-0.023	5	-0.022	8	3.400	8	-0.960	5	1.646	5	-0.092	8	15.687	8	0.020	8	0.016	0.270	0.131	3.400	0.003	0.003
2088	M219	3in Dia. Duct	Sec 4 - min	-0.003	7	0.004	8	0.086	5	0.088	8	-0.263	5	2.261	7	-9.112	6	-19.817	6	-0.085	6	0.000	0.011	0.405	0.112	0.007	0.007
1290	M140	8in Dia. Duct	Sec 4 - min	0.003	7	-0.336	1	0.169	2	-0.329	8	-0.740	5	3.522	7	-5.074	8	746.243	1	0.655	1	0.000	0.053	0.362	5.074	0.081	0.041
1708	M181	4in Dia. Duct	Sec 5 - max	0.528	5	0.179	5	-0.026	8	-2.840	7	5.063	6	-1.083	6	3.158	7	271.447	7	0.597	7	0.051	0.225	0.140	5.003	0.048	0.014
1760	M186	5in Dia. Duct	Sec 5 - min	0.105	8	-0.133	8	-0.098	6	0.880	5	-3.400	8	0.092	8	-1.646	5	-156.808	5	-0.204	5	0.015	0.270	0.131	3.400	0.028	0.018
416	M44	6in Dia. Duct	Sec 4 - min	-0.245	5	0.103	8	-0.204	7	1.565	8	-2.189	5	1.601	5	-3.199	8	294.302	7	0.246	7	0.031	0.156	0.229	3.199	0.030	0.026
1300	M140	8in Dia. Duct	Sec 6 - min	0.003	7	-0.337	1	0.169	2	-0.434	6	-0.650	7	3.582	7	-5.165	6	746.243	1	0.655	1	0.000	0.047	0.368	6.155	0.081	0.042
1074	M118	6in Dia. Duct	Sec 2 - min	-0.113	5	-0.249	5	-0.105	6	-3.585	5	-3.111	8	-2.030	5	-1.252	8	-108.093	6	-0.090	6	0.014	0.256	0.145	3.585	0.011	0.031
2248	M235	6in Dia. Duct	Sec 4 - min	0.006	8	0.142	8	-0.044	6	1.783	8	-4.717	5	-1.087	8	-0.050	5	-401.710	7	-0.336	7	0.001	0.337	0.078	4.717	0.041	0.018
1073	M118	6in Dia. Duct	Sec 2 - max	0.112	8	0.196	8	0.087	7	3.111	8	3.585	5	1.252	8	2.030	5	16.797	7	0.014	7	0.014	0.256	0.145	3.585	0.002	0.024
119	M12	5in Dia. Duct	Sec 5 - max	0.094	5	0.213	6	-0.022	8	3.400	8	-0.960	5	-0.064	8	1.855	5	230.032	6	0.307	6	0.014	0.270	0.131	3.400	0.042	0.029
2261	M238	6in Dia. Duct	Sec 1 - max	0.121	6	0.168	7	0.016	7	4.815	6	-1.850	8	0.211	6	0.776	8	-217.737	5	-0.182	6	0.015	0.344	0.058	4.815	0.022	0.021
2288	M238	8in Dia. Duct	Sec 3 - min	0.032	8	0.080	8	-0.042	8	1.888	8	-4.831	5	-0.812	8	-0.222	6	-607.000	8	-0.508	8	0.004	0.362	0.058	4.931	0.063	0.010
659	M59	12in Dia. Duct	Sec 5 - max	-0.112	2	-0.162	1	0.243	4	6.752	7	-0.556	8	-0.777	7	2.379	6	-1083.896	7	-0.355	7	0.008	0.300	0.106	6.752	0.027	0.019
77	M8	6in Dia. Duct	Sec 4 - max	-0.114	2	-0.155	5	-0.035	5	-2.709	2	2.828	1	-0.930	6	2.761	8	139.532	8	0.117	8	0.014	0.202	0.397	2.828	0.014	0.019
2269	M237	6in Dia. Duct	Sec 5 - max	0.131	5	0.181	7	0.012	7	5.084	5	-2.246	8	0.370	5	0.462	8	-148.287	5	-0.124	5	0.017	0.383	0.033	5.084	0.015	0.012
83	M7	6in Dia. Duct	Sec 2 - max	0.097	8	0.260	1	-0.251	2	-0.758	7	1.874	6	3.729	6	-1.851	7	353.376	6	0.296	6	0.012	0.134	0.266	3.729	0.037	0.032
2400	M250	6in Dia. Duct	Sec 5 - min	-0.079	6	-0.137	7	-0.020	8	-2.770	7	-0.921	6	0.642	6	-2.850	7	280.966	8	0.235	6	0.010	0.198	0.204	2.850	0.029	0.017
2271	M238	6in Dia. Duct	Sec 1 - max	0.125	6	0.038	8	0.012	7	5.084	5	-2.248	8	0.452	7	-0.042	6	-52.468	5	-0.044	6	0.016	0.363	0.032	5.084	0.005	0.005
2493	M260	6in Dia. Duct	Sec 2 - max	0.082	5	0.298	5	0.047	7	-1.947	6	4.014	7	1.139	6	1.596	7	-179.120	8	-0.150	6	0.010	0.287	0.114	4.014	0.019	0.037
2287	M237	6in Dia. Duct	Sec 4 - max	0.132	5	0.102	7	0.013	7	5.075	5	-2.208	8	0.366	5	0.445	8	-148.287	5	-0.124	6	0.017	0.363	0.032	5.075	0.015	0.013
120	M12	5in Dia. Duct	Sec 6 - min	0.064	6	0.120	5	-0.096	5	0.960	5	-3.400	8	-1.665	5	0.064	8	-93.537	7	-0.083	7	0.009	0.270	0.131	3.400	0.011	0.017
2081	M219	3in Dia. Duct	Sec 1 - max	0.172	5	0.011	5	0.405	8	0.237	5	-0.079	8	8.548	6	-2.011	7	-11.397	8	-0.049	8	0.020	0.011	0.380	6.548	0.004	0.031
2261	M239	6in Dia. Duct	Sec 1 - max	0.112	5	0.127	5	0.037	6	-2.310	8	4.930	5	-0.104	6	0.609	7	0.908	6	0.000	5	0.014	0.352	0.044	4.930	0.000	0.016
121	M13	5in Dia. Duct	Sec 1 - max	0.065	1	0.066	5	0.066	8	0.500	8	1.362	6	-1.252	7	3.674	6	-6.000	6	-0.008	8	0.010	0.108	0.292	3.674	0.001	0.009
122	M13	5in Dia. Duct	Sec 1 - min	0.065	1	-0.068	8	-0.065	7	-1.362	5	-0.500	8	-3.874	6	1.252	7	-418.045	5	-0.544	5	0.010	0.108	0.292	3.674	0.075	0.009
2243	M235	6in Dia. Duct	Sec 2 - max	0.000	5	0.209	5	0.016	7	4.520	6	-1.647	8	0.037	5	1.049	8	-231.213	6	-0.194	6	0.011	0.323	0.075	4.520	0.024	0.026
2266	M237	6in Dia. Duct	Sec 3 - max	0.132	5	0.103	7	0.013	7	5.005	5	-2.166	8	0.362	5	0.426	8	-148.287	5	-0.124	5	0.017	0.352	0.031	5.065	0.015	0.013
2254	M236	6in Dia. Duct	Sec 2 - min	0.032	6	0.081	6	-0.043	8	1.900	8	-4.074	5	-0.794	6	-0.216	6	-607.000	8	-0.508	8	0.004	0.348	0.057	4.874	0.063	0.010
2273	M238	6in Dia. Duct	Sec 2 - max	0.124	5	0.037	6	0.012	7	5.045	5	-2.264	8	0.456	7	-0.023	6	-52.468	5	-0.044	5	0.016	0.360	0.033	5.045	0.005	0.005
2103	M221	3in Dia. Duct	Sec 2 - max	0.225	6	0.001	6	0.068	8	-0.028	5	0.055	8	0.542	6	-2.869	7	-14.328	8	-0.061	8	0.026	0.002	0.380	8.542	0.005	0.005
478	M50	8in Dia. Duct	Sec 3 - min	0.023	8	-0.252	7	-0.307	8	-1.495	8	-0.084	5	-4.180	8	-0.081	5	-140.129	8	-0.123	6	0.003	0.107	0.298	4.180	0.015	0.036
2066	M219	3in Dia. Duct	Sec 3 - min	-0.003	7	0.005	8	0.008	6	0.085	6	-0.248	5	2.177	7	-8.925	6	-19.817	5	-0.085	5	0.000	0.011	0.397	8.925	0.007	0.007
2263	M237	6in Dia. Duct	Sec 2 - max	0.133	6	0.104	7	0.014	7	5.056	5	-2.126	8	0.358	6	0.411	8	-148.287	5	-0.124	6	0.017	0.361	0.029	5.056	0.016	0.013
2248	M235	6in Dia. Duct	Sec 3 - min	0.005	8	0.143	8	-0.044	6	1.715	8	-4.619	5	-1.068	6	-0.044	5	-401.710	7	-0.336	7	0.001	0.330	0.078	4.819	0.041	0.018
2275	M238	6in Dia. Duct	Sec 3 - max	0.124	5	0.038	8	0.011	7	6.007	5	-2.281	8	0.463	7	-0.005	6	-52.468	5	-0.044	5	0.016	0.368	0.033	5.007	0.005	0.004
2105	M221	3in Dia. Duct	Sec 3 - max	0.224	6	-0.003	5	0.070	8	-0.033	5	0.079	8	8.475	6	-2.437	5	-14.328	8	-0.061	8	0.026	0.004	0.377	8.475	0.005	0.005
1072	M118	6in Dia. Duct	Sec 1 - min	-0.113	5	-0.246	5	-0.105	6	-3.491	6	-3.037	8	-1.993	5	-1.219	8	-108.093	6	-0.090	6	0.014	0.249	0.142	3.491	0.011	0.031
1071	M118	6in Dia. Duct	Sec 1 - max	0.112	6	0.198	8	0.097	7	3.037	6	3.491	5	1.219	8	1.993	5	16.797	7	0.014	7	0.014	0.249	0.142	3.491	0.002	0.024
2536	M284	2in Dia. Duct	Sec 3 - min	0.076	8	-0.180	5	-0.392	5	1.107	8	-3.322	5	1.658	8	-7.179	5	0.000	1	0.000	1	0.017	0.123	0.266	7.179	0.000	0.025
2499	M260	6in Dia. Duct	Sec 5 - max	0.068	5	0.241	5	0.018	7	4.421	5	-1.579	8	-0.051	5	1.135	8	-179.120	6	-0.150	6	0.009	0.316	0.061	4.421	0.019	0.030
2261	M237	6in Dia. Duct	Sec 1 - max	0.133	5	0.105	7	0.014	7	5.048	5	-2.084	8	0.353	5	0.394	8	-148.287	5	-0.124	5	0.017	0.360	0.028	5.046	0.015	0.013
64	M7	6in Dia. Duct	Sec 2 - min	0.029	5	0.031	2	-0.692	1	-1.874	6	0.758	7	1.051	7	-3.729	6	326.161	7	0.273	7	0.004	0.134	0.265	3.729	0.034	0.085
2277	M238	8in Dia. Duct	Sec 4 - max	0.123	5	0.036	8	0.011	7	4.968	5	-2.298	6	0.468	7	0.013	6	-52.468	5	-0.044	5	0.016	0.355	0.033	4.968	0.006	0.004
2494	M260	6in Dia. Duct	Sec 2 - min	-0.024	5	0.203	8	-0.074	6	-4.014	7	1.947	6	-1.596	7	-1.139	6	-325.274	7	-0.272	7	0.003	0.267	0.114	4.014	0.034	0.025
2282	M239	6in Dia. Duct	Sec 1 - min	0.064	6	-0.010	8	-0.010	7	-4.930	6	2.313	8	-0.609	7	0.104	6	-787.950	6	-0.650	6	0.008	0.352	0.044	4.930	0.051	0.001
2272	M238	6in Dia. Duct	Sec 1 - min	0.064	6	-0.082	5	-0.039	5	2.248	8	-5.084	5	0.042	6	-0.452	7	-802.531	8	-0.872	8	0.008	0.363	0.032	5.084	0.063	0.010
2079	M218	3in Dia. Duct	Sec 8 - max	0.093	5	0.011	6	0.453	6	0.264	5	-0.110	8	8.548	6	-2.011	7	-8.930	8	-0.030	8	0.011	0.013	0.380	8.548	0.002	0.035
2252	M238	6in Dia. Duct	Sec 1 - min	0.032	8	0.081	6	-0.043	8	1.850	8	-4.815	5	-0.775	8	-0.211	5	-607.000	8	-0.508	8	0.004	0.344	0.055	4.815	0.063	0.010
2106	M221	3in Dia. Duct	Sec 4 - min	0.074	7	-0.013	6	-0.194	5	-0.121	8	0.050	6	1.063	5	-8.759	8	-36.108	5	-0.155	5	0.009	0.005	0.369	8.759	0.012	0.015
1160	M126	6in Dia. Duct	Sec 6 - min	-0.289	5	0.134	7	-0.164	5	0.016	8	-4.922	7	-0.646	8	0.085	5	216.326	7	0.181	7	0.034	0.323	0.046	4.522	0.022	0.020
662	M59	12in Dia. Duct	Sec 1 - min	-0.256	1	0.691	8	-0.296	6	5.864	1	-6.175	2	-2.465	6	0.618	7	-1879.512	6	-0.618	6	0.019	0.274	0.110	6.175	0.047	0.059
2270	M237	6in Dia. Duct	Sec 5 - min	0.052	8	0.002	6	-0.039	5	2.240	8	-5.064	5	-0.462	8	-0.370	6	-754.433	8	-0.631	8	0.007	0.363	0.033	5.084	0.078	0.005
2399	M250	6in Dia. Duct	Sec 5 - max	-0.009	5	0.074	6	0.147	7	0.921	6	2.770	7	2.850	7	-0.542	6	1365.639	7	1.160	7	0.001	0.198	0.204	2.850	0.143	0.018
309	M33	6in Dia. Duct	Sec 6 - max	0.081	6	0.246	8	0.104	8	3.049	8	3.605	5	1.188	8	1.977	5	0.000	1	0.000	1	0.010	0.250	0.141	3.505	0.000	0.030
2398	M250	6in Dia. Duct	Sec 4 - min	-0.078	6	-0.136	7	-0.028	6	-2.705	7	-0.668	6	0.556	6	-2.781	7	280.958	6	0.235	6	0.010	0.193	0.199	2.781	0.029	0.017
2279	M238	6in Dia. Duct	Sec 5 - max	0.123	5	0.035	8	0.010	7	4.930	5	-2.315	8	0.473	7	0.031	6	-52.468	5	-0.044	5	0.016	0.352	0.034	4.930	0.005	0.004
674	M70	12in Dia. Duct	Sec 2 - min	-0.143	1	-0.387	2	-0.162	3	8.836	6	-5.926	7	-2.866	0	1.722	7	-2460.349	6	-0.813	6	0.010	0.283	0.127	5.926	0.003	0.030
310	M33	6in Dia. Duct	Sec 5 - min	-0.075	5	-0.298	5	-0.111	5	-3.505	5	-3.049	8	-1.977	5	-1.188	8	0.000	1	0.000	1	0.009	0.250	0.141	3.505	0.000	0.037
2274	M238	6in Dia. Duct	Sec 2 - min	0.063	8	-0.082	5	-0.039	8	2.264	6	-5.045	5	0.023	5	-0.458	7	-802.531	8	-0.672	8	0.008	0.360	0.033	5.046	0.083	0.040
2268	M237	6in Dia. Duct	Sec 4 - min	0.052	8	0.002	8	-0.040	6	2.206	8	-5.075	5	-0.445	8	-0.366	5	-754.433	8	-0.631	8	0.007	0.363	0.032	5.075	0.076	0.005
2241	M235	6in Dia. Duct	Sec 1 - max	0.090	5	0.210	5	0.018	7	4.421	5	-1.579	8	0.031	5	1.030	8	-231.213	6	-0.194	6	0.011	0.316	0.074	4.421	0.024	0.026
535	M59	8in Dia. Duct	Sec 3 - max	0.219	1	-0.180	8	0.056	5	-0.338	2	0.459	1	4.778	6	-3.664	7	-935.256	8	-0.821	8	0.028	0.033	0.341	4.778	0.101	0.022
2084	M219	3in Dia. Duct	Sec 2 - min	-0.003	7	0.006	8	0.095	5	0.062	8	-0.243	5	2.034	7	-8.737	6	-19.817	5	-0.085	5	0.000	0.011	0.389	8.737	0.007	0.007
2266	M237	8in Dia. Duct	Sec 3 - min	0.052	8	0.002	6	-0.040	6	2.160	6	-5.065	5	-0.428	8	-0.362	5	-754.433	8	-0.631	8	0.007	0.362	0.031	5.065	0.078	0.005
2192	M230	2in Dia. Duct	Sec 1 - min	0.070	8	-0.319	5	0.029	8	-6.718	5	1.290	8	-3.635	5	0.708	8	-199.769	5	-2.724	5	0.016	0.249	0.135	5.710	0.175	0.020
2278	M238	6in Dia. Duct	Sec 3 - min	0.063	8	-0.082	5	-0.038	6	2.281	8	-5.007	5	0.005	8	-0.493	7	-802.531	8	-0.872	8	0.008	0.358	0.033	5.007	0.083	0.010
2244	M235	6in Dia. Duct	Sec 2 - min	0.005	8	0.144	8	-0.045	6	1.647	8	-4.520	5	-1.049	8	-0.037	5	-401.710	7	-0.336	7	0.001	0.323	0.076	4.520	0.041	0.018
2500	M260	6in Dia. Duct	Sec 5 - min	-0.009	8	0.145	8	-0.045	6	1.579	8	-4.421	5	-1.135	8	0.051	5	-325.274	7	-0.272	7	0.001	0.316	0.081	4.421	0.034	0.018

D-2250

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_t	f_{by}/σ_a	f_{bz}/σ_a	f_t (ksi)	f/F_t	f_v/σ_v
529	M55	6in Dia. Duct	Sec 5 - max	0.020	6	-0.005	5	0.251	1	0.821	5	0.287	8	4.709	6	-3.213	7	1028.609	7	0.903	7	0.002	0.059	0.336	4.709	0.111	0.031
530	M55	6in Dia. Duct	Sec 5 - min	-0.020	5	-0.088	8	0.174	2	-0.297	8	-0.821	5	3.213	7	-4.709	5	956.930	6	0.640	6	0.002	0.059	0.336	4.709	0.104	0.021
2264	M237	6in Dia. Duct	Sec 2 - min	0.052	8	0.002	6	-0.041	6	2.125	8	-5.056	5	-0.411	8	-0.358	5	-764.433	8	-0.631	8	0.007	0.361	0.028	5.056	0.078	0.005
2060	M216	3in Dia. Duct	Sec 5 - min	-0.032	8	0.000	8	0.140	7	0.110	8	-0.264	5	2.011	7	-6.548	6	-7.681	5	-0.033	5	0.004	0.013	0.380	6.548	0.003	0.011
2276	M238	6in Dia. Duct	Sec 4 - min	0.002	8	-0.081	5	-0.038	6	2.298	8	-4.968	5	-0.013	6	-0.469	7	-802.531	8	-0.672	8	0.006	0.355	0.033	4.968	0.083	0.010
1158	M126	8in Dia. Duct	Sec 4 - min	-0.270	5	0.135	7	-0.164	5	-0.108	8	-4.458	6	-0.606	6	0.007	5	216.326	7	0.181	7	0.034	0.318	0.043	4.458	0.022	0.020
65	M7	6in Dia. Duct	Sec 3 - max	0.097	5	0.259	1	-0.252	2	-0.723	7	1.916	6	3.550	6	-1.725	7	353.378	6	0.296	5	0.012	0.130	0.264	3.550	0.037	0.032
2262	M237	8in Dia. Duct	Sec 1 - min	0.053	8	0.002	6	-0.041	6	2.084	8	-5.046	5	-0.384	8	-0.353	5	-754.433	8	-0.631	8	0.007	0.360	0.028	5.046	0.078	0.005
417	M44	6in Dia. Duct	Sec 4 - max	-0.079	8	0.147	5	0.204	6	2.189	5	-1.555	8	3.189	6	-1.601	5	625.835	6	0.524	6	0.010	0.156	0.229	3.189	0.065	0.025
659	M68	12in Dia. Duct	Sec 5 - max	0.020	7	0.976	7	0.004	3	7.716	2	-7.423	1	-0.012	6	1.134	6	-211.895	6	-0.089	6	0.001	0.343	0.050	7.716	0.006	0.015
660	M68	12in Dia. Duct	Sec 5 - min	-0.018	6	0.837	8	-0.143	4	7.423	1	-7.716	2	-1.134	5	0.012	7	-1300.365	5	-0.427	5	0.001	0.343	0.050	7.715	0.053	0.054
2280	M238	6in Dia. Duct	Sec 5 - min	0.062	8	-0.081	8	-0.037	6	2.315	8	-4.930	5	-0.031	6	-0.473	7	-802.531	8	-0.672	8	0.009	0.352	0.034	4.930	0.083	0.010
2397	M250	6in Dia. Duct	Sec 4 - max	-0.009	6	0.074	8	0.146	7	0.880	6	2.705	7	2.781	8	-0.556	8	1385.839	7	1.160	7	0.001	0.193	0.199	2.781	0.143	0.018
1689	M200	4in Dia. Duct	Sec 5 - max	0.534	8	-0.040	8	0.008	8	-3.343	8	5.961	5	1.215	6	1.719	7	130.227	8	0.287	6	0.061	0.265	0.078	5.961	0.022	0.003
673	M70	12in Dia. Duct	Sec 2 - max	0.022	2	-0.319	1	0.145	4	5.926	7	-5.836	6	-1.722	7	2.866	6	-1713.903	7	-0.562	7	0.002	0.263	0.127	5.926	0.043	0.026
2396	M250	6in Dia. Duct	Sec 3 - min	-0.076	8	-0.135	7	-0.028	6	-2.641	7	-0.852	6	0.570	7	-2.712	6	280.950	6	0.235	6	0.010	0.189	0.194	2.712	0.029	0.017
681	M69	12in Dia. Duct	Sec 1 - max	-0.112	2	1.036	5	-0.043	6	8.176	2	-5.864	1	-0.618	7	2.465	6	-1093.896	7	-0.355	7	0.008	0.274	0.110	6.176	0.027	0.080
482	M49	6in Dia. Duct	Sec 1 - min	0.041	8	-0.185	5	-0.185	5	-2.521	8	0.985	5	-2.882	8	-2.611	5	-30.646	6	-0.027	6	0.006	0.180	0.206	2.882	0.003	0.023
2082	M219	3in Dia. Duct	Sec 1 - min	-0.003	7	0.000	8	0.035	5	0.079	6	-0.237	7	2.011	7	-8.548	6	-39.817	5	-0.085	5	0.000	0.011	0.380	8.548	0.007	0.007
2104	M221	3in Dia. Duct	Sec 2 - min	0.072	7	-0.003	6	-0.190	5	-0.055	8	0.029	5	2.859	7	-8.542	6	-36.108	5	-0.155	5	0.008	0.002	0.380	8.542	0.012	0.015
2187	M229	2in Dia. Duct	Sec 4 - max	0.163	5	-0.075	8	0.040	5	-1.792	8	8.012	5	0.018	8	0.551	5	10.134	5	0.138	6	0.038	0.334	0.020	8.012	0.009	0.005
2242	M235	6in Dia. Duct	Sec 1 - min	0.005	8	0.145	8	-0.045	6	1.579	8	-4.421	6	-1.030	8	-0.031	5	-401.710	7	-0.338	7	0.001	0.318	0.074	4.421	0.041	0.018
530	M55	6in Dia. Duct	Sec 3 - min	0.132	2	-0.185	8	-0.058	6	-0.459	1	0.136	2	3.884	7	-4.778	6	-1046.519	6	-0.918	6	0.016	0.033	0.341	4.778	0.113	0.023
180	M18	6in Dia. Duct	Sec 5 - min	-0.041	7	-0.082	5	-0.039	6	-1.739	6	0.859	8	-3.098	6	1.164	7	258.010	5	0.338	5	0.006	0.138	0.246	3.098	0.040	0.011
2106	M221	3in Dia. Duct	Sec 3 - min	0.073	7	-0.008	6	-0.192	5	-0.079	8	0.033	5	2.437	8	-8.475	6	-36.108	5	-0.155	5	0.008	0.004	0.377	8.475	0.012	0.015
1156	M126	6in Dia. Duct	Sec 3 - min	-0.270	5	0.136	7	-0.165	5	-0.232	6	-4.394	7	-0.565	8	-0.071	5	216.326	7	0.181	7	0.034	0.314	0.040	4.394	0.022	0.020
66	M7	8in Dia. Duct	Sec 3 - min	0.029	5	0.030	2	-0.691	1	-1.816	6	0.723	7	1.725	7	-3.550	6	326.161	7	0.273	7	0.004	0.130	0.254	3.550	0.034	0.085
1160	M125	6in Dia. Duct	Sec 5 - min	-0.223	5	0.265	6	-0.168	5	-0.481	6	-4.265	7	-0.744	8	-0.020	5	183.441	7	0.154	7	0.028	0.305	0.053	4.265	0.019	0.033
179	M16	5in Dia. Duct	Sec 5 - max	-0.014	5	-0.027	8	0.038	5	-0.659	8	1.739	5	-1.164	7	3.098	5	780.461	8	1.018	8	0.002	0.138	0.248	3.098	0.140	0.005
2205	M231	2in Dia. Duct	Sec 3 - max	0.205	5	-0.108	8	0.045	5	-2.630	8	7.694	5	-0.286	8	1.235	5	-10.064	6	-0.137	6	0.046	0.262	0.046	7.694	0.009	0.007
2395	M250	6in Dia. Duct	Sec 3 - max	-0.008	5	0.073	5	0.146	7	0.852	6	2.641	7	2.712	6	-0.570	5	1385.839	7	1.160	7	0.001	0.189	0.194	2.712	0.143	0.018
2394	M250	6in Dia. Duct	Sec 2 - min	-0.077	8	-0.136	7	-0.028	6	-2.577	6	-0.817	6	0.583	6	-2.643	5	280.956	6	0.235	6	0.010	0.164	0.189	2.643	0.020	0.017
305	M33	6in Dia. Duct	Sec 3 - max	0.084	8	0.258	8	0.097	8	3.809	8	3.833	8	0.628	8	1.373	7	0.000	1	0.000	1	0.011	0.274	0.098	3.833	0.000	0.032
1933	M204	8in Dia. Duct	Sec 2 - max	0.245	1	-0.202	1	0.073	5	-3.060	2	3.177	1	5.006	5	-3.656	8	-935.256	8	-0.621	8	0.019	0.141	0.222	5.006	0.063	0.016
306	M33	6in Dia. Duct	Sec 3 - min	-0.078	5	-0.283	5	-0.104	5	-3.833	7	-3.609	6	-1.373	6	-0.628	6	0.000	1	0.000	1	0.010	0.274	0.098	3.833	0.000	0.035
1154	M128	6in Dia. Duct	Sec 2 - min	-0.270	5	0.137	5	-0.165	5	-0.357	6	-4.330	6	-0.625	6	-0.149	5	216.326	7	0.181	7	0.034	0.309	0.038	4.330	0.022	0.020
1170	M127	6in Dia. Duct	Sec 5 - min	-0.273	5	-0.085	7	-0.162	5	0.437	6	-4.363	6	-0.466	7	0.203	5	262.242	7	0.220	7	0.035	0.312	0.033	4.363	0.027	0.020
1168	M127	6in Dia. Duct	Sec 4 - min	-0.273	5	-0.084	7	-0.182	5	0.331	6	-4.403	6	-0.425	8	0.127	5	262.242	7	0.220	7	0.035	0.315	0.030	4.403	0.027	0.020
1166	M127	6in Dia. Duct	Sec 3 - min	-0.274	5	-0.084	7	-0.163	5	0.226	6	-4.443	6	-0.383	6	0.050	5	262.242	7	0.220	7	0.035	0.317	0.027	4.443	0.027	0.020
1164	M127	6in Dia. Duct	Sec 2 - min	-0.274	5	-0.083	7	-0.163	5	0.121	6	-4.483	8	-0.342	8	-0.028	5	262.242	7	0.220	7	0.035	0.320	0.024	4.483	0.027	0.020
1102	M127	6in Dia. Duct	Sec 1 - min	-0.274	5	-0.082	7	-0.164	5	0.016	6	-4.522	6	-0.301	8	-0.105	5	262.242	7	0.220	7	0.035	0.323	0.022	4.522	0.027	0.020
87	M7	8in Dia. Duct	Sec 4 - max	0.097	8	0.259	1	-0.252	2	-0.688	7	1.767	6	3.371	6	-1.599	7	353.378	6	0.296	6	0.012	0.126	0.241	3.371	0.037	0.032
1702	M161	4in Dia. Duct	Sec 1 - min	0.062	8	0.000	8	-0.061	5	-5.276	6	2.897	7	-3.089	7	1.023	6	169.565	8	0.373	6	0.006	0.234	0.137	5.276	0.029	0.005
1704	M161	4in Dia. Duct	Sec 2 - min	0.061	8	0.000	8	-0.061	5	-5.223	6	2.883	7	-3.100	7	1.034	6	169.585	8	0.373	6	0.008	0.232	0.138	5.223	0.029	0.005
405	M43	8in Dia. Duct	Sec 3 - max	0.086	6	0.553	5	-0.071	5	-2.032	7	3.281	5	1.827	5	-0.025	6	414.335	5	0.347	5	0.011	0.234	0.131	3.281	0.043	0.068
408	M43	8in Dia. Duct	Sec 3 - min	-0.086	7	0.221	8	-0.179	5	-3.281	8	2.032	6	0.025	8	-1.827	8	85.682	8	0.072	8	0.011	0.234	0.131	3.281	0.009	0.027
123	M13	8in Dia. Duct	Sec 2 - max	0.062	1	0.062	8	0.082	8	0.280	8	1.152	7	-1.462	7	3.464	8	-0.000	8	-0.005	8	0.009	0.091	0.275	3.464	0.001	0.009
124	M13	5in Dia. Duct	Sec 2 - min	0.062	1	-0.062	8	-0.002	7	-1.152	5	-0.290	8	-3.464	6	1.462	7	-418.045	5	-0.544	5	0.009	0.091	0.275	3.464	0.075	0.009
1708	M161	4in Dia. Duct	Sec 3 - min	0.061	8	0.000	8	-0.061	5	-5.169	6	2.889	7	-3.124	7	1.063	6	169.588	6	0.373	6	0.006	0.230	0.139	5.169	0.029	0.005
493	M51	8in Dia. Duct	Sec 2 - max	-0.036	1	0.006	8	0.037	6	0.762	5	0.810	8	4.369	7	0.395	6	1313.992	4	1.153	4	0.004	0.058	0.312	4.369	0.142	0.005
494	M51	6in Dia. Duct	Sec 2 - min	-0.036	6	-0.066	5	-0.212	7	-0.610	8	-0.762	5	-0.395	6	-4.369	7	1103.694	3	0.969	3	0.004	0.058	0.312	4.369	0.120	0.026
2393	M250	6in Dia. Duct	Sec 2 - max	-0.008	5	0.073	8	0.146	7	0.817	6	2.577	7	2.643	7	-0.583	6	1385.839	7	1.160	7	0.001	0.164	0.169	2.643	0.143	0.018
1152	M126	6in Dia. Duct	Sec 1 - min	-0.270	6	0.138	7	-0.166	5	-0.401	6	-4.265	7	-0.485	8	-0.227	5	210.926	7	0.181	7	0.034	0.305	0.035	4.266	0.022	0.020
1934	M204	8in Dia. Duct	Sec 2 - min	0.128	2	-0.235	2	-0.073	6	-3.172	1	3.060	2	3.656	8	-5.008	5	-1045.519	5	-0.918	5	0.010	0.141	0.222	5.006	0.071	0.018
2392	M250	6in Dia. Duct	Sec 1 - min	-0.077	8	-0.134	7	-0.027	6	-2.513	7	-0.762	6	0.596	6	-2.574	7	280.956	6	0.235	6	0.010	0.180	0.164	2.574	0.029	0.017
1706	M181	4in Dia. Duct	Sec 4 - min	0.061	8	0.000	6	-0.060	5	-5.116	8	2.854	7	-3.141	7	1.056	6	169.585	6	0.373	6	0.006	0.227	0.140	5.116	0.029	0.005
2237	M234	2in Dia. Duct	Sec 4 - max	0.329	5	-0.053	8	-0.056	6	-1.569	8	5.562	5	-0.805	8	2.530	5	8.083	5	0.110	5	0.073	0.206	0.094	5.562	0.007	0.004
1159	M126	6in Dia. Duct	Sec 5 - max	-0.027	8	0.282	6	-0.066	8	4.522	7	-0.016	6	-0.085	5	0.646	8	532.193	6	0.445	6	0.003	0.323	0.046	4.522	0.055	0.032
1149	M125	6in Dia. Duct	Sec 4 - min	-0.223	5	0.265	6	-0.160	6	-0.607	6	-4.106	7	-0.704	8	-0.105	5	183.441	7	0.154	7	0.028	0.293	0.050	4.106	0.019	0.033
1710	M181	4in Dia. Duct	Sec 5 - min	0.060	8	0.000	8	-0.060	5	-5.063	8	2.840	7	-3.150	7	1.083	6	169.565	6	0.373	6	0.006	0.225	0.140	5.063	0.029	0.008
68	M7	6in Dia. Duct	Sec 4 - min	0.029	5	0.029	2	-0.691	1	-1.757	6	0.688	7	1.599	7	-3.371	6	326.161	7	0.273	7	0.004	0.126	0.241	3.371	0.034	0.085
97	M10	3in Dia. Duct	Sec 4 - max	0.669	7	-0.034	1	-0.296	5	-0.678	7	0.838	6	-5.523	5	6.101	8	10.086	4	0.043	4	0.066	0.028	0.271	6.101	0.003	0.020
1157	M126	6in Dia. Duct	Sec 4 - max	-0.026	8	0.262	6	-0.066	6	4.456	7	0.108	6	-0.007	6	0.606	8	532.193	6	0.445	6	0.004	0.318	0.043	4.458	0.055	0.032
2188	M229	2in Dia. Duct	Sec 4 - min	0.047	8	-0.242	6	-0.001	8	-9.012	5	1.792	6	-0.551	5	-0.016	8	-61.036	7	-0.843	7	0.010	0.334	0.020	9.012	0.054	0.016
2391	M250	6in Dia. Duct	Sec 1 - max	-0.007	5	0.073	6	0.146	7	0.782	6	2.513	7	2.574	7	-0.596	5	1385.839	7	1.160	7	0.001	0.180	0.164	2.574	0.143	0.016
307	M33	6in Dia. Duct	Sec 4 - max	0.082	8	0.251	8	0.100	8	2.987	8	3.307	7	0.879	8	1.646	6	0.000	1	0.000	1	0.010	0.230	0.118	3.307	0.000	0.031
412	M44	6in Dia. Duct	Sec 1 - min	-0.269	6	0.088	8	-0.190	7	0.107	5	-0.270	8	0.437	6	-4.363	7	294.302	7	0.249	7	0.033	0.019	0.312	4.303	0.030	0.023
1211	M132	6in Dia. Duct	Sec 1 - max	0.077	6	-0.314	8	0.294	6	-2.233	6	4.107	7	0.845	5	0.153	6	414.335	5	0.347	6	0.010	0.293	0.000	4.107	0.043	0.039
1212	M132	6in Dia. Duct	Sec 1 - min	-0.077	7	-0.348	5	0.092	8	-4.107	7	2.233	6	-0.153	8	-0.846	5	85.682	8	0.072	8	0.010	0.293	0.060	4.107	0.009	0.043
308	M33	6in Dia. Duct	Sec 4 - min	-0.076	5	-0.290	5	-0.107	5	-3.307	7	-2.987	6	-1.846	5	-0.879	6	0.000	1	0.000	1	0.010	0.236	0.116	3.307	0.000	0.038
676	M70	12in Dia. Duct	Sec 3 - min	-0.143	1	-0.395	2	-0.146	3	5.148	8	-5.273	6	-2.665	6	1.937	7	-2480.340	6	-0.813	6	0.010	0.234	0.118	5.273	0.083	0.030
1711	M162	4in Dia. Duct	Sec 1 - max	0.413	5	0.683	5	-0.026	8	-2.840	7	5.063	6	-0.503	6	2.200	5	593.913	7	1.307	7	0.040	0.225	0.088	5.069	0.101	0.053
399	M42	6in Dia. Duct	Sec 5 - max	0.069	6	-0.262	6	0.278	5	-2.233	6	4.107	7	0.645	5	0.153	8	414.335	5	0.347	5	0.009	0.293	0.060	4.107	0.043	0.035
400	M42	8in Dia. Duct	Sec 5 - min	-0.069	7	-0.315	5	0.106	8	-4.107	7	2.233	6	-0.153	8	-0.845	5	85.682	8	0.072	8	0.009	0.293	0.060	4.107	0.009	0.039
69	M7	6in Dia. Duct	Sec 5 - max	0.098	8	0.258	1	-0.252	2	-0.563	7	1.698	5	3.192	6	-1.472	7	353.378	6	0.296	6	0.012	0.121	0.228	3.192	0.037	0.032
1149	M125	6in Dia. Duct	Sec 5 - max	0.023	8	0.335	5	-0.084	8	4.265	7	0.481	6	0.026	5	0.744	8	449.066	6	0.376	6	0.003	0.305	0.053	4.265	0.046	0.041
2206	M231	2in Dia. Duct	Sec 3 - min	0.095	6	-0.274	5	0.011	8	-7.894	5	2.830	8	-1.235	5	0.296	8	-64.216	7	-0.875	7	0.021	0.292	0.046	7.894	0.055	0.018
2526	M263	2in Dia. Duct	Sec 3 - max	0.134	5	-0.057	8	-0.055	8	3.927	5	-0.987	8	4.958	5	-0.954	8	0.000	1	0.000	1	0.030	0.145	0.184	4.958	0.000	0.004
87	M9	3in Dia. Duct	Sec 4 - max	0.164	7	-0.376	6	0.667	7	-2.743	5	2.922	8	4.739	8	-4.593	5	34.434	6	0.147	6	0.016	0.130	0.211	4.739	0.011	0.076
113	M12	5in Dia. Duct	Sec 2 - max	0.100	5	0.233	8	-0.043	8	-3.089	8	3.389	5	0.934	6	-0.776	7	236.032	6	0.307	6	0.015	0.269	0.074	3.389	0.042	0.032
1146	M125	6in Dia. Duct	Sec 3 - min	-0.224	5	0.266	8	-0.107	6	-0.733	6	-3.947	7	-0.665	6	-0.184	5	183.441	7	0.154	7	0.026	0.282	0.048	3.947	0.019	0.033
1155	M126	8in Dia. Duct	Sec 3 - max	-0.028	8	0.262	8	-0.085	6	4.394	7	0.232	6	0.071	5	0.565	8	532.193	6	0.445	6	0.004	0.314	0.040	4.394	0.055	0.032
114	M12	5in Dia. Duct	Sec 2 - min	0.093	8	0.178	5	-0.074	5	-3.389	6	3.089	8	0.776	7	-0.934	6	-93.537	7	-0.083	7	0.014	0.269	0.074	3.389	0.011	0.025
88	M9	3in Dia. Duct	Sec 4 - min	0.123	6	-0.545	7	0.664	8	-2.922	8	2.743	5	4.593	6	-4.739	8	30.864	7	0.132	7	0.014	0.130	0.211	4.739	0.010	0.051
875	M70	12in Dia. Duct	Sec 3 - max	0.022	2	-0.327	1	0.139	4	5.273	5	-5.146	6	-1.937	7	2.666	8	-1713.993	7	-0.562	7	0.002	0.234	0.115	5.273	0.043	0.026

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_a	f_y/σ_a	f_z/σ_a	f_t (ksi)	f_t/σ_t	f_t/σ_t
1331	M144	6in Dia. Duct	Sec 1 - max	0.070	6	0.296	1	-0.273	2	-0.561	7	1.573	6	3.262	6	-1.528	7	331.996	6	0.278	6	0.009	0.112	0.233	3.262	0.034	0.034
1169	M127	6in Dia. Duct	Sec 5 - max	-0.073	6	0.223	6	-0.086	8	4.363	7	-0.437	6	-0.203	5	0.466	8	596.410	6	0.499	6	0.009	0.312	0.033	4.363	0.062	0.028
1163	M127	6in Dia. Duct	Sec 2 - max	-0.075	6	0.222	6	-0.087	5	4.480	7	-0.121	6	0.028	5	0.342	8	596.410	6	0.499	6	0.009	0.320	0.024	4.480	0.062	0.027
1167	M127	6in Dia. Duct	Sec 4 - max	-0.073	6	0.222	6	-0.086	8	4.403	7	-0.331	6	-0.127	5	0.425	8	596.410	6	0.499	6	0.009	0.316	0.030	4.403	0.062	0.027
1165	M127	6in Dia. Duct	Sec 3 - max	-0.074	6	0.222	6	-0.087	8	4.443	7	-0.226	6	-0.050	5	0.383	8	596.410	6	0.499	6	0.009	0.317	0.027	4.443	0.062	0.027
1161	M127	6in Dia. Duct	Sec 1 - max	-0.075	6	0.221	6	-0.086	5	4.522	7	-0.016	6	0.105	5	0.301	8	596.410	5	0.499	6	0.009	0.323	0.022	4.522	0.062	0.027
1713	M182	4in Dia. Duct	Sec 2 - max	0.412	5	0.682	5	-0.028	5	-2.779	7	4.844	6	-0.613	8	2.223	5	593.913	7	1.307	7	0.040	0.218	0.099	4.944	0.101	0.062
70	M7	6in Dia. Duct	Sec 3 - min	0.029	6	0.029	2	-0.691	1	-1.686	6	0.853	7	1.472	7	-3.195	5	328.161	7	0.273	7	0.004	0.121	0.228	3.192	0.034	0.085
483	M49	6in Dia. Duct	Sec 2 - max	0.255	7	0.105	6	0.330	6	-1.344	6	2.197	8	2.297	6	2.231	8	781.769	7	0.680	7	0.032	0.157	0.164	2.297	0.085	0.041
179	M15	6in Dia. Duct	Sec 4 - min	-0.037	7	-0.075	5	-0.035	6	-1.418	5	0.552	8	-2.947	6	1.316	7	258.010	5	0.336	6	0.005	0.113	0.234	2.947	0.046	0.010
1153	M126	6in Dia. Duct	Sec 2 - max	-0.029	8	0.263	6	-0.065	6	4.330	7	0.357	6	0.149	5	0.525	8	532.193	8	0.445	6	0.004	0.309	0.038	4.330	0.065	0.032
1332	M144	6in Dia. Duct	Sec 1 - min	-0.040	5	0.038	2	-0.688	1	-1.573	6	0.551	7	1.526	7	-3.262	6	299.994	7	0.251	7	0.005	0.112	0.233	3.262	0.031	0.066
177	M16	6in Dia. Duct	Sec 4 - max	-0.013	6	-0.026	6	0.035	5	-0.662	8	1.418	5	-1.316	7	2.947	6	780.451	6	1.019	8	0.002	0.113	0.234	2.947	0.140	0.005
99	M10	6in Dia. Duct	Sec 4 - min	0.410	6	-0.063	2	-0.297	8	-0.636	6	0.676	7	-8.101	8	5.523	6	6.736	3	0.924	3	0.048	0.028	0.271	6.101	0.002	0.012
1960	M200	4in Dia. Duct	Sec 5 - min	0.059	6	-0.110	5	-0.029	7	-5.901	5	3.343	8	-1.719	7	-1.213	6	63.888	5	0.119	5	0.000	0.266	0.076	5.891	0.009	0.009
1147	M125	6in Dia. Duct	Sec 4 - max	0.023	6	0.336	5	-0.084	5	4.106	7	0.607	6	0.105	5	0.704	8	449.066	6	0.376	6	0.003	0.293	0.059	4.105	0.049	0.043
312	M34	6in Dia. Duct	Sec 1 - min	-0.153	5	-0.033	7	-0.157	6	-0.989	7	-0.046	6	-4.471	5	-3.574	8	-444.321	6	-0.372	6	0.021	0.006	0.319	4.471	0.046	0.019
1715	M182	4in Dia. Duct	Sec 2 - max	0.412	5	0.681	5	-0.028	8	-2.718	7	4.626	8	-0.523	8	2.245	5	593.913	7	1.307	7	0.040	0.206	0.100	4.626	0.101	0.052
1144	M125	6in Dia. Duct	Sec 2 - min	-0.324	5	0.267	8	-0.167	5	-0.859	6	-3.767	7	-0.826	8	-0.263	5	183.441	7	0.154	7	0.026	0.271	0.045	3.767	0.019	0.033
125	M13	6in Dia. Duct	Sec 3 - max	0.059	1	0.059	5	0.059	8	0.090	6	0.952	5	-1.662	7	3.264	6	-6.000	8	-0.008	6	0.000	0.076	0.259	3.264	0.001	0.009
126	M13	6in Dia. Duct	Sec 3 - min	0.059	1	-0.059	6	-0.059	7	-0.952	5	-0.090	6	-3.264	6	1.662	7	-418.045	5	-0.544	5	0.000	0.076	0.259	3.264	0.076	0.008
1151	M126	6in Dia. Duct	Sec 1 - max	-0.029	8	0.263	6	-0.064	5	4.265	7	0.481	6	0.227	5	0.405	8	532.193	8	0.445	6	0.004	0.305	0.039	4.265	0.055	0.032
411	M44	6in Dia. Duct	Sec 1 - max	-0.093	8	0.162	5	0.190	6	0.270	8	-0.107	5	4.363	7	-0.437	8	625.835	6	0.524	5	0.012	0.019	0.312	4.363	0.065	0.023
311	M34	6in Dia. Duct	Sec 1 - max	0.129	8	0.015	6	0.146	5	0.046	6	0.088	7	3.974	8	4.471	5	110.574	7	0.095	7	0.016	0.006	0.319	4.471	0.012	0.016
1021	M113	6in Dia. Duct	Sec 1 - max	0.272	7	0.195	8	0.328	8	-1.193	6	2.586	7	1.772	5	0.274	6	428.703	7	0.376	7	0.033	0.183	0.127	2.586	0.046	0.040
414	M44	6in Dia. Duct	Sec 2 - min	-0.254	5	0.093	8	-0.196	7	0.676	6	-0.622	5	1.300	6	-3.500	7	294.362	7	0.246	7	0.032	0.059	0.250	3.500	0.030	0.024
2526	M263	2in Dia. Duct	Sec 3 - min	0.051	8	-0.213	5	-0.270	5	0.587	8	-3.927	6	0.954	8	-4.956	5	0.000	1	0.000	1	0.011	0.145	0.164	4.956	0.000	0.017
1333	M144	6in Dia. Duct	Sec 2 - max	0.070	8	0.255	1	-0.273	2	-0.520	7	1.521	6	3.099	6	-1.415	7	331.996	6	0.278	6	0.009	0.109	0.221	3.099	0.034	0.034
287	M31	6in Dia. Duct	Sec 4 - max	0.190	6	0.190	6	0.006	6	1.700	6	0.361	7	2.333	6	2.813	7	0.000	1	0.000	1	0.016	0.121	0.201	2.813	0.000	0.023
286	M31	6in Dia. Duct	Sec 4 - min	-0.124	5	-0.058	7	-0.013	7	-0.361	7	-1.700	6	-2.813	7	-2.333	6	0.000	1	0.000	1	0.016	0.121	0.201	2.813	0.000	0.007
1717	M182	4in Dia. Duct	Sec 4 - max	0.412	5	0.861	5	-0.020	8	-2.657	7	4.407	8	-0.533	8	2.268	5	593.913	7	1.307	7	0.040	0.198	0.101	4.407	0.101	0.052
2390	M249	6in Dia. Duct	Sec 5 - min	-0.068	8	-0.027	5	-0.100	8	0.493	6	-2.072	7	-0.782	6	-2.513	7	345.041	5	0.289	6	0.009	0.148	0.150	2.513	0.036	0.012
279	M30	6in Dia. Duct	Sec 5 - max	0.139	8	-0.027	7	0.025	5	0.337	7	2.045	6	2.054	6	2.405	7	0.000	1	0.000	1	0.018	0.146	0.172	2.405	0.000	0.003
281	M31	6in Dia. Duct	Sec 1 - max	0.139	8	0.028	6	0.025	6	0.337	7	2.045	6	2.054	6	2.405	7	0.000	1	0.000	1	0.016	0.148	0.172	2.405	0.000	0.026
1334	M144	6in Dia. Duct	Sec 2 - min	-0.040	5	0.037	2	-0.699	1	-1.521	6	0.520	7	1.415	7	-3.099	5	299.994	7	0.251	7	0.005	0.109	0.221	3.099	0.031	0.086
280	M30	6in Dia. Duct	Sec 6 - min	-0.133	5	-0.075	6	-0.032	7	-2.045	6	-0.337	7	-2.405	7	-2.054	6	0.000	1	0.000	1	0.017	0.148	0.172	2.405	0.000	0.009
282	M31	6in Dia. Duct	Sec 1 - min	-0.133	5	-0.020	7	-0.032	7	-2.045	6	-0.337	7	-2.405	7	-2.054	6	0.000	1	0.000	1	0.017	0.148	0.172	2.405	0.000	0.004
678	M70	12in Dia. Duct	Sec 4 - min	-0.143	1	-0.403	2	-0.140	3	4.400	2	-4.637	1	-2.641	5	1.976	6	-2460.349	6	-0.813	6	0.010	0.206	0.117	4.637	0.083	0.031
316	M34	6in Dia. Duct	Sec 4 - min	-0.197	5	-0.082	7	-0.126	8	-1.719	7	-0.620	6	-2.602	5	-1.367	7	-444.321	8	-0.372	8	0.025	0.123	0.186	2.602	0.046	0.016
2238	M234	2in Dia. Duct	Sec 4 - min	0.151	8	-0.272	5	-0.166	7	-5.562	6	1.660	8	-2.530	6	0.605	8	-0.009	5	0.000	8	0.034	0.206	0.034	5.562	0.000	0.017
1145	M125	6in Dia. Duct	Sec 3 - max	0.022	8	0.337	5	-0.083	8	3.947	7	0.733	6	0.184	5	0.665	8	449.066	6	0.376	6	0.003	0.282	0.048	3.947	0.046	0.042
2153	M226	6in Dia. Duct	Sec 2 - max	0.093	8	0.043	8	0.085	6	-0.669	7	1.418	6	-2.000	7	3.044	6	352.376	6	0.280	6	0.012	0.101	0.217	3.044	0.037	0.010
1140	M124	6in Dia. Duct	Sec 5 - min	-0.142	6	0.231	8	-0.185	5	-0.966	6	-3.627	7	-0.744	6	-0.113	5	157.598	6	0.132	6	0.018	0.259	0.053	3.627	0.016	0.029
2359	M249	6in Dia. Duct	Sec 5 - max	-0.020	5	0.145	7	0.127	5	2.072	7	-0.493	6	2.513	7	0.782	6	1690.205	7	1.369	7	0.003	0.148	0.180	2.513	0.171	0.018
1269	M137	6in Dia. Duct	Sec 5 - max	0.006	2	0.017	4	0.009	6	1.931	6	-1.214	5	-1.569	8	2.675	5	753.983	5	0.662	5	0.001	0.136	0.191	2.675	0.002	0.002
1270	M137	6in Dia. Duct	Sec 5 - min	-0.006	1	0.017	1	-0.009	5	1.214	5	-1.931	6	-2.675	5	1.569	8	174.142	8	0.153	8	0.001	0.136	0.191	2.675	0.019	0.002
1142	M125	6in Dia. Duct	Sec 1 - min	-0.224	5	0.267	6	-0.165	5	-0.966	6	-3.927	7	-0.587	8	-0.342	5	183.441	7	0.154	7	0.026	0.269	0.042	3.627	0.019	0.033
1023	M113	6in Dia. Duct	Sec 2 - max	0.273	7	0.193	8	0.327	8	-1.077	6	2.500	7	1.649	5	0.011	6	428.703	7	0.376	7	0.033	0.179	0.118	2.500	0.046	0.040
1267	M137	6in Dia. Duct	Sec 4 - max	0.006	3	0.018	4	0.010	8	1.924	8	-1.200	5	-1.573	8	2.671	5	753.983	5	0.662	5	0.001	0.137	0.191	2.671	0.062	0.002
1268	M137	6in Dia. Duct	Sec 4 - min	-0.006	1	0.018	1	-0.010	8	1.200	5	-1.924	8	-2.671	5	1.573	6	174.142	4	0.153	8	0.001	0.137	0.191	2.671	0.019	0.002
508	M53	6in Dia. Duct	Sec 5 - max	0.006	2	0.022	7	0.012	8	1.923	6	-1.294	5	-1.987	8	2.657	5	625.175	5	0.549	5	0.001	0.137	0.190	2.657	0.068	0.003
510	M53	6in Dia. Duct	Sec 5 - min	-0.006	1	0.022	6	-0.012	5	1.294	5	-1.923	8	-2.657	5	1.987	8	-16.964	8	-0.015	6	0.001	0.137	0.190	2.657	0.002	0.003
1265	M137	6in Dia. Duct	Sec 3 - max	0.006	2	0.019	4	0.011	8	1.916	8	-1.199	5	-1.577	8	2.666	5	753.983	5	0.662	5	0.001	0.137	0.190	2.665	0.082	0.002
1266	M137	6in Dia. Duct	Sec 3 - min	-0.006	1	0.019	1	-0.011	5	1.199	5	-1.916	8	-2.666	5	1.577	8	174.142	8	0.153	8	0.001	0.137	0.190	2.666	0.019	0.002
1712	M182	4in Dia. Duct	Sec 1 - min	0.052	8	0.061	8	-0.060	5	-5.063	6	2.849	7	-2.200	5	0.503	8	269.842	6	0.594	6	0.005	0.225	0.095	5.063	0.046	0.005
1719	M182	4in Dia. Duct	Sec 5 - max	0.412	5	0.660	5	-0.026	8	-2.597	7	4.189	6	-0.542	8	2.290	5	593.913	7	1.307	7	0.040	0.196	0.102	4.189	0.101	0.052
1263	M137	6in Dia. Duct	Sec 2 - max	0.007	2	0.020	4	0.012	5	1.906	6	-1.191	5	-1.582	8	2.662	5	753.983	5	0.662	5	0.001	0.136	0.190	2.662	0.082	0.002
1264	M137	6in Dia. Duct	Sec 2 - min	-0.007	1	0.020	5	-0.013	5	1.191	6	-1.906	8	-2.662	5	1.582	8	174.142	8	0.153	8	0.001	0.136	0.190	2.662	0.019	0.002
416	M44	6in Dia. Duct	Sec 3 - max	-0.249	5	0.098	6	-0.199	7	1.105	8	-1.510	5	2.183	6	-2.815	7	294.362	7	0.246	7	0.032	0.109	0.157	2.815	0.030	0.025
464	M49	6in Dia. Duct	Sec 2 - min	0.044	8	-0.197	5	-0.162	5	-2.197	8	1.344	6	-2.231	8	-2.297	5	-30.646	6	-0.027	6	0.005	0.157	0.154	2.297	0.003	0.023
1261	M137	6in Dia. Duct	Sec 1 - max	0.007	2	0.022	4	0.012	8	1.899	8	-1.162	5	-1.587	8	2.657	5	753.983	5	0.662	5	0.001	0.136	0.190	2.657	0.082	0.003
1262	M137	6in Dia. Duct	Sec 1 - min	-0.007	1	0.022	1	-0.012	5	1.162	5	-1.899	8	-2.657	5	1.587	8	174.142	8	0.153	8	0.001	0.136	0.190	2.657	0.019	0.003
1931	M204	6in Dia. Duct	Sec 1 - max	0.258	1	-0.188	1	0.067	5	-2.002	2	2.239	1	4.676	5	-3.884	8	-935.256	8	-0.821	8	0.016	0.100	0.208	4.676	0.063	0.019
2451	M255	6in Dia. Duct	Sec 1 - max	0.114	7	0.024	7	-0.026	7	0.772	7	-0.866	6	3.560	7	-1.907	6	52.117	6	0.044	6	0.014	0.055	0.256	3.560	0.005	0.003
2453	M255	6in Dia. Duct	Sec 2 - max	0.115	7	0.023	7	-0.026	7	0.783	7	-0.866	6	3.567	7	-1.886	6	52.117	6	0.044	6	0.015	0.056	0.255	3.567	0.005	0.003
2455	M255	6in Dia. Duct	Sec 3 - max	0.115	7	0.022	7	-0.026	7	0.783	7	-0.670	6	3.555	7	-1.869	6	52.117	6	0.044	6	0.015	0.057	0.254	3.555	0.005	0.003
677	M70	12in Dia. Duct	Sec 4 - max	0.022	2	-0.335	1	0.133	4	4.637	1	-4.400	2	-1.975	6	2.641	5	-1713.503	7	-0.562	7	0.002	0.206	0.117	4.637	0.043	0.026
2457	M255	6in Dia. Duct	Sec 4 - max	0.115	7	0.021	7	-0.026	7	0.800	7	-0.671	6	3.543	7	-1.843	6	52.117	6	0.044	6	0.015	0.057	0.253	3.543	0.005	0.003
2458	M255	6in Dia. Duct	Sec 5 - max	0.116	7	0.020	7	-0.026	7	0.813	7	-0.671	6	3.530	7	-1.822	6	52.117	6	0.044	6	0.016	0.058	0.252	3.530	0.005	0.003
1691	M200	4in Dia. Duct	Sec 1 - max	0.595	5	-0.047	6	0.068	6	2.655	7	-1.306	6	3.356	7	2.070	6	130.227	8	0.287	8	0.057	0.118	0.149	3.356	0.022	0.005
657	M68	12in Dia. Duct	Sec 4 - max	0.022	7	0.053	7	-0.001	3	6.234	6	-6.045	5	9.089	7	1.016	5	-211.895	8	-0.069	8	0.002	0.277	0.045	6.234	0.075	0.005
658	M68	12in Dia. Duct	Sec 4 - min	-0.020	8	0.043	6	-0.139	4	6.045	5	-6.234	6	-1.016	6	-0.089	7	-1303.365	5	-0.427	5	0.001	0.277	0.045	6.234	0.033	0.055
2449	M255	6in Dia. Duct	Sec 6 - max	0.111	7	0.024	7	0.084	7	0.753	7	-0.582	6	3.580	7	-1.907	6	200.487	6	0.168	6	0.014	0.054	0.256	3.580	0.021	0.008
1335	M144	6in Dia. Duct	Sec 3 - max	0.070	8	0.256	1	-0.273	2	-0.468	7	1.468	6	2.937	6	-1.301	7	331.996	6	0.278	6	0.009	0.109	0.210	2.937	0.034	0.034
2154	M226	6in Dia. Duct	Sec 2 - min	0.033	5	0.002	7	0.002	7	-1.418	5	0.669	7	-3.044	6	2.000	7	328.161	7	0.273	7	0.004	0.101	0.317	3.044	0.034	0.000
317	M34	6in Dia. Duct	Sec 4 - max	0.195	8	0.024	6	0.114	5	0.620	6	1.715	7	1.067	7	2.602	6	110.574	7	0.095	7	0.013	0.123	0.166	2.602	0.012	0.014
1139	M124	6in Dia. Duct	Sec 5 - max	0.071	8	0.483	5	-0.092	8	3.627	7	0.986	6	0.113	5	0.744	6	370.941	5	0.310	5	0.009	0.259	0.053	3.627	0.038	0.060
2113	M222	3in Dia. Duct	Sec 2 - max	0.218	8	-0.008	8	-0.023	5	-0.128	5	0.165	8	0.468	6	-0.604	5	-14.326	6	-0.051	8	0.025	0.008	0.267	0.468	0.006	0.002
277	M30	6in Dia. Duct	Sec 4 - max	0.190	6	-0.022	7	0.027	6	0.365	7	1.902	6	2.003	6	2.340	7	0.000	1	0.000	1	0.016	0.136	0.167	2.340	0.000	0.003
2447	M255	6in Dia. Duct	Sec 4 - max	0.110	7	0.025	7	0.063	7	0.742	7	-0.560	6	3.550	7	-1.905	6	200.487	6	0.168	6	0.014	0.053	0.254	3.550	0.021	0.008
276	M30	6in Dia. Duct	Sec 4 - min	-0.134	5	-0.071	6	-0.034	7	-1.802	6	-0.365	7	-2.340	7	-2.003	6	0.000	1	0.000	1	0.017	0.136	0.167	2.340	0.000	0.009
413	M44	6in Dia. Duct	Sec 2 - max	-0.088	8	0.157	5	0.195	6	0.622	5	-0.676	8	3.500	7	-1.300	6	625.835	6	0.524	6	0.011	0.059	0.250	3.500	0.048	0.024
1336	M144	6in Dia. Duct	Sec 3 - min	-0.040	5	0.037	2	-0.699	1	-1.468	6	0.489	7	1.301	7	-2.937	6	299.994	7	0.251	7	0.005	0.109	0.210	2.937	0.031	0.085
1714	M182	4in Dia. Duct	Sec 3 - max	0.052	8	0.061	8	-0.060	5	-4.844	6	2.779	7	-2.223	5	0.513	8	269.842	6	0.594	6	0.005	0.215	0.099	4.844	0.046	0.005
2452	M255	6in Dia. Duct	Sec 1 - min	0.059	6	0.005	6	-0.045	6	0.568	6	-0.772	7	1.907	6	-3.580	7	-62.152	7	-0.052	7	0.007	0.055	0.255	3.580	0.006	0.008

D-2250

	Member	Duct Size		Axial (kil)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_c	f_{by}/σ_c	f_{bz}/σ_c	f_t (ksi)	f_t/σ_t	f_t/σ_c
498	M49	6in Dia. Duct	Sec 3 - max	0.263	7	0.165	8	0.333	8	-1.558	6	2.022	7	1.986	5	1.966	8	781.760	7	0.686	7	0.032	0.145	0.142	2.023	0.085	0.041
2454	M256	6in Dia. Duct	Sec 2 - min	0.059	6	0.004	6	-0.045	6	0.669	6	-0.703	7	1.086	6	-3.567	7	-62.152	7	-0.052	7	0.007	0.056	0.255	3.557	0.006	0.006
2455	M256	6in Dia. Duct	Sec 3 - min	0.059	6	0.003	6	-0.045	6	0.670	6	-0.793	7	1.065	6	-3.555	7	-62.152	7	-0.052	7	0.007	0.057	0.254	3.556	0.006	0.006
1143	M125	6in Dia. Duct	Sec 2 - max	0.022	8	0.358	5	-0.083	8	0.767	7	0.859	6	0.263	5	0.026	6	449.056	6	0.376	6	0.003	0.271	0.042	3.757	0.045	0.042
2456	M256	6in Dia. Duct	Sec 4 - min	0.058	6	0.002	6	-0.046	6	0.671	6	-0.803	7	1.643	6	-3.543	7	-62.152	7	-0.052	7	0.007	0.057	0.253	3.543	0.006	0.006
2450	M256	6in Dia. Duct	Sec 5 - min	0.064	6	0.005	6	0.004	6	0.562	6	-0.753	7	1.907	6	-3.560	7	119.033	7	0.100	7	0.008	0.054	0.256	3.550	0.012	0.001
2460	M256	6in Dia. Duct	Sec 5 - min	0.058	6	0.000	6	-0.045	6	0.671	6	-0.813	7	1.622	6	-3.530	7	-62.152	7	-0.052	7	0.007	0.058	0.252	3.530	0.006	0.006
176	M18	6in Dia. Duct	Sec 3 - min	-0.035	7	-0.067	6	-0.031	6	-1.129	5	0.456	8	-2.811	6	1.452	7	766.010	5	0.336	6	0.005	0.090	0.223	2.811	0.048	0.009
2449	M256	6in Dia. Duct	Sec 3 - max	0.110	7	0.029	7	0.065	7	0.730	7	-0.577	6	3.520	7	-1.903	6	200.487	6	0.166	6	0.014	0.052	0.251	3.520	0.021	0.008
1932	M204	6in Dia. Duct	Sec 1 - min	0.120	2	-0.217	2	-0.067	6	-2.239	1	2.002	2	3.864	6	-4.676	5	-1045.519	5	-0.918	5	0.010	0.100	0.208	4.676	0.071	0.017
1025	M113	6in Dia. Duct	Sec 3 - max	0.274	7	0.191	8	0.325	8	-0.971	6	2.448	7	1.527	5	-0.252	8	428.703	7	0.376	7	0.033	0.175	0.109	2.448	0.048	0.040
1279	M138	6in Dia. Duct	Sec 5 - max	0.003	7	0.012	7	0.009	2	1.734	8	-0.711	5	-1.556	8	2.686	5	948.784	7	0.831	7	0.000	0.124	0.192	2.686	0.103	0.001
1280	M138	6in Dia. Duct	Sec 5 - min	-0.003	5	0.012	3	-0.009	1	0.711	5	-1.734	8	-2.686	5	1.556	8	538.124	6	0.472	6	0.000	0.124	0.192	2.686	0.058	0.001
2461	M257	6in Dia. Duct	Sec 1 - max	0.102	7	0.020	7	-0.086	6	0.711	7	-0.664	6	3.530	7	-1.922	6	-105.306	5	-0.088	5	0.013	0.051	0.252	3.530	0.011	0.011
1277	M138	6in Dia. Duct	Sec 4 - max	0.004	7	0.013	7	0.010	2	1.728	8	-0.706	5	-1.559	8	2.685	5	946.784	7	0.831	7	0.000	0.123	0.192	2.685	0.103	0.002
1278	M138	6in Dia. Duct	Sec 4 - min	-0.004	6	0.013	3	-0.010	1	0.706	5	-1.728	8	-2.685	5	1.559	8	538.124	8	0.472	6	0.000	0.123	0.192	2.685	0.058	0.002
467	M49	6in Dia. Duct	Sec 4 - max	0.264	7	0.153	8	0.331	8	-1.374	6	2.204	7	1.584	5	0.946	8	781.760	7	0.686	7	0.032	0.183	0.120	2.254	0.085	0.041
1275	M138	6in Dia. Duct	Sec 3 - max	0.004	7	0.014	7	0.011	2	1.723	8	-0.701	5	-1.562	8	2.682	5	946.784	7	0.831	7	0.000	0.123	0.192	2.682	0.103	0.002
1276	M138	6in Dia. Duct	Sec 3 - min	-0.004	6	0.014	3	-0.011	1	0.701	5	-1.723	8	-2.682	5	1.562	8	538.124	6	0.472	6	0.000	0.123	0.192	2.682	0.058	0.002
2448	M255	6in Dia. Duct	Sec 4 - min	0.064	6	0.006	6	0.004	6	0.580	6	-0.742	7	1.906	6	-3.530	7	119.033	7	0.100	7	0.008	0.053	0.254	3.550	0.012	0.001
507	M55	6in Dia. Duct	Sec 4 - max	0.003	7	0.034	7	0.019	6	1.800	8	-1.271	5	-1.554	8	2.590	5	525.175	5	0.549	5	0.001	0.129	0.185	2.590	0.006	0.004
508	M53	6in Dia. Duct	Sec 4 - min	-0.009	6	0.034	6	-0.019	6	1.271	5	-1.800	8	-2.590	5	1.554	6	416.594	5	-0.016	8	0.001	0.129	0.185	2.590	0.003	0.004
680	M70	12in Dia. Duct	Sec 5 - min	-0.143	1	-0.412	2	-0.135	3	3.641	2	-3.998	1	-2.544	5	1.767	8	-2480.349	6	-0.813	6	0.010	0.378	0.126	3.999	0.063	0.032
1273	M138	6in Dia. Duct	Sec 2 - max	0.004	7	0.016	7	0.012	2	1.717	8	-0.694	5	-1.565	8	2.678	5	946.784	7	0.831	7	0.000	0.123	0.191	2.678	0.103	0.002
1274	M138	6in Dia. Duct	Sec 2 - min	-0.004	6	0.016	3	-0.012	1	0.694	5	-1.717	8	-2.678	5	1.565	8	538.124	6	0.472	6	0.000	0.123	0.191	2.678	0.058	0.002
175	M18	6in Dia. Duct	Sec 3 - max	-0.011	6	-0.022	8	0.031	6	-0.456	8	1.129	5	-1.452	7	2.611	6	780.461	8	1.016	8	0.002	0.090	0.223	2.611	0.140	0.004
2443	M255	6in Dia. Duct	Sec 2 - max	0.109	7	0.027	7	0.060	7	0.717	7	-0.574	6	3.490	7	-1.901	6	200.487	6	0.166	6	0.014	0.051	0.249	3.490	0.021	0.008
2485	M259	6in Dia. Duct	Sec 3 - max	0.100	5	-0.076	6	0.058	6	-1.723	8	2.696	7	0.210	6	1.622	7	-179.120	6	-0.150	6	0.015	0.166	0.116	2.696	0.019	0.010
1271	M138	6in Dia. Duct	Sec 1 - max	0.005	7	0.017	7	0.013	2	1.710	8	-0.688	5	-1.569	8	2.675	5	946.784	7	0.831	7	0.001	0.122	0.191	2.675	0.103	0.002
1272	M138	6in Dia. Duct	Sec 1 - min	-0.005	8	0.017	3	-0.013	1	0.688	5	-1.710	8	-2.675	5	1.569	8	538.124	6	0.472	6	0.001	0.122	0.191	2.675	0.058	0.002
469	M49	6in Dia. Duct	Sec 5 - max	0.269	7	0.147	5	0.328	8	-1.163	6	2.556	7	1.386	5	0.311	8	781.760	7	0.686	7	0.032	0.183	0.099	2.556	0.065	0.040
1022	M113	6in Dia. Duct	Sec 1 - min	0.030	6	0.006	5	-0.163	5	-0.956	7	1.183	6	-0.274	5	-1.772	5	30.037	6	0.027	6	0.004	0.183	0.127	2.556	0.003	0.019
2483	M257	6in Dia. Duct	Sec 2 - max	0.102	7	0.019	7	-0.085	6	0.720	7	-0.654	6	3.477	7	-1.782	6	-105.306	6	-0.088	6	0.013	0.051	0.248	3.477	0.011	0.010
127	M13	6in Dia. Duct	Sec 4 - max	0.058	1	0.056	5	0.056	6	-0.101	6	0.761	5	-1.652	7	3.073	6	-8.000	8	-0.008	8	0.008	0.060	0.244	3.073	0.001	0.008
128	M13	6in Dia. Duct	Sec 4 - min	0.056	1	-0.056	8	-0.056	7	-0.761	5	0.101	8	-3.073	6	1.652	7	-418.045	5	-0.544	5	0.008	0.060	0.244	3.073	0.075	0.009
2446	M255	6in Dia. Duct	Sec 3 - min	0.064	6	0.007	6	0.004	6	0.577	6	-0.730	7	1.903	6	-3.520	7	119.033	7	0.100	7	0.008	0.052	0.251	3.520	0.012	0.001
2441	M255	6in Dia. Duct	Sec 1 - max	0.109	7	0.028	7	0.063	7	0.704	7	-0.570	6	3.469	7	-1.899	6	200.487	6	0.166	6	0.014	0.050	0.247	3.469	0.021	0.008
1136	M124	6in Dia. Duct	Sec 4 - min	-0.142	5	0.232	8	-0.166	5	-1.095	6	-3.398	7	-0.705	8	-0.103	5	157.868	6	0.137	6	0.018	0.243	0.050	3.398	0.016	0.029
1716	M162	4in Dia. Duct	Sec 3 - min	0.051	6	0.051	6	-0.060	6	-4.926	6	2.718	7	-2.245	5	0.533	6	269.942	6	0.594	6	0.005	0.206	0.100	4.926	0.046	0.005
2465	M257	6in Dia. Duct	Sec 3 - max	0.102	7	0.017	7	-0.085	6	0.720	7	-0.653	6	3.423	7	-1.742	6	-105.306	6	-0.088	6	0.013	0.052	0.245	3.423	0.011	0.010
2444	M255	6in Dia. Duct	Sec 2 - min	0.055	6	0.008	6	0.004	6	0.574	6	-0.717	7	1.901	6	-3.490	7	119.033	7	0.100	7	0.008	0.051	0.249	3.490	0.012	0.001
2462	M257	6in Dia. Duct	Sec 1 - min	0.045	8	0.000	6	-0.113	7	0.654	6	-0.711	7	1.822	6	-3.530	7	-243.217	7	-0.204	7	0.005	0.051	0.252	3.530	0.025	0.014
1337	M144	6in Dia. Duct	Sec 4 - max	0.070	8	0.254	1	-0.273	2	-0.459	7	1.416	6	2.774	6	-1.168	7	331.096	6	0.278	6	0.009	0.101	0.188	2.774	0.034	0.034
471	M50	6in Dia. Duct	Sec 1 - max	0.244	5	-0.149	6	0.149	5	2.426	5	-0.677	6	-0.736	6	1.476	7	115.607	7	0.101	7	0.029	0.173	0.105	2.426	0.012	0.018
1027	M113	6in Dia. Duct	Sec 4 - max	0.275	7	0.189	8	0.324	8	-0.829	8	2.431	5	1.406	5	-0.614	8	428.703	7	0.376	7	0.033	0.174	0.100	2.431	0.046	0.040
2466	M259	6in Dia. Duct	Sec 3 - min	-0.041	6	-0.143	7	-0.008	7	-2.598	7	1.723	6	-1.622	7	-0.210	6	-325.274	7	-0.272	7	0.005	0.186	0.116	2.598	0.034	0.018
2467	M257	6in Dia. Duct	Sec 4 - max	0.100	7	0.016	7	-0.084	6	0.737	7	-0.652	6	3.369	7	-1.701	6	-105.306	6	-0.088	6	0.013	0.053	0.241	3.369	0.011	0.010
276	M30	6in Dia. Duct	Sec 3 - max	0.151	8	-0.018	7	0.029	6	0.424	7	1.707	6	1.948	6	2.271	7	0.000	1	0.000	1	0.018	0.125	0.162	2.271	0.000	0.004
679	M70	12in Dia. Duct	Sec 6 - max	0.022	2	-0.349	1	0.127	4	3.899	1	-3.041	2	-1.787	6	2.544	5	-1713.993	7	-0.602	7	0.002	0.176	0.126	3.999	0.043	0.026
2442	M255	6in Dia. Duct	Sec 1 - min	0.065	6	0.009	6	0.004	6	0.576	6	-0.704	7	1.899	6	-3.460	7	119.033	7	0.100	7	0.008	0.050	0.247	3.460	0.012	0.001
445	M44	6in Dia. Duct	Sec 3 - max	-0.083	8	0.192	5	0.199	6	1.516	5	-1.105	6	2.815	7	-2.185	6	625.635	6	0.524	6	0.011	0.108	0.187	2.815	0.065	0.028
276	M30	6in Dia. Duct	Sec 3 - min	-0.135	5	-0.067	6	-0.037	7	-1.767	6	-0.424	7	-2.271	7	-1.948	6	0.000	1	0.000	1	0.017	0.126	0.162	2.271	0.000	0.008
2464	M257	6in Dia. Duct	Sec 2 - min	0.046	6	0.000	6	-0.113	7	0.654	6	-0.720	7	1.782	6	-3.477	7	-243.217	7	-0.204	7	0.006	0.051	0.248	3.477	0.025	0.014
2114	M222	6in Dia. Duct	Sec 2 - min	0.078	7	-0.010	5	-0.179	8	-0.185	8	0.126	5	0.664	5	-0.468	8	-38.158	5	-0.159	5	0.009	0.008	0.267	0.468	0.012	0.014
1338	M144	6in Dia. Duct	Sec 1 - max	-0.040	5	0.036	2	-0.699	1	-1.416	6	0.459	7	1.168	7	-2.774	6	229.894	7	0.251	7	0.005	0.101	0.198	2.774	0.031	0.068
1141	M125	6in Dia. Duct	Sec 1 - max	0.021	8	0.339	5	-0.042	8	3.627	7	0.986	6	0.542	5	0.587	8	449.056	6	0.376	6	0.003	0.259	0.042	3.627	0.046	0.042
2469	M257	6in Dia. Duct	Sec 6 - max	0.103	7	0.016	7	-0.084	6	0.744	7	-0.661	6	3.315	7	-1.682	6	-105.306	6	-0.088	6	0.013	0.053	0.237	3.316	0.011	0.010
2468	M257	6in Dia. Duct	Sec 3 - min	0.045	6	-0.081	6	-0.114	7	0.653	6	-0.729	7	1.742	6	-3.423	7	-243.217	7	-0.204	7	0.006	0.052	0.245	3.423	0.025	0.014
1137	M124	6in Dia. Duct	Sec 4 - max	0.070	8	0.486	5	-0.061	8	0.398	7	1.089	6	0.193	5	0.706	8	370.941	5	0.310	5	0.009	0.243	0.050	3.398	0.038	0.060
1718	M162	4in Dia. Duct	Sec 4 - min	0.051	5	0.051	6	-0.060	5	-4.407	6	2.557	7	-2.250	5	0.533	8	269.942	6	0.594	6	0.005	0.196	0.101	4.407	0.046	0.005
1024	M113	6in Dia. Duct	Sec 2 - min	0.032	6	0.006	5	-0.152	5	-2.500	7	1.077	6	-0.011	8	-1.849	5	30.037	6	0.027	6	0.004	0.179	0.118	2.500	0.003	0.019
473	M50	6in Dia. Duct	Sec 2 - max	0.261	5	-0.157	5	0.141	5	1.276	5	0.430	8	-0.657	5	2.499	6	115.607	7	0.101	7	0.030	0.091	0.178	2.498	0.012	0.018
2178	M228	6in Dia. Duct	Sec 5 - max	0.069	7	0.026	7	0.142	7	0.574	7	-0.398	6	3.460	7	-1.689	6	315.448	6	0.264	6	0.011	0.041	0.247	3.460	0.033	0.018
2458	M257	6in Dia. Duct	Sec 4 - min	0.044	6	-0.003	6	-0.114	7	0.652	6	-0.737	7	1.761	6	-3.569	7	-243.217	7	-0.204	7	0.006	0.053	0.243	3.569	0.025	0.014
1029	M113	6in Dia. Duct	Sec 5 - max	0.276	7	0.187	8	0.323	8	-0.677	8	2.426	5	1.256	7	-0.774	6	428.703	7	0.376	7	0.033	0.173	0.092	2.426	0.046	0.040
1740	M164	5in Dia. Duct	Sec 5 - min	-0.025	7	-0.032	5	-0.033	8	-0.715	7	0.167	6	-2.962	6	2.064	7	-255.320	5	-0.332	5	0.004	0.057	0.237	2.962	0.046	0.004
1739	M164	5in Dia. Duct	Sec 4 - min	-0.025	7	-0.031	5	-0.023	8	-0.719	7	0.159	6	-2.975	6	2.071	7	-255.320	5	-0.332	5	0.004	0.057	0.236	2.975	0.046	0.004
1738	M164	5in Dia. Duct	Sec 3 - min	-0.024	7	-0.031	5	-0.023	8	-0.723	7	0.149	6	-2.968	6	2.077	7	-255.320	5	-0.332	5	0.004	0.057	0.235	2.968	0.046	0.004
1739	M164	5in Dia. Duct	Sec 5 - max	-0.020	5	0.014	8	0.023	7	-0.167	6	0.715	7	-2.964	7	2.892	6	208.456	6	0.271	6	0.003	0.057	0.237	2.982	0.037	0.003
1734	M164	5in Dia. Duct	Sec 2 - min	-0.024	7	-0.031	5	-0.022	8	-0.727	7	0.140	6	-2.962	6	2.084	7	-255.320	5	-0.332	5	0.004	0.058	0.235	2.962	0.046	0.004
1737	M164	5in Dia. Duct	Sec 4 - max	-0.020	5	0.014	8	0.023	7	-0.158	6	0.719	7	-2.971	7	2.975	6	208.456	6	0.271	6	0.003	0.057	0.236	2.976	0.037	0.003
1732	M164	5in Dia. Duct	Sec 1 - min	-0.024	7	-0.030	5	-0.022	8	-0.730	7	0.132	6	-2.998	6	2.090	7	-255.320	5	-0.332	5	0.004	0.056	0.235	2.998	0.046	0.004
1736	M164	5in Dia. Duct	Sec 3 - max	-0.020	5	0.013	8	0.023	7	-0.149	6	0.723	7	-2.977	7	2.989	6	208.456	6	0.271	6	0.003	0.057	0.236	2.989	0.037	0.003
1733	M164	5in Dia. Duct	Sec 2 - max	-0.020	5	0.013	8	0.022	7	-0.140	6	0.727	7	-2.054	7	2.962	6	208.456	6	0.271	6	0.003	0.056	0.235	2.962	0.037	0.003
2160	M228	6in Dia. Duct	Sec 9 - min	0.059	6	0.008	6	0.054	6	0.358	6	-0.574	7	1.099	6	-3.460	7	270.065	7	0.227	7	0.007	0.041	0.247	3.460	0.028	0.007
2470	M257	6in Dia. Duct	Sec 5 - min	0.044	8	-0.004	6	-0.115	7	0.651	6	-0.744	7	1.662	6	-3.315	7	-243.217	7	-0.204	7	0.006	0.053	0.237	3.316	0.025	0.014
1731	M164	5in Dia. Duct	Sec 1 - max	-0.020	5	0.013	8	0.022	7	-0.132	8	0.730	7	-2.090	7	2.956	6	208.456	6	0.271	6	0.003	0.058	0.236	2.956	0.037	0.003
503	M53	6in Dia. Duct	Sec 3 - max	0.013	7	0.047	7	0.027	4	1.821	8	-1.092	5	-1.752	8	2.492	5	525.175	5	0.549	5	0.002	0.118	0.178	2.492	0.006	0.006
506	M53	6in Dia. Duct	Sec 3 - min	-0.013	6	0.047	6	-0.027	3	1.092	5	-1.821	8	-2.492	5	1.752	8	16.084	8	-0.016	8	0.002	0.116	0.179	2.492	0.002	0.006
2471	M256	6in Dia. Duct	Sec 1 - max	0.020	7	0.013	7	-0.109	6	0.651	7	-0.604	6	3.315	7	-1.662	6	-179.120	6	-0.150	6	0.011	0.047	0.237	3.316	0.019	0.012
129	M13	5in Dia. Duct	Sec 6 - max	0.054	1	0.054	5	0.054	8	-0.152	6	0.710	7	2.603	7	2.892	6	-6.000	8	-0.008	8	0.008	0.050	0.230	2.892	0.001	0.007
130	M13	5in Dia. Duct	Sec 6 - min	0.054	1	-0.054	8	-0.054	7	-0.710	7	0.152	6	-2.892	6	2.603	7	-418.045	5	-0.544	5	0.008	0.056	0.230	2.892	0.075	0.007
397	M42	6in Dia. Duct	Sec 4 - max	0.068	6	-0.278	6	0.278	5	-1.700	6	3.621	7	0.369	5	0.341	8	414.335	5	0.347	5	0.009	0.259	0.028	3.621	0.009	0.338
398	M42	6in Dia. Duct	Sec 4 - min	-0.068	7	-0.311	5	0.110	8	-3.621	7	1.700	6	-0.341	6	-0.369	5	55.682	8	0.072	8	0.009	0.259	0.028	3.621	0.033	0.017
2177	M228	6in Dia. Duct	Sec 4 - max	0.068	7	0.029	7	0.141	7	0.565	7	-0.393	6	3.393	7	-1.674	6	315.448	6	0.264	6	0.011	0.040	0.242	3.393		

D-2250

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_a	f_{by}/σ_b	f_{bz}/σ_b	[illegible]	f_c (ksi)	[illegible]	f/τ_t	f/σ_t	[illegible]
1339	M144	6in Dia. Duct	Sec 5 - max	0.071	6	0.264	1	-0.274	2	-0.429	7	1.364	6	2.612	6	-1.074	7	331.996	6	0.278	6	0.009	0.097	0.187	[illegible]	2.612	[illegible]	0.034	0.034	[illegible]
1720	M182	4in Dia. Duct	Sec 5 - min	0.051	6	0.060	8	-0.060	5	-4.169	8	2.597	7	-2.290	5	0.542	8	269.942	6	0.594	8	0.005	0.166	0.102	[illegible]	4.169	[illegible]	0.046	0.005	[illegible]
466	M49	8in Dia. Duct	Sec 3 - min	0.047	6	-0.159	5	-0.159	5	-2.023	7	1.508	8	-1.566	8	-1.088	5	-30.846	8	-0.027	6	0.006	0.145	0.142	[illegible]	2.023	[illegible]	0.003	0.023	[illegible]
273	M30	6in Dia. Duct	Sec 2 - max	0.142	5	-0.014	7	0.032	6	0.456	7	1.641	6	1.686	6	2.197	7	0.000	1	0.000	1	0.016	0.117	0.157	[illegible]	2.197	[illegible]	0.000	0.004	[illegible]
1342	M145	6in Dia. Duct	Sec 1 - min	-0.170	6	0.024	2	-0.653	1	-0.990	6	0.193	7	1.178	7	-2.787	6	241.509	7	0.202	7	0.022	0.071	0.199	[illegible]	2.787	[illegible]	0.025	0.061	[illegible]
1136	M124	6in Dia. Duct	Sec 3 - min	-0.142	5	0.232	8	-0.169	5	-1.206	6	-3.168	7	-0.067	8	-0.273	5	157.598	8	0.132	8	0.019	0.226	0.048	[illegible]	3.168	[illegible]	0.016	0.029	[illegible]
2229	M233	2in Dia. Duct	Sec 5 - max	0.324	5	0.024	5	0.110	2	2.636	5	0.001	8	3.288	2	-0.420	1	8.083	5	0.110	5	0.072	0.098	0.122	[illegible]	3.288	[illegible]	0.007	0.007	[illegible]
2231	M234	2in Dia. Duct	Sec 1 - max	0.324	6	-0.038	8	-0.048	8	2.636	5	0.001	8	3.288	2	-0.420	1	8.083	5	0.110	5	0.072	0.098	0.122	[illegible]	3.288	[illegible]	0.007	0.003	[illegible]
274	M30	6in Dia. Duct	Sec 2 - min	-0.136	5	-0.083	6	-0.039	7	-1.641	6	-0.450	7	-2.197	7	-1.886	6	0.000	1	0.000	1	0.017	0.117	0.157	[illegible]	2.197	[illegible]	0.000	0.008	[illegible]
730	M83	6in Dia. Duct	Sec 5 - min	-0.346	7	-0.104	7	-0.229	7	-1.451	7	-2.128	6	-1.336	7	-1.025	8	-219.491	7	-0.184	7	0.044	0.152	0.095	[illegible]	2.128	[illegible]	0.023	0.026	[illegible]
85	M9	3in Dia. Duct	Sec 3 - max	0.154	7	-0.375	6	0.988	7	-2.104	7	2.331	8	3.812	8	-3.310	7	34.434	8	0.147	8	0.018	0.104	0.169	[illegible]	3.812	[illegible]	0.011	0.076	[illegible]
2067	M217	3in Dia. Duct	Sec 4 - max	0.076	6	-0.031	8	-0.025	5	0.223	8	-0.217	5	-2.142	5	6.100	8	-6.980	8	-0.030	8	0.009	0.010	0.271	[illegible]	6.100	[illegible]	0.002	0.002	[illegible]
2178	M228	6in Dia. Duct	Sec 4 - min	0.060	6	0.010	6	0.094	6	0.393	8	-0.561	7	1.874	6	-3.393	7	270.985	7	0.227	7	0.008	0.040	0.242	[illegible]	3.393	[illegible]	0.028	0.007	[illegible]
2185	M229	2in Dia. Duct	Sec 3 - max	0.160	5	-0.064	8	0.040	5	-0.839	8	3.769	5	0.036	8	1.101	5	10.134	6	0.136	6	0.038	0.214	0.041	[illegible]	5.769	[illegible]	0.009	0.004	[illegible]
468	M49	8in Dia. Duct	Sec 4 - min	0.050	6	-0.191	5	-0.156	5	-2.284	7	1.374	6	-0.940	8	-1.684	5	-30.846	6	-0.027	6	0.006	0.163	0.120	[illegible]	2.284	[illegible]	0.003	0.024	[illegible]
169	M17	5in Dia. Duct	Sec 5 - max	-0.022	1	0.022	7	0.022	5	-0.132	5	0.730	7	-2.054	7	2.872	6	-6.000	6	-0.008	8	0.003	0.059	0.228	[illegible]	2.872	[illegible]	0.001	0.003	[illegible]
170	M17	5in Dia. Duct	Sec 5 - min	-0.022	2	-0.022	8	-0.022	8	-0.730	7	0.132	6	-2.872	6	2.054	7	-418.045	5	-0.544	5	0.003	0.058	0.228	[illegible]	2.872	[illegible]	0.075	0.003	[illegible]
1340	M144	6in Dia. Duct	Sec 5 - min	-0.040	5	0.035	2	-0.698	1	-1.364	6	0.429	7	1.074	7	-2.612	6	290.904	7	0.261	7	0.005	0.097	0.187	[illegible]	2.612	[illegible]	0.031	0.086	[illegible]
167	M17	5in Dia. Duct	Sec 4 - max	-0.018	1	0.018	7	0.018	5	-0.034	6	0.828	7	-2.151	7	2.774	6	-6.000	8	-0.008	8	0.003	0.066	0.220	[illegible]	2.774	[illegible]	0.001	0.002	[illegible]
168	M17	5in Dia. Duct	Sec 4 - min	-0.018	2	-0.018	6	-0.018	6	-0.828	7	0.034	6	-2.774	6	2.151	7	-418.045	5	-0.544	5	0.003	0.066	0.220	[illegible]	2.774	[illegible]	0.075	0.002	[illegible]
470	M49	8in Dia. Duct	Sec 5 - min	0.053	6	-0.193	5	-0.153	5	-2.556	7	1.163	6	-0.311	8	-1.386	5	-30.646	6	-0.027	6	0.006	0.163	0.099	[illegible]	2.556	[illegible]	0.003	0.024	[illegible]
165	M17	5in Dia. Duct	Sec 3 - max	-0.013	1	0.013	7	0.013	5	0.042	6	0.904	7	-2.227	7	2.698	6	-6.000	8	-0.008	8	0.002	0.072	0.214	[illegible]	2.698	[illegible]	0.001	0.002	[illegible]
166	M17	5in Dia. Duct	Sec 3 - min	-0.013	2	-0.013	6	-0.013	8	-0.904	7	-0.042	6	-2.698	6	2.227	7	-418.045	5	-0.544	5	0.002	0.072	0.214	[illegible]	2.698	[illegible]	0.075	0.002	[illegible]
2175	M228	6in Dia. Duct	Sec 3 - max	0.088	7	0.030	7	0.141	7	0.547	7	-0.389	6	3.326	7	-1.848	6	319.448	6	0.264	6	0.011	0.039	0.238	[illegible]	3.320	[illegible]	0.033	0.017	[illegible]
1026	M113	8in Dia. Duct	Sec 3 - min	0.033	6	0.006	5	-0.151	5	-2.446	7	0.971	8	0.252	8	-1.527	5	30.937	6	0.027	6	0.004	0.175	0.100	[illegible]	2.446	[illegible]	0.003	0.019	[illegible]
2472	M268	6in Dia. Duct	Sec 1 - min	0.035	6	-0.004	6	-0.153	7	0.004	6	-0.651	7	1.602	6	-3.315	7	-325.274	7	-0.272	7	0.004	0.047	0.237	[illegible]	3.315	[illegible]	0.034	0.019	[illegible]
86	M9	3in Dia. Duct	Sec 3 - min	0.122	6	-0.543	7	0.663	8	-2.331	8	2.104	7	3.310	7	-3.812	8	30.864	7	0.132	7	0.014	0.104	0.169	[illegible]	3.812	[illegible]	0.010	0.051	[illegible]
141	M15	5in Dia. Duct	Sec 1 - max	0.009	1	0.009	5	0.009	8	0.094	6	0.956	7	-2.280	7	2.646	6	-6.000	8	-0.008	8	0.001	0.076	0.210	[illegible]	2.646	[illegible]	0.001	0.001	[illegible]
142	M15	5in Dia. Duct	Sec 1 - min	0.009	1	-0.009	7	-0.009	5	-0.956	7	-0.094	8	-2.646	6	2.280	7	-418.045	5	-0.544	5	0.001	0.076	0.210	[illegible]	2.646	[illegible]	0.076	0.001	[illegible]
163	M17	5in Dia. Duct	Sec 2 - max	-0.009	1	0.009	7	0.009	5	0.097	6	0.959	7	-2.282	7	2.643	6	-6.000	8	-0.008	8	0.001	0.076	0.210	[illegible]	2.643	[illegible]	0.001	0.001	[illegible]
164	M17	5in Dia. Duct	Sec 2 - min	-0.009	2	-0.009	6	-0.009	8	-0.959	7	-0.097	6	-2.643	6	2.282	7	-418.045	5	-0.544	5	0.001	0.076	0.210	[illegible]	2.643	[illegible]	0.075	0.001	[illegible]
174	M18	5in Dia. Duct	Sec 2 - min	-0.030	7	-0.059	5	-0.028	8	-0.872	5	0.370	8	-2.690	6	1.573	7	258.010	5	0.335	5	0.004	0.069	0.213	[illegible]	2.690	[illegible]	0.046	0.008	[illegible]
1268	M139	8in Dia. Duct	Sec 5 - max	0.002	7	0.007	5	0.008	2	1.321	8	-0.117	5	-1.549	8	2.695	5	1031.360	7	0.905	7	0.000	0.094	0.193	[illegible]	2.695	[illegible]	0.112	0.001	[illegible]
1200	M139	8in Dia. Duct	Sec 5 - min	-0.002	6	0.007	3	-0.006	1	0.117	5	-1.321	8	-2.695	5	1.549	8	840.402	6	0.738	6	0.000	0.094	0.193	[illegible]	2.695	[illegible]	0.091	0.001	[illegible]
527	M55	8in Dia. Duct	Sec 4 - max	0.016	6	0.016	5	0.239	8	0.785	5	-0.256	8	3.206	8	-1.075	5	1028.609	7	0.003	7	0.002	0.056	0.229	[illegible]	3.206	[illegible]	0.111	0.030	[illegible]
528	M56	8in Dia. Duct	Sec 4 - min	-0.016	5	-0.067	8	0.186	7	0.256	8	-0.785	5	1.675	5	-3.206	8	956.930	6	0.840	6	0.002	0.056	0.229	[illegible]	3.206	[illegible]	0.104	0.023	[illegible]
143	M15	5in Dia. Duct	Sec 2 - max	0.007	1	0.007	5	0.007	8	0.115	6	0.077	7	-2.300	7	2.625	6	-6.000	8	-0.008	8	0.001	0.078	0.208	[illegible]	2.625	[illegible]	0.001	0.001	[illegible]
144	M15	5in Dia. Duct	Sec 2 - min	0.007	1	-0.007	7	-0.007	5	-0.077	7	-0.115	6	-2.625	8	2.300	7	-418.045	5	-0.544	5	0.001	0.078	0.208	[illegible]	2.625	[illegible]	0.075	0.001	[illegible]
1287	M139	8in Dia. Duct	Sec 4 - max	0.002	7	0.008	5	0.007	2	1.317	8	-0.114	5	-1.650	8	2.694	6	1031.360	7	0.905	7	0.000	0.094	0.192	[illegible]	2.694	[illegible]	0.112	0.001	[illegible]
1288	M139	8in Dia. Duct	Sec 4 - min	-0.002	6	0.008	3	-0.007	1	0.114	5	-1.317	6	-2.694	5	1.550	8	840.402	8	0.738	6	0.000	0.094	0.192	[illegible]	2.694	[illegible]	0.091	0.001	[illegible]
145	M15	5in Dia. Duct	Sec 3 - max	0.005	1	0.005	5	0.005	6	0.129	8	0.991	7	-2.315	7	2.611	6	-6.000	8	-0.008	8	0.001	0.079	0.207	[illegible]	2.611	[illegible]	0.001	0.001	[illegible]
146	M15	5in Dia. Duct	Sec 3 - min	0.005	1	-0.005	7	-0.005	5	-0.091	7	-0.129	5	-2.611	6	2.315	7	-418.045	5	-0.544	5	0.001	0.079	0.207	[illegible]	2.611	[illegible]	0.075	0.001	[illegible]
159	M16	5in Dia. Duct	Sec 5 - max	-0.005	1	0.005	7	0.005	5	0.130	6	0.992	7	-2.315	7	2.610	6	-6.000	8	-0.008	8	0.001	0.079	0.207	[illegible]	2.610	[illegible]	0.001	0.001	[illegible]
160	M16	5in Dia. Duct	Sec 5 - min	-0.005	1	-0.005	6	-0.005	5	-0.992	7	-0.130	6	-2.610	6	2.315	7	-418.045	5	-0.544	5	0.001	0.079	0.207	[illegible]	2.610	[illegible]	0.075	0.001	[illegible]
161	M17	5in Dia. Duct	Sec 1 - max	-0.005	1	0.005	7	0.005	5	0.130	8	0.992	7	-2.315	7	2.610	6	-6.000	8	-0.008	8	0.001	0.079	0.207	[illegible]	2.610	[illegible]	0.001	0.001	[illegible]
162	M17	5in Dia. Duct	Sec 1 - min	-0.005	2	-0.005	8	-0.005	6	-0.992	7	-0.130	8	-2.810	6	2.315	7	-418.045	5	-0.544	5	0.001	0.079	0.207	[illegible]	2.610	[illegible]	0.075	0.001	[illegible]
1265	M139	8in Dia. Duct	Sec 3 - max	0.002	7	0.009	5	0.008	2	1.314	8	-0.110	5	-1.552	8	2.692	5	1031.360	7	0.905	7	0.000	0.094	0.192	[illegible]	2.692	[illegible]	0.112	0.001	[illegible]
1266	M139	8in Dia. Duct	Sec 3 - min	-0.002	6	0.009	3	-0.008	1	0.110	6	-1.314	8	-2.692	5	1.552	6	840.402	6	0.738	6	0.000	0.094	0.192	[illegible]	2.692	[illegible]	0.091	0.001	[illegible]
1750	M185	5in Dia. Duct	Sec 5 - min	-0.027	8	-0.047	6	-0.024	8	-0.723	7	0.219	6	-2.835	6	1.873	7	69.263	5	0.116	5	0.004	0.057	0.225	[illegible]	2.835	[illegible]	0.016	0.006	[illegible]
157	M16	5in Dia. Duct	Sec 4 - max	-0.003	1	0.003	7	0.003	5	0.135	6	0.997	7	-2.320	7	2.605	6	-6.000	8	-0.008	8	0.000	0.079	0.207	[illegible]	2.605	[illegible]	0.001	0.000	[illegible]
158	M16	5in Dia. Duct	Sec 4 - min	-0.003	1	-0.003	6	-0.003	8	-0.997	7	-0.135	6	-2.605	6	2.320	7	-418.045	5	-0.544	5	0.000	0.079	0.207	[illegible]	2.605	[illegible]	0.075	0.000	[illegible]
147	M15	5in Dia. Duct	Sec 4 - max	0.002	1	0.002	5	0.002	8	0.138	6	1.000	7	-2.324	7	2.602	6	-6.000	8	-0.008	8	0.000	0.079	0.207	[illegible]	2.602	[illegible]	0.001	0.000	[illegible]
148	M15	5in Dia. Duct	Sec 4 - min	0.002	1	-0.002	7	-0.002	5	-1.000	7	-0.138	6	-2.602	6	2.324	7	-418.045	5	-0.544	5	0.000	0.079	0.207	[illegible]	2.602	[illegible]	0.075	0.000	[illegible]
155	M16	5in Dia. Duct	Sec 3 - max	-0.002	1	0.002	7	0.002	5	0.138	8	1.000	7	-2.324	7	2.602	6	-6.000	8	-0.008	8	0.000	0.079	0.207	[illegible]	2.602	[illegible]	0.001	0.000	[illegible]
156	M16	5in Dia. Duct	Sec 3 - min	-0.002	1	-0.002	5	-0.002	6	-1.000	7	-0.138	8	-2.602	6	2.324	7	-418.045	5	-0.544	5	0.000	0.079	0.207	[illegible]	2.602	[illegible]	0.075	0.000	[illegible]
153	M16	5in Dia. Duct	Sec 2 - max	-0.001	1	0.001	7	0.001	5	0.140	6	1.002	7	-2.320	7	2.600	6	-6.000	8	-0.008	8	0.000	0.080	0.206	[illegible]	2.600	[illegible]	0.001	0.000	[illegible]
154	M16	5in Dia. Duct	Sec 2 - min	-0.001	1	-0.001	6	-0.001	6	-1.002	7	-0.140	6	-2.600	6	2.326	7	-418.045	5	-0.544	5	0.000	0.080	0.206	[illegible]	2.600	[illegible]	0.075	0.000	[illegible]
2203	M239	6in Dia. Duct	Sec 2 - max	0.097	5	0.112	6	0.022	6	-2.347	6	3.189	5	0.325	6	0.643	7	0.908	5	0.000	5	0.012	0.228	0.046	[illegible]	3.189	[illegible]	0.000	0.014	[illegible]
1283	M139	8in Dia. Duct	Sec 2 - max	0.002	7	0.011	5	0.009	2	1.310	8	-0.106	5	-1.554	8	2.690	5	1031.360	7	0.905	7	0.000	0.094	0.192	[illegible]	2.690	[illegible]	0.112	0.001	[illegible]
1284	M139	8in Dia. Duct	Sec 2 - min	-0.002	6	0.011	3	-0.009	1	0.106	5	-1.310	8	-2.690	5	1.554	8	840.402	6	0.738	6	0.000	0.094	0.192	[illegible]	2.690	[illegible]	0.091	0.001	[illegible]
149	M15	5in Dia. Duct	Sec 5 - max	0.000	1	0.000	1	0.000	1	0.141	6	1.003	7	-2.326	7	2.599	6	-6.000	8	-0.008	8	0.000	0.080	0.206	[illegible]	2.599	[illegible]	0.001	0.000	[illegible]
150	M15	5in Dia. Duct	Sec 5 - min	0.000	1	0.000	1	0.000	1	-1.003	7	-0.141	6	-2.599	6	2.326	7	-418.045	5	-0.544	5	0.000	0.080	0.206	[illegible]	2.599	[illegible]	0.075	0.000	[illegible]
151	M16	5in Dia. Duct	Sec 1 - max	0.000	1	0.000	1	0.000	1	0.141	6	1.003	7	-2.326	7	2.599	6	-6.000	8	-0.008	8	0.000	0.080	0.206	[illegible]	2.599	[illegible]	0.001	0.000	[illegible]
152	M16	5in Dia. Duct	Sec 1 - min	0.000	1	0.000	1	0.000	1	-1.003	7	-0.141	6	-2.599	6	2.326	7	-418.045	5	-0.544	5	0.000	0.080	0.206	[illegible]	2.599	[illegible]	0.075	0.000	[illegible]
1748	M185	5in Dia. Duct	Sec 4 - min	-0.027	8	-0.046	6	-0.024	8	-0.721	7	0.205	6	-2.829	6	1.860	7	69.263	5	0.116	5	0.004	0.057	0.225	[illegible]	2.829	[illegible]	0.016	0.006	[illegible]
1261	M139	8in Dia. Duct	Sec 1 - max	0.003	7	0.012	5	0.010	2	1.305	8	-0.101	5	-1.556	8	2.688	5	1031.360	7	0.905	7	0.000	0.093	0.192	[illegible]	2.688	[illegible]	0.112	0.001	[illegible]
1262	M139	8in Dia. Duct	Sec 1 - min	-0.003	6	0.012	3	-0.010	1	0.101	5	-1.305	8	-2.688	5	1.556	8	840.402	6	0.738	6	0.000	0.093	0.192	[illegible]	2.688	[illegible]	0.091	0.001	[illegible]
1746	M185	5in Dia. Duct	Sec 3 - min	-0.026	8	-0.046	6	-0.024	8	-0.719	7	0.192	6	-2.822	6	1.887	7	69.263	5	0.116	5	0.004	0.057	0.224	[illegible]	2.822	[illegible]	0.016	0.006	[illegible]
1649	M195	16in Dia. Duct	Sec 6 - max	0.265	2	-0.080	2	0.012	4	-2.522	2	2.647	1	-0.604	7	0.921	6	1234.847	3	0.245	3	0.030	0.189	0.068	[illegible]	2.647	[illegible]	0.030	0.010	[illegible]
1749	M185	6in Dia. Duct	Sec 5 - max	-0.013	6	-0.007	7	0.024	5	-0.219	6	0.723	7	-1.873	7	2.835	6	609.251	8	0.793	8	0.002	0.057	0.226	[illegible]	2.835	[illegible]	0.109	0.003	[illegible]
2176	M228	6in Dia. Duct	Sec 3 - min	0.060	6	0.011	6	0.055	8	0.389	8	-0.547	7	1.848	6	-3.326	7	270.985	7	0.227	7	0.006	0.039	0.238	[illegible]	3.326	[illegible]	0.028	0.007	[illegible]
173	M18	5in Dia. Duct	Sec 2 - max	-0.010	5	-0.020	8	0.028	5	-0.370	8	0.872	5	-1.573	7	2.690	6	760.481	8	1.016	8	0.001	0.069	0.213	[illegible]	2.690	[illegible]	0.140	0.004	[illegible]
1744	M185	5in Dia. Duct	Sec 2 - min	-0.026	8	-0.045	6	-0.023	8	-0.717	7	0.180	6	-2.815	6	1.893	7	69.263	5	0.116	5	0.004	0.057	0.223	[illegible]	2.815	[illegible]	0.016	0.006	[illegible]
729	M83	6in Dia. Duct	Sec 6 - max	0.287	6	0.020	6	0.161	6	2.128	6	1.451	7	1.026	6	1.336	7	467.131	6	0.383	6	0.030	0.152	0.095	[illegible]	2.128	[illegible]	0.047	0.022	[illegible]
1747	M185	5in Dia. Duct	Sec 4 - max	-0.013	6	-0.007	7	0.024	5	-0.205	8	0.721	7	-1.880	7	2.829	6	609.251	8	0.793	8	0.002	0.057	0.225	[illegible]	2.829	[illegible]	0.109	0.003	[illegible]
395	M42	6in Dia. Duct	Sec 3 - max	0.067	6	-0.274	8	0.274	5	-1.173	8	3.141	7	0.075	7	0.710	6	414.335	5	0.347	5	0.006	0.224	0.051	[illegible]	3.141	[illegible]	0.043	0.034	[illegible]
396	M42	6in Dia. Duct	Sec 3 - min	-0.067	7	-0.307	5	0.112	6	-3.141	7	1.173	6	-0.710	6	-0.075	7	85.562	8	0.072	8	0.008	0.224	0.051	[illegible]	3.141	[illegible]	0.009	0.036	[illegible]
1742	M185	5in Dia. Duct	Sec 1 - min	-0.026	8	-0.045	6	-0.023	8	-0.715	7	0.167	6	-2.809	6	1.900	7	69.263	6	0.116	5	0.004	0.057	0.223	[illegible]	2.809	[illegible]	0.016	0.006	[illegible]
1650	M195	16in Dia. Duct	Sec 5 - min	0.253	1	-0.126	1	-0.017	3	-2.547	1	2.622	2	-0.921	6	0.604	7	-61.561	4	-0.012	4	0.028	0.189	0.066	[illegible]	2.647	[illegible]	0.001	0.016	[illegible]
2068	M217	3in Dia. Duct	Sec 4 - min	-0.017	8	-0.031	5	-0.131	8	0.217	5	-0.223	8	-6.100	8	2.142	5	-7.091	5	-0.003	5	0.002	0.010	0.271	[illegible]	6.100	[illegible]	0.003	0.010	[illegible]
1745	M185	5in Dia. Duct	Sec 3 - max	-0.013	5	-0.007	7	0.024	5	-0.192	6	0.719	7	-1.887	7	2.822	6	609.251	8	0.793	8	0.002	0.057	0.224	[illegible]	2.822	[illegible]	0.109	0.003	[illegible]
2073	M218	3in Dia. Duct	Sec 2 - max	0.086	5	0.045	6	0.466	8	-0.524	5	0.559	8	-1.060	5	5.562	8	-0.980	8	-0.030	8	0.010	0.025	0.248	[illegible]	5.582	[illegible]	0.002	0.038	[illegible]
1135	M124	6in Dia. Duct	Sec 3 - max	0.070	8	0.487	5	-0.081	8	3.168	7	1.206	6	0.273	5	0.667	6	370.941	5	0.310	5	0.009	0.226	0.046	[illegible]	3.168	[illegible]	0.038	0.060	[illegible]
1743	M185	6in Dia. Duct	Sec 2 - max	-0.013	6	-0.007	7	0.023	5	-0.160	6	0.717	7	-1.893	7	2.815	6	609.251	8	0.793	8	0.002	0.057	0.223	[illegible]	2.815	[illegible]	0.109	0.003	[illegible]
2173	M228	6in Dia. Duct	Sec 2 - max	0.088	7	0.031	7	0.141	7	0.533	7	-0.303	6	3.259	7	-1.822	6	315.448	6	0.264	6	0.011	0.038	0.233	[illegible]	3.259	[illegible]	0.033	0.017	[illegible]

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_a	f_{by}/σ_b (D-2250)	f_{bz}/σ_b	f_r (ksi)	f/τ_t	$1/\sigma_t$
314	M34	6in Dia. Duct	Sec 2 - min	-0.176	5	-0.049	7	-0.146	8	-0.476	7	-0.211	6	-3.157	5	-2.148	8	-444.321	6	-0.372	6	0.022	0.034	0.226	3.167	0.046	0.018
1741	M195	5in Dia. Duct	Sec 1 - max	-0.013	6	-0.006	7	0.023	5	-0.167	6	0.715	7	-1.900	7	2.809	6	609.251	6	0.783	6	0.002	0.057	0.223	2.809	0.103	0.003
1847	M195	16in Dia. Duct	Sec 4 - max	0.263	2	-0.078	2	0.014	4	-2.463	2	2.586	1	-0.595	7	0.827	6	1234.847	3	0.245	3	0.030	0.185	0.066	2.586	0.030	0.010
2284	M239	6in Dia. Duct	Sec 2 - min	0.046	6	0.004	6	0.005	7	-3.169	6	2.347	8	-0.643	7	-0.325	5	-787.960	8	-0.650	8	0.006	0.228	0.046	3.169	0.081	0.001
472	M50	8in Dia. Duct	Sec 1 - min	0.007	6	-0.268	7	-0.323	5	0.677	8	-2.426	5	-1.476	7	0.736	6	-140.129	6	-0.123	6	0.001	0.173	0.105	2.426	0.018	0.040
1848	M195	18in Dia. Duct	Sec 4 - min	0.251	1	-0.127	1	-0.019	3	-2.586	1	2.483	2	-0.927	6	0.596	7	-01.561	4	-0.012	4	0.028	0.165	0.066	2.586	0.001	0.016
393	M42	6in Dia. Duct	Sec 2 - max	0.068	6	-0.270	6	0.272	5	-0.653	6	2.068	7	-0.177	7	1.121	6	414.335	5	0.347	5	0.006	0.191	0.080	2.608	0.043	0.034
394	M42	6in Dia. Duct	Sec 2 - min	-0.060	7	-0.304	5	0.114	6	-2.068	7	0.053	6	-1.121	6	0.177	7	65.082	8	0.072	8	0.008	0.191	0.080	2.008	0.009	0.038
1892	M200	4in Dia. Duct	Sec 1 - min	0.121	8	-0.109	7	-0.090	7	1.305	6	-2.655	7	-2.070	6	-3.356	7	93.888	5	0.119	5	0.012	0.118	0.149	3.356	0.009	0.008
2174	M228	6in Dia. Duct	Sec 2 - min	0.060	6	0.012	6	0.065	6	0.383	6	-0.533	7	1.822	6	-3.259	7	270.986	7	0.227	7	0.008	0.036	0.233	3.259	0.028	0.007
271	M30	6in Dia. Duct	Sec 1 - max	0.144	8	-0.010	7	0.034	8	0.479	7	1.523	6	1.825	6	2.120	7	0.000	1	0.000	1	0.018	0.109	0.151	2.120	0.000	0.004
1026	M113	6in Dia. Duct	Sec 4 - min	0.034	6	0.000	6	-0.150	5	-2.431	5	0.829	6	0.514	6	-1.406	5	30.937	6	0.027	6	0.004	0.174	0.100	2.431	0.003	0.019
1344	M145	6in Dia. Duct	Sec 2 - min	-0.170	5	0.023	2	-0.652	1	-0.901	6	0.174	7	1.070	7	-2.827	6	241.509	7	0.202	7	0.022	0.089	0.188	2.827	0.025	0.080
272	M30	6in Dia. Duct	Sec 1 - min	-0.138	5	-0.058	6	-0.041	7	-1.523	6	-0.478	7	-2.120	7	-1.826	8	0.000	1	0.000	1	0.017	0.109	0.161	2.120	0.000	0.007
1845	M195	16in Dia. Duct	Sec 3 - max	0.262	2	-0.075	2	0.015	4	-2.446	2	2.524	1	-0.566	7	0.934	6	1234.847	3	0.245	3	0.029	0.180	0.067	2.524	0.030	0.009
2171	M228	6in Dia. Duct	Sec 1 - max	0.088	7	0.032	7	0.140	7	0.518	7	-0.378	6	3.193	7	-1.796	6	315.448	6	0.204	6	0.011	0.037	0.228	3.193	0.033	0.017
2074	M216	3in Dia. Duct	Sec 2 - min	-0.025	8	0.040	8	0.126	7	-0.559	8	0.524	5	-5.582	8	1.060	5	-7.691	6	-0.033	5	0.003	0.075	0.248	5.582	0.003	0.010
1848	M195	16in Dia. Duct	Sec 3 - min	0.260	1	-0.128	1	-0.021	3	-2.524	1	2.446	2	-0.934	6	0.586	7	-61.561	4	-0.012	4	0.028	0.180	0.067	2.524	0.001	0.018
313	M34	6in Dia. Duct	Sec 2 - max	0.121	8	0.018	6	0.134	5	0.211	6	0.476	7	2.140	6	3.157	5	113.974	7	0.095	7	0.015	0.034	0.226	3.157	0.012	0.017
391	M42	6in Dia. Duct	Sec 1 - max	0.065	6	-0.267	8	0.270	5	-0.139	6	2.201	7	-0.432	7	1.530	6	414.335	5	0.347	5	0.008	0.157	0.109	2.201	0.043	0.033
392	M42	6in Dia. Duct	Sec 1 - min	-0.005	7	-0.300	5	0.116	6	-2.201	7	0.139	6	-1.530	6	0.432	7	65.602	8	0.072	8	0.008	0.157	0.109	2.201	0.009	0.037
2349	M245	6in Dia. Duct	Sec 5 - max	0.060	7	-0.016	6	0.118	5	0.453	5	1.388	6	2.326	7	-0.640	6	661.406	7	0.554	7	0.008	0.099	0.166	2.326	0.068	0.014
2172	M228	6in Dia. Duct	Sec 1 - min	0.060	6	0.013	8	0.055	8	0.378	6	-0.518	7	1.796	6	-3.193	7	270.085	7	0.227	7	0.006	0.037	0.226	3.193	0.028	0.007
1134	M124	6in Dia. Duct	Sec 2 - min	-0.147	5	0.233	6	-0.169	5	-1.316	6	-2.937	7	-0.628	6	-0.353	5	157.596	8	0.132	8	0.018	0.210	0.045	2.937	0.018	0.029
1543	M195	16in Dia. Duct	Sec 2 - max	0.261	2	-0.073	2	0.017	4	-2.410	2	2.461	1	-0.576	7	0.941	6	1234.847	3	0.246	3	0.028	0.176	0.067	2.461	0.030	0.009
250	M25	4in Dia. Duct	Sec 5 - min	-0.051	8	0.002	5	-0.090	6	1.305	6	-2.655	7	-2.070	6	-3.358	7	53.008	6	0.119	5	0.005	0.118	0.149	3.358	0.009	0.007
869	M97	6in Dia. Duct	Sec 5 - max	0.000	1	0.041	5	-0.107	6	1.278	6	-0.917	7	-1.019	5	2.530	8	-687.343	6	-0.575	6	0.000	0.091	0.181	2.530	0.071	0.013
870	M97	6in Dia. Duct	Sec 5 - min	0.000	1	0.007	8	-0.279	7	0.917	7	-1.278	6	-2.530	6	1.019	5	-992.905	7	-0.831	7	0.000	0.091	0.181	2.530	0.103	0.034
871	M98	6in Dia. Duct	Sec 1 - max	0.000	1	0.000	1	0.000	1	1.276	5	-0.917	7	-1.019	5	2.530	8	-687.343	6	-0.575	6	0.000	0.091	0.181	2.530	0.071	0.000
872	M98	6in Dia. Duct	Sec 1 - min	0.000	1	0.000	1	0.000	1	0.917	7	-1.278	6	-2.530	6	1.019	5	-992.905	7	-0.831	7	0.000	0.091	0.181	2.530	0.103	0.000
873	M98	6in Dia. Duct	Sec 2 - max	0.000	6	-0.002	1	0.000	5	1.277	6	-0.916	7	-1.019	5	2.530	8	-687.343	6	-0.575	6	0.000	0.091	0.181	2.530	0.071	0.000
874	M98	6in Dia. Duct	Sec 2 - min	0.000	5	-0.002	1	0.000	7	0.916	7	-1.277	6	-2.530	6	1.019	5	-992.905	7	-0.831	7	0.000	0.091	-0.181	2.530	0.103	0.000
875	M98	6in Dia. Duct	Sec 3 - max	0.000	6	-0.004	1	0.002	5	1.274	6	-0.914	7	-1.017	5	2.531	8	-687.343	6	-0.575	6	0.000	0.091	0.181	2.531	0.071	0.000
876	M98	6in Dia. Duct	Sec 3 - min	0.000	5	-0.004	1	-0.002	7	0.914	7	-1.274	6	-2.531	6	1.017	5	-992.905	7	-0.831	7	0.000	0.091	0.181	2.531	0.103	0.000
877	M98	6in Dia. Duct	Sec 4 - max	0.001	6	-0.006	1	0.003	5	1.270	6	-0.910	7	-1.015	5	2.533	8	-687.343	6	-0.575	6	0.000	0.091	0.181	2.533	0.071	0.001
878	M98	6in Dia. Duct	Sec 4 - min	-0.001	5	-0.006	1	-0.003	7	0.910	7	-1.270	6	-2.533	6	1.015	5	-992.905	7	-0.831	7	0.000	0.091	0.181	2.533	0.103	0.001
879	M98	6in Dia. Duct	Sec 5 - max	0.002	6	-0.006	1	0.004	5	1.264	6	-0.904	7	-1.012	5	2.536	8	-687.343	6	-0.575	6	0.000	0.090	0.181	2.536	0.071	0.001
880	M98	6in Dia. Duct	Sec 5 - min	-0.002	5	-0.008	1	-0.004	7	0.904	7	-1.264	6	-2.536	6	1.012	5	-992.905	7	-0.831	7	0.000	0.090	0.181	2.536	0.103	0.001
881	M99	6in Dia. Duct	Sec 1 - max	0.002	6	-0.008	7	0.004	8	1.264	6	-0.904	7	-1.012	5	2.536	8	-687.343	6	-0.575	6	0.000	0.090	0.181	2.538	0.071	0.001
882	M99	6in Dia. Duct	Sec 1 - min	-0.002	5	-0.008	6	-0.004	7	0.904	7	-1.264	6	-2.536	8	1.012	5	-992.905	7	-0.831	7	0.000	0.090	0.181	2.538	0.103	0.001
1341	M145	6in Dia. Duct	Sec 1 - max	0.009	6	0.176	1	-0.290	2	-0.193	7	0.999	6	2.707	5	-1.176	7	283.879	6	0.238	6	0.001	0.071	0.189	2.707	0.029	0.036
883	M99	6in Dia. Duct	Sec 2 - max	0.002	6	-0.010	7	0.006	8	1.255	6	-0.894	7	-1.008	5	2.541	8	-687.343	6	-0.575	6	0.000	0.090	0.182	2.541	0.071	0.001
884	M99	6in Dia. Duct	Sec 2 - min	-0.002	5	-0.010	6	-0.006	7	0.894	7	-1.255	6	-2.541	8	1.000	5	-992.905	7	-0.831	7	0.000	0.090	0.182	2.541	0.103	0.001
474	M50	6in Dia. Duct	Sec 2 - min	0.015	6	-0.280	7	-0.315	8	-0.430	8	-1.276	5	-2.488	6	0.057	5	-140.129	6	-0.123	6	0.002	0.091	0.178	2.498	0.016	0.039
219	M25	4in Dia. Duct	Sec 5 - max	-0.041	5	0.061	6	0.080	7	2.655	7	-1.305	6	3.358	7	2.070	6	130.227	8	0.287	8	0.004	0.118	0.149	3.358	0.022	0.007
885	M99	6in Dia. Duct	Sec 3 - max	0.003	6	-0.012	7	0.006	6	1.243	6	-0.882	7	-1.002	5	2.547	8	-687.343	6	-0.575	6	0.000	0.089	0.182	2.547	0.071	0.001
888	M99	6in Dia. Duct	Sec 3 - min	-0.003	5	-0.012	8	-0.006	7	0.882	7	-1.243	6	-2.547	8	1.002	5	-992.905	7	-0.831	7	0.000	0.088	0.182	2.547	0.103	0.001
1844	M195	16in Dia. Duct	Sec 2 - min	0.246	1	-0.130	1	-0.023	3	-2.481	1	2.410	2	-0.941	6	0.676	7	-61.561	4	-0.012	4	0.028	0.176	0.067	2.461	0.001	0.016
887	M99	6in Dia. Duct	Sec 4 - max	0.004	6	-0.015	7	0.007	6	1.228	6	-0.868	7	-0.994	5	2.554	8	-687.343	6	-0.576	6	0.001	0.088	0.182	2.554	0.071	0.002
888	M99	6in Dia. Duct	Sec 4 - min	-0.004	5	-0.015	1	-0.007	7	0.868	7	-1.228	8	-2.554	6	0.994	5	-992.905	7	-0.831	7	0.001	0.088	0.182	2.554	0.103	0.002
2350	M245	6in Dia. Duct	Sec 5 - min	-0.041	6	-0.060	8	-0.010	5	-1.366	8	-0.453	5	0.640	6	-2.326	7	-268.028	6	-0.724	6	0.005	0.099	0.166	2.326	0.028	0.010
889	M99	6in Dia. Duct	Sec 5 - max	0.004	6	-0.017	7	0.008	6	1.211	6	-0.851	7	-0.986	5	2.563	8	-687.343	6	-0.575	6	0.001	0.087	0.163	2.563	0.071	0.002
890	M99	6in Dia. Duct	Sec 5 - min	-0.004	5	-0.017	1	-0.008	7	0.851	7	-1.211	6	-2.563	8	0.960	5	-992.905	7	-0.831	7	0.001	0.087	0.163	2.563	0.103	0.002
503	M53	6in Dia. Duct	Sec 2 - max	0.016	7	0.060	7	0.036	4	1.380	6	-0.857	5	-1.881	6	2.363	5	925.176	5	0.549	6	0.002	0.099	0.158	2.363	0.089	0.007
604	M53	6in Dia. Duct	Sec 2 - min	-0.016	8	0.060	8	-0.036	3	0.867	5	-1.366	8	-2.363	6	1.881	8	-16.864	8	-0.015	6	0.002	0.099	0.158	2.363	0.002	0.007
2203	M231	2in Dia. Duct	Sec 2 - max	0.202	5	-0.097	8	0.051	1	-1.419	8	4.212	5	-0.444	8	1.852	5	-10.064	5	-0.137	6	0.045	0.150	0.069	4.212	0.009	0.006
1030	M113	6in Dia. Duct	Sec 5 - min	0.036	6	0.006	5	-0.149	5	-2.426	5	0.677	6	0.774	6	-1.286	7	30.937	6	0.027	6	0.004	0.173	0.092	2.426	0.003	0.016
1841	M195	16in Dia. Duct	Sec 1 - max	0.260	2	-0.071	2	0.019	4	-2.368	4	2.403	3	-0.566	7	0.948	6	1234.847	3	0.245	3	0.029	0.172	0.069	2.403	0.030	0.009
1839	M194	16in Dia. Duct	Sec 5 - max	0.259	2	-0.070	2	0.019	4	-2.368	4	2.403	3	-0.566	7	0.948	6	1234.893	3	0.245	3	0.029	0.172	0.068	2.403	0.030	0.009
517	M54	6in Dia. Duct	Sec 4 - max	0.000	7	0.002	8	0.002	2	1.051	8	0.190	5	-1.646	6	2.699	5	1026.609	7	0.903	7	0.000	0.075	0.193	2.699	0.111	0.000
518	M54	6in Dia. Duct	Sec 4 - min	0.000	6	0.002	7	-0.002	1	-0.190	5	-1.051	8	-2.698	5	1.546	8	956.930	6	0.640	6	0.000	0.075	0.193	2.698	0.104	0.000
519	M54	8in Dia. Duct	Sec 5 - max	0.000	1	0.000	1	0.000	1	1.051	8	0.189	6	-1.545	6	2.896	5	1026.609	7	0.903	7	0.000	0.075	0.193	2.898	0.111	0.000
520	M54	8in Dia. Duct	Sec 5 - min	0.000	1	0.000	1	0.000	1	-0.189	5	-1.051	8	-2.630	5	1.545	8	956.930	6	0.640	8	0.000	0.076	0.193	2.698	0.104	0.000
2501	M261	6in Dia. Duct	Sec 1 - max	0.000	1	0.000	1	0.000	1	1.051	8	0.189	5	-1.545	8	2.698	5	1028.609	7	0.903	7	0.000	0.075	0.193	2.698	0.111	0.000
2502	M261	6in Dia. Duct	Sec 1 - min	0.000	1	0.000	1	0.000	1	-0.189	5	-1.051	8	-2.698	5	1.545	8	950.930	6	0.840	6	0.000	0.075	0.193	2.698	0.104	0.000
2503	M261	6in Dia. Duct	Sec 2 - max	0.000	6	-0.002	1	0.002	1	1.051	8	0.190	5	-1.546	8	2.698	5	1028.609	7	0.903	7	0.000	0.075	0.193	2.698	0.111	0.000
2504	M261	6in Dia. Duct	Sec 2 - min	0.000	5	-0.002	1	-0.002	2	-0.190	5	-1.051	8	-2.698	5	1.546	8	950.930	6	0.640	6	0.000	0.076	0.193	2.698	0.104	0.000
515	M54	8in Dia. Duct	Sec 3 - max	0.000	7	0.004	8	0.003	2	1.049	8	0.191	5	-1.546	6	2.697	5	1020.609	7	0.903	7	0.000	0.075	0.193	2.697	0.111	0.000
516	M54	6in Dia. Duct	Sec 3 - min	0.000	6	0.004	7	-0.003	1	-0.191	5	-1.049	8	-2.697	6	1.540	8	950.930	6	0.640	6	0.000	0.075	0.193	2.697	0.104	0.000
2505	M261	6in Dia. Duct	Sec 3 - max	0.000	6	-0.004	1	0.003	1	1.049	6	0.192	5	-1.546	6	2.697	5	1028.009	7	0.903	7	0.000	0.076	0.193	2.697	0.111	0.000
2506	M261	6in Dia. Duct	Sec 3 - min	0.000	5	-0.004	1	-0.003	2	-0.192	5	-1.049	8	-2.697	5	1.540	8	956.930	6	0.640	6	0.000	0.075	0.193	2.697	0.104	0.000
513	M54	6in Dia. Duct	Sec 2 - max	0.001	7	0.005	6	0.005	2	1.047	8	0.194	5	-1.547	6	2.696	5	1028.009	7	0.903	7	0.000	0.075	0.193	2.696	0.111	0.001
514	M54	6in Dia. Duct	Sec 2 - min	-0.001	6	0.005	7	-0.005	1	-0.194	5	-1.047	8	-2.696	5	1.547	8	950.930	6	0.640	6	0.000	0.076	0.193	2.696	0.104	0.001
2507	M261	6in Dia. Duct	Sec 4 - max	0.001	6	-0.005	1	0.005	1	1.046	8	0.195	5	-1.548	8	2.696	5	1028.609	7	0.903	7	0.000	0.075	0.193	2.698	0.111	0.001
2508	M261	6in Dia. Duct	Sec 4 - min	-0.001	5	-0.005	1	-0.005	2	-0.195	6	-1.046	8	-2.696	5	1.548	8	950.930	8	0.640	6	0.000	0.076	0.193	2.696	0.104	0.001
2169	M227	6in Dia. Duct	Sec 5 - max	0.072	7	0.032	7	0.172	7	0.420	7	-0.267	6	3.193	7	-1.796	6	353.378	6	0.296	6	0.009	0.030	0.228	3.193	0.037	0.021
511	M54	6in Dia. Duct	Sec 1 - max	0.001	7	0.007	6	0.006	2	1.043	8	0.198	5	-1.549	8	2.695	5	1028.609	7	0.903	7	0.000	0.075	0.193	2.695	0.111	0.001
512	M54	6in Dia. Duct	Sec 1 - min	-0.001	6	0.007	7	-0.006	1	-0.198	5	-1.043	8	-2.095	5	1.549	8	950.930	6	0.840	8	0.000	0.075	0.192	2.695	0.104	0.001
1842	M195	16in Dia. Duct	Sec 1 - min	0.247	1	-0.131	1	-0.025	3	-2.403	3	2.368	4	-0.948	6	0.566	7	-81.501	4	-0.012	4	0.028	0.172	0.068	2.403	0.001	0.016
2509	M261	6in Dia. Duct	Sec 5 - max	0.002	6	-0.008	1	0.007	1	1.041	8	0.199	5	-1.549	8	2.694	5	1028.609	7	0.903	7	0.000	0.074	0.192	2.694	0.111	0.001
2510	M261	6in Dia. Duct	Sec 5 - min	-0.002	5	-0.008	1	-0.007	2	-0.199	5	-1.041	8	-2.694	5	1.549	8	956.930	6	0.640	6	0.000	0.074	0.192	2.694	0.104	0.031
2511	M262	6in Dia. Duct	Sec 1 - max	0.002	6	-0.008	3	0.007	1	1.041	8	0.199	5	-1.549	8	2.694	5	1028.609	7	0.903	7	0.000	0.074	0.192	2.694	0.111	0.001
2512	M262	6in Dia. Duct	Sec 1 - min	-0.002	5	-0.008	1	-0.007	2	-0.199	5	-1.041	8	-2.694	5	1.549	8	958.030	6	0.840	6	0.000	0.074	0.192	2.694	0.104	0.001
2347	M245	6in Dia. Duct	Sec 4 - max	0.060	7	-0.014	5	0.115	6	0.460	5	1.360	8	2.262	7	-0.633	6	661.406	7	0.554	7	0.008	0.090	0.163	2.262	0.068	0.014
1840	M194	16in Dia. Duct	Sec 5 - min	0.245	1	-0.130	1	-0.025	3	-2.403	3	2.368	4	-0.948	6	0.568	7	-61.524	4	-0.012	4	0.028	0.172	0.068	2.403	0.001	0.018

D-2250

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_a	f_b/σ_b	f_v/σ_v	f_c (ksi)	f_v	f/σ_t
93	M10	3in Dia. Duct	Sec 2 - max	0.566	7	-0.005	2	-0.256	6	0.430	2	-0.170	1	4.081	2	-3.540	1	10.086	4	0.043	4	0.066	0.019	0.161	4.081	0.003	0.020
2513	M262	6in Dia. Duct	Sec 2 - max	0.002	8	-0.010	3	0.008	1	1.036	8	0.205	5	-1.652	0	2.692	5	1028.609	7	0.903	7	0.000	0.074	0.192	2.692	0.111	0.001
2514	M262	6in Dia. Duct	Sec 2 - min	-0.002	5	-0.010	1	-0.008	2	-0.205	5	-1.036	8	-2.692	5	1.552	8	958.930	8	0.840	6	0.000	0.074	0.192	2.692	0.104	0.001
1851	M166	16in Dia. Duct	Sec 1 - max	0.228	7	-0.277	6	0.025	2	0.848	5	-0.557	7	-2.191	4	2.526	3	-2204.300	3	-0.453	3	0.025	0.001	0.160	2.526	0.066	0.034
728	M63	6in Dia. Duct	Sec 4 - min	-0.346	7	-0.101	7	-0.231	7	-1.309	7	-2.098	6	-1.016	7	-0.774	8	-219.491	7	-0.184	7	0.044	0.150	0.073	2.098	0.023	0.029
172	M16	5in Dia. Duct	Sec 1 - min	-0.026	7	-0.051	5	-0.024	8	-0.723	7	0.219	8	-2.503	6	1.679	7	258.010	6	0.336	5	0.004	0.057	0.205	2.583	0.046	0.007
2368	M249	6in Dia. Duct	Sec 4 - min	-0.084	8	-0.023	6	-0.098	6	0.562	5	-1.556	8	-0.427	6	-2.055	7	345.041	6	0.269	6	0.008	0.111	0.147	2.055	0.038	0.012
2515	M262	6in Dia. Duct	Sec 3 - max	0.002	6	-0.011	3	0.010	1	1.029	8	0.211	5	-1.554	8	2.689	5	1028.609	7	0.903	7	0.000	0.074	0.192	2.689	0.111	0.001
2516	M262	6in Dia. Duct	Sec 3 - min	-0.002	5	-0.011	1	-0.010	2	-0.211	5	-1.029	8	-2.689	5	1.554	8	958.930	6	0.840	6	0.000	0.074	0.192	2.689	0.104	0.001
2166	M220	2in Dia. Duct	Sec 3 - min	0.051	8	-0.231	5	-0.001	8	-5.769	5	0.830	8	-1.101	5	-0.036	8	-61.836	7	-0.843	7	0.011	0.214	0.041	5.769	0.054	0.019
2517	M262	8in Dia. Duct	Sec 4 - max	0.003	6	-0.013	3	0.012	1	1.022	8	0.219	5	-1.557	8	2.686	5	1028.609	7	0.903	7	0.000	0.073	0.192	2.686	0.111	0.002
2518	M262	6in Dia. Duct	Sec 4 - min	-0.003	5	-0.013	1	-0.012	2	-0.219	5	-1.022	8	-2.686	5	1.557	8	958.930	8	0.840	6	0.000	0.073	0.192	2.686	0.104	0.002
1837	M194	16in Dia. Duct	Sec 4 - max	0.257	2	-0.066	2	0.021	4	-2.316	4	2.350	3	-0.554	7	0.957	6	1234.803	3	0.245	3	0.029	0.168	0.058	2.350	0.030	0.006
1852	M196	16in Dia. Duct	Sec 1 - min	0.214	6	-0.304	8	-0.026	1	0.557	7	-0.648	6	-2.626	3	2.191	4	-3382.935	4	-0.671	4	0.024	0.061	0.160	2.526	0.063	0.030
2170	M227	6in Dia. Duct	Sec 5 - min	0.054	6	0.013	6	0.078	6	0.287	8	-0.420	7	1.798	6	-3.193	7	326.161	7	0.273	7	0.007	0.030	0.228	3.193	0.034	0.010
739	M84	6in Dia. Duct	Sec 5 - max	0.271	7	0.020	8	0.115	8	2.126	6	1.451	7	0.769	6	1.095	7	219.491	7	0.184	7	0.034	0.152	0.076	2.126	0.023	0.014
2349	M245	6in Dia. Duct	Sec 4 - min	-0.040	8	-0.079	8	-0.010	5	-1.360	6	-0.460	5	0.633	6	-2.282	7	-266.028	6	-0.224	6	0.005	0.096	0.163	2.282	0.026	0.010
521	M55	8in Dia. Duct	Sec 1 - max	0.003	6	0.078	5	0.247	2	1.013	8	0.228	5	-1.681	8	2.683	5	1028.609	7	0.903	7	0.000	0.072	0.192	2.683	0.111	0.030
522	M55	8in Dia. Duct	Sec 1 - min	-0.003	5	-0.004	8	0.176	1	-0.220	5	-1.013	8	-2.683	6	1.561	8	958.930	6	0.840	6	0.000	0.072	0.192	2.683	0.104	0.022
2519	M262	6in Dia. Duct	Sec 5 - max	0.003	6	-0.015	3	0.013	1	1.013	8	0.220	5	-1.581	8	2.683	5	1028.609	7	0.903	7	0.000	0.072	0.192	2.683	0.111	0.002
2520	M262	6in Dia. Duct	Sec 5 - min	-0.003	5	-0.015	1	-0.013	2	-0.228	5	-1.013	8	-2.683	5	1.561	8	958.930	8	0.840	8	0.000	0.072	0.192	2.683	0.104	0.002
171	M16	5in Dia. Duct	Sec 1 - max	-0.009	4	-0.017	8	0.024	5	-0.219	6	0.723	7	-1.670	7	2.563	6	760.451	8	1.016	6	0.001	0.057	0.205	2.563	0.140	0.003
1346	M146	6in Dia. Duct	Sec 3 - min	-0.170	5	0.022	2	-0.652	1	-0.923	6	0.155	7	0.902	7	-2.467	6	241.509	7	0.202	7	0.022	0.056	0.178	2.467	0.025	0.080
1638	M194	16in Dia. Duct	Sec 4 - min	0.244	1	-0.132	1	-0.027	3	-2.350	3	2.316	4	-0.957	6	0.654	7	-61.524	4	-0.012	4	0.027	0.168	0.066	2.350	0.001	0.018
1133	M124	6in Dia. Duct	Sec 2 - max	0.070	8	0.468	5	-0.080	8	2.937	7	1.316	6	0.353	5	0.629	6	370.941	5	0.310	5	0.009	0.210	0.045	2.937	0.038	0.060
2339	M244	6in Dia. Duct	Sec 5 - max	0.063	7	0.009	5	0.114	8	0.479	5	1.239	6	7.327	7	-0.512	8	411.135	6	0.344	6	0.008	0.089	0.166	2.327	0.042	0.014
1635	M194	16in Dia. Duct	Sec 3 - max	0.256	2	-0.065	2	0.023	4	-2.259	1	2.303	2	-0.542	7	0.968	6	1234.893	3	0.245	3	0.029	0.165	0.069	2.303	0.030	0.009
2346	M246	6in Dia. Duct	Sec 3 - max	0.060	7	-0.013	5	0.115	8	0.467	5	1.313	8	2.239	7	-0.026	6	681.406	7	0.554	7	0.008	0.094	0.160	2.239	0.068	0.014
1636	M194	16in Dia. Duct	Sec 3 - min	0.242	1	-0.133	1	-0.029	3	-2.303	2	2.259	1	-0.966	6	0.542	7	-61.524	4	-0.012	4	0.027	0.165	0.069	2.303	0.001	0.016
1633	M194	16in Dia. Duct	Sec 2 - max	0.255	2	-0.063	2	0.025	4	-2.169	1	2.270	2	-0.529	7	0.976	6	1234.893	3	0.245	3	0.029	0.162	0.070	2.270	0.030	0.008
2387	M249	6in Dia. Duct	Sec 4 - max	-0.018	5	0.141	7	0.123	5	1.556	6	-0.562	6	2.055	7	0.427	6	1659.205	7	1.389	7	0.002	0.111	0.147	2.055	0.171	0.017
2340	M244	6in Dia. Duct	Sec 6 - min	-0.034	6	-0.087	8	-0.008	5	-1.239	6	-0.479	6	0.512	6	-2.327	7	-347.366	5	-0.291	5	0.004	0.089	0.166	2.327	0.036	0.011
1634	M194	16in Dia. Duct	Sec 2 - min	0.241	1	-0.134	1	-0.031	3	-2.270	2	2.169	1	-0.976	6	0.529	7	-61.524	4	-0.012	4	0.027	0.162	0.070	2.270	0.001	0.017
727	M83	6in Dia. Duct	Sec 4 - max	0.287	6	0.023	5	0.163	8	2.098	6	1.309	7	0.774	6	1.018	7	457.131	6	0.383	0	0.036	0.150	0.073	2.098	0.047	0.023
1631	M194	16in Dia. Duct	Sec 1 - max	0.254	2	-0.060	2	0.027	4	-2.118	1	2.235	2	-0.516	7	0.987	6	1234.893	3	0.245	3	0.029	0.160	0.071	2.235	0.030	0.007
2348	M245	6in Dia. Duct	Sec 3 - min	-0.040	6	-0.076	6	-0.009	5	-1.313	5	-0.467	6	0.626	6	-2.239	7	-266.028	6	-0.224	6	0.005	0.094	0.160	2.239	0.026	0.010
655	M68	12in Dia. Duct	Sec 3 - max	0.023	7	0.090	7	-0.006	5	4.874	6	-4.526	7	0.195	7	0.903	7	-211.695	6	-0.069	6	0.002	0.217	0.040	4.874	0.005	0.076
656	M68	12in Dia. Duct	Sec 3 - min	-0.021	6	0.850	6	-0.134	4	4.526	7	-4.874	6	-0.903	6	-0.195	7	-1303.365	6	-0.427	6	0.002	0.217	0.040	4.874	0.033	0.085
1629	M193	16in Dia. Duct	Sec 5 - max	0.224	2	-0.251	2	0.027	4	-2.118	1	2.238	2	-0.540	6	1.020	8	391.612	3	0.078	3	0.025	0.160	0.073	2.236	0.010	0.031
1343	M146	6in Dia. Duct	Sec 2 - max	0.009	8	0.176	1	-0.290	7	-0.174	7	0.961	6	2.627	6	-1.070	7	263.879	6	0.236	6	0.001	0.069	0.188	2.627	0.029	0.036
1632	M104	16in Dia. Duct	Sec 1 - min	0.236	1	-0.135	1	-0.033	3	-2.238	2	2.118	1	-0.987	6	0.516	7	-61.524	4	-0.012	4	0.027	0.160	0.071	2.238	0.001	0.017
1697	M200	4in Dia. Duct	Sec 4 - max	0.549	6	-0.055	6	0.023	6	-2.330	8	3.855	5	0.882	6	0.939	7	150.227	8	0.287	8	0.053	0.162	0.042	3.655	0.022	0.004
641	M95	6in Dia. Duct	Sec 1 - max	0.000	1	0.000	1	0.000	1	1.963	8	1.656	5	1.113	6	1.631	8	1206.484	7	1.010	7	0.000	0.140	0.117	1.963	0.125	0.000
642	M95	6in Dia. Duct	Sec 1 - min	0.000	1	0.000	1	0.000	1	-1.658	7	-1.063	7	-1.631	8	-1.113	5	666.966	6	0.576	6	0.000	0.140	0.117	1.963	0.071	0.000
643	M95	6in Dia. Duct	Sec 2 - max	0.000	6	-0.003	5	0.001	5	1.962	7	1.659	6	1.114	5	1.632	8	1200.484	7	1.010	7	0.000	0.140	0.117	1.962	0.125	0.000
644	M95	6in Dia. Duct	Sec 2 - min	0.000	5	-0.003	6	-0.001	7	-1.659	7	-1.962	6	-1.032	6	-1.114	6	666.956	6	0.575	6	0.000	0.140	0.117	1.962	0.071	0.000
645	M95	6in Dia. Duct	Sec 3 - max	0.001	5	-0.006	5	0.003	5	1.957	5	1.064	7	1.110	5	1.654	6	1206.484	7	1.010	7	0.000	0.140	0.117	1.957	0.125	0.001
646	M95	6in Dia. Duct	Sec 3 - min	-0.001	6	-0.006	6	-0.003	7	-1.664	7	-1.957	6	-1.634	8	-1.116	6	698.956	6	0.576	6	0.000	0.140	0.117	1.957	0.071	0.001
647	M95	6in Dia. Duct	Sec 4 - max	0.002	5	-0.008	6	0.004	5	1.950	6	1.671	8	1.120	5	1.630	6	1200.484	7	1.010	7	0.000	0.139	0.117	1.950	0.125	0.001
648	M96	6in Dia. Duct	Sec 4 - min	-0.002	5	-0.008	6	-0.004	7	-1.671	7	-1.950	8	-1.638	7	-1.120	6	686.956	6	0.575	6	0.000	0.139	0.117	1.950	0.071	0.001
740	M84	6in Dia. Duct	Sec 5 - min	-0.206	8	-0.104	7	-0.167	7	-1.451	7	-2.128	6	-1.095	7	-0.769	6	-457.131	6	-0.383	6	0.026	0.152	0.076	2.128	0.047	0.021
840	M85	6in Dia. Duct	Sec 5 - max	0.003	8	-0.010	5	0.005	5	1.939	6	1.682	7	1.125	5	1.043	8	1206.484	7	1.010	7	0.000	0.139	0.117	1.939	0.125	0.001
650	M95	6in Dia. Duct	Sec 5 - min	-0.003	5	-0.010	6	-0.005	7	-1.682	7	-1.939	6	-1.643	8	-1.125	5	698.956	6	0.576	6	0.000	0.139	0.117	1.939	0.071	0.001
1853	M196	16in Dia. Duct	Sec 2 - max	0.227	7	-0.279	5	0.023	2	0.702	8	-0.418	7	-2.191	4	2.526	3	-2284.300	3	-0.453	3	0.026	0.050	0.160	2.526	0.056	0.034
76	M8	6in Dia. Duct	Sec 3 - min	-0.346	1	-0.146	8	-0.211	8	-1.741	1	1.607	2	-1.232	8	0.668	5	83.143	7	0.070	7	0.044	0.124	0.088	1.741	0.009	0.026
2343	M245	6in Dia. Duct	Sec 2 - max	0.060	7	-0.012	5	0.115	8	0.473	5	1.278	8	2.195	7	-0.619	6	601.406	7	0.554	7	0.008	0.091	0.157	2.195	0.066	0.014
1630	M193	16in Dia. Duct	Sec 5 - min	0.198	1	-0.310	1	-0.033	3	-2.236	2	2.118	1	-1.020	6	0.546	7	-756.873	4	-0.150	4	0.022	0.160	0.073	2.238	0.019	0.036
1654	M196	16in Dia. Duct	Sec 2 - min	0.216	8	-0.305	8	-0.073	1	0.419	7	-0.702	6	-2.526	3	2.191	4	-3382.935	4	-0.071	4	0.024	0.050	0.160	2.526	0.063	0.036
2230	M233	2in Dia. Duct	Sec 6 - min	0.157	8	-0.036	8	-0.022	1	-0.001	8	-2.636	5	0.420	1	-3.288	2	-0.009	8	0.000	8	0.035	0.098	0.122	3.288	0.000	0.002
2232	M234	2in Dia. Duct	Sec 1 - min	0.157	8	-0.248	5	-0.177	7	-0.001	8	-2.636	5	0.420	1	-3.260	2	-0.009	8	0.000	8	0.035	0.098	0.122	3.288	0.000	0.016
1132	M124	6in Dia. Duct	Sec 1 - min	-0.141	5	0.234	6	-0.170	5	-1.427	6	-2.700	7	-0.591	6	-0.433	5	157.596	6	0.132	8	0.019	0.193	0.042	2.706	0.016	0.029
407	M43	6in Dia. Duct	Sec 4 - max	0.088	6	0.544	5	-0.075	8	0.357	7	2.334	6	1.055	5	0.293	8	414.335	5	0.347	5	0.011	0.167	0.075	2.334	0.043	0.067
406	M43	6in Dia. Duct	Sec 4 - min	-0.088	7	0.212	8	-0.175	5	-2.334	6	-0.357	7	-0.293	8	-1.055	5	85.882	8	0.072	8	0.011	0.167	0.075	2.334	0.009	0.026
351	M38	5in Dia. Duct	Sec 1 - max	0.015	5	0.058	7	0.094	8	-0.659	6	1.510	7	1.548	5	1.645	8	401.076	7	0.522	7	0.002	0.120	0.131	1.645	0.072	0.013
352	M38	5in Dia. Duct	Sec 1 - min	-0.016	8	0.058	8	-0.100	5	-1.518	7	0.850	5	-1.645	8	-1.548	5	274.123	6	0.357	6	0.002	0.120	0.131	1.646	0.049	0.014
2344	M245	6in Dia. Duct	Sec 2 - min	-0.040	6	-0.078	6	-0.008	5	-1.276	6	-0.473	5	0.619	6	-2.195	7	-266.028	6	-0.224	6	0.005	0.091	0.157	2.195	0.028	0.010
283	M31	6in Dia. Duct	Sec 2 - max	0.136	6	0.216	8	0.019	6	0.181	7	0.720	6	2.180	6	2.580	7	0.000	1	0.000	1	0.017	0.051	0.184	2.580	0.000	0.027
284	M31	6in Dia. Duct	Sec 2 - min	-0.130	5	-0.033	7	-0.026	7	-0.720	6	-0.181	7	-2.580	7	-2.188	8	0.000	1	0.000	1	0.016	0.051	0.184	2.580	0.000	0.004
2156	M226	6in Dia. Duct	Sec 3 - max	0.089	8	0.022	6	0.076	8	-0.747	7	1.107	6	-1.842	7	2.261	6	353.370	6	0.296	6	0.011	0.079	0.182	2.261	0.037	0.009
409	M43	6in Dia. Duct	Sec 5 - max	0.091	8	0.535	5	-0.080	8	2.706	7	1.427	8	0.304	5	0.631	8	414.335	5	0.347	5	0.012	0.193	0.046	2.706	0.043	0.066
410	M43	6in Dia. Duct	Sec 5 - min	-0.091	7	0.203	8	-0.170	5	-1.427	6	-2.706	7	-0.831	8	-0.304	6	-86.602	8	0.072	6	0.012	0.193	0.045	2.706	0.009	0.025
2341	M245	6in Dia. Duct	Sec 1 - max	0.059	7	-0.011	5	0.114	8	0.479	5	1.239	8	2.152	7	-0.612	8	881.406	7	0.554	7	0.007	0.089	0.154	2.152	0.068	0.014
1346	M145	6in Dia. Duct	Sec 4 - min	-0.170	5	0.022	2	-0.652	1	-0.686	8	0.137	5	0.854	7	-2.308	8	241.509	7	0.202	7	0.022	0.063	0.165	2.308	0.026	0.030
1827	M193	16in Dia. Duct	Sec 4 - max	0.223	2	-0.248	2	0.029	4	-1.956	1	2.107	2	-0.932	7	1.031	6	391.612	3	0.078	3	0.026	0.151	0.074	2.107	0.010	0.031
285	M31	6in Dia. Duct	Sec 3 - max	0.133	8	0.203	6	0.012	8	0.628	8	0.052	7	2.279	6	2.715	7	0.000	1	0.000	1	0.017	0.036	0.194	2.715	0.000	0.025
667	M97	6in Dia. Duct	Sec 4 - max	0.006	5	0.043	5	-0.106	8	1.232	6	-0.904	7	-0.855	5	2.245	8	-667.343	6	-0.579	8	0.000	0.088	0.160	2.246	0.071	0.013
668	M97	6in Dia. Duct	Sec 4 - min	0.000	8	0.010	6	-0.278	7	0.904	7	-1.232	6	-2.245	8	0.865	5	-992.905	7	-0.631	7	0.000	0.088	0.160	2.245	0.103	0.034
2360	M246	6in Dia. Duct	Sec 5 - min	-0.049	6	-0.098	7	-0.013	5	-1.403	8	-0.347	5	0.788	6	-1.901	7	-101.350	6	-0.086	6	0.006	0.106	0.136	1.901	0.010	0.012
286	M31	6in Dia. Duct	Sec 3 - min	-0.127	5	-0.045	7	-0.020	7	-0.052	7	-0.528	8	-2.715	7	-2.279	6	0.000	1	0.000	1	0.016	0.036	0.194	2.715	0.000	0.006
2369	M246	8in Dia. Duct	Sec 5 - max	0.046	7	-0.012	6	0.119	8	0.347	5	1.463	8	1.901	7	-0.768	8	1142.672	7	0.866	7	0.008	0.106	0.136	1.901	0.118	0.015
702	M81	6in Dia. Duct	Sec 1 - min	-0.358	7	-0.036	7	-0.221	6	-0.330	7	-1.259	6	-1.571	7	-1.318	6	-371.703	5	-0.311	5	0.045	0.090	0.112	1.571	0.038	0.027
2342	M245	8in Dia. Duct	Sec 1 - min	-0.039	6	-0.077	8	-0.008	5	-1.239	8	-0.479	5	0.612	6	-2.152	7	-266.028	6	-0.224	6	0.005	0.069	0.154	2.152	0.028	0.010
94	M10	3in Dia. Duct	Sec 2 - min	0.393	8	-0.012	1	-0.297	7	0.178	1	-0.436	2	3.540	1	-4.081	2	5.736	3	0.024	3	0.048	0.019	0.181	4.081	0.002	0.023
2204	M231	2in Dia. Duct	Sec 2 - min	0.098	8	-0.262	5	0.005	2	-4.212	5	1.410	8	-1.862	5	0.444	8	-64.216	7	-0.675	7	0.022	0.156	0.069	4.212	0.056	0.017
1828	M193	16in Dia. Duct	Sec 4 - min	0.194	1	-0.310	1	-0.035	3	-2.107	2	1.958	1	-1.031	6	0.632	7	-756.873	4	-0.150	4	0.022	0.151	0.074	2.107	0.019	0.038

D-2250

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torsion (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_a	f_y/σ_y	f_z/σ_z	f_t (ksi)	f_y/σ_y	f_z/σ_z
737	M84	6in Dia. Duct	Sec 4 - max	0.370	7	0.023	6	0.116	6	2.096	6	1.309	7	0.610	6	0.604	7	219.491	7	0.184	7	0.034	0.150	0.062	2.096	0.023	0.014
1555	M196	16in Dia. Duct	Sec 3 - max	0.228	7	-0.292	5	0.021	2	0.555	6	-0.260	7	-2.191	4	2.526	3	-2284.300	3	-0.453	3	0.026	0.040	0.160	2.526	0.056	0.035
2156	M228	6in Dia. Duct	Sec 3 - min	0.037	5	-0.019	7	0.010	7	-1.107	6	0.747	7	-2.261	6	1.942	7	326.161	7	0.273	7	0.005	0.079	0.162	2.261	0.034	0.002
599	M80	6in Dia. Duct	Sec 5 - max	0.204	6	-0.014	7	0.046	6	0.575	7	1.161	6	1.662	6	1.918	7	0.000	1	0.000	1	0.025	0.093	0.137	1.918	0.000	0.005
1056	M190	10in Dia. Duct	Sec 3 - min	0.217	6	-0.306	6	-0.021	1	0.280	7	-0.555	6	-2.526	3	2.191	4	-3362.935	4	-0.671	4	0.024	0.040	0.160	2.526	0.083	0.038
2647	M265	2in Dia. Duct	Sec 4 - max	0.159	5	-0.108	6	-0.124	6	2.632	5	-0.971	6	3.110	5	-1.110	6	0.000	1	0.000	1	0.035	0.094	0.115	3.110	0.000	0.008
1131	M124	6in Dia. Duct	Sec 1 - max	0.069	8	0.488	6	-0.060	6	2.700	7	1.427	6	0.433	6	0.591	6	370.941	5	0.310	5	0.069	0.193	0.042	2.700	0.038	0.060
700	M80	6in Dia. Duct	Sec 5 - min	-0.196	5	-0.083	6	-0.058	7	-1.161	6	-0.575	7	-1.910	7	-1.662	6	0.000	1	0.000	1	0.024	0.083	0.137	1.918	0.000	0.010
1345	M145	6in Dia. Duct	Sec 3 - max	0.009	6	0.175	1	-0.290	2	-0.155	7	0.925	6	2.467	6	-0.962	7	283.879	6	0.238	6	0.001	0.066	0.176	2.467	0.029	0.036
2358	M246	6in Dia. Duct	Sec 4 - min	-0.046	6	-0.097	7	-0.012	5	-1.459	8	-0.374	5	0.782	6	-1.868	7	-101.350	6	-0.085	6	0.006	0.104	0.123	1.656	0.010	0.012
2357	M246	6in Dia. Duct	Sec 4 - max	0.040	7	-0.012	6	0.110	8	0.374	5	1.459	8	1.868	7	-0.782	6	1142.672	7	0.856	7	0.006	0.104	0.123	1.656	0.115	0.015
726	M83	6in Dia. Duct	Sec 3 - min	-0.347	7	-0.098	7	-0.233	7	-1.171	7	-2.054	6	-0.697	7	-0.520	6	-219.491	7	-0.184	7	0.044	0.147	0.080	2.054	0.023	0.029
1825	M103	16in Dia. Duct	Sec 3 - max	0.223	2	-0.245	2	0.031	4	-1.793	1	1.973	2	-0.517	7	1.043	6	391.612	3	0.078	3	0.025	0.141	0.075	1.977	0.010	0.030
839	M84	6in Dia. Duct	Sec 6 - max	0.054	5	0.068	3	0.369	5	-0.508	6	1.283	7	1.546	5	1.645	8	506.840	7	0.660	7	0.008	0.102	0.131	1.645	0.091	0.054
701	M81	6in Dia. Duct	Sec 1 - max	0.297	6	0.099	6	0.262	7	1.259	6	0.330	7	1.316	8	1.571	7	109.312	7	0.091	7	0.038	0.090	0.112	1.571	0.011	0.032
501	M53	6in Dia. Duct	Sec 1 - max	0.020	7	0.073	7	0.046	4	1.094	8	-0.565	5	-2.029	6	2.215	7	825.175	5	0.549	5	0.002	0.078	0.158	2.215	0.069	0.009
502	M53	6in Dia. Duct	Sec 1 - min	-0.020	8	0.073	8	-0.046	5	0.565	5	+1.094	6	-2.215	7	2.029	6	-16.984	8	-0.015	8	0.002	0.078	0.158	2.215	0.002	0.009
485	M51	6in Dia. Duct	Sec 3 - max	-0.024	1	0.018	8	0.049	6	0.148	5	0.715	6	2.585	7	0.042	5	1313.992	4	0.853	4	0.003	0.051	0.185	2.585	0.142	0.005
486	M51	6in Dia. Duct	Sec 3 - min	-0.024	6	-0.080	5	-0.224	7	-0.715	8	-0.148	5	-0.042	6	-2.585	7	1103.694	3	0.569	3	0.003	0.051	0.185	2.585	0.120	0.028
840	M94	6in Dia. Duct	Sec 5 - min	-0.041	8	0.058	8	-0.268	8	-1.283	7	0.508	6	-1.645	8	-1.546	5	318.127	6	0.414	6	0.006	0.102	0.131	1.645	0.057	0.037
1350	M145	6in Dia. Duct	Sec 5 - min	-0.176	5	0.021	2	-0.452	1	-0.874	6	0.095	5	0.732	5	-2.162	8	241.509	7	0.202	7	0.022	0.062	0.154	2.162	0.025	0.080
2356	M246	6in Dia. Duct	Sec 3 - min	-0.047	6	-0.095	7	-0.011	5	-1.435	6	-0.401	5	0.776	6	+1.812	7	-101.350	6	-0.085	6	0.006	0.103	0.129	1.812	0.010	0.012
2355	M246	6in Dia. Duct	Sec 3 - max	0.046	7	-0.011	6	0.115	8	0.401	5	1.435	8	1.812	7	-0.776	6	1142.672	7	0.956	7	0.006	0.103	0.129	1.812	0.118	0.015
738	M84	6in Dia. Duct	Sec 4 - min	-0.205	6	-0.101	7	-0.168	7	-1.309	7	-2.096	6	-0.604	7	-0.610	6	-457.131	6	-0.383	6	0.026	0.150	0.062	2.096	0.047	0.021
1626	M193	16in Dia. Duct	Sec 3 - min	0.193	1	-0.310	1	-0.037	3	-1.877	2	1.793	1	-1.043	6	0.517	7	-758.673	4	-0.150	4	0.022	0.141	0.075	1.977	0.019	0.035
1721	M163	4in Dia. Duct	Sec 1 - max	0.197	5	1.001	5	-0.026	8	-2.597	7	4.169	8	0.180	8	0.733	6	764.901	7	1.603	7	0.016	0.166	0.033	4.169	0.129	0.077
2537	M234	2in Dia. Duct	Sec 4 - max	0.181	5	-0.061	8	-0.102	8	1.675	5	-0.540	8	3.603	5	-0.815	8	0.000	1	0.000	1	0.040	0.082	0.113	3.603	0.000	0.007
837	M94	6in Dia. Duct	Sec 4 - max	0.054	3	0.069	3	0.369	5	-0.522	6	1.298	7	1.438	6	1.569	8	506.840	7	0.660	7	0.008	0.103	0.125	1.569	0.091	0.054
1557	M190	16in Dia. Duct	Sec 4 - max	0.229	7	-0.284	5	0.019	2	0.409	6	-0.139	7	-2.191	4	2.526	3	-2284.300	3	-0.453	3	0.026	0.029	0.160	2.526	0.056	0.035
316	M34	6in Dia. Duct	Sec 3 - min	-0.166	5	-0.066	7	-0.136	8	-1.019	7	-0.403	6	-1.938	5	-0.817	6	-444.321	6	-0.372	6	0.024	0.073	0.139	1.939	0.046	0.017
1886	M196	16in Dia. Duct	Sec 4 - min	0.218	6	-0.306	8	-0.019	1	0.139	7	-0.409	6	-2.526	3	2.191	4	-3362.935	4	-0.671	4	0.024	0.029	0.160	2.526	0.083	0.038
838	M94	6in Dia. Duct	Sec 4 - min	-0.042	8	0.059	6	-0.267	8	-1.299	7	0.522	6	-1.569	8	-1.438	5	318.127	6	0.414	6	0.006	0.103	0.125	1.569	0.057	0.037
725	M83	6in Dia. Duct	Sec 3 - max	0.207	6	0.026	6	0.186	6	2.054	6	1.171	7	0.520	6	0.697	7	457.131	6	0.383	6	0.026	0.147	0.080	2.054	0.047	0.023
2354	M240	6in Dia. Duct	Sec 2 - min	-0.047	6	-0.094	7	-0.011	5	-1.411	6	-0.427	5	0.769	6	-1.769	7	-101.350	6	-0.085	6	0.006	0.101	0.126	1.769	0.010	0.012
2353	M246	6in Dia. Duct	Sec 2 - max	0.046	7	-0.011	6	0.117	8	0.427	5	1.411	8	1.769	7	-0.769	6	1142.672	7	0.956	7	0.006	0.101	0.126	1.769	0.118	0.014
1623	M193	16in Dia. Duct	Sec 2 - max	0.222	2	-0.242	2	0.033	4	-1.631	1	1.650	2	-0.502	7	1.055	6	391.612	3	0.078	3	0.025	0.132	0.075	1.650	0.010	0.030
2159	M228	6in Dia. Duct	Sec 5 - max	0.080	8	-0.020	5	0.058	8	-1.094	8	1.513	7	-0.940	6	1.581	7	353.378	6	0.296	6	0.010	0.108	0.113	1.581	0.037	0.009
2161	M227	6in Dia. Duct	Sec 1 - max	0.080	8	0.097	7	0.154	6	-1.094	8	1.513	7	-0.940	6	1.581	7	353.378	6	0.296	6	0.010	0.108	0.113	1.581	0.037	0.019
835	M94	6in Dia. Duct	Sec 3 - max	0.054	9	0.059	3	0.369	5	-0.539	6	1.316	7	1.327	6	1.494	8	506.840	7	0.660	7	0.008	0.104	0.110	1.494	0.091	0.054
2285	M239	6in Dia. Duct	Sec 3 - max	0.001	5	0.090	5	0.028	5	-1.275	6	2.554	7	0.925	6	0.449	7	0.000	5	0.000	5	0.010	0.152	0.038	2.554	0.000	0.012
704	M81	6in Dia. Duct	Sec 2 - min	-0.357	7	-0.038	7	-0.222	6	-0.282	7	-1.379	6	-1.206	7	+1.012	6	-371.709	6	-0.311	6	0.045	0.099	0.046	1.379	0.038	0.027
2069	M211	3in Dia. Duct	Sec 5 - max	0.220	7	-0.050	6	0.074	2	-1.197	8	1.206	7	3.386	8	-1.043	5	-13.162	5	-0.056	5	0.028	0.054	0.150	3.386	0.004	0.006
2011	M212	3in Dia. Duct	Sec 1 - max	0.220	7	0.070	8	-0.019	1	-1.197	6	1.206	7	3.386	8	-1.043	5	-13.162	5	-0.056	5	0.028	0.054	0.150	3.386	0.004	0.005
2497	M260	6in Dia. Duct	Sec 4 - max	0.073	3	0.261	5	0.028	7	2.167	5	-0.193	6	-0.025	6	0.918	7	-176.120	6	-0.150	6	0.009	0.155	0.066	2.167	0.019	0.032
63	M9	3in Dia. Duct	Sec 2 - max	0.155	7	-0.373	6	0.989	7	-1.379	7	1.831	6	2.925	6	+1.986	7	34.434	6	0.147	6	0.016	0.081	0.138	2.925	0.011	0.076
1347	M145	6in Dia. Duct	Sec 4 - max	0.009	6	0.175	1	-0.291	2	-0.137	5	0.885	6	2.308	6	-0.954	7	283.879	6	0.238	6	0.001	0.063	0.165	2.308	0.029	0.036
838	M94	5in Dia. Duct	Sec 3 - min	-0.042	6	0.059	6	-0.267	8	-1.316	7	0.539	6	-1.494	8	-1.327	5	318.127	6	0.414	6	0.006	0.104	0.119	1.494	0.057	0.037
1352	M146	6in Dia. Duct	Sec 1 - min	-0.273	5	-0.027	2	-0.509	1	-0.410	6	-0.141	5	0.781	5	-2.312	8	173.712	5	0.145	5	0.035	0.069	0.165	2.312	0.010	0.083
1624	M193	16in Dia. Duct	Sec 2 - min	0.191	1	-0.310	1	-0.038	3	-1.050	2	1.631	1	-1.055	6	0.602	7	-758.673	4	-0.150	4	0.021	0.132	0.075	1.650	0.019	0.034
2351	M246	6in Dia. Duct	Sec 1 - max	0.046	7	-0.010	6	0.118	6	0.453	5	1.368	8	1.725	7	-0.783	8	1142.672	7	0.856	7	0.006	0.099	0.123	1.725	0.118	0.014
2352	M240	6in Dia. Duct	Sec 1 - min	-0.046	6	-0.093	7	-0.010	5	-1.368	8	-0.453	5	0.783	6	-1.725	7	-101.350	6	-0.085	6	0.006	0.099	0.123	1.725	0.010	0.011
1679	M198	16in Dia. Duct	Sec 5 - max	0.057	7	-0.541	1	0.003	2	-1.668	6	1.951	7	-0.601	4	1.146	3	-5978.034	2	-1.185	2	0.006	0.139	0.082	1.951	0.146	0.067
1680	M198	16in Dia. Duct	Sec 5 - min	0.056	8	-0.558	2	-0.003	1	-1.951	7	1.668	6	-1.146	3	0.601	4	-6450.135	1	-1.276	1	0.006	0.139	0.082	1.951	0.155	0.069
75	M8	9in Dia. Duct	Sec 3 - max	-0.115	2	-0.149	5	-0.041	5	-1.007	2	1.741	1	-0.668	5	1.232	8	130.532	6	0.117	6	0.015	0.124	0.089	1.741	0.014	0.016
1260	M136	6in Dia. Duct	Sec 5 - min	-0.027	8	0.064	6	-0.046	3	0.564	5	-1.094	8	-2.035	2	-1.918	1	210.306	8	0.185	8	0.003	0.078	0.146	2.035	0.023	0.008
2160	M228	6in Dia. Duct	Sec 5 - min	0.046	6	-0.000	7	0.018	5	-1.513	7	1.094	6	-1.581	7	0.940	8	326.161	7	0.273	7	0.006	0.108	0.113	1.581	0.034	0.007
2162	M227	6in Dia. Duct	Sec 1 - min	0.046	5	0.076	6	0.086	8	-1.513	7	1.094	6	-1.581	7	0.940	8	326.161	7	0.273	7	0.006	0.108	0.113	1.581	0.034	0.012
725	M84	6in Dia. Duct	Sec 3 - max	0.209	7	0.026	8	0.116	6	2.054	6	1.171	7	0.450	6	0.631	7	219.491	7	0.184	7	0.034	0.147	0.045	2.054	0.023	0.014
833	M94	5in Dia. Duct	Sec 2 - max	0.054	5	0.060	3	0.369	5	-0.556	6	1.333	7	1.217	5	1.416	8	506.840	7	0.660	7	0.008	0.106	0.113	1.416	0.091	0.054
2548	M265	2in Dia. Duct	Sec 4 - min	0.077	8	-0.277	5	-0.340	5	0.971	8	-2.532	6	1.110	8	-3.110	5	0.000	1	0.000	1	0.017	0.094	0.115	3.110	0.000	0.022
315	M34	6in Dia. Duct	Sec 3 - max	0.113	6	0.022	8	0.124	5	0.402	6	1.019	7	0.817	6	1.939	5	113.974	7	0.095	7	0.014	0.073	0.139	1.939	0.012	0.015
84	M9	3in Dia. Duct	Sec 2 - min	0.122	6	-0.542	7	0.683	6	-1.031	6	1.379	7	1.986	7	-2.925	6	30.804	7	0.132	7	0.014	0.081	0.130	2.925	0.010	0.051
1258	M136	6in Dia. Duct	Sec 4 - min	-0.027	6	0.065	6	-0.046	3	0.545	5	-1.073	8	-2.039	2	1.918	1	210.306	8	0.185	8	0.003	0.077	0.146	2.039	0.023	0.008
1259	M136	6in Dia. Duct	Sec 5 - max	0.012	7	0.079	7	0.045	4	1.094	8	-0.564	6	-1.016	1	2.036	2	858.129	5	0.753	5	0.001	0.078	0.148	2.036	0.093	0.010
1659	M196	16in Dia. Duct	Sec 5 - max	0.220	7	-0.266	5	0.017	2	0.251	6	0.802	7	-2.191	4	2.526	3	-2284.300	3	-0.453	3	0.026	0.019	0.160	2.526	0.056	0.035
665	M97	6in Dia. Duct	Sec 3 - max	0.001	6	0.045	5	-0.109	6	1.194	6	-0.888	7	-0.689	5	1.962	8	-697.340	6	-0.375	6	0.000	0.095	0.140	1.962	0.071	0.013
666	M97	6in Dia. Duct	Sec 3 - min	-0.001	8	0.012	6	-0.278	7	0.888	7	-1.194	6	-1.962	8	0.689	5	-992.905	7	-0.851	7	0.000	0.095	0.140	1.962	0.103	0.034
834	M94	5in Dia. Duct	Sec 2 - min	-0.042	6	0.060	8	-0.267	8	-1.333	7	0.556	6	-1.416	8	-1.217	5	318.127	6	0.414	6	0.006	0.106	0.113	1.416	0.057	0.037
1821	M193	16in Dia. Duct	Sec 1 - max	0.221	2	-0.238	2	0.035	4	-1.486	1	1.724	2	-0.458	7	1.058	6	391.612	3	0.078	3	0.025	0.123	0.078	1.724	0.010	0.029
1256	M136	6in Dia. Duct	Sec 3 - min	-0.027	8	0.065	6	-0.046	3	0.525	5	+1.052	6	-2.041	2	1.912	1	210.306	8	0.185	6	0.003	0.075	0.146	2.041	0.023	0.008
2288	M239	6in Dia. Duct	Sec 3 - min	0.033	8	0.021	6	0.001	8	-2.554	7	1.275	6	-0.449	7	-0.526	6	-797.550	6	-0.850	6	0.004	0.182	0.038	2.554	0.081	0.003
1257	M136	6in Dia. Duct	Sec 4 - max	0.013	7	0.080	7	0.046	4	1.073	8	-0.545	6	-1.915	1	2.039	2	858.129	5	0.753	5	0.002	0.077	0.146	2.039	0.093	0.010
1660	M196	16in Dia. Duct	Sec 5 - min	0.219	6	-0.307	8	-0.017	1	-0.002	7	-0.261	6	-2.526	3	2.191	4	-3362.935	4	-0.671	4	0.025	0.019	0.160	2.526	0.083	0.038
1723	M163	4in Dia. Duct	Sec 2 - max	0.187	5	1.001	5	-0.027	8	-2.506	7	3.864	6	0.170	8	0.765	6	764.901	7	1.603	7	0.015	0.172	0.034	3.864	0.120	0.077
1254	M136	6in Dia. Duct	Sec 2 - min	-0.028	6	0.066	6	-0.045	3	0.505	5	-1.031	8	-2.044	2	1.910	1	210.306	8	0.185	8	0.003	0.074	0.146	2.044	0.023	0.008
1869	M197	16in Dia. Duct	Sec 5 - max	0.156	7	-0.449	1	0.010	2	-0.617	6	0.882	7	-1.511	4	1.988	3	-4550.766	3	-0.902	3	0.018	0.063	0.142	1.988	0.111	0.056
1354	M146	6in Dia. Duct	Sec 2 - min	-0.273	5	-0.027	2	-0.509	1	-0.413	8	-0.145	5	0.654	5	-2.219	8	173.712	5	0.145	5	0.035	0.030	0.159	2.219	0.018	0.083
1255	M136	6in Dia. Duct	Sec 3 - max	0.013	7	0.081	7	0.046	4	1.052	8	-0.525	6	-1.912	1	2.041	2	858.129	5	0.753	5	0.002	0.075	0.146	2.041	0.093	0.010
703	M81	6in Dia. Duct	Sec 2 - max	0.268	6	0.086	6	0.263	7	1.379	6	0.362	7	1.012	6	1.206	7	109.312	7	0.091	7	0.037	0.099	0.086	1.379	0.011	0.032
1252	M136	6in Dia. Duct	Sec 1 - min	-0.026	8	0.057	6	-0.045	3	0.485	5	-1.010	8	-2.053	2	1.901	1	210.306	8	0.185	8	0.003	0.072	0.147	2.053	0.023	0.008
2498	M260	6in Dia. Duct	Sec 4 - min	-0.014	8	0.184	8	-0.055	6	0.193	8	-2.167	5	-0.918	7	0.025	8	-325.274	7	-0.272	7	0.002	0.165	0.066	2.167	0.034	0.020
1870	M197	16in Dia. Duct	Sec 5 - max	0.150	6	-0.461	2	-0.040	1	-0.842	7	0.617	8	-1.388	3	1.511	4	-5241.464	4	-1.039	4	0.017	0.063	0.142	1.944	0.126	0.057
831	M94	5in Dia. Duct	Sec 1 - max	0.054	5	0.060	3	0.369	5	-0.573	8	1.350	7	1.107	5	1.342	8	506.840	7	0.660	7	0.008	0.107	0.107	1.350	0.091	0.054
1722	M163	4in Dia. Duct	Sec 1 - min	0.020	8	0.103	8	-0.060	5	-4.169	8	2.597	7	-0.733	5	-0.100	6	305.056	6	0.071	6	0.003	0.159	0.033	4.169	0.052	0.008
1253	M136	6in Dia. Duct	Sec 2 - max	0.013	7	0.082	7	0.046	4	1.031	8	-0.505	6	-1.910	1	2.044	2	858.129	5	0.753	5	0.002	0.074	0.146	2.044	0.093	0.010

D-2250

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_c	f_{by}/σ_y	f_{bz}/σ_z		f_v (ksi)		f/η	$1/n_r$	
1622	M193	16in Dia. Duct	Sec 1 - min	0.189	1	-0.310	1	-0.041	3	-1.724	2	1.460	1	-1.006	6	0.486	7	-758.873	4	-0.150	4	0.021	0.123	0.076	[illegible]	1.724	[illegible]	0.019	0.038	[illegible]
2115	M222	3in Dia. Duct	Sec 3 - max	0.216	8	-0.025	8	-0.030	5	-0.391	5	0.422	8	3.979	8	-0.232	6	-14.328	8	-0.061	8	0.025	0.019	0.177	[illegible]	3.979	[illegible]	0.005	0.002	[illegible]
1251	M138	8in Dia. Duct	Sec 1 - max	0.013	7	0.083	7	0.046	4	1.010	8	-0.485	5	-1.901	5	2.063	8	858.129	5	0.763	5	0.002	0.072	0.147	[illegible]	2.063	[illegible]	0.093	0.010	[illegible]
832	M94	5in Dia. Duct	Sec 1 - min	-0.042	8	0.060	8	-0.266	8	-1.359	7	0.573	6	-1.342	8	-1.107	5	318.127	6	0.414	6	0.006	0.107	0.107	[illegible]	1.350	[illegible]	0.057	0.037	[illegible]
1121	M123	6in Dia. Duct	Sec 1 - max	0.141	5	0.182	5	0.041	7	-1.304	8	1.694	5	1.133	8	-0.662	5	956.444	6	0.626	6	0.018	0.121	0.081	[illegible]	1.694	[illegible]	0.102	0.022	[illegible]
738	M84	8in Dia. Duct	Sec 3 - min	-0.204	8	-0.096	7	-0.169	7	-1.171	7	-2.084	6	-0.631	7	-0.450	6	-457.131	6	-0.383	6	0.026	0.147	0.045	[illegible]	2.064	[illegible]	0.047	0.021	[illegible]
1349	M145	6in Dia. Duct	Sec 5 - max	0.009	8	0.174	1	-0.291	2	-0.093	5	0.874	8	2.162	8	-0.732	5	283.879	6	0.238	6	0.001	0.062	0.154	[illegible]	2.162	[illegible]	0.029	0.036	[illegible]
2495	M260	6in Dia. Duct	Sec 5 - max	0.077	6	0.260	8	0.036	7	0.069	6	1.695	7	0.514	6	1.213	7	-179.120	6	-0.150	6	0.010	0.121	0.087	[illegible]	1.695	[illegible]	0.019	0.035	[illegible]
951	M109	6in Dia. Duct	Sec 1 - max	0.034	8	-0.009	6	0.030	8	-0.837	7	1.196	8	1.775	8	-0.917	5	351.339	5	0.294	5	0.004	0.085	0.127	[illegible]	1.775	[illegible]	0.030	0.004	[illegible]
1356	M146	6in Dia. Duct	Sec 3 - min	-0.272	5	-0.028	2	-0.508	1	-0.418	8	-0.149	6	0.527	5	-2.125	8	173.712	5	0.145	5	0.034	0.030	0.152	[illegible]	2.125	[illegible]	0.016	0.063	[illegible]
953	M105	6in Dia. Duct	Sec 3 - max	0.034	8	-0.009	8	0.031	5	-0.805	7	1.200	6	1.760	8	-0.932	5	351.339	5	0.294	5	0.004	0.086	0.126	[illegible]	1.760	[illegible]	0.036	0.004	[illegible]
1122	M123	6in Dia. Duct	Sec 1 - min	0.109	8	0.070	8	-0.141	6	-1.694	5	1.304	8	0.662	5	-1.133	6	376.378	7	0.315	7	0.014	0.121	0.081	[illegible]	1.694	[illegible]	0.039	0.017	[illegible]
248	M25	4in Dia. Duct	Sec 4 - min	-0.046	8	0.007	8	-0.084	8	1.251	6	-2.069	7	-1.398	6	-2.685	7	53.888	6	0.119	5	0.004	0.092	0.119	[illegible]	2.685	[illegible]	0.002	0.008	[illegible]
724	M83	6in Dia. Duct	Sec 2 - min	-0.347	7	-0.095	7	-0.235	7	-1.037	7	-2.027	6	-0.374	7	-0.363	6	-219.491	7	-0.184	7	0.044	0.145	0.027	[illegible]	2.027	[illegible]	0.023	0.029	[illegible]
855	M106	6in Dia. Duct	Sec 3 - max	0.035	8	-0.009	8	0.031	6	-0.894	7	1.204	6	1.746	6	-0.946	5	351.339	5	0.294	5	0.004	0.086	0.125	[illegible]	1.746	[illegible]	0.036	0.004	[illegible]
2473	M258	6in Dia. Duct	Sec 2 - max	0.094	7	0.000	7	-0.091	6	0.706	7	-0.516	6	2.136	7	-0.943	6	-179.120	6	-0.150	6	0.012	0.050	0.153	[illegible]	2.136	[illegible]	0.019	0.011	[illegible]
247	M25	4in Dia. Duct	Sec 4 - max	-0.035	5	0.075	8	0.084	7	2.069	7	-1.251	6	2.685	7	1.398	6	130.227	8	0.287	8	0.003	0.092	0.119	[illegible]	2.685	[illegible]	0.022	0.006	[illegible]
957	M108	6in Dia. Duct	Sec 4 - max	0.035	8	-0.009	6	0.032	5	-0.923	7	1.209	6	1.731	6	-0.961	5	351.339	6	0.294	5	0.004	0.086	0.124	[illegible]	1.731	[illegible]	0.035	0.004	[illegible]
711	M82	6in Dia. Duct	Sec 1 - max	0.249	7	0.089	6	0.186	7	1.259	6	0.330	7	1.032	6	1.301	7	371.703	6	0.311	6	0.032	0.090	0.093	[illegible]	1.301	[illegible]	0.039	0.023	[illegible]
952	M106	6in Dia. Duct	Sec 1 - min	0.017	5	-0.059	7	-0.030	6	-1.196	6	0.837	7	0.917	5	-1.775	6	-35.179	8	-0.029	8	0.002	0.085	0.127	[illegible]	1.775	[illegible]	0.004	0.007	[illegible]
2157	M226	6in Dia. Duct	Sec 4 - max	0.084	6	0.000	8	0.068	6	-0.978	2	1.049	1	-1.550	8	1.802	7	353.378	6	0.296	6	0.011	0.075	0.129	[illegible]	1.802	[illegible]	0.037	0.008	[illegible]
959	M106	6in Dia. Duct	Sec 5 - max	0.038	6	-0.009	8	0.032	5	-0.953	7	1.213	6	1.715	8	-0.977	5	351.339	5	0.294	5	0.005	0.087	0.123	[illegible]	1.715	[illegible]	0.036	0.004	[illegible]
954	M108	6in Dia. Duct	Sec 2 - min	0.017	5	-0.060	7	-0.031	6	-1.200	6	0.865	7	0.932	5	-1.760	8	-35.179	8	-0.029	8	0.002	0.086	0.126	[illegible]	1.760	[illegible]	0.004	0.007	[illegible]
2538	M264	2in Dia. Duct	Sec 4 - min	0.079	8	-0.183	5	-0.395	5	0.540	8	-1.675	5	0.915	6	-3.603	5	0.000	1	0.000	1	0.018	0.062	0.133	[illegible]	3.603	[illegible]	0.000	0.026	[illegible]
968	M106	6in Dia. Duct	Sec 3 - min	0.017	5	-0.061	7	-0.031	6	-1.204	6	0.894	7	0.946	5	-1.746	6	-35.179	8	-0.029	8	0.002	0.086	0.125	[illegible]	1.746	[illegible]	0.004	0.008	[illegible]
958	M106	6in Dia. Duct	Sec 4 - min	0.018	5	-0.062	7	-0.032	6	-1.209	6	0.023	7	0.961	5	-1.731	6	-35.179	8	-0.029	8	0.002	0.086	0.124	[illegible]	1.731	[illegible]	0.004	0.008	[illegible]
706	M81	8in Dia. Duct	Sec 3 - min	-0.356	7	-0.042	7	-0.222	6	-0.437	7	-1.495	8	-0.643	7	-0.705	6	-371.703	6	-0.311	6	0.045	0.107	0.060	[illegible]	1.495	[illegible]	0.039	0.027	[illegible]
1123	M123	6in Dia. Duct	Sec 2 - max	0.142	6	0.182	5	0.042	7	-1.278	6	1.625	5	1.085	6	-0.673	6	986.444	6	0.826	6	0.018	0.116	0.078	[illegible]	1.625	[illegible]	0.102	0.022	[illegible]
960	M109	6in Dia. Duct	Sec 5 - min	0.018	5	-0.083	7	-0.032	6	-1.213	6	0.853	7	0.877	5	-1.715	6	-35.179	8	-0.029	8	0.002	0.087	0.123	[illegible]	1.715	[illegible]	0.004	0.009	[illegible]
1898	M200	4in Dia. Duct	Sec 4 - min	0.075	6	-0.101	5	-0.044	7	-3.855	5	2.333	8	-0.939	7	-0.682	6	53.888	5	0.119	5	0.007	0.162	0.042	[illegible]	3.856	[illegible]	0.309	0.009	[illegible]
259	M26	4in Dia. Duct	Sec 5 - max	0.065	5	1.053	5	-0.029	6	4.309	5	2.198	6	0.373	8	0.296	5	778.135	7	1.712	7	0.005	0.192	0.014	[illegible]	4.309	[illegible]	0.132	0.081	[illegible]
2235	M234	2in Dia. Duct	Sec 3 - max	0.327	5	-0.054	8	-0.053	6	-0.954	8	2.737	5	0.015	8	1.002	6	8.083	5	0.110	5	0.073	0.101	0.037	[illegible]	2.737	[illegible]	0.007	0.003	[illegible]
2010	M211	3in Dia. Duct	Sec 6 - min	0.056	6	-0.060	7	0.001	1	-1.206	7	1.197	6	1.943	5	-3.386	8	-14.055	8	-0.050	8	0.007	0.054	0.150	[illegible]	3.388	[illegible]	0.005	0.005	[illegible]
2012	M212	3in Dia. Duct	Sec 1 - min	0.056	6	0.070	6	-0.103	2	-1.206	7	1.197	8	1.043	5	-3.386	8	-14.055	8	-0.050	8	0.007	0.054	0.150	[illegible]	3.388	[illegible]	0.005	0.008	[illegible]
2498	M200	6in Dia. Duct	Sec 3 - min	-0.019	8	0.183	6	-0.065	8	-1.095	7	-0.009	6	-1.213	7	-0.514	6	-325.274	7	-0.272	7	0.002	0.121	0.087	[illegible]	1.695	[illegible]	0.034	0.023	[illegible]
1725	M183	4in Dia. Duct	Sec 3 - max	0.187	5	1.000	5	-0.027	8	-2.416	7	3.539	6	0.160	6	0.777	5	764.801	7	1.683	7	0.016	0.157	0.035	[illegible]	3.539	[illegible]	0.129	0.077	[illegible]
1358	M146	6in Dia. Duct	Sec 4 - min	-0.272	5	-0.028	2	-0.506	1	-0.420	8	-0.154	5	0.400	5	-2.031	6	173.712	5	0.145	5	0.034	0.030	0.145	[illegible]	2.031	[illegible]	0.018	0.053	[illegible]
2158	M228	8in Dia. Duct	Sec 4 - min	0.042	5	-0.039	7	0.019	7	-1.049	1	0.978	2	-1.602	7	1.560	6	328.161	7	0.273	7	0.005	0.075	0.129	[illegible]	1.602	[illegible]	0.034	0.005	[illegible]
1877	M198	16in Dia. Duct	Sec 4 - max	0.058	7	-0.539	1	0.005	2	-1.403	6	1.682	7	-0.601	4	1.148	3	-5976.034	2	-1.185	2	0.007	0.120	0.082	[illegible]	1.662	[illegible]	0.146	0.087	[illegible]
2221	M233	2in Dia. Duct	Sec 1 - max	0.312	5	0.082	5	0.067	7	0.471	8	1.082	5	0.160	1	2.072	2	8.083	5	0.110	5	0.069	0.040	0.099	[illegible]	2.072	[illegible]	0.007	0.005	[illegible]
1819	M192	16in Dia. Duct	Sec 5 - max	0.159	2	-0.390	2	0.035	4	-1.468	1	1.724	2	-0.438	7	0.942	6	-437.069	3	-0.087	3	0.016	0.123	0.087	[illegible]	1.724	[illegible]	0.011	0.046	[illegible]
1724	M183	4in Dia. Duct	Sec 2 - min	0.029	8	0.103	8	-0.060	5	-3.864	6	2.506	7	-0.755	5	-0.170	8	305.080	8	0.671	8	0.003	0.172	0.034	[illegible]	3.864	[illegible]	0.052	0.008	[illegible]
1879	M198	16in Dia. Duct	Sec 4 - min	0.054	8	-0.553	2	-0.005	1	-1.882	7	1.403	6	-1.146	3	0.601	4	-6450.135	1	-1.278	1	0.000	0.120	0.082	[illegible]	1.882	[illegible]	0.158	0.088	[illegible]
723	M83	6in Dia. Duct	Sec 3 - max	0.266	6	0.029	6	0.166	6	2.027	6	1.037	7	0.263	6	0.374	7	457.131	6	0.383	6	0.036	0.146	0.027	[illegible]	2.027	[illegible]	0.047	0.023	[illegible]
949	M105	6in Dia. Duct	Sec 5 - max	0.030	6	-0.034	8	0.030	5	-0.837	7	1.196	6	1.662	8	-0.822	5	604.595	7	0.506	7	0.004	0.085	0.119	[illegible]	1.662	[illegible]	0.062	0.004	[illegible]
947	M105	6in Dia. Duct	Sec 4 - max	0.029	6	-0.033	8	0.030	5	-0.806	7	1.180	6	1.677	8	-0.608	5	604.595	7	0.506	7	0.004	0.084	0.120	[illegible]	1.677	[illegible]	0.062	0.004	[illegible]
2227	M233	2in Dia. Duct	Sec 4 - max	0.321	5	0.038	6	0.097	2	2.090	5	-0.500	8	1.593	7	-0.561	6	8.083	5	0.110	5	0.071	0.077	0.059	[illegible]	2.090	[illegible]	0.007	0.000	[illegible]
945	M109	6in Dia. Duct	Sec 3 - max	0.029	6	-0.033	6	0.029	5	-0.774	7	1.185	6	1.591	8	-0.594	5	604.595	7	0.508	7	0.004	0.083	0.121	[illegible]	1.691	[illegible]	0.082	0.004	[illegible]
1362	M147	6in Dia. Duct	Sec 1 - min	-0.342	1	-0.101	5	-0.239	6	0.095	8	-0.301	5	0.240	5	-1.998	8	107.065	5	0.090	5	0.043	0.022	0.143	[illegible]	1.998	[illegible]	0.011	0.036	[illegible]
943	M105	6in Dia. Duct	Sec 2 - max	0.028	6	-0.032	6	0.029	5	-0.744	7	1.150	6	1.704	8	-0.580	5	604.595	7	0.506	7	0.004	0.082	0.122	[illegible]	1.704	[illegible]	0.062	0.004	[illegible]
1124	M123	6in Dia. Duct	Sec 2 - min	0.109	6	0.069	8	-0.141	6	-1.625	5	1.278	6	0.673	8	-1.065	6	376.378	7	0.315	7	0.014	0.116	0.078	[illegible]	1.625	[illegible]	0.039	0.017	[illegible]
941	M105	6in Dia. Duct	Sec 1 - max	0.028	6	-0.031	6	0.028	5	-0.714	7	1.135	6	1.718	8	-0.565	5	604.595	7	0.506	7	0.004	0.081	0.123	[illegible]	1.718	[illegible]	0.062	0.004	[illegible]
733	M84	6in Dia. Duct	Sec 2 - max	0.286	7	0.029	6	0.117	6	2.027	8	1.037	7	0.288	5	0.398	7	219.491	7	0.184	7	0.034	0.146	0.028	[illegible]	2.027	[illegible]	0.023	0.014	[illegible]
260	M26	4in Dia. Duct	Sec 6 - min	0.011	5	0.103	8	-0.057	8	-2.198	8	-4.309	5	-0.298	5	-0.323	6	295.030	6	0.050	6	0.001	0.152	0.014	[illegible]	4.309	[illegible]	0.050	0.008	[illegible]
2474	M258	8in Dia. Duct	Sec 2 - min	0.031	6	-0.020	6	-0.161	7	0.518	6	-0.706	7	0.943	6	-2.136	7	-325.274	7	-0.272	7	0.004	0.050	0.153	[illegible]	2.136	[illegible]	0.034	0.020	[illegible]
1087	M197	18in Dia. Duct	Sec 4 - max	0.157	7	-0.446	5	0.012	2	-0.398	6	0.660	7	-1.511	4	1.986	3	-4550.766	3	-0.802	3	0.016	0.047	0.142	[illegible]	1.986	[illegible]	0.111	0.056	[illegible]
2463	M259	6in Dia. Duct	Sec 2 - max	0.106	5	-0.063	6	0.045	6	-0.955	6	1.083	7	-0.391	6	1.620	7	-179.120	6	-0.150	6	0.013	0.077	0.116	[illegible]	1.620	[illegible]	0.019	0.007	[illegible]
712	M82	6in Dia. Duct	Sec 1 - min	-0.193	8	-0.036	7	-0.140	6	-0.330	7	-1.259	6	-1.301	7	-1.032	6	-109.312	7	-0.091	7	0.023	0.090	0.093	[illegible]	1.301	[illegible]	0.011	0.017	[illegible]
1888	M197	16in Dia. Duct	Sec 4 - min	0.146	6	-0.459	8	-0.012	1	-0.660	7	0.396	6	-1.988	3	1.511	4	-5241.464	4	-1.030	4	0.017	0.047	0.142	[illegible]	1.988	[illegible]	0.128	0.057	[illegible]
2116	M222	3in Dia. Duct	Sec 3 - min	0.081	7	-0.027	5	-0.172	8	-0.422	8	0.391	5	0.232	5	-3.979	6	-35.186	5	-0.155	5	0.009	0.019	0.177	[illegible]	3.979	[illegible]	0.012	0.013	[illegible]
950	M105	6in Dia. Duct	Sec 5 - min	0.004	7	-0.067	5	-0.030	7	-1.196	6	0.837	7	0.622	5	-1.662	6	302.846	6	0.253	6	0.001	0.085	0.119	[illegible]	1.662	[illegible]	0.031	0.006	[illegible]
948	M105	6in Dia. Duct	Sec 4 - min	0.004	7	-0.066	5	-0.030	7	-1.180	6	0.806	7	0.608	5	-1.677	6	302.846	6	0.253	6	0.001	0.084	0.120	[illegible]	1.677	[illegible]	0.031	0.006	[illegible]
946	M105	6in Dia. Duct	Sec 3 - min	0.004	7	-0.065	5	-0.029	7	-1.165	6	0.774	7	0.594	5	-1.691	8	302.846	6	0.253	6	0.001	0.083	0.121	[illegible]	1.691	[illegible]	0.031	0.006	[illegible]
705	M81	6in Dia. Duct	Sec 3 - max	0.286	8	0.083	6	0.204	7	1.495	6	0.437	7	0.705	6	0.643	7	109.312	7	0.091	7	0.037	0.107	0.060	[illegible]	1.495	[illegible]	0.011	0.033	[illegible]
713	M82	6in Dia. Duct	Sec 2 - max	0.249	7	0.066	8	0.188	7	1.378	8	0.382	7	0.637	5	1.042	7	371.703	6	0.311	6	0.032	0.099	0.074	[illegible]	1.379	[illegible]	0.036	0.023	[illegible]
944	M105	6in Dia. Duct	Sec 2 - min	0.004	7	-0.064	5	-0.029	7	-1.150	8	0.744	7	0.560	5	-1.704	8	302.846	6	0.253	6	0.001	0.082	0.122	[illegible]	1.704	[illegible]	0.031	0.006	[illegible]
942	M105	6in Dia. Duct	Sec 1 - min	0.004	7	-0.063	5	-0.028	7	-1.135	6	0.714	7	0.560	5	-1.718	8	302.846	6	0.253	6	0.001	0.081	0.123	[illegible]	1.718	[illegible]	0.031	0.006	[illegible]
2311	M242	6in Dia. Duct	Sec 1 - max	0.056	6	0.034	5	0.064	8	0.500	8	1.292	5	0.345	5	1.458	8	192.953	7	0.162	7	0.007	0.092	0.104	[illegible]	1.458	[illegible]	0.020	0.008	[illegible]
748	M85	6in Dia. Duct	Sec 4 - min	-0.360	7	-0.089	7	-0.039	5	-0.852	7	-2.081	5	-0.114	6	-0.075	5	-15.133	7	-0.013	7	0.047	0.149	0.006	[illegible]	2.081	[illegible]	0.002	0.011	[illegible]
1820	M192	16in Dia. Duct	Sec 5 - min	0.115	1	-0.431	1	-0.041	3	-1.724	2	1.468	1	-0.942	7	0.438	7	-1403.254	4	-0.276	4	0.013	0.123	0.087	[illegible]	1.724	[illegible]	0.034	0.053	[illegible]
746	M85	6in Dia. Duct	Sec 3 - min	-0.369	7	-0.086	7	-0.037	5	-0.730	7	-2.030	6	-0.162	6	-0.129	5	-15.133	7	-0.013	7	0.047	0.145	0.012	[illegible]	2.030	[illegible]	0.002	0.011	[illegible]
1125	M123	6in Dia. Duct	Sec 3 - max	0.142	5	0.183	5	0.042	7	-1.252	6	1.556	5	1.036	6	-0.864	6	986.444	6	0.826	6	0.018	0.111	0.074	[illegible]	1.556	[illegible]	0.102	0.023	[illegible]
1360	M146	6in Dia. Duct	Sec 5 - min	-0.272	5	-0.028	2	-0.508	1	-0.423	8	-0.158	5	0.274	5	-1.938	8	173.712	5	0.145	5	0.034	0.030	0.136	[illegible]	1.938	[illegible]	0.018	0.063	[illegible]
561	M41	8in Dia. Duct	Sec 1 - max	0.114	5	-0.151	6	0.094	6	1.698	7	-1.398	5	-0.463	5	0.944	8	859.016	6	0.720	6	0.014	0.121	0.067	[illegible]	1.698	[illegible]	0.089	0.019	[illegible]
750	M85	8in Dia. Duct	Sec 5 - min	-0.387	7	-0.092	7	-0.041	5	-0.979	7	-2.127	6	-0.083	6	-0.029	5	-15.133	7	-0.013	7	0.048	0.152	0.005	[illegible]	2.127	[illegible]	0.002	0.011	[illegible]
561	M107	6in Dia. Duct	Sec 1 - max	0.035	8	0.019	6	0.032	5	-0.953	7	1.213	6	1.502	8	-1.127	5	101.348	5	0.085	5	0.004	0.087	0.112	[illegible]	1.562	[illegible]	0.010	0.004	[illegible]
1242	M135	8in Dia. Duct	Sec 1 - min	-0.041	8	0.042	8	-0.046	3	0.389	7	-0.959	6	-1.603	8	1.131	5	633.536	6	0.556	6	0.005	0.069	0.129	[illegible]	1.603	[illegible]	0.089	0.006	[illegible]
2301	M241	6in Dia. Duct	Sec 1 - max	0.060	5	0.030	6	0.061	8	0.476	8	1.273	5	0.388	5	1.452	5	-21.985	7	-0.018	7	0.008	0.091	0.104	[illegible]	1.452	[illegible]	0.002	0.008	[illegible]
2338	M248	8in Dia. Duct	Sec 3 - min	-0.060	6	-0.019	6	-0.091	6	0.558	6	-1.113	8	-0.068	6	-1.612	7	345.041	6	0.289	6	0.008	0.080	0.115	[illegible]	1.612	[illegible]	0.036	0.011	[illegible]
1250	M135	8in Dia. Duct	Sec 5 - min	-0.039	6	0.040	8	-0.046	3	0.485	5	-1.010	8	-1.755	5	1.160	5	633.536	6	0.556	6	0.005	0.072	0.125	[illegible]	1.755	[illegible]	0.069	0.006	[illegible]
1244	M135	8in Dia. Duct	Sec 2 - min	-0.040	8	0.041	6	-0.046	3	0.414	7	-0.972	6	-1.791	8	1.144	5	633.536	6	0.556	6	0.005	0.069	0.128	[illegible]	1.791	[illegible]	0.069	0.006	[illegible]
1246	M135	8in Dia. Duct	Sec 3 - min	-0.040	8	0.041	6	-0.048	3	0.439	7	-0.983	6	-1.779	8	1.158	5	633.536	6	0.556	6	0.005	0.070	0.127	[illegible]	1.779	[illegible]	0.069	0.008	[illegible]
1248	M135	8in Dia. Duct	Sec 4 - min	-0.039	6	0.040	6	-0.046	3	0.464	7	-0.995	6	-1.767	8	1.168	5	633.536	6	0.556	6	0.005	0.071	0.126	[illegible]	1.767	[illegible]	0.069	0.005	[illegible]
982	M107	6in Dia. Duct	Sec 1 - min	0.029	7	-0.045	7	-0.032	6	-1.213	6	0.953	7	1.127	5	-1.562	6	-424.601	8	-0.355	8	0.004	0.087	0.112	[illegible]	1.562	[illegible]	0.044	0.006	[illegible]
1109	M121	6in Dia. Duct	Sec 5 - max	0.148	5	-0.132	7	0.039	7	-1.233	8	1.720	5	-0.109	7	0.640	6	1097.171	8	0.916	8	0.019	0.123	0.060	[illegible]	1.720	[illegible]	0.113	0.016	[illegible]

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_a	f_b/σ_a	f_v/σ_a	f_t (ksi)	f/f_t	f/σ_a
1351	M146	6in Dia. Duct	Sec 1 - max	-0.054	8	0.032	1	-0.267	2	0.141	6	0.410	8	2.312	8	-0.781	8	224.697	8	0.168	6	0.007	0.029	0.165	2.312	0.023	0.033
863	M97	6in Dia. Duct	Sec 2 - max	0.002	6	0.048	5	-0.111	6	1.133	6	-0.668	7	-0.522	5	1.661	8	-687.343	6	-0.575	6	0.000	0.081	0.120	1.681	0.071	0.014
864	M97	6in Dia. Duct	Sec 2 - min	-0.002	8	0.016	8	-0.275	7	0.068	7	-1.133	6	-1.681	8	0.622	5	-992.908	7	-0.831	7	0.000	0.081	0.120	1.681	0.103	0.034
963	M107	6in Dia. Duct	Sec 2 - max	0.028	8	0.010	5	0.033	5	-0.974	7	1.204	6	1.647	8	-1.143	5	101.348	5	0.085	6	0.006	0.088	0.111	1.647	0.010	0.004
382	M41	6in Dia. Duct	Sec 1 - min	0.098	6	-0.235	5	-0.094	7	1.398	8	-1.690	7	-0.944	8	0.483	5	202.160	7	0.169	7	0.012	0.121	0.067	1.696	0.021	0.029
2370	M247	6in Dia. Duct	Sec 5 - min	-0.056	8	-0.130	7	-0.015	6	-1.506	8	-0.176	6	0.816	6	-1.202	7	86.544	6	0.072	6	0.007	0.108	0.088	1.506	0.009	0.016
2303	M241	6in Dia. Duct	Sec 2 - max	0.060	5	0.030	6	0.062	8	0.482	8	1.277	5	0.410	5	1.423	8	-21.085	7	-0.018	7	0.008	0.091	0.102	1.423	0.002	0.008
2313	M242	6in Dia. Duct	Sec 2 - max	0.056	6	0.033	5	0.064	8	0.502	6	1.276	5	0.365	5	1.428	8	192.963	7	0.162	7	0.007	0.091	0.102	1.428	0.020	0.008
1364	M147	6in Dia. Duct	Sec 2 - min	-0.342	1	-0.102	5	-0.290	8	0.071	6	-0.272	5	0.191	5	-1.925	8	107.085	5	0.090	5	0.043	0.018	0.138	1.925	0.011	0.036
2077	M218	3in Dia. Duct	Sec 4 - max	0.091	5	0.022	5	0.457	6	0.123	5	0.004	8	4.143	6	-0.682	7	-6.980	8	-0.030	8	0.011	0.005	0.164	4.143	0.002	0.035
964	M107	6in Dia. Duct	Sec 2 - min	0.029	7	-0.045	7	-0.033	8	-1.204	6	0.974	7	1.143	5	-1.547	8	-424.001	8	-0.355	6	0.004	0.088	0.111	1.547	0.044	0.006
491	M52	6in Dia. Duct	Sec 1 - max	-0.058	1	0.051	6	0.053	3	-0.205	8	1.379	5	0.995	8	1.315	5	1313.992	4	1.153	4	0.007	0.099	0.094	1.379	0.142	0.007
492	M52	6in Dia. Duct	Sec 1 - min	-0.058	8	-0.051	7	-0.053	4	-1.379	5	0.205	8	-1.315	6	-0.996	8	1103.694	3	0.969	3	0.007	0.099	0.094	1.379	0.120	0.007
965	M107	6in Dia. Duct	Sec 3 - max	0.030	8	0.020	6	0.033	5	-0.996	7	1.194	6	1.531	8	-1.159	6	101.348	5	0.085	5	0.005	0.085	0.109	1.531	0.010	0.004
2464	M259	6in Dia. Duct	Sec 2 - min	-0.047	8	-0.117	7	0.006	7	-1.080	7	0.955	8	-1.620	7	0.391	8	-326.274	7	-0.272	7	0.006	0.077	0.118	1.620	0.034	0.014
1128	M123	6in Dia. Duct	Sec 3 - min	0.109	8	0.068	8	-0.142	6	-1.550	5	1.252	8	0.604	5	-1.036	8	378.378	7	0.315	7	0.014	0.111	0.074	1.556	0.039	0.019
755	M80	6in Dia. Duct	Sec 5 - max	0.280	7	0.032	6	0.032	8	2.127	6	0.979	7	0.126	6	0.161	7	15.133	7	0.013	7	0.035	0.152	0.012	2.127	0.002	0.004
744	M85	6in Dia. Duct	Sec 2 - min	-0.377	7	-0.051	7	-0.020	5	-0.657	7	-1.929	0	-0.186	8	-0.157	5	-15.133	7	-0.013	7	0.048	0.136	0.013	1.929	0.002	0.008
734	M84	6in Dia. Duct	Sec 2 - min	-0.203	8	-0.095	7	-0.170	7	-1.037	7	-2.027	6	-0.396	7	-0.288	6	-457.131	8	-0.363	6	0.026	0.145	0.028	2.027	0.047	0.021
2305	M241	6in Dia. Duct	Sec 3 - max	0.059	5	0.030	6	0.062	8	0.488	8	1.282	6	0.431	5	1.394	8	-21.985	7	-0.018	7	0.007	0.092	0.100	1.394	0.002	0.008
966	M107	6in Dia. Duct	Sec 3 - min	0.030	7	-0.046	7	-0.033	8	-1.194	6	0.996	7	1.159	5	-1.531	8	-424.601	8	-0.355	6	0.004	0.085	0.109	1.531	0.044	0.006
1127	M123	6in Dia. Duct	Sec 4 - max	0.142	5	0.183	5	0.043	7	-1.217	6	1.497	7	1.028	7	-0.655	6	980.444	6	0.828	6	0.018	0.107	0.073	1.497	0.102	0.023
757	M86	6in Dia. Duct	Sec 4 - max	0.279	7	0.036	6	0.030	6	2.081	8	0.652	7	0.107	6	0.198	7	15.133	7	0.013	7	0.035	0.149	0.014	2.081	0.002	0.004
1240	M135	6in Dia. Duct	Sec 5 - max	-0.004	7	0.087	7	0.046	4	1.010	8	-0.485	5	-1.180	5	1.765	8	1216.143	7	1.067	7	0.000	0.073	0.125	1.755	0.132	0.011
1241	M135	6in Dia. Duct	Sec 1 - max	-0.004	7	0.091	7	0.046	4	0.960	6	-0.389	7	-1.131	5	1.603	8	1216.143	7	1.067	7	0.000	0.069	0.129	1.603	0.132	0.011
1243	M135	6in Dia. Duct	Sec 2 - max	-0.004	7	0.090	7	0.046	4	0.972	6	-0.414	7	-1.144	5	1.791	8	1216.143	7	1.067	7	0.000	0.069	0.126	1.791	0.132	0.011
1245	M135	6in Dia. Duct	Sec 3 - max	-0.004	7	0.089	7	0.048	4	0.983	6	-0.439	7	-1.156	5	1.779	8	1216.143	7	1.067	7	0.000	0.070	0.127	1.779	0.132	0.011
1247	M135	6in Dia. Duct	Sec 4 - max	-0.004	7	0.088	7	0.046	4	0.995	6	-0.464	7	-1.168	5	1.767	8	1216.143	7	1.067	7	0.000	0.071	0.126	1.767	0.132	0.011
2312	M242	6in Dia. Duct	Sec 1 - min	-0.009	8	0.006	8	0.043	5	-1.292	5	-0.600	8	-1.458	8	-0.346	5	-452.030	6	-0.378	8	0.001	0.092	0.104	1.458	0.047	0.005
967	M107	6in Dia. Duct	Sec 4 - max	0.037	6	0.020	6	0.034	5	-1.018	7	1.185	6	1.515	8	-1.175	5	101.348	5	0.085	5	0.005	0.085	0.108	1.515	0.010	0.004
2369	M247	6in Dia. Duct	Sec 5 - max	0.029	5	0.026	6	0.121	6	0.176	5	1.506	6	1.202	7	-0.616	6	1400.159	7	1.247	7	0.004	0.108	0.086	1.506	0.154	0.015
755	M86	6in Dia. Duct	Sec 3 - max	0.278	7	0.036	6	0.029	8	2.030	8	0.730	7	0.208	8	0.234	7	15.133	7	0.013	7	0.035	0.145	0.017	2.030	0.002	0.005
2315	M242	6in Dia. Duct	Sec 3 - max	0.056	5	0.032	5	0.065	8	0.504	8	1.260	5	0.385	5	1.397	8	192.963	7	0.162	7	0.007	0.090	0.100	1.397	0.020	0.008
2368	M247	6in Dia. Duct	Sec 4 - min	-0.055	8	-0.129	7	-0.015	5	-1.500	6	-0.220	5	0.610	6	-1.158	7	86.544	6	0.072	6	0.007	0.107	0.083	1.500	0.009	0.016
2307	M241	6in Dia. Duct	Sec 4 - max	0.059	5	0.030	6	0.063	8	0.494	8	1.266	5	0.451	5	1.364	8	-21.985	7	-0.018	7	0.007	0.092	0.097	1.364	0.002	0.008
969	M107	6in Dia. Duct	Sec 4 - min	0.030	7	-0.047	7	-0.034	8	-1.185	6	1.018	7	1.175	5	-1.515	8	-424.601	6	-0.355	6	0.004	0.085	0.108	1.515	0.044	0.006
1727	M163	4in Dia. Duct	Sec 4 - max	0.187	5	0.999	5	-0.027	8	-2.325	7	3.215	6	0.150	8	0.600	5	704.901	7	1.683	7	0.018	0.143	0.036	3.215	0.129	0.077
379	M40	6in Dia. Duct	Sec 5 - max	0.122	5	-0.166	6	0.038	7	-1.015	6	1.497	5	-0.453	7	1.034	6	997.775	8	0.835	8	0.015	0.107	0.074	1.497	0.103	0.023
2627	M263	2in Dia. Duct	Sec 4 - max	0.136	6	-0.054	8	-0.052	6	1.977	5	-0.480	8	2.493	5	-0.403	8	0.000	1	0.000	1	0.001	0.073	0.092	2.493	0.000	0.003
2365	M249	6in Dia. Duct	Sec 3 - max	-0.012	6	0.136	7	0.119	5	1.113	8	-0.556	5	1.612	7	0.088	6	1659.205	7	1.389	7	0.002	0.080	0.115	1.612	0.171	0.017
714	M82	6in Dia. Duct	Sec 2 - min	-0.183	6	-0.039	7	-0.142	6	-0.382	7	-1.379	6	-1.042	7	-0.837	6	-109.312	7	-0.091	7	0.023	0.099	0.074	1.378	0.011	0.018
969	M107	6in Dia. Duct	Sec 5 - max	0.037	6	0.020	6	0.035	5	-1.040	7	1.175	6	1.499	8	-1.191	5	101.348	5	0.085	5	0.005	0.084	0.107	1.499	0.010	0.004
1129	M123	6in Dia. Duct	Sec 5 - max	0.143	6	0.183	5	0.043	7	-1.177	6	1.442	7	1.044	7	-0.601	6	988.444	8	0.828	6	0.018	0.103	0.076	1.442	0.102	0.023
2183	M229	2in Dia. Duct	Sec 2 - max	0.167	6	-0.052	8	0.040	5	-0.041	8	2.602	5	0.054	8	1.652	5	10.134	6	0.138	6	0.035	0.099	0.061	2.682	0.009	0.003
2302	M241	6in Dia. Duct	Sec 1 - min	-0.005	8	-0.026	7	0.045	5	-1.273	5	-0.476	8	-1.452	8	-0.088	5	-471.614	6	-0.395	6	0.001	0.091	0.104	1.452	0.049	0.006
747	M65	6in Dia. Duct	Sec 4 - max	0.304	6	0.035	6	0.035	8	2.081	6	0.852	7	0.076	5	0.114	8	11.733	6	0.010	6	0.038	0.149	0.008	2.081	0.001	0.004
745	M65	6in Dia. Duct	Sec 3 - max	0.305	6	0.036	8	0.034	8	2.030	8	0.730	7	0.129	6	0.162	8	11.733	6	0.010	6	0.039	0.145	0.012	2.030	0.001	0.005
2121	M223	3in Dia. Duct	Sec 1 - max	0.174	6	0.094	8	0.053	1	-2.496	5	2.523	6	1.411	2	0.956	1	-14.328	8	-0.061	8	0.020	0.112	0.083	2.523	0.006	0.007
2559	M266	3in Dia. Duct	Sec 5 - max	0.174	0	-0.094	5	0.049	8	-2.496	6	2.523	8	1.411	2	0.956	1	-14.328	8	-0.061	6	0.020	0.112	0.063	2.523	0.005	0.007
2309	M241	6in Dia. Duct	Sec 5 - max	0.052	5	0.030	6	0.064	8	0.500	8	1.292	5	0.471	5	1.334	8	-21.985	7	-0.018	7	0.007	0.092	0.095	1.334	0.002	0.008
1350	M146	6in Dia. Duct	Sec 2 - max	-0.054	8	0.032	1	-0.257	2	0.145	5	0.413	8	2.219	6	-0.654	5	224.697	8	0.188	8	0.007	0.030	0.159	2.219	0.023	0.033
970	M107	6in Dia. Duct	Sec 6 - min	0.030	7	-0.047	7	-0.036	8	-1.175	6	1.040	7	1.191	5	-1.499	8	-424.601	8	-0.355	8	0.004	0.084	0.107	1.499	0.044	0.006
749	M86	6in Dia. Duct	Sec 6 - max	0.303	6	0.032	6	0.037	8	2.127	6	0.979	7	0.020	5	0.053	8	11.733	6	0.010	8	0.038	0.152	0.005	2.127	0.001	0.005
1617	M182	16in Dia. Duct	Sec 4 - max	0.159	2	-0.385	2	0.037	4	-1.242	1	1.520	2	-0.421	7	0.956	6	-437.069	3	-0.087	3	0.018	0.109	0.069	1.520	0.011	0.048
1728	M183	4in Dia. Duct	Sec 3 - min	0.028	8	0.102	8	-0.059	5	-3.530	6	2.416	7	-0.777	5	-0.160	8	305.066	6	0.671	6	0.003	0.157	0.035	3.539	0.052	0.008
2314	M242	6in Dia. Duct	Sec 2 - min	-0.010	8	0.005	8	0.042	5	-1.276	5	-0.502	8	-1.428	8	-0.365	5	-452.030	6	-0.378	6	0.001	0.091	0.102	1.428	0.047	0.005
715	M82	6in Dia. Duct	Sec 3 - max	0.280	7	0.083	8	0.190	7	1.495	6	0.437	7	0.639	5	0.782	7	371.703	6	0.311	6	0.032	0.107	0.058	1.495	0.038	0.023
1126	M123	6in Dia. Duct	Sec 4 - min	0.110	8	0.066	8	-0.142	6	-1.497	7	1.217	6	0.656	6	-1.026	7	378.376	7	0.315	7	0.014	0.107	0.073	1.497	0.039	0.018
653	M68	12in Dia. Duct	Sec 2 - max	0.025	7	0.997	7	-0.011	3	3.533	8	-2.960	7	0.390	7	0.795	6	-211.695	8	-0.069	8	0.002	0.157	0.035	3.533	0.005	0.077
654	M68	12in Dia. Duct	Sec 2 - min	-0.023	6	0.857	6	-0.128	4	2.968	7	-3.533	6	-0.795	6	-0.308	7	-1303.365	5	-0.427	5	0.002	0.157	0.035	3.533	0.033	0.066
708	M81	6in Dia. Duct	Sec 4 - min	-0.355	7	-0.045	7	-0.223	6	-0.497	7	-1.607	6	-0.476	7	-0.397	6	-371.703	6	-0.311	6	0.045	0.115	0.034	1.607	0.038	0.028
1107	M121	6in Dia. Duct	Sec 4 - max	0.148	5	-0.131	7	0.039	7	-1.177	8	1.663	6	-0.122	7	0.788	8	1097.171	8	0.916	8	0.019	0.119	0.056	1.663	0.113	0.016
1110	M121	6in Dia. Duct	Sec 6 - min	0.085	8	-0.169	8	-0.139	8	-1.720	5	1.233	8	-0.640	6	0.108	7	567.911	5	0.407	5	0.011	0.123	0.060	1.720	0.056	0.021
2304	M241	6in Dia. Duct	Sec 2 - min	-0.008	0	-0.026	7	0.044	6	-1.277	6	-0.482	8	-1.423	8	-0.410	5	-471.614	6	-0.395	6	0.001	0.091	0.102	1.423	0.049	0.005
2317	M242	6in Dia. Duct	Sec 4 - max	0.056	5	0.031	5	0.066	8	0.506	8	1.245	6	0.404	5	1.366	8	192.963	7	0.162	7	0.007	0.089	0.098	1.366	0.020	0.008
2367	M247	6in Dia. Duct	Sec 4 - max	0.029	5	0.026	6	0.121	8	0.220	5	1.500	8	1.156	7	-0.610	6	1490.159	7	1.247	7	0.004	0.107	0.083	1.500	0.154	0.015
1959	M206	2in Dia. Duct	Sec 5 - max	0.157	5	-0.046	8	-0.114	6	-0.224	6	1.811	7	-0.592	8	2.469	5	-5.695	8	-0.080	8	0.035	0.067	0.091	2.469	0.005	0.007
1919	M202	8in Dia. Duct	Sec 6 - max	0.008	1	0.008	8	0.008	8	-0.205	8	1.379	5	0.995	8	1.315	5	1313.992	4	1.153	4	0.001	0.099	0.094	1.379	0.142	0.001
1920	M202	8in Dia. Duct	Sec 5 - min	0.008	1	-0.008	8	-0.008	5	-1.379	5	0.205	8	-1.315	5	-0.995	8	1103.694	3	0.969	3	0.001	0.099	0.094	1.379	0.120	0.001
2368	M247	6in Dia. Duct	Sec 3 - min	-0.055	8	-0.126	7	-0.014	5	-1.494	8	-0.262	5	0.805	8	-1.113	7	86.544	6	0.072	6	0.007	0.107	0.080	1.494	0.009	0.018
2076	M218	3in Dia. Duct	Sec 4 - min	-0.030	8	0.017	7	0.135	7	-0.004	8	-0.123	7	0.602	7	-4.143	5	-7.691	5	-0.033	5	0.003	0.005	0.184	4.143	0.003	0.010
742	M65	5in Dia. Duct	Sec 1 - min	-0.378	7	-0.047	7	-0.016	5	-0.569	6	-1.825	8	-0.207	8	-0.183	5	-15.133	7	-0.013	7	0.048	0.130	0.016	1.825	0.002	0.006
115	M12	5in Dia. Duct	Sec 3 - max	0.098	5	0.228	6	-0.038	6	-0.862	8	1.747	5	0.503	8	-0.063	8	230.032	6	0.307	6	0.014	0.139	0.040	1.747	0.042	0.031
1366	M147	8in Dia. Duct	Sec 3 - min	-0.342	1	-0.102	5	-0.290	6	0.047	6	-0.243	5	0.134	5	-1.852	6	107.085	5	0.090	5	0.043	0.017	0.132	1.652	0.011	0.036
1917	M202	8in Dia. Duct	Sec 4 - max	0.007	1	0.007	8	0.007	8	-0.210	6	1.373	5	0.990	6	1.309	5	1313.992	4	1.153	4	0.001	0.096	0.094	1.373	0.142	0.001
1918	M202	8in Dia. Duct	Sec 4 - min	0.007	1	-0.007	8	-0.007	5	-1.373	5	0.210	6	-1.309	6	-0.990	8	1103.694	3	0.969	3	0.001	0.096	0.094	1.373	0.120	0.001
2306	M241	6in Dia. Duct	Sec 3 - min	-0.006	8	-0.027	7	0.044	5	-1.262	5	-0.468	8	-1.394	6	-0.431	5	-471.614	6	-0.395	6	0.001	0.092	0.100	1.394	0.049	0.005
1916	M202	8in Dia. Duct	Sec 3 - max	0.008	1	0.008	8	0.006	8	-0.215	8	1.368	5	0.985	8	1.304	5	1313.992	4	1.153	4	0.001	0.098	0.093	1.368	0.142	0.001
1916	M202	8in Dia. Duct	Sec 3 - min	0.008	1	-0.008	6	-0.006	6	-1.368	6	0.215	8	-1.304	5	-0.985	8	1103.694	3	0.969	3	0.001	0.098	0.093	1.368	0.120	0.001
1130	M123	6in Dia. Duct	Sec 5 - min	0.110	8	0.067	8	-0.143	6	-1.442	7	1.177	8	0.601	6	-1.044	7	376.378	7	0.315	7	0.014	0.103	0.075	1.442	0.039	0.018
2021	M213	3in Dia. Duct	Sec 1 - max	0.233	7	-0.045	7	0.145	5	0.113	6	-0.105	6	-0.189	6	3.579	7	-9.047	1	-0.039	1	0.027	0.005	0.159	3.579	0.003	0.011
2316	M242	6in Dia. Duct	Sec 3 - min	-0.010	8	0.004	8	0.041	5	-1.260	5	-0.504	8	-1.397	6	-0.385	5	-452.030	6	-0.378	6	0.001	0.090	0.100	1.397	0.047	0.005
1865	M197	16in Dia. Duct	Sec 3 - max	0.157	7	-0.443	8	0.014	2	-0.176	5	0.439	7	-1.511	4	1.988	3	-4550.766	3	-0.802	3	0.018	0.031	0.142	1.988	0.111	0.035
1913	M202	8in Dia. Duct	Sec 2 - max	0.005	1	0.005	8	0.006	6	-0.219	5	1.364	5	0.981	8	1.300	5	1313.992	4	1.153	4	0.001	0.097	0.093	1.364	0.142	0.001
1914	M202	8in Dia. Duct	Sec 2 - min	0.005	1	-0.005	6	-0.005	6	-1.384	5	0.219	5	-1.300	6	-0.981	5	1103.694	3	0.969	3	0.001	0.097	0.093	1.384	0.120	0.001

D-2250

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_a	f_{by}/σ_b	f_{bz}/σ_b	f_v (ksi)	f_v/v_a	f_t/σ_t
743	M65	6in Dia. Duct	Sec 2 - max	0.314	6	0.074	5	0.016	8	1.920	6	0.657	7	0.157	5	0.166	6	11.733	6	0.010	6	0.040	0.136	0.013	1.929	0.001	0.009
116	M12	5in Dia. Duct	Sec 3 - min	0.083	6	0.159	5	-0.082	5	-1.747	6	0.602	6	0.063	5	-0.503	6	-63.537	7	-0.083	7	0.012	0.139	0.040	1.747	0.011	0.022
2019	M212	3in Dia. Duct	Sec 5 - max	0.212	7	-0.045	8	-0.031	2	0.973	8	-0.007	5	-3.189	6	3.579	7	-13.162	5	-0.056	5	0.028	0.003	0.159	3.579	0.004	0.003
2319	M242	6in Dia. Duct	Sec 6 - max	0.056	5	0.030	5	0.006	8	0.508	8	1.231	5	0.423	6	1.335	8	192.983	7	0.162	7	0.007	0.089	0.095	1.335	0.029	0.008
1909	M201	8in Dia. Duct	Sec 5 - max	0.004	1	0.004	7	0.004	6	-0.223	8	1.361	5	0.977	8	1.297	5	1313.992	4	1.153	4	0.000	0.097	0.093	1.361	0.142	0.000
1910	M201	8in Dia. Duct	Sec 5 - min	0.004	1	-0.004	6	-0.004	5	-1.361	6	0.223	8	-1.297	5	-0.977	8	1103.694	3	0.969	3	0.000	0.097	0.093	1.361	0.120	0.000
1911	M202	8in Dia. Duct	Sec 1 - max	0.004	1	0.004	6	0.004	6	-0.223	8	1.361	6	0.977	8	1.297	5	1313.992	4	1.153	4	0.000	0.097	0.093	1.361	0.142	0.000
1912	M202	8in Dia. Duct	Sec 1 - min	0.004	1	-0.004	6	-0.004	5	-1.361	5	0.223	8	-1.297	5	-0.977	8	1103.694	3	0.969	3	0.000	0.097	0.093	1.361	0.120	0.000
722	M63	6in Dia. Duct	Sec 1 - min	-0.348	7	-0.092	7	-0.237	7	-0.908	7	-1.985	8	-0.063	8	-0.020	5	-219.491	7	-0.184	7	0.044	0.142	0.005	1.985	0.023	0.029
2308	M241	6in Dia. Duct	Sec 4 - min	-0.007	8	-0.028	7	0.043	5	-1.266	5	-0.494	8	-1.304	8	-0.451	5	-471.814	6	-0.395	6	0.001	0.092	0.097	1.354	0.049	0.005
760	M66	6in Dia. Duct	Sec 5 - min	-0.210	6	-0.092	7	-0.036	5	-0.976	7	-2.127	6	-0.151	7	-0.125	6	-11.733	5	-0.010	6	0.027	0.152	0.012	2.127	0.001	0.011
2365	M247	6in Dia. Duct	Sec 3 - max	0.029	5	0.026	6	0.120	8	0.262	5	1.494	6	1.113	7	-0.806	6	1490.159	7	1.247	7	0.004	0.107	0.080	1.494	0.164	0.019
1865	M197	16in Dia. Duct	Sec 3 - min	0.147	6	-0.457	8	-0.014	1	-0.439	7	0.176	8	-1.988	3	1.511	4	-5241.484	4	-1.039	4	0.017	0.031	0.142	1.986	0.128	0.056
1907	M201	8in Dia. Duct	Sec 4 - max	0.003	1	0.003	7	0.003	6	-0.225	6	1.350	5	0.975	8	1.294	5	1313.992	4	1.153	4	0.000	0.097	0.092	1.358	0.142	0.000
1908	M201	8in Dia. Duct	Sec 4 - min	0.003	1	-0.003	5	-0.003	5	-1.358	6	0.225	8	-1.294	5	-0.975	8	1103.694	3	0.969	3	0.000	0.097	0.092	1.358	0.120	0.000
1816	M182	16in Dia. Duct	Sec 4 - min	0.114	1	-0.430	1	-0.042	3	-1.520	2	1.242	1	-0.956	6	0.421	7	-1403.254	4	-0.278	4	0.013	0.109	0.068	1.520	0.034	0.053
2364	M247	6in Dia. Duct	Sec 2 - min	-0.054	8	-0.128	7	-0.013	5	-1.489	6	-0.305	5	0.799	6	-1.068	7	86.544	6	0.072	6	0.007	0.106	0.076	1.489	0.008	0.016
1905	M201	8in Dia. Duct	Sec 3 - max	0.002	1	0.002	7	0.002	6	-0.227	6	1.356	5	0.973	8	1.292	5	1313.992	4	1.153	4	0.000	0.097	0.092	1.356	0.142	0.000
1906	M201	8in Dia. Duct	Sec 3 - min	0.002	1	-0.002	5	-0.002	5	-1.356	5	0.227	8	-1.292	5	-0.973	8	1103.694	3	0.969	3	0.000	0.097	0.092	1.358	0.120	0.000
1875	M198	16in Dia. Duct	Sec 3 - max	0.058	7	-0.536	1	0.006	2	-1.140	6	1.414	7	-0.601	4	1.146	3	-5976.034	2	-1.185	2	0.007	0.101	0.082	1.414	0.146	0.066
753	M60	8in Dia. Duct	Sec 2 - max	0.269	7	0.074	6	0.011	8	1.929	6	0.657	7	0.223	8	0.244	7	15.133	7	0.013	7	0.034	0.138	0.017	1.929	0.002	0.009
759	M60	8in Dia. Duct	Sec 4 - min	-0.209	8	-0.089	7	-0.034	5	-0.862	7	-2.081	8	-0.198	7	-0.167	6	-11.733	6	-0.010	6	0.026	0.149	0.014	2.081	0.001	0.011
2122	M223	3in Dia. Duct	Sec 1 - min	0.123	7	0.093	5	-0.058	2	-2.523	8	2.496	5	-0.956	1	-1.411	2	-36.188	6	-0.155	5	0.014	0.112	0.063	2.523	0.012	0.007
2560	M258	3in Dia. Duct	Sec 5 - min	0.123	7	-0.094	8	-0.036	5	-2.523	8	2.496	5	-0.956	1	-1.411	2	-36.188	5	-0.155	5	0.014	0.112	0.063	2.523	0.012	0.007
1903	M201	8in Dia. Duct	Sec 2 - max	0.001	1	0.001	7	0.001	6	-0.228	6	1.355	6	0.972	8	1.291	5	1313.992	4	1.153	4	0.000	0.097	0.092	1.358	0.142	0.000
1904	M201	6in Dia. Duct	Sec 2 - min	0.001	1	-0.001	5	-0.001	5	-1.365	5	0.228	8	-1.291	5	-0.972	8	1103.694	3	0.969	3	0.000	0.097	0.092	1.355	0.120	0.000
469	M51	8in Dia. Duct	Sec 5 - max	0.000	1	0.042	8	0.073	6	-0.229	8	1.355	5	0.971	8	1.291	5	1313.992	4	1.153	4	0.000	0.097	0.092	1.355	0.142	0.009
490	M51	8in Dia. Duct	Sec 5 - min	0.000	6	-0.104	5	-0.248	7	-1.355	5	0.229	8	-1.201	5	-0.071	8	1103.694	3	0.969	3	0.000	0.097	0.092	1.355	0.120	0.031
1901	M201	8in Dia. Duct	Sec 1 - max	0.000	1	0.000	1	0.000	1	-0.229	8	1.355	5	0.971	8	1.291	5	1313.992	4	1.153	4	0.000	0.097	0.092	1.356	0.142	0.000
1902	M201	8in Dia. Duct	Sec 1 - min	0.000	1	0.000	1	0.000	1	-1.355	5	0.229	8	-1.291	5	-0.971	8	1103.694	3	0.969	3	0.000	0.097	0.092	1.356	0.120	0.000
300	M40	8in Dia. Duct	Sec 5 - min	0.064	6	-0.219	5	-0.136	6	-1.497	5	1.015	8	-1.034	6	0.453	7	472.982	5	0.396	5	0.008	0.107	0.074	1.497	0.049	0.027
1676	M196	16in Dia. Duct	Sec 3 - min	0.053	6	-0.550	2	-0.008	1	-1.414	7	1.140	6	-1.148	3	0.601	4	-6450.135	1	-1.278	1	0.000	0.101	0.082	1.414	0.158	0.008
2310	M241	6in Dia. Duct	Sec 5 - min	-0.007	8	-0.029	7	0.043	5	-1.292	5	-0.500	8	-1.334	8	-0.471	5	-471.814	6	-0.395	6	0.001	0.092	0.096	1.334	0.049	0.009
1355	M146	6in Dia. Duct	Sec 3 - max	-0.054	6	0.031	1	-0.267	2	0.149	5	0.416	8	2.125	8	-0.527	5	224.697	8	0.168	8	0.007	0.030	0.152	2.125	0.023	0.033
756	M66	6in Dia. Duct	Sec 3 - min	-0.208	6	-0.066	7	-0.032	5	-0.730	7	-2.030	8	-0.234	7	-0.208	6	-11.733	6	-0.010	6	0.020	0.145	0.017	2.030	0.001	0.011
2318	M242	6in Dia. Duct	Sec 4 - min	-0.010	8	0.004	8	0.041	5	-1.245	5	-0.506	8	-1.366	8	-0.404	5	-452.030	6	-0.378	8	0.001	0.089	0.098	1.368	0.047	0.005
2023	M213	3in Dia. Duct	Sec 2 - max	0.233	7	-0.045	8	0.146	7	0.009	8	-0.060	5	-3.189	2	3.526	1	-9.047	1	-0.039	1	0.027	0.004	0.157	3.525	0.003	0.011
731	M84	6in Dia. Duct	Sec 1 - max	0.267	7	0.032	6	0.118	8	1.985	6	0.908	7	0.125	6	0.161	7	219.491	7	0.164	7	0.034	0.142	0.012	1.985	0.023	0.015
331	M36	5in Dia. Duct	Sec 1 - max	0.193	6	0.091	6	0.045	6	-0.204	7	0.535	6	1.004	5	1.463	8	650.492	7	0.647	7	0.028	0.042	0.116	1.463	0.117	0.013
2569	M267	16in Dia. Duct	Sec 6 - max	0.002	6	-0.011	1	0.008	1	-1.578	6	1.961	7	-0.103	4	0.051	3	-6235.746	2	-1.236	2	0.000	0.140	0.047	1.961	0.153	0.001
2570	M267	16in Dia. Duct	Sec 6 - min	-0.002	5	-0.011	1	-0.008	2	-1.961	7	1.678	6	-0.651	3	0.103	4	-6812.210	1	-1.350	1	0.000	0.140	0.047	1.961	0.167	0.001
2383	M247	6in Dia. Duct	Sec 2 - max	0.030	5	0.026	6	0.120	8	0.305	5	1.489	8	1.066	7	-0.799	6	1490.159	7	1.247	7	0.004	0.106	0.076	1.489	0.154	0.015
2567	M267	16in Dia. Duct	Sec 4 - max	0.002	6	-0.006	1	0.006	1	-1.673	6	1.956	7	-0.103	4	0.051	3	-6235.746	2	-1.236	2	0.000	0.140	0.047	1.956	0.153	0.001
2568	M267	16in Dia. Duct	Sec 4 - min	-0.002	6	-0.006	1	-0.006	2	-1.956	7	1.673	6	-0.651	3	0.103	4	-6812.210	1	-1.350	1	0.000	0.140	0.047	1.956	0.167	0.001
707	M61	6in Dia. Duct	Sec 4 - max	0.295	6	0.080	6	0.265	7	1.607	6	0.497	7	0.397	6	0.478	7	109.312	7	0.091	7	0.037	0.115	0.034	1.607	0.011	0.033
2025	M213	3in Dia. Duct	Sec 3 - max	0.233	7	-0.046	8	0.146	7	0.064	6	-0.056	5	-3.145	2	3.517	1	-9.047	1	-0.039	1	0.027	0.003	0.166	3.517	0.003	0.011
2565	M267	16in Dia. Duct	Sec 3 - max	0.001	6	-0.006	1	0.004	1	-1.669	6	1.952	7	-0.103	4	0.651	3	-6235.746	2	-1.236	2	0.000	0.139	0.047	1.952	0.153	0.001
2566	M267	16in Dia. Duct	Sec 3 - min	-0.001	5	-0.006	1	-0.004	2	-1.052	7	1.608	6	-0.651	3	0.103	4	-6812.210	1	-1.350	1	0.000	0.139	0.047	1.952	0.167	0.001
1105	M121	6in Dia. Duct	Sec 3 - max	0.147	6	-0.131	7	0.008	7	-1.121	6	1.607	5	-0.137	7	0.736	6	1087.171	8	0.918	8	0.019	0.116	0.063	1.607	0.113	0.018
716	M82	6in Dia. Duct	Sec 3 - min	-0.184	6	-0.042	7	-0.144	6	-0.437	7	-1.405	6	-0.782	7	-0.639	6	-109.312	7	-0.091	7	0.023	0.107	0.056	1.495	0.011	0.018
2392	M247	6in Dia. Duct	Sec 1 - min	-0.054	8	-0.125	7	-0.013	5	-1.463	8	-0.347	5	0.793	6	-1.024	7	86.544	6	0.072	6	0.007	0.106	0.073	1.483	0.009	0.015
1881	M199	16in Dia. Duct	Sec 1 - max	0.000	6	0.004	2	0.003	2	-1.568	6	1.951	7	-0.103	4	0.651	3	-6235.746	2	-1.236	2	0.000	0.139	0.047	1.961	0.163	0.000
1882	M199	16in Dia. Duct	Sec 1 - min	0.000	8	0.004	5	-0.003	1	-1.951	7	1.668	6	-0.651	3	0.103	4	-6812.210	1	-1.350	1	0.000	0.139	0.047	1.951	0.167	0.000
1108	M121	6in Dia. Duct	Sec 4 - min	0.085	8	-0.188	6	-0.138	6	-1.663	5	1.177	8	-0.788	6	0.122	7	557.911	5	0.467	5	0.011	0.119	0.056	1.663	0.058	0.021
1883	M199	16in Dia. Duct	Sec 2 - max	0.000	5	0.003	2	0.002	2	-1.687	8	1.950	7	-0.103	4	0.651	3	-6235.746	2	-1.236	2	0.000	0.139	0.047	1.950	0.153	0.000
1884	M199	16in Dia. Duct	Sec 2 - min	0.000	8	0.003	5	-0.002	1	-1.950	7	1.687	6	-0.651	3	0.103	4	-6812.210	1	-1.350	1	0.000	0.139	0.047	1.950	0.167	0.000
1885	M199	16in Dia. Duct	Sec 3 - max	0.000	5	0.002	2	0.001	2	-1.667	8	1.950	7	-0.103	4	0.651	3	-6235.746	2	-1.236	2	0.000	0.139	0.047	1.950	0.153	0.000
1886	M199	16in Dia. Duct	Sec 3 - min	0.000	8	0.002	5	-0.001	1	-1.950	7	1.667	6	-0.651	3	0.103	4	-6812.210	1	-1.350	1	0.000	0.139	0.047	1.950	0.167	0.000
1887	M199	16in Dia. Duct	Sec 4 - max	0.000	5	0.000	2	0.000	2	-1.666	6	1.950	7	-0.103	4	0.651	3	-6235.746	2	-1.236	2	0.000	0.139	0.047	1.950	0.153	0.000
1888	M199	16in Dia. Duct	Sec 4 - min	0.000	8	0.000	5	0.000	1	-1.950	7	1.666	6	-0.651	3	0.103	4	-6812.210	1	-1.350	1	0.000	0.139	0.047	1.950	0.167	0.000
1889	M199	16in Dia. Duct	Sec 5 - max	0.000	1	0.000	1	0.000	1	-1.660	6	1.950	7	-0.103	4	0.651	3	-6236.746	2	-1.236	2	0.000	0.139	0.047	1.950	0.153	0.000
1890	M199	16in Dia. Duct	Sec 5 - min	0.000	1	0.000	1	0.000	1	-1.950	7	1.660	8	-0.661	3	0.103	4	-6812.210	1	-1.350	1	0.000	0.139	0.047	1.950	0.167	0.000
2561	M267	16in Dia. Duct	Sec 1 - max	0.000	1	0.000	1	0.000	1	-1.666	6	1.950	7	-0.103	4	0.651	3	-6235.746	2	-1.236	2	0.000	0.139	0.047	1.950	0.153	0.000
2562	M267	16in Dia. Duct	Sec 1 - min	0.000	1	0.000	1	0.000	1	-1.950	7	1.666	5	-0.651	3	0.103	4	-6812.210	1	-1.350	1	0.000	0.139	0.047	1.950	0.167	0.000
2563	M267	16in Dia. Duct	Sec 2 - max	0.000	6	-0.003	1	0.002	1	-1.887	6	1.950	7	-0.103	4	0.851	3	-6235.746	2	-1.236	2	0.000	0.139	0.047	1.960	0.153	0.000
2564	M267	16in Dia. Duct	Sec 2 - min	0.000	5	-0.003	1	-0.002	2	-1.950	7	1.887	6	-0.651	3	0.103	4	-6812.210	1	-1.350	1	0.000	0.139	0.047	1.950	0.167	0.000
1366	M147	6in Dia. Duct	Sec 4 - min	-0.342	1	-0.103	5	-0.290	6	0.022	6	-0.214	5	0.077	6	-1.779	6	107.085	5	0.090	6	0.043	0.015	0.127	1.779	0.011	0.036
979	M108	6in Dia. Duct	Sec 5 - max	0.038	6	0.038	8	0.038	6	-1.190	8	1.334	5	-1.024	8	1.192	5	-39.368	5	-0.033	6	0.005	0.095	0.085	1.334	0.004	0.005
980	M108	6in Dia. Duct	Sec 5 - min	0.036	2	-0.036	6	-0.038	7	-1.334	6	1.198	8	-1.192	5	1.024	8	-591.099	8	-0.495	8	0.005	0.095	0.085	1.334	0.061	0.005
741	M65	6in Dia. Duct	Sec 1 - max	0.314	6	0.077	8	0.015	6	1.625	6	0.509	7	0.183	5	0.207	8	11.733	6	0.010	6	0.040	0.150	0.015	1.625	0.001	0.010
971	M108	6in Dia. Duct	Sec 1 - max	0.035	5	0.035	5	0.036	6	-1.163	8	1.350	7	-1.040	7	1.175	6	-39.368	5	-0.033	5	0.004	0.096	0.084	1.350	0.004	0.004
972	M108	6in Dia. Duct	Sec 1 - min	0.035	2	-0.035	8	-0.035	7	-1.350	7	1.163	6	-1.175	6	1.040	7	-591.099	8	-0.495	8	0.004	0.096	0.084	1.350	0.061	0.004
2027	M213	3in Dia. Duct	Sec 4 - max	0.233	7	-0.047	8	0.146	7	0.039	8	-0.030	5	-3.100	2	3.503	1	-9.047	1	-0.039	1	0.027	0.002	0.156	3.508	0.003	0.011
2320	M242	6in Dia. Duct	Sec 5 - min	-0.011	8	0.003	8	0.040	5	-1.231	5	-0.600	8	-1.335	8	-0.423	5	-452.030	6	-0.378	6	0.001	0.088	0.098	1.335	0.047	0.005
697	M80	8in Dia. Duct	Sec 4 - max	0.209	6	0.005	7	0.057	8	0.605	7	0.697	8	1.333	6	1.525	7	0.000	1	0.000	1	0.025	0.050	0.109	1.525	0.000	0.007
525	M56	8in Dia. Duct	Sec 3 - max	0.011	8	0.037	5	0.231	6	0.878	3	-0.380	4	1.677	8	-0.162	5	1028.609	7	0.903	7	0.001	0.083	0.120	1.677	0.111	0.029
526	M55	8in Dia. Duct	Sec 3 - min	-0.011	5	-0.046	8	0.194	7	0.380	4	-0.876	3	0.162	5	-1.677	8	956.930	6	0.640	6	0.001	0.063	0.120	1.677	0.104	0.024
829	M93	5in Dia. Duct	Sec 5 - max	0.124	6	0.060	2	0.325	8	-0.212	6	0.742	7	1.107	5	1.342	8	606.772	7	0.866	7	0.018	0.059	0.107	1.342	0.120	0.045
72	M8	6in Dia. Duct	Sec 1 - min	-0.359	1	-0.128	1	-0.199	8	0.218	5	-0.239	8	0.000	5	-1.695	8	93.143	7	0.070	7	0.046	0.017	0.121	1.695	0.009	0.025
717	M62	6in Dia. Duct	Sec 4 - max	0.260	7	0.080	6	0.191	7	1.607	6	0.497	7	0.439	6	0.518	7	371.703	6	0.311	6	0.032	0.115	0.037	1.607	0.036	0.024
2028	M213	3in Dia. Duct	Sec 5 - max	0.233	7	-0.047	8	0.147	7	0.013	6	-0.005	5	-3.066	2	3.409	1	-9.047	1	-0.039	1	0.027	0.001	0.156	3.499	0.003	0.011
1729	M163	4in Dia. Duct	Sec 5 - max	0.188	5	0.999	5	-0.027	8	-2.235	7	2.691	6	0.140	8	0.622	5	764.901	7	1.663	7	0.016	0.129	0.037	2.891	0.129	0.077
2351	M247	6in Dia. Duct	Sec 1 - max	0.030	5	0.026	6	0.119	8	0.347	5	1.483	8	1.024	7	-0.793	6	1490.159	7	1.247	7	0.004	0.106	0.073	1.483	0.164	0.015
698	M80	8in Dia. Duct	Sec 4 - min	-0.200	5	-0.065	6	-0.067	7	-0.697	8	-0.605	7	-1.525	7	-1.333	6	0.000	1	0.000	1	0.024	0.050	0.109	1.525	0.000	0.008
2321	M243	8in Dia. Duct	Sec 1 - max	0.046	5	0.071	5	0.066	8	0.508	8	1.231	5	0.238	5	1.246	8	351.523	7	0.294	7	0.006	0.088	0.089	1.246	0.039	0.009

D-2260

	Member	Duct Size	Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_a	f_{by}/σ_b	f_{bz}/σ_b	f_t (ksi)	f_v/σ_v	f_t/σ_t
721	M83	6in Dia. Duct	Sec 1 - max	0.286	6	0.032	6	0.168	6	1.986	6	0.928	7	0.020	5	0.063	8	457.131	6	0.303	6	0.035	0.142	0.005	1.685	0.047	0.023
751	M88	6in Dia. Duct	Sec 1 - max	0.269	7	0.077	6	0.010	6	1.925	6	0.589	7	0.236	6	0.252	7	15.133	7	0.013	7	0.034	0.130	0.018	1.625	0.002	0.010
710	M81	6in Dia. Duct	Sec 5 - min	-0.354	7	-0.047	7	-0.224	6	-0.560	7	-1.715	6	-0.207	6	-0.193	5	-371.703	5	-0.311	5	0.045	0.123	0.018	1.715	0.035	0.026
1357	M146	6in Dia. Duct	Sec 4 - max	-0.054	6	0.031	1	-0.207	2	0.184	5	0.420	6	2.031	6	-0.409	5	224.697	6	0.168	6	0.007	0.030	0.145	2.031	0.022	0.032
1515	M192	16in Dia. Duct	Sec 3 - max	0.159	2	-0.363	3	0.039	4	-1.017	1	1.316	2	-0.404	7	0.978	6	-437.069	3	0.018	3	0.018	0.094	0.069	1.316	0.011	0.047
493	M52	6in Dia. Duct	Sec 2 - max	-0.054	1	0.047	6	0.033	5	-0.329	6	1.255	5	0.071	6	1.101	5	1313.992	4	1.153	4	0.007	0.090	0.065	1.255	0.142	0.007
494	M52	6in Dia. Duct	Sec 2 - min	-0.054	6	-0.047	7	-0.053	4	-1.255	5	0.329	6	-1.191	5	-0.871	8	1103.694	3	0.969	3	0.007	0.090	0.065	1.255	0.120	0.007
1728	M183	4in Dia. Duct	Sec 4 - min	0.028	6	0.102	8	-0.059	5	-3.216	6	2.325	7	-0.800	5	-0.150	6	305.086	6	0.674	6	0.003	0.143	0.036	3.215	0.052	0.006
1119	M122	6in Dia. Duct	Sec 5 - max	0.168	5	0.017	6	0.041	7	-1.304	6	1.694	5	0.534	7	0.120	6	1123.552	8	0.940	8	0.021	0.121	0.039	1.694	0.118	0.005
754	M66	6in Dia. Duct	Sec 2 - min	-0.199	6	-0.051	7	-0.015	5	-0.657	7	-1.929	6	-0.244	7	-0.223	6	-11.733	0	-0.010	6	0.025	0.138	0.017	1.929	0.001	0.006
973	M108	6in Dia. Duct	Sec 2 - max	0.035	5	0.035	6	0.035	6	-1.219	6	1.316	7	-1.022	7	1.144	6	-39.368	5	-0.033	5	0.004	0.094	0.062	1.316	0.004	0.004
974	M108	6in Dia. Duct	Sec 2 - min	0.035	2	-0.035	8	-0.035	7	-1.319	7	1.219	6	-1.144	6	1.072	7	-591.099	5	-0.495	8	0.004	0.094	0.062	1.316	0.061	0.004
363	M41	6in Dia. Duct	Sec 2 - max	0.116	5	-0.149	8	0.098	6	1.412	7	-1.068	8	-0.522	6	0.905	7	859.916	5	0.720	6	0.015	0.101	0.065	1.412	0.089	0.018
827	M93	6in Dia. Duct	Sec 4 - max	0.124	5	0.061	2	0.328	6	-0.229	6	0.759	7	1.017	5	1.281	8	666.772	7	0.668	7	0.016	0.060	0.102	1.291	0.120	0.045
977	M109	6in Dia. Duct	Sec 4 - max	0.037	5	0.037	6	0.037	8	-1.233	6	1.299	5	-1.058	8	1.157	5	-39.368	5	-0.033	5	0.005	0.093	0.063	1.299	0.064	0.005
976	M109	6in Dia. Duct	Sec 4 - min	0.037	2	-0.037	9	-0.037	7	-1.299	5	1.233	6	-1.157	5	1.058	8	-591.099	8	-0.495	8	0.005	0.093	0.063	1.299	0.061	0.005
939	M104	6in Dia. Duct	Sec 5 - max	0.019	6	-0.050	5	0.025	6	-0.714	7	1.135	6	1.348	6	-0.101	5	826.314	7	0.692	7	0.002	0.081	0.058	1.348	0.085	0.006
1117	M122	6in Dia. Duct	Sec 4 - max	0.167	5	0.017	5	0.041	7	-1.286	8	1.700	5	0.519	7	0.057	6	1123.552	8	0.940	8	0.021	0.121	0.037	1.700	0.116	0.006
1118	M122	6in Dia. Duct	Sec 3 - max	0.167	5	0.017	5	0.040	7	-1.269	8	1.707	5	0.504	7	0.034	6	1123.552	8	0.940	8	0.021	0.122	0.036	1.707	0.116	0.005
937	M104	6in Dia. Duct	Sec 4 - max	0.019	6	-0.049	6	0.020	6	-0.685	7	1.111	6	1.361	6	-0.166	5	826.314	7	0.692	7	0.002	0.079	0.057	1.361	0.085	0.006
732	M84	6in Dia. Duct	Sec 1 - min	-0.202	6	-0.092	7	-0.171	7	-0.900	7	-1.985	5	-0.161	7	-0.125	5	-457.131	6	-0.383	6	0.026	0.142	0.012	1.985	0.047	0.021
2291	M240	6in Dia. Duct	Sec 1 - max	0.056	5	0.020	6	0.059	7	0.446	6	1.174	5	0.362	5	1.229	8	-42.065	5	-0.035	5	0.007	0.064	0.088	1.229	0.004	0.007
830	M83	6in Dia. Duct	Sec 5 - min	-0.090	5	0.060	5	-0.222	7	-0.742	7	0.213	6	-1.342	0	-1.107	5	378.109	6	0.492	6	0.012	0.058	0.107	1.342	0.058	0.031
859	M86	6in Dia. Duct	Sec 5 - max	0.011	5	0.053	5	-0.129	6	1.079	5	-0.840	7	-0.353	5	1.401	8	-687.343	6	-0.575	6	0.001	0.077	0.109	1.401	0.071	0.016
860	M86	6in Dia. Duct	Sec 5 - min	-0.011	6	0.050	8	-0.257	7	0.646	7	-1.079	6	-1.401	8	0.353	5	-992.905	7	-0.831	7	0.001	0.077	0.108	1.401	0.103	0.032
2289	M240	6in Dia. Duct	Sec 2 - max	0.056	5	0.020	5	0.059	8	0.453	8	1.199	5	0.384	5	1.202	8	-42.065	5	-0.035	5	0.007	0.066	0.086	1.202	0.004	0.007
840	M104	6in Dia. Duct	Sec 5 - min	-0.008	5	-0.081	7	-0.026	6	-1.136	6	0.714	7	0.181	5	-1.348	0	534.257	6	0.447	6	0.001	0.081	0.096	1.348	0.055	0.008
935	M104	6in Dia. Duct	Sec 3 - max	0.019	6	-0.048	6	0.027	6	-0.657	7	1.089	6	1.375	6	-0.156	5	826.314	7	0.692	7	0.002	0.076	0.098	1.375	0.085	0.006
2322	M243	6in Dia. Duct	Sec 1 - min	-0.011	6	-0.006	6	0.040	5	-1.231	5	-0.506	6	-1.246	6	-0.238	5	-392.427	6	-0.320	6	0.001	0.086	0.089	1.246	0.040	0.005
1113	M122	6in Dia. Duct	Sec 2 - max	0.166	5	0.017	5	0.040	7	-1.250	8	1.713	5	0.489	7	-0.038	6	1123.552	8	0.940	8	0.021	0.122	0.035	1.713	0.116	0.005
1370	M147	6in Dia. Duct	Sec 5 - min	-0.041	1	-0.103	5	-0.291	6	-0.003	5	-0.195	5	0.021	5	-1.706	8	107.085	5	0.090	5	0.043	0.013	0.122	1.706	0.011	0.036
1109	M121	6in Dia. Duct	Sec 2 - max	0.147	6	-0.130	7	-0.039	7	-1.045	8	1.550	5	-0.151	7	0.094	6	1097.171	8	0.918	8	0.019	0.111	0.049	1.550	0.113	-0.016
1681	M197	16in Dia. Duct	Sec 1 - max	0.159	7	-0.438	5	0.017	2	0.261	5	0.002	7	-1.511	4	1.988	3	-4550.766	3	-0.902	3	0.016	0.019	0.142	1.988	0.111	0.054
1106	M121	6in Dia. Duct	Sec 3 - min	0.085	6	-0.167	5	-0.138	6	-1.507	5	1.121	6	-0.730	6	0.137	7	997.911	8	0.467	5	0.011	0.110	0.053	1.507	-0.058	0.021
2323	M243	6in Dia. Duct	Sec 2 - max	0.048	5	0.069	5	0.067	6	0.505	8	1.197	5	0.257	5	1.215	8	351.523	7	0.294	7	0.006	0.086	0.087	1.215	0.036	0.009
2295	M240	6in Dia. Duct	Sec 3 - max	0.055	5	0.021	6	0.060	8	0.461	8	1.223	5	0.406	5	1.173	8	-42.065	5	-0.035	5	0.007	0.067	0.084	1.223	0.004	0.007
384	M41	6in Dia. Duct	Sec 2 - min	0.099	6	-0.236	5	-0.096	7	1.086	6	-1.412	7	-0.905	7	0.522	6	202.160	7	0.169	7	0.013	0.101	0.065	1.412	0.029	-0.009
117	M12	6in Dia. Duct	Sec 4 - max	0.096	6	0.220	8	-0.029	6	1.301	8	0.284	5	0.186	8	0.762	5	238.032	8	0.307	5	0.014	0.103	0.060	1.301	0.042	0.030
332	M36	6in Dia. Duct	Sec 1 - min	-0.131	8	0.091	7	-0.046	7	-0.535	6	0.204	7	-1.483	6	-1.004	8	320.911	6	0.418	6	0.019	0.042	0.116	1.483	0.058	0.013
2297	M240	6in Dia. Duct	Sec 4 - max	0.054	5	0.021	6	0.061	6	0.468	8	1.248	5	0.426	5	1.146	8	-42.065	5	-0.035	5	0.007	0.069	0.082	1.248	0.004	0.005
1111	M122	6in Dia. Duct	Sec 1 - max	0.166	5	0.018	5	0.039	7	-1.233	8	1.720	5	0.474	7	-0.091	6	1123.552	8	0.940	8	0.021	0.123	0.034	1.720	0.116	0.005
938	M104	6in Dia. Duct	Sec 4 - min	-0.008	5	-0.060	7	-0.028	6	-1.111	6	0.665	7	0.188	5	-1.361	8	534.257	8	0.447	8	0.001	0.078	0.097	1.361	0.055	0.007
2526	M263	2in Dia. Duct	Sec 4 - min	0.054	8	-0.216	5	-0.273	5	0.460	8	-1.977	5	0.453	8	-2.493	5	0.000	1	0.000	1	0.012	0.073	0.092	2.493	0.000	0.018
861	M97	6in Dia. Duct	Sec 1 - max	0.003	8	0.051	5	-0.112	6	1.079	5	-0.840	7	-0.353	5	1.401	5	-687.343	5	-0.575	5	0.000	0.077	0.100	1.401	0.071	0.014
862	M97	6in Dia. Duct	Sec 1 - min	-0.003	8	0.017	6	-0.274	7	0.646	7	-1.079	6	-1.401	6	0.353	5	-992.905	7	-0.831	7	0.000	0.077	0.100	1.401	0.103	0.034
2299	M240	6in Dia. Duct	Sec 5 - max	0.054	5	0.022	6	0.061	6	0.478	8	1.273	5	0.450	5	1.116	8	-42.065	5	-0.035	5	0.007	0.091	0.090	1.273	0.004	0.008
933	M104	6in Dia. Duct	Sec 2 - max	0.019	8	-0.047	6	0.027	6	-0.620	7	1.065	6	1.387	6	-0.142	5	826.314	7	0.692	7	0.002	0.076	0.099	1.387	0.085	0.006
938	M104	6in Dia. Duct	Sec 3 - min	-0.008	5	-0.059	7	-0.027	8	-1.088	6	0.657	7	0.155	5	-1.375	8	534.257	6	0.447	6	0.001	0.078	0.098	1.375	0.055	0.007
1562	M197	16in Dia. Duct	Sec 1 - min	0.145	8	-0.454	5	-0.017	1	-0.002	7	-0.231	6	-1.588	3	1.511	4	-5241.484	4	-1.039	4	0.016	0.019	0.142	1.988	0.128	0.056
1361	M147	6in Dia. Duct	Sec 1 - max	-0.100	2	-0.085	8	-0.167	7	0.301	5	-0.099	8	1.998	8	-0.248	5	164.322	8	0.138	8	0.013	0.022	0.143	1.998	0.017	0.021
931	M104	6in Dia. Duct	Sec 1 - max	0.018	8	-0.047	6	0.028	6	-0.602	7	1.043	8	1.400	8	-0.129	5	826.314	7	0.692	7	0.002	0.075	0.100	1.400	0.085	0.006
625	M93	6in Dia. Duct	Sec 3 - max	0.124	5	0.061	2	0.325	6	-0.247	6	0.776	7	0.927	5	1.221	8	666.772	7	0.668	7	0.016	0.062	0.097	1.221	0.120	0.045
976	M109	6in Dia. Duct	Sec 3 - min	0.036	5	0.036	8	0.035	6	-1.247	5	1.285	7	-1.092	8	1.124	5	-39.368	5	-0.033	5	0.005	0.092	0.060	1.285	0.061	0.004
978	M109	6in Dia. Duct	Sec 3 - min	0.036	2	-0.036	9	-0.036	7	-1.285	7	1.247	6	-1.124	5	-1.092	8	-591.099	8	-0.495	8	0.005	0.092	0.060	1.285	0.061	0.004
2222	M233	2in Dia. Duct	Sec 1 - min	0.168	8	0.022	5	0.021	8	-1.002	5	-0.471	6	-2.672	2	-0.160	1	-0.009	6	0.000	8	0.037	0.040	0.099	2.672	0.000	0.001
934	M104	6in Dia. Duct	Sec 2 - min	-0.008	5	-0.056	7	-0.027	8	-1.085	6	0.629	7	0.142	5	-1.367	8	534.257	5	0.447	6	0.001	0.076	0.099	1.387	0.055	0.007
1818	M192	16in Dia. Duct	Sec 3 - min	0.112	1	-0.428	1	-0.044	3	-1.318	2	1.017	1	-0.970	6	0.404	7	-1463.254	4	-0.276	4	0.013	0.034	0.069	1.318	0.034	0.053
2059	M216	3in Dia. Duct	Sec 5 - max	0.000	5	-0.055	5	0.078	3	-0.972	5	0.977	6	2.821	6	-1.333	5	-0.980	8	-0.030	5	0.007	0.043	0.125	2.821	0.000	0.008
2061	M217	3in Dia. Duct	Sec 1 - max	0.000	5	0.061	5	-0.045	4	-0.972	5	0.977	5	2.821	6	-1.333	5	-6.980	8	-0.030	5	0.007	0.043	0.125	2.821	0.000	0.005
952	M104	6in Dia. Duct	Sec 1 - min	-0.086	5	-0.057	7	-0.026	6	-1.043	6	0.602	7	0.129	5	-1.400	8	534.257	6	0.447	6	0.001	0.075	0.100	1.400	0.059	0.007
1359	M146	6in Dia. Duct	Sec 5 - max	-0.054	8	0.030	1	-0.208	2	0.158	5	0.423	8	1.938	6	-0.274	5	224.697	6	0.168	8	0.007	0.030	0.138	1.938	0.023	0.033
1663	M197	16in Dia. Duct	Sec 2 - max	0.157	7	-0.441	5	0.016	2	0.043	6	0.220	7	-1.511	4	1.988	3	-4550.766	3	-0.902	3	0.016	0.018	0.142	1.988	0.111	0.054
1960	M205	2in Dia. Duct	Sec 5 - min	0.075	6	-0.251	5	-0.274	7	-1.611	7	0.224	6	-2.469	5	0.592	6	-24.008	5	-0.335	5	0.017	0.067	0.091	2.469	0.021	0.017
829	M93	6in Dia. Duct	Sec 4 - min	-0.090	5	0.061	5	-0.222	7	-0.759	7	0.229	6	-1.261	6	-1.017	5	378.109	6	0.492	6	0.013	0.060	0.102	1.261	0.058	0.031
718	M82	6in Dia. Duct	Sec 4 - min	-0.184	6	-0.045	7	-0.146	8	-0.497	7	-1.607	6	-0.518	7	-0.439	6	-109.312	7	-0.091	7	0.023	0.115	0.037	1.607	0.011	0.018
119	M12	6in Dia. Duct	Sec 4 - min	0.074	8	0.140	5	-0.009	6	-0.286	5	-1.301	6	-0.762	5	-0.195	8	-63.537	7	-0.003	7	0.011	0.103	0.060	1.301	0.011	0.019
709	M81	6in Dia. Duct	Sec 5 - max	0.204	6	0.077	6	0.266	7	1.715	6	0.560	7	0.183	5	0.207	8	109.312	7	0.091	7	0.037	0.123	0.015	1.715	0.011	0.033
2481	M258	6in Dia. Duct	Sec 1 - max	0.112	6	-0.028	6	0.003	6	0.139	7	0.479	6	-0.846	6	1.765	7	-179.120	6	-0.150	6	0.014	0.034	0.125	1.765	0.019	0.004
1864	M197	16in Dia. Duct	Sec 2 - min	0.148	6	-0.458	8	-0.016	1	-0.220	7	-0.043	6	-1.588	3	1.511	4	-5241.484	4	-1.039	4	0.015	0.018	0.142	1.988	0.128	0.056
2479	M258	6in Dia. Duct	Sec 5 - max	0.106	7	-0.049	7	-0.067	6	0.139	7	0.479	6	-0.846	8	1.765	7	-179.120	6	-0.150	6	0.013	0.034	0.125	1.765	0.019	0.008
2324	M243	6in Dia. Duct	Sec 2 - min	-0.011	8	-0.009	8	0.039	5	-1.197	8	-0.505	8	-1.215	6	-0.257	5	-392.427	6	-0.320	6	0.001	0.066	0.087	1.215	0.040	0.005
752	M86	6in Dia. Duct	Sec 1 - min	-0.199	6	-0.047	7	-0.013	5	-0.589	7	-1.925	6	-0.252	7	-0.236	6	-11.733	6	-0.010	6	0.025	0.130	0.018	1.925	0.001	0.006
2325	M243	6in Dia. Duct	Sec 2 - max	0.048	5	0.068	5	0.067	8	0.502	8	1.166	5	0.275	5	1.183	8	351.523	7	0.294	7	0.006	0.083	0.085	1.183	0.036	0.008
1120	M122	6in Dia. Duct	Sec 5 - min	0.112	5	-0.049	8	-0.141	6	-1.694	5	1.304	6	-0.120	6	-0.534	7	592.931	5	0.486	5	0.014	0.121	0.039	1.594	0.051	0.017
823	M93	6in Dia. Duct	Sec 2 - max	0.124	5	0.062	2	0.325	6	-0.264	5	0.794	7	0.937	5	1.160	8	666.772	7	0.668	7	0.016	0.063	0.092	1.160	0.120	0.045
2031	M214	3in Dia. Duct	Sec 1 - max	0.125	5	-0.047	8	0.434	7	0.068	8	-0.059	5	-3.055	2	3.492	1	-5.619	5	-0.024	6	0.019	0.003	0.156	3.492	0.002	0.033
1118	M122	6in Dia. Duct	Sec 4 - min	0.112	8	-0.046	8	-0.140	6	-1.700	5	1.286	8	-0.067	6	-0.519	7	592.931	5	0.486	5	0.014	0.121	0.037	1.700	0.061	0.017
2267	M239	6in Dia. Duct	Sec 4 - max	0.065	5	0.080	5	0.041	5	-0.316	6	1.805	7	0.497	6	0.026	7	0.000	5	0.000	5	0.006	0.129	0.036	1.805	0.000	0.010
2164	M225	2in Dia. Duct	Sec 2 - min	0.054	8	-0.216	5	-0.001	8	-2.662	5	0.041	8	-1.652	5	-0.054	8	-61.838	7	-0.343	7	0.012	0.099	0.061	2.662	0.054	0.014
2238	M234	2in Dia. Duct	Sec 3 - min	0.153	8	-0.263	5	-0.170	7	-2.737	5	0.054	8	-1.002	5	-0.015	6	-0.008	8	0.000	8	0.034	0.101	0.037	2.737	0.000	0.017
719	M82	6in Dia. Duct	Sec 5 - max	0.251	7	0.077	6	0.183	7	1.715	6	0.560	7	0.236	6	0.252	7	371.703	6	0.311	6	0.032	0.123	0.018	1.715	0.036	0.024
1116	M122	6in Dia. Duct	Sec 3 - min	0.111	8	-0.047	8	-0.140	6	-1.707	5	1.268	8	-0.014	6	-0.504	7	592.931	5	0.486	5	0.014	0.122	0.036	1.707	0.061	0.017
2228	M233	2in Dia. Duct	Sec 4 - min	0.180	8	-0.021	8	-0.009	1	0.500	8	-2.090	5	0.561	8	-1.593	7	-0.009	8	0.000	8	0.038	0.077	0.059	2.090	0.000	0.001
826	M93	6in Dia. Duct	Sec 3 - min	-0.090	8	0.061	5	-0.222	7	-0.776	7	0.247	6	-1.221	6	-0.927	5	378.109	6	0.492	6	0.013	0.062	0.097	1.221	0.058	0.031
2292	M240	6in Dia. Duct	Sec 1 - min	0.000	8	-0.056	7	0.047	6	-1.174	5	-0.449	8	-1.229	8	-0.342	5	-457.301	8	-0.550	8	0.000	0.064	0.089	1.229	0.068	0.007

0-2250

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_a	f_b/σ_b	f_v/σ_v	f_t (ksi)	f/f_t	f/σ_t
2284	M240	6in Dia. Duct	Sec 2 - min	0.000	8	-0.056	7	0.047	5	-1.189	5	-0.463	8	-1.202	8	-0.384	5	-657.301	8	-0.550	6	0.000	0.088	0.068	1.202	0.068	0.007
339	M30	5in Dia. Duct	Sec 5 - max	0.199	5	0.066	8	0.033	8	0.860	7	-0.530	8	0.472	5	0.931	8	650.492	7	0.647	7	0.029	0.068	0.074	0.931	0.117	0.009
1114	M122	6in Dia. Duct	Sec 2 - min	0.111	8	-0.046	6	-0.139	8	-1.713	5	1.260	8	0.038	6	-0.489	7	592.931	6	0.496	5	0.014	0.122	0.035	1.713	0.051	0.017
2290	M240	6in Dia. Duct	Sec 3 - min	-0.001	8	-0.057	7	0.046	5	-1.223	6	-0.461	8	-1.173	8	-0.406	5	-657.301	8	-0.550	6	0.000	0.087	0.084	1.223	0.058	0.007
2298	M240	6in Dia. Duct	Sec 4 - min	-0.002	8	-0.058	7	0.046	5	-1.248	5	-0.468	8	-1.145	8	-0.428	5	-657.301	8	-0.550	8	0.000	0.089	0.082	1.248	0.066	0.007
385	M41	6in Dia. Duct	Sec 3 - max	0.118	5	-0.148	6	0.097	6	1.130	7	-0.771	6	-0.373	8	1.054	7	859.916	8	0.720	6	0.015	0.081	0.075	1.130	0.069	0.014
2300	M240	6in Dia. Duct	Sec 5 - min	-0.002	8	-0.059	7	0.045	5	-1.273	5	-0.476	8	-1.110	8	-0.450	5	-657.301	8	-0.550	8	0.000	0.091	0.080	1.273	0.068	0.007
1112	M122	6in Dia. Duct	Sec 1 - min	0.111	8	-0.045	8	-0.139	6	-1.720	5	1.233	8	0.091	6	-0.474	7	592.931	5	0.496	5	0.014	0.123	0.034	1.720	0.061	0.017
1701	M121	6in Dia. Duct	Sec 1 - max	0.147	6	-0.129	7	0.037	7	-1.010	8	1.494	5	-0.165	7	0.632	6	1097.171	8	0.818	8	0.019	0.107	0.045	1.494	0.113	0.016
1104	M121	6in Dia. Duct	Sec 2 - min	0.066	8	-0.166	6	-0.137	8	-1.550	5	1.065	8	-0.684	6	0.151	7	557.911	5	0.487	5	0.011	0.111	0.049	1.550	0.056	0.020
1073	M108	16in Dia. Duct	Sec 2 - max	0.058	7	-0.534	1	0.006	2	-0.078	6	1.147	7	-0.501	4	1.148	3	-6075.034	2	-1.155	2	0.007	0.092	0.092	1.147	0.146	0.056
821	M93	5in Dia. Duct	Sec 1 - max	0.124	6	0.062	2	0.336	8	-0.262	6	0.812	7	0.747	5	1.100	8	666.772	7	0.868	7	0.018	0.064	0.087	1.100	0.120	0.045
1979	M206	3in Dia. Duct	Sec 5 - max	0.187	7	-0.013	7	0.069	7	0.626	6	-0.596	7	2.704	5	-1.014	8	34.434	6	0.147	6	0.022	0.026	0.120	2.704	0.011	0.006
1674	M198	16in Dia. Duct	Sec 2 - min	0.052	6	-0.547	2	-0.008	1	-1.147	7	0.878	0	-1.140	3	0.601	4	-6450.135	1	-1.278	1	0.006	0.082	0.082	1.147	0.158	0.098
1363	M147	6in Dia. Duct	Sec 2 - max	-0.100	2	-0.085	8	-0.187	7	0.272	5	-0.071	6	1.025	8	-0.191	5	104.322	6	0.138	8	0.013	0.019	0.136	1.025	0.017	0.021
2022	M213	3in Dia. Duct	Sec 1 - min	0.048	6	-0.045	5	-0.046	6	0.105	5	-0.113	8	-3.579	7	3.189	6	-9.844	2	-0.042	2	0.005	0.005	0.159	3.579	0.003	0.004
2328	M243	6in Dia. Duct	Sec 3 - min	-0.011	8	-0.007	8	0.039	5	-1.165	5	-0.502	8	-1.183	8	-0.275	5	-382.427	6	-0.320	6	0.001	0.083	0.085	1.183	0.040	0.005
131	M14	6in Dia. Duct	Sec 1 - max	0.028	1	0.028	5	0.028	6	-0.098	8	0.457	7	-1.307	7	1.860	6	-6.000	6	-0.005	8	0.004	0.033	0.133	1.860	0.001	0.003
132	M14	6in Dia. Duct	Sec 1 - min	0.028	1	-0.028	8	-0.028	5	-0.457	7	0.098	6	-1.860	6	1.307	7	-418.045	5	-0.360	5	0.004	0.033	0.133	1.860	0.043	0.003
2327	M243	6in Dia. Duct	Sec 4 - max	0.046	6	0.067	5	0.068	8	0.498	8	1.133	5	0.294	5	1.161	8	351.523	7	0.294	7	0.006	0.081	0.082	1.151	0.036	0.008
2060	M218	3in Dia. Duct	Sec 5 - min	0.001	0	-0.055	6	0.014	4	-0.977	8	0.972	5	-1.333	5	-2.821	8	-7.691	5	-0.033	5	0.000	0.043	0.125	2.821	0.003	0.004
2062	M217	3in Dia. Duct	Sec 1 - min	0.001	8	0.061	5	-0.111	3	-0.977	8	0.972	5	1.333	5	-2.821	8	-7.691	5	-0.033	5	0.000	0.043	0.125	2.821	0.003	0.009
363	M38	6in Dia. Duct	Sec 2 - max	0.011	5	0.045	7	0.087	8	-0.276	6	1.134	7	0.820	5	0.973	8	401.076	7	0.522	7	0.002	0.090	0.077	1.134	0.072	0.012
354	M38	5in Dia. Duct	Sec 2 - min	-0.011	8	0.045	6	-0.094	5	-1.134	7	0.276	5	-0.973	6	-0.829	6	274.123	5	0.357	6	0.002	0.090	0.077	1.134	0.049	0.013
386	M41	6in Dia. Duct	Sec 3 - min	0.101	8	-0.235	5	-0.097	7	0.771	6	-1.130	7	-1.054	7	0.373	6	202.160	7	0.169	7	0.013	0.081	0.075	1.130	0.021	0.028
133	M14	6in Dia. Duct	Sec 2 - max	0.026	1	0.026	5	0.026	0	-0.054	6	0.500	7	-1.351	7	1.810	6	-6.000	8	-0.005	8	0.003	0.036	0.130	1.816	0.001	0.003
134	M14	6in Dia. Duct	Sec 2 - min	0.026	1	-0.026	6	-0.026	5	-0.500	7	0.054	8	-1.816	6	1.351	7	-418.045	5	-0.350	5	0.003	0.036	0.130	1.816	0.043	0.003
135	M14	6in Dia. Duct	Sec 3 - max	0.024	1	0.024	6	0.024	8	-0.013	6	0.542	7	-1.392	7	1.775	8	-6.000	8	-0.005	8	0.003	0.039	0.127	1.775	0.001	0.003
136	M14	6in Dia. Duct	Sec 3 - min	0.024	1	-0.024	8	-0.024	5	-0.542	7	0.013	6	-1.775	6	1.392	7	-418.045	5	-0.350	5	0.003	0.039	0.127	1.775	0.043	0.003
824	M93	5in Dia. Duct	Sec 2 - min	-0.090	8	0.082	5	-0.222	7	-0.794	7	0.264	6	-1.160	8	-0.837	5	376.109	6	0.492	6	0.013	0.063	0.092	1.160	0.066	0.031
137	M14	6in Dia. Duct	Sec 4 - max	0.022	1	0.022	5	0.022	6	0.026	6	0.500	7	-1.431	7	1.737	6	-6.000	8	-0.005	8	0.003	0.041	0.124	1.737	0.001	0.003
138	M14	6in Dia. Duct	Sec 4 - min	0.022	1	-0.022	8	-0.022	5	-0.500	7	-0.025	8	-1.737	6	1.431	7	-418.045	5	-0.350	5	0.003	0.041	0.124	1.737	0.043	0.003
2017	M212	3in Dia. Duct	Sec 4 - max	0.236	7	-0.016	8	-0.049	2	0.825	6	-0.819	7	-1.406	6	2.336	7	-13.162	5	-0.056	5	0.026	0.037	0.104	2.336	0.004	0.004
1813	M192	16in Dia. Duct	Sec 2 - max	0.159	2	-0.370	2	0.041	4	-0.703	1	1.119	2	-0.366	7	0.985	6	-437.068	3	-0.067	3	0.016	0.080	0.070	1.119	0.011	0.047
139	M14	6in Dia. Duct	Sec 5 - max	0.021	1	0.021	5	0.021	6	0.061	8	0.615	7	-1.466	7	1.701	6	-6.000	8	-0.005	8	0.003	0.044	0.122	1.701	0.001	0.003
140	M14	6in Dia. Duct	Sec 5 - min	0.021	1	-0.021	8	-0.021	5	-0.615	7	-0.061	8	-1.701	6	1.466	7	-418.045	5	-0.350	5	0.003	0.044	0.122	1.701	0.043	0.003
81	M9	3in Dia. Duct	Sec 1 - max	0.185	7	-0.371	6	0.969	7	-0.655	7	1.333	6	2.039	5	-0.665	7	34.434	6	0.147	6	0.018	0.059	0.091	2.039	0.011	0.076
1961	M207	3in Dia. Duct	Sec 1 - max	0.185	7	0.051	6	0.041	1	-0.655	7	1.333	6	-0.665	7	2.039	6	34.434	6	0.147	6	0.018	0.059	0.091	2.039	0.011	0.004
1730	M180	4in Dia. Duct	Sec 5 - min	0.028	8	0.101	6	-0.059	5	-2.891	6	2.235	7	-0.022	5	-0.140	8	305.088	6	0.671	6	0.003	0.128	0.037	2.891	0.052	0.008
371	M40	6in Dia. Duct	Sec 1 - max	0.115	5	-0.162	6	0.023	7	1.247	6	-0.492	7	0.509	8	0.895	5	997.775	8	0.835	8	0.015	0.069	0.064	1.247	0.103	0.020
2482	M259	6in Dia. Duct	Sec 1 - min	-0.054	8	-0.092	7	0.019	7	-0.479	6	-0.139	7	-1.765	7	0.846	6	-325.274	7	-0.272	7	0.007	0.034	0.126	1.765	0.034	0.011
1981	M209	3in Dia. Duct	Sec 1 - max	0.153	7	-0.013	7	-0.119	6	0.651	8	-0.608	7	2.704	5	-1.014	8	-27.019	5	-0.115	5	0.018	0.029	0.120	2.704	0.009	0.009
2033	M214	3in Dia. Duct	Sec 2 - max	0.125	6	-0.048	8	0.434	7	0.042	8	-0.033	5	-2.916	2	3.306	1	-5.615	6	-0.024	6	0.016	0.002	0.160	3.386	0.002	0.033
2119	M222	3in Dia. Duct	Sec 5 - max	0.209	8	-0.058	9	-0.043	8	-1.594	8	1.615	6	0.077	7	1.588	8	-14.328	8	-0.061	8	0.024	0.072	0.071	1.615	0.005	0.004
2551	M266	3in Dia. Duct	Sec 1 - max	0.209	8	0.082	5	0.048	1	-1.594	8	1.615	5	0.077	7	1.588	6	-14.328	8	-0.061	8	0.024	0.072	0.071	1.615	0.006	0.008
2288	M239	8in Dia. Duct	Sec 4 - min	0.017	8	0.037	8	-0.014	8	-1.805	7	0.315	6	-0.026	7	-0.497	6	-787.950	8	-0.660	8	0.002	0.129	0.036	1.805	0.081	0.005
2020	M212	3in Dia. Duct	Sec 5 - min	0.033	6	-0.045	5	-0.091	1	0.007	5	-0.073	8	-3.579	7	3.189	6	-14.055	8	-0.060	8	0.004	0.003	0.159	3.579	0.005	0.007
2024	M213	3in Dia. Duct	Sec 2 - min	0.048	6	-0.045	6	-0.047	8	0.080	5	-0.089	8	-3.525	1	3.109	2	-9.844	2	-0.042	2	0.005	0.004	0.157	3.525	0.003	0.004
2201	M231	2in Dia. Duct	Sec 1 - max	0.199	5	-0.088	8	0.056	1	-0.041	6	0.809	7	-0.692	8	2.469	5	-10.064	0	-0.137	5	0.044	0.030	0.091	2.469	0.009	0.006
1232	M134	8in Dia. Duct	Sec 1 - min	-0.047	6	0.007	8	-0.047	5	0.297	7	-0.952	8	-1.286	8	0.164	5	960.974	6	0.843	6	0.006	0.056	0.092	1.286	0.104	0.006
822	M93	5in Dia. Duct	Sec 1 - min	-0.090	8	0.062	5	-0.222	7	-0.612	7	0.282	6	-1.100	8	-0.747	5	378.109	6	0.492	6	0.013	0.064	0.087	1.100	0.068	0.031
1234	M134	8in Dia. Duct	Sec 2 - min	-0.047	6	0.007	6	-0.048	6	0.320	7	-0.954	6	-1.273	8	0.197	5	960.974	6	0.843	6	0.006	0.066	0.091	1.273	0.104	0.006
2328	M243	6in Dia. Duct	Sec 4 - min	-0.011	8	-0.008	8	0.038	6	-1.133	6	-0.498	8	-1.151	8	-0.294	5	-382.427	6	-0.320	6	0.001	0.081	0.082	1.151	0.040	0.005
495	M52	8in Dia. Duct	Sec 3 - max	-0.051	1	0.043	6	0.053	3	-0.443	8	1.140	5	0.757	8	1.078	5	1313.992	4	1.153	4	0.006	0.081	0.077	1.140	0.142	0.007
496	M52	8in Dia. Duct	Sec 3 - min	-0.051	6	-0.043	7	-0.053	4	-1.140	5	0.443	8	-1.078	5	-0.757	8	1103.694	3	0.969	3	0.006	0.081	0.077	1.140	0.120	0.007
2329	M243	6in Dia. Duct	Sec 5 - max	0.046	6	0.066	5	0.069	8	0.494	8	1.101	5	0.312	5	1.119	8	351.923	7	0.294	7	0.006	0.079	0.080	1.119	0.036	0.009
2028	M213	3in Dia. Duct	Sec 3 - min	0.045	6	-0.046	5	-0.047	6	0.050	6	-0.064	8	-3.517	1	3.145	2	-9.844	2	-0.042	2	0.005	0.003	0.158	3.517	0.003	0.004
2382	M249	6in Dia. Duct	Sec 1 - min	-0.062	6	-0.011	8	-0.083	8	-0.008	7	-0.785	6	-0.108	5	-1.424	6	345.041	6	0.289	6	0.007	0.056	0.102	1.424	0.036	0.010
2372	M248	6in Dia. Duct	Sec 1 - min	-0.054	6	-0.137	7	-0.016	5	-1.506	8	-0.176	5	0.158	7	-0.698	6	266.455	6	0.223	6	0.007	0.108	0.050	1.506	0.028	0.017
82	M9	3in Dia. Duct	Sec 1 - min	0.122	8	-0.540	7	0.662	6	-1.333	6	0.655	7	0.605	7	-2.039	6	30.864	7	0.132	7	0.014	0.059	0.091	2.039	0.010	0.051
1982	M207	3in Dia. Duct	Sec 1 - min	0.122	6	0.040	7	-0.015	2	-1.333	6	0.655	7	-2.039	8	0.665	7	30.864	7	0.132	7	0.014	0.059	0.091	2.039	0.010	0.003
1236	M134	8in Dia. Duct	Sec 3 - min	-0.048	5	0.007	8	-0.046	3	0.344	7	-0.956	6	-1.260	8	0.209	5	960.974	6	0.843	6	0.006	0.068	0.090	1.260	0.104	0.006
720	M82	6in Dia. Duct	Sec 5 - min	-0.184	6	-0.047	7	-0.148	8	-0.580	7	-1.715	6	-0.252	7	-0.236	6	-109.312	7	-0.091	7	0.023	0.123	0.016	1.715	0.011	0.018
2374	M248	6in Dia. Duct	Sec 2 - min	-0.054	8	-0.138	7	-0.016	5	-1.491	8	-0.126	3	0.201	7	-0.704	6	266.455	8	0.223	6	0.007	0.107	0.050	1.491	0.028	0.017
1238	M134	8in Dia. Duct	Sec 4 - min	-0.046	8	0.007	8	-0.046	3	0.367	7	-0.958	6	-1.248	8	0.222	5	960.974	6	0.843	6	0.006	0.068	0.089	1.248	0.104	0.006
2376	M248	6in Dia. Duct	Sec 3 - min	-0.056	8	-0.139	7	-0.016	5	-1.476	8	-0.075	5	0.247	7	-0.709	6	266.455	6	0.223	6	0.007	0.105	0.051	1.476	0.028	0.017
248	M25	4in Dia. Duct	Sec 3 - min	-0.040	8	0.013	5	-0.078	6	1.154	6	-1.526	7	-0.768	6	-2.055	7	63.888	5	0.119	5	0.004	0.068	0.091	2.055	0.009	0.008
2026	M213	3in Dia. Duct	Sec 4 - min	0.045	6	-0.047	5	-0.047	6	0.030	6	-0.039	8	-3.508	1	3.100	2	-9.844	2	-0.042	2	0.005	0.002	0.156	3.508	0.003	0.004
2032	M214	3in Dia. Duct	Sec 1 - min	0.037	8	-0.047	5	0.030	8	0.059	5	-0.068	8	-3.499	1	3.065	2	-0.221	7	-0.027	7	0.004	0.003	0.156	3.499	0.092	0.004
1102	M121	6in Dia. Duct	Sec 1 - min	0.088	8	-0.166	6	-0.137	6	-1.404	5	1.010	8	-0.032	8	0.165	7	557.911	5	0.467	5	0.011	0.107	0.045	1.494	0.058	0.020
2460	M258	6in Dia. Duct	Sec 5 - min	0.019	8	-0.068	6	-0.185	7	-0.479	6	-0.139	7	-1.765	7	0.846	6	-325.274	7	-0.272	7	0.002	0.034	0.126	1.765	0.034	0.023
1814	M192	16in Dia. Duct	Sec 2 - min	0.110	1	-0.427	1	-0.046	3	-1.119	2	0.793	1	-0.985	6	0.386	7	-1403.254	4	-0.278	4	0.012	0.080	0.070	1.119	0.034	0.033
1231	M134	8in Dia. Duct	Sec 1 - max	-0.022	7	0.085	7	0.047	8	0.952	6	-0.297	7	-0.184	6	1.280	8	1387.337	7	1.218	7	0.003	0.068	0.092	1.285	0.150	0.010
2378	M248	6in Dia. Duct	Sec 4 - min	-0.056	8	-0.140	7	-0.017	5	-1.461	8	-0.024	5	0.292	7	-0.714	8	266.455	6	0.223	6	0.007	0.104	0.051	1.461	0.028	0.017
1386	M147	6in Dia. Duct	Sec 3 - max	-0.100	2	-0.086	8	-0.187	7	0.243	5	-0.047	6	1.652	8	-0.134	5	164.322	8	0.138	8	0.013	0.017	0.132	1.652	0.017	0.021
340	M36	5in Dia. Duct	Sec 5 - min	-0.137	8	0.066	7	-0.033	7	0.530	6	-0.890	7	-0.931	8	-0.472	6	320.911	6	0.418	6	0.020	0.068	0.074	0.931	0.056	0.009
1240	M134	8in Dia. Duct	Sec 5 - min	-0.045	6	0.007	6	-0.046	3	0.389	7	-0.960	6	-1.235	8	0.234	5	960.974	6	0.843	6	0.005	0.069	0.088	1.235	0.104	0.006
245	M25	4in Dia. Duct	Sec 3 - max	-0.030	5	0.070	8	0.078	7	1.520	7	-1.154	8	2.055	7	0.768	8	130.227	8	0.287	8	0.003	0.058	0.091	2.055	0.022	0.006
372	M40	6in Dia. Duct	Sec 1 - min	0.071	6	-0.195	5	-0.122	6	0.492	7	-1.247	8	-0.895	5	-0.509	8	472.862	5	0.396	5	0.009	0.089	0.064	1.247	0.049	0.024
337	M36	5in Dia. Duct	Sec 4 - max	0.198	5	0.072	6	0.038	6	0.625	7	-0.294	0	0.500	5	1.049	8	650.497	7	0.647	7	0.029	0.050	0.083	1.049	0.117	0.010
387	M41	6in Dia. Duct	Sec 4 - max	0.119	5	-0.148	8	0.098	8	0.850	7	-0.453	8	-0.221	6	1.206	7	859.916	6	0.720	6	0.015	0.061	0.086	1.206	0.069	0.018
2380	M248	6in Dia. Duct	Sec 5 - min	-0.058	8	-0.140	7	-0.018	5	-1.446	6	0.028	5	0.338	7	-0.718	6	266.455	8	0.223	6	0.007	0.103	0.051	1.446	0.028	0.017
1233	M134	8in Dia. Duct	Sec 2 - max	-0.021	7	0.084	7	0.046	8	0.954	6	-0.320	7	-0.197	6	1.273	8	1387.337	7	1.218	7	0.003	0.068	0.091	1.273	0.150	0.010
2030	M213	3in Dia. Duct	Sec 5 - min	0.046	6	-0.047	5	-0.046	6	0.005	5	-0.013	8	-3.499	1	3.055	2	-9.844	2	-0.042	2	0.005	0.001	0.156	3.499	0.003	0.004
857	M80	6in Dia. Duct	Sec 4 - max	0.011	5	0.085	5	-0.129	6	1.014	6	-0.803	7	-0.225	6	1.225	8	-687.343	6	-0.576	6	0.001	0.072	0.088	1.225	0.071	0.016

D-2250

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_a	f_{by}/σ_a	f_{bz}/σ_a	f_t (ksi)	f/σ_t	f/σ_a
859	M96	6in Dia. Duct	Sec 4 - min	-0.011	6	-0.052	6	-0.257	7	0.603	7	-1.014	6	-1.225	6	0.225	5	-392.905	7	-0.831	7	0.001	0.072	0.089	1.225	0.103	0.032
2065	M217	3in Dia. Duct	Sec 3 - max	0.072	5	0.000	8	-0.036	5	0.535	5	-0.632	7	-1.308	5	2.602	6	-5.980	8	-0.030	6	0.009	0.028	0.125	2.602	0.002	0.003
1235	M134	6in Dia. Duct	Sec 3 - max	-0.021	7	0.083	7	0.046	4	0.966	6	-0.344	7	-0.209	5	1.260	8	1387.337	7	1.218	7	0.003	0.086	0.090	1.260	0.150	0.010
1897	M208	2in Dia. Duct	Sec 4 - max	0.156	5	-0.084	6	-0.114	6	0.020	6	1.317	7	-0.120	2	2.068	1	-5.895	8	-0.080	8	0.035	0.049	0.077	2.068	0.005	0.007
2035	M214	3in Dia. Duct	Sec 3 - max	0.125	5	-0.046	6	0.434	7	0.016	6	-0.007	5	-2.775	2	3.273	1	-5.815	6	-0.024	4	0.015	0.001	0.145	3.273	0.002	0.033
2337	M244	6in Dia. Duct	Sec 4 - max	0.057	7	0.028	5	0.103	6	0.321	6	0.569	6	1.578	7	-0.051	6	411.135	6	0.344	6	0.007	0.041	0.113	1.578	0.042	0.013
1237	M134	6in Dia. Duct	Sec 4 - max	-0.021	7	0.082	7	0.046	4	0.959	6	-0.367	7	-0.223	5	1.248	8	1387.337	7	1.216	7	0.003	0.086	0.089	1.248	0.150	0.010
2230	M243	6in Dia. Duct	Sec 5 - min	-0.012	6	-0.009	8	0.036	5	-1.101	5	-0.494	8	-1.119	8	-0.312	5	-392.437	6	-0.328	6	0.002	0.079	0.080	1.119	0.040	0.005
2039	M214	3in Dia. Duct	Sec 5 - max	0.125	5	-0.050	8	0.435	7	-0.037	6	0.046	5	-2.221	7	3.226	6	-5.815	6	-0.024	6	0.015	0.002	0.143	3.226	0.002	0.033
388	M41	6in Dia. Duct	Sec 4 - min	0.103	6	-0.240	5	-0.099	7	0.493	6	-0.650	7	-1.290	7	0.221	8	202.160	7	0.169	7	0.013	0.061	0.086	1.205	0.021	0.030
2037	M214	3in Dia. Duct	Sec 4 - max	0.128	6	-0.049	8	0.435	7	-0.010	6	0.020	5	-2.557	7	3.242	5	-5.815	5	-0.024	6	0.015	0.001	0.144	3.242	0.002	0.033
1239	M134	6in Dia. Duct	Sec 5 - max	-0.021	7	0.081	7	0.046	4	0.960	6	-0.369	7	-0.234	5	1.235	8	1387.337	7	1.218	7	0.003	0.089	0.089	1.235	0.150	0.010
2371	M246	6in Dia. Duct	Sec 1 - max	0.009	5	0.082	6	0.121	8	0.176	5	1.506	8	0.690	5	-0.156	7	1651.601	7	1.382	7	0.001	0.106	0.050	1.506	0.171	0.015
523	M55	6in Dia. Duct	Sec 2 - max	0.007	6	0.056	5	0.228	2	0.915	6	-0.256	7	0.088	6	1.291	5	1028.009	7	0.903	7	0.001	0.065	0.092	1.291	0.111	0.028
524	M55	6in Dia. Duct	Sec 2 - min	-0.007	5	-0.025	8	0.197	1	0.250	7	-0.915	6	-1.201	5	-0.056	8	956.930	6	0.840	6	0.001	0.065	0.092	1.291	0.104	0.024
1980	M208	3in Dia. Duct	Sec 5 - min	0.069	6	-0.015	6	0.011	6	0.596	7	-0.628	6	1.014	8	-2.704	5	30.854	7	0.132	7	0.010	0.028	0.120	2.704	0.030	0.001
2391	M249	6in Dia. Duct	Sec 1 - max	-0.004	5	0.128	7	0.110	5	0.755	6	0.009	7	1.424	6	0.106	5	1651.605	7	1.369	7	0.001	0.056	0.102	1.424	0.171	0.016
2373	M246	6in Dia. Duct	Sec 2 - max	0.008	5	0.052	8	0.122	8	0.126	5	1.491	8	0.704	6	-0.201	7	1651.601	7	1.382	7	0.001	0.107	0.050	1.491	0.171	0.015
2389	M249	6in Dia. Duct	Sec 5 - max	0.050	5	0.073	7	0.057	6	0.660	5	1.073	8	1.009	5	0.174	8	0.308	5	0.000	5	0.000	0.077	0.074	1.073	0.000	0.009
2375	M249	6in Dia. Duct	Sec 3 - max	0.008	5	0.052	5	0.123	8	0.075	5	1.476	8	0.709	6	-0.247	7	1651.601	7	1.382	7	0.001	0.105	0.051	1.476	0.171	0.015
2338	M244	6in Dia. Duct	Sec 4 - min	-0.029	6	-0.069	8	0.004	5	-0.569	5	-0.321	5	0.351	6	-1.576	7	-347.366	5	-0.291	5	0.004	0.041	0.113	1.576	0.036	0.009
928	M103	6in Dia. Duct	Sec 6 - max	0.013	6	-0.053	3	0.026	5	-0.602	7	1.043	6	1.132	8	0.077	5	897.442	7	0.751	7	0.002	0.075	0.081	1.132	0.093	0.007
930	M103	6in Dia. Duct	Sec 6 - min	-0.013	7	-0.053	6	-0.026	6	-1.043	6	0.602	7	-0.077	5	-1.132	8	615.192	5	0.515	6	0.002	0.075	0.081	1.132	0.064	0.007
1982	M208	3in Dia. Duct	Sec 1 - min	0.067	6	-0.015	6	-0.223	7	0.505	7	-0.551	6	1.014	8	-2.704	5	-26.024	8	-0.120	8	0.008	0.028	0.120	2.704	0.009	0.017
2034	M214	3in Dia. Duct	Sec 2 - min	0.037	8	-0.048	6	0.030	6	0.033	5	-0.042	8	-1.380	1	2.916	2	-6.221	7	-0.027	7	0.004	0.002	0.150	3.366	0.002	0.004
2167	M227	6in Dia. Duct	Sec 4 - max	0.071	6	0.046	7	0.165	7	0.141	8	-0.088	5	1.526	7	-1.135	6	253.378	8	0.290	6	0.000	0.010	0.138	1.925	0.037	0.020
927	M103	6in Dia. Duct	Sec 4 - max	0.013	6	-0.052	3	0.026	5	-0.590	7	1.031	6	1.138	6	0.083	5	897.442	7	0.751	7	0.002	0.074	0.081	1.138	0.093	0.006
929	M103	6in Dia. Duct	Sec 4 - min	-0.013	7	-0.052	6	-0.026	6	-1.031	6	0.590	7	-0.083	5	-1.138	6	615.192	6	0.515	6	0.002	0.074	0.081	1.138	0.064	0.006
2377	M249	6in Dia. Duct	Sec 4 - max	0.008	5	0.053	6	0.123	8	0.024	5	1.461	8	0.714	6	-0.292	7	1651.601	7	1.382	7	0.001	0.104	0.051	1.461	0.171	0.015
1893	M200	4in Dia. Duct	Sec 2 - max	0.080	5	-0.052	6	0.054	5	0.664	8	0.020	5	1.599	7	0.760	6	130.227	6	0.287	6	0.056	0.030	0.071	1.599	0.022	0.035
925	M103	6in Dia. Duct	Sec 3 - max	0.013	6	-0.052	3	0.026	5	-0.578	7	1.019	6	1.144	8	0.069	5	897.442	7	0.751	7	0.002	0.073	0.082	1.144	0.093	0.006
928	M103	6in Dia. Duct	Sec 3 - min	-0.013	7	-0.052	6	-0.026	6	-1.019	6	0.578	7	-0.069	5	-1.144	6	615.192	6	0.515	6	0.002	0.073	0.082	1.144	0.064	0.006
923	M103	6in Dia. Duct	Sec 2 - max	0.013	6	-0.051	3	0.026	5	-0.560	7	1.007	6	1.150	8	0.095	5	897.442	7	0.751	7	0.002	0.072	0.082	1.150	0.093	0.005
924	M103	6in Dia. Duct	Sec 2 - min	-0.013	7	-0.051	6	-0.026	6	-1.007	6	0.560	7	-0.095	5	-1.150	8	615.192	6	0.515	6	0.002	0.072	0.082	1.150	0.064	0.006
251	M28	4in Dia. Duct	Sec 1 - max	0.052	5	1.062	5	-0.027	8	-2.235	7	2.501	8	0.495	6	-0.053	5	778.135	7	1.712	7	0.006	0.126	0.022	2.831	0.132	0.002
2379	M245	6in Dia. Duct	Sec 5 - max	0.007	5	0.063	6	0.124	8	-0.028	5	1.446	8	0.716	6	-0.338	7	1651.601	7	1.382	7	0.001	0.103	0.051	1.446	0.171	0.015
2331	M244	6in Dia. Duct	Sec 1 - max	0.040	7	0.083	5	0.069	6	0.404	8	1.101	5	0.202	5	1.004	8	411.135	8	0.344	6	0.005	0.079	0.072	1.101	0.042	0.010
921	M103	6in Dia. Duct	Sec 1 - max	0.013	6	-0.051	3	0.025	5	-0.554	7	0.995	6	1.156	8	0.101	5	897.442	7	0.751	7	0.002	0.071	0.083	1.156	0.093	0.005
922	M103	6in Dia. Duct	Sec 1 - min	-0.013	7	-0.051	6	-0.025	6	-0.995	6	0.554	7	-0.101	5	-1.156	8	615.192	6	0.515	6	0.002	0.071	0.083	1.156	0.064	0.005
1811	M192	16in Dia. Duct	Sec 1 - max	0.159	2	-0.375	2	0.043	4	-0.569	1	0.921	2	-0.355	7	1.000	8	-437.069	3	-0.097	3	0.018	0.066	0.071	1.000	0.011	0.046
1367	M147	6in Dia. Duct	Sec 4 - max	-0.100	2	-0.067	8	-0.166	7	0.214	5	-0.022	8	1.779	5	-0.077	5	164.322	5	0.139	8	0.013	0.015	0.127	1.779	0.017	0.020
2168	M227	6in Dia. Duct	Sec 4 - min	0.055	5	0.029	6	0.084	8	0.086	5	-0.141	6	1.185	6	-1.526	7	326.161	7	0.273	7	0.007	0.010	0.138	1.925	0.034	0.010
919	M102	6in Dia. Duct	Sec 5 - max	0.004	8	-0.015	2	0.009	5	-0.554	7	0.995	6	1.156	8	0.101	5	897.442	7	0.751	7	0.001	0.071	0.083	1.156	0.093	0.002
920	M102	6in Dia. Duct	Sec 5 - min	-0.004	5	-0.015	8	-0.009	7	-0.995	6	0.554	7	-0.101	5	-1.156	8	615.192	6	0.515	6	0.001	0.071	0.083	1.156	0.064	0.002
369	M41	6in Dia. Duct	Sec 5 - max	0.121	5	-0.144	5	0.101	6	0.582	6	-0.125	5	-0.056	8	1.361	7	859.816	6	0.720	8	0.015	0.042	0.097	1.361	0.089	0.018
2060	M217	3in Dia. Duct	Sec 3 - min	-0.011	6	0.000	5	-0.119	8	0.632	7	-0.035	6	-2.602	6	1.308	5	-7.691	5	-0.033	5	0.001	0.028	0.125	2.602	0.003	0.009
2225	M233	2in Dia. Duct	Sec 2 - max	0.315	5	0.087	5	0.073	7	0.736	6	-0.231	5	0.661	1	1.518	2	8.083	5	0.110	5	0.070	0.027	0.056	1.518	0.007	0.005
917	M102	6in Dia. Duct	Sec 4 - max	0.004	8	-0.015	2	0.008	5	-0.534	7	0.975	6	1.166	8	0.111	5	897.442	7	0.751	7	0.001	0.070	0.083	1.166	0.093	0.002
918	M102	6in Dia. Duct	Sec 4 - min	-0.004	5	-0.015	8	-0.008	7	-0.975	6	0.534	7	-0.111	5	-1.166	8	615.192	6	0.515	6	0.001	0.070	0.083	1.166	0.064	0.002
336	M36	5in Dia. Duct	Sec 4 - min	-0.138	8	0.072	7	-0.035	7	0.294	6	-0.025	7	-1.048	8	-0.590	5	320.911	5	0.416	6	0.020	0.050	0.083	1.049	0.058	0.010
71	M9	6in Dia. Duct	Sec 1 - max	-0.116	2	-0.112	2	-0.053	5	0.239	8	-0.218	5	1.695	6	0.000	5	139.532	8	0.117	6	0.015	0.017	0.121	1.695	0.014	0.014
915	M102	6in Dia. Duct	Sec 3 - max	0.003	8	-0.013	2	0.006	5	-0.517	7	0.958	6	1.174	8	0.119	5	897.442	7	0.751	7	0.000	0.068	0.084	1.174	0.093	0.002
916	M102	6in Dia. Duct	Sec 3 - min	-0.003	5	-0.013	8	-0.006	7	-0.958	6	0.517	7	-0.119	5	-1.174	8	615.192	6	0.515	6	0.000	0.068	0.084	1.174	0.064	0.002
2120	M222	3in Dia. Duct	Sec 5 - min	0.088	7	-0.060	5	-0.159	8	-1.615	5	1.594	8	-1.588	5	-0.077	7	-36.188	5	-0.155	5	0.010	0.072	0.071	1.615	0.012	0.012
2592	M266	3in Dia. Duct	Sec 1 - min	0.088	7	0.060	8	-0.034	2	-1.615	5	1.594	8	-1.588	6	-0.077	7	-36.188	6	-0.155	5	0.010	0.072	0.071	1.615	0.012	0.012
913	M102	6in Dia. Duct	Sec 2 - max	0.003	6	-0.010	2	0.005	5	-0.504	7	0.945	6	1.181	8	0.120	5	897.442	7	0.751	7	0.000	0.068	0.084	1.181	0.093	0.001
914	M102	6in Dia. Duct	Sec 2 - min	-0.003	5	-0.010	8	-0.005	7	-0.945	6	0.504	7	-0.120	5	-1.181	8	615.192	6	0.515	6	0.000	0.068	0.084	1.181	0.064	0.001
881	M100	6in Dia. Duct	Sec 1 - max	0.002	5	0.010	1	0.005	7	-0.502	7	0.844	6	1.162	8	0.126	5	897.442	7	0.751	7	0.000	0.067	0.084	1.162	0.093	0.001
882	M100	6in Dia. Duct	Sec 1 - min	-0.002	6	0.010	2	-0.005	6	-0.844	6	0.502	7	-0.126	5	-1.162	8	615.192	6	0.515	6	0.000	0.067	0.084	1.162	0.064	0.001
390	M41	6in Dia. Duct	Sec 5 - min	0.104	8	-0.241	5	-0.101	7	0.126	5	-0.582	6	-1.381	7	0.056	6	202.160	7	0.169	7	0.013	0.042	0.097	1.361	0.021	0.030
333	M36	5in Dia. Duct	Sec 2 - max	0.195	5	0.055	6	0.042	6	0.093	7	0.238	6	0.658	5	1.315	6	650.492	7	0.547	7	0.029	0.019	0.104	1.315	0.117	0.012
252	M28	4in Dia. Duct	Sec 1 - min	0.014	8	0.112	8	-0.059	5	-2.691	6	2.235	7	0.663	5	-0.498	6	295.530	6	0.650	6	0.001	0.126	0.022	2.831	0.050	0.009
2332	M244	6in Dia. Duct	Sec 1 - min	-0.012	6	-0.014	8	0.038	5	-1.101	5	-0.404	8	-1.004	8	-0.202	5	-347.366	5	-0.291	5	0.003	0.079	0.072	1.101	0.036	0.006
909	M101	6in Dia. Duct	Sec 5 - max	0.002	6	-0.008	1	0.004	5	-0.493	7	0.934	6	1.187	8	0.131	5	897.442	7	0.751	7	0.000	0.067	0.085	1.187	0.093	0.001
910	M101	6in Dia. Duct	Sec 5 - min	-0.002	5	-0.008	1	-0.004	7	-0.934	6	0.493	7	-0.131	5	-1.187	8	615.192	6	0.515	6	0.000	0.067	0.085	1.187	0.064	0.001
911	M102	6in Dia. Duct	Sec 1 - max	0.002	6	-0.008	2	0.004	5	-0.493	7	0.934	6	1.187	8	0.131	5	897.442	7	0.751	7	0.000	0.067	0.085	1.187	0.093	0.001
912	M102	6in Dia. Duct	Sec 1 - min	-0.002	5	-0.008	8	-0.004	7	-0.934	6	0.493	7	-0.131	5	-1.187	8	615.192	6	0.515	6	0.000	0.067	0.085	1.187	0.064	0.001
809	M91	5in Dia. Duct	Sec 5 - max	0.189	5	0.064	6	0.104	6	0.597	7	-0.431	6	0.924	5	0.956	8	702.447	7	0.914	7	0.029	0.047	0.076	0.956	0.126	0.014
893	M100	6in Dia. Duct	Sec 2 - max	0.002	6	0.007	1	0.004	7	-0.492	7	0.933	6	1.187	8	0.131	5	897.442	7	0.751	7	0.000	0.067	0.085	1.187	0.093	0.001
894	M100	6in Dia. Duct	Sec 2 - min	-0.002	8	0.007	2	-0.004	6	-0.933	6	0.492	7	-0.131	5	-1.187	8	615.192	6	0.515	6	0.000	0.067	0.085	1.187	0.064	0.001
335	M36	5in Dia. Duct	Sec 3 - max	0.196	5	0.078	6	0.039	6	0.360	7	-0.039	6	0.718	5	1.176	6	650.492	7	0.647	7	0.029	0.028	0.093	1.176	0.117	0.011
907	M101	6in Dia. Duct	Sec 4 - max	0.001	8	-0.008	1	0.003	6	-0.487	7	0.928	6	1.190	8	0.134	5	897.442	7	0.751	7	0.000	0.066	0.085	1.190	0.093	0.001
908	M101	6in Dia. Duct	Sec 4 - min	-0.001	6	-0.008	2	-0.003	7	-0.928	6	0.487	7	-0.134	5	-1.190	8	615.192	6	0.515	6	0.000	0.066	0.085	1.190	0.064	0.001
1871	M196	16in Dia. Duct	Sec 1 - max	0.069	7	-0.531	1	0.019	2	-0.617	6	0.882	7	-0.691	4	1.145	3	-3970.034	2	-1.195	2	0.007	0.063	0.082	1.145	0.146	0.046
895	M100	6in Dia. Duct	Sec 3 - max	0.001	5	0.005	1	0.002	7	-0.485	7	0.926	6	1.191	8	0.135	5	897.442	7	0.751	7	0.000	0.066	0.085	1.191	0.093	0.000
896	M100	6in Dia. Duct	Sec 3 - min	-0.001	5	0.005	2	-0.002	5	-0.926	6	0.485	7	-0.135	5	-1.191	8	615.192	6	0.515	6	0.000	0.066	0.085	1.191	0.064	0.001
905	M101	6in Dia. Duct	Sec 3 - max	0.000	6	-0.004	1	0.002	5	-0.483	7	0.924	6	1.192	8	0.136	5	897.442	7	0.751	7	0.000	0.066	0.085	1.192	0.093	0.000
906	M101	6in Dia. Duct	Sec 3 - min	0.000	5	-0.004	1	-0.002	7	-0.924	6	0.483	7	-0.136	5	-1.192	8	615.192	6	0.515	6	0.000	0.066	0.085	1.192	0.064	0.000
897	M100	6in Dia. Duct	Sec 4 - max	0.000	6	0.002	1	0.001	7	-0.481	7	0.922	6	1.193	8	0.137	5	897.442	7	0.751	7	0.000	0.066	0.085	1.193	0.093	0.000
898	M100	6in Dia. Duct	Sec 4 - min	0.000	6	0.002	2	-0.001	6	-0.922	6	0.481	7	-0.137	5	-1.193	8	615.192	6	0.515	6	0.000	0.066	0.085	1.193	0.064	0.000
903	M101	6in Dia. Duct	Sec 2 - max	0.000	6	-0.002	1	0.000	6	-0.480	7	0.921	6	1.193	8	0.138	5	897.442	7	0.751	7	0.000	0.066	0.085	1.193	0.093	0.000
904	M101	6in Dia. Duct	Sec 2 - min	0.000	5	-0.002	1	0.000	7	-0.921	6	0.480	7	-0.138	5	-1.193	8	615.192	6	0.515	6	0.000	0.066	0.085	1.193	0.064	0.000
2230	M238	6in Dia. Duct	Sec 5 - min	0.001	8	0.042	8	-0.030	8	-1.073	8	-0.660	5	-0.174	8	-1.039	5	-767.950	6	-0.660	8	0.000	0.077	0.074	1.073	0.081	0.005
899	M100	6in Dia. Duct	Sec 5 - max	0.000	1	0.000	1	0.000	1	-0.479	7	0.920	6	1.193	8	0.138	5	897.442	7	0.751	7	0.000	0.066	0.085	1.193	0.093	0.000
900	M100	6in Dia. Duct	Sec 5 - min	0.000	1	0.000	1	0.000	1	-0.920	6	0.479	7	-0.138	5	-1.193	8	615.192	6	0.515	6	0.000	0.066	0.085	1.193	0.064	0.000

D-2250

	Member	Duct Size	Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_a	f_{sy}/σ_a	f_{sz}/σ_a	f_t (ksi)	f_t/σ_a	f_j/σ_a
901	M101	6in Dia. Duct	Sec 1 - max	0.000	1	0.000	1	0.000	1	-0.479	7	0.520	6	1.193	8	0.138	5	897.442	7	0.764	7	0.000	0.066	0.065	1.193	0.093	0.000
902	M101	6in Dia. Duct	Sec 1 - min	0.000	1	0.000	1	-0.920	6	0.479	7	-0.138	5	-1.193	6	616.192	6	0.515	6	0.000	0.056	0.065	1.193	0.084	0.000
1072	M190	16in Dia. Duct	Sec 1 - min	0.021	6	-0.549	2	-0.010	1	-0.862	7	0.617	6	-1.140	3	0.601	4	-6450.135	1	-1.278	1	0.006	0.063	0.082	1.146	0.158	0.087
2036	M214	3in Dia. Duct	Sec 3 - min	0.037	8	-0.049	5	0.030	6	0.007	5	-0.018	8	-3.273	1	2.778	2	-6.221	7	-0.027	7	0.004	0.003	0.145	3.273	0.002	0.004
2041	M215	3in Dia. Duct	Sec 1 - max	0.046	1	-0.050	8	0.489	7	-0.015	8	0.023	5	-2.321	7	3.226	8	-6.080	8	-0.030	8	0.005	0.001	0.143	3.226	0.002	0.039
807	M91	5in Dia. Duct	Sec 4 - max	0.199	5	0.065	6	0.104	6	0.509	7	-0.412	6	0.511	5	0.949	8	702.447	7	0.914	7	0.029	0.045	0.075	0.949	0.128	0.014
2040	M214	3in Dia. Duct	Sec 5 - min	0.037	8	-0.050	8	0.029	6	-0.046	5	0.037	8	-3.226	6	2.321	7	-6.221	7	-0.027	7	0.004	0.002	0.143	3.226	0.002	0.004
1812	M192	16in Dia. Duct	Sec 1 - min	0.109	1	-0.426	1	-0.045	3	-0.921	2	0.569	1	-1.000	6	0.366	7	-1403.264	4	-0.274	4	0.012	0.066	0.071	1.000	0.034	0.052
2038	M214	3in Dia. Duct	Sec 4 - min	0.037	8	-0.049	5	0.029	6	-0.020	5	0.010	8	-3.242	6	2.557	7	-6.221	7	-0.027	7	0.004	0.001	0.144	3.242	0.002	0.004
2129	M223	3in Dia. Duct	Sec 5 - max	0.178	5	-0.051	8	0.052	2	-1.528	8	1.656	5	0.927	2	1.297	1	+14.326	6	-0.001	8	0.021	0.074	0.055	1.655	0.005	0.006
2131	M224	3in Dia. Duct	Sec 1 - max	0.178	5	0.056	8	0.043	1	-1.558	8	1.655	5	0.927	2	1.297	1	+14.326	6	-0.001	8	0.021	0.074	0.055	1.655	0.005	0.005
2043	M215	3in Dia. Duct	Sec 2 - max	0.046	1	-0.051	8	0.469	7	-0.075	6	0.063	5	-1.744	7	3.150	6	-6.980	8	-0.030	8	0.005	0.004	0.140	3.150	0.002	0.038
497	M52	6in Dia. Duct	Sec 4 - max	-0.047	1	0.040	8	0.055	3	-0.548	8	1.036	5	0.657	8	0.971	5	1313.692	4	1.193	4	0.006	0.074	0.069	1.036	0.142	0.007
498	M52	6in Dia. Duct	Sec 4 - min	-0.047	6	-0.040	7	-0.053	4	-1.035	5	0.548	8	-0.971	5	-0.657	8	1103.694	3	0.969	3	0.005	0.074	0.069	1.036	0.120	0.007
2046	M215	3in Dia. Duct	Sec 3 - max	0.046	1	-0.052	8	0.490	7	-0.136	8	0.144	5	-1.167	7	3.075	6	-6.980	8	-0.030	8	0.005	0.006	0.137	3.075	0.002	0.038
2047	M215	3in Dia. Duct	Sec 4 - max	0.046	1	-0.054	8	0.490	7	-0.199	8	0.207	5	-0.598	7	3.001	6	-6.980	8	-0.030	8	0.005	0.009	0.133	3.001	0.002	0.038
2181	M229	2in Dia. Duct	Sec 1 - max	0.153	5	-0.041	8	0.045	1	0.871	6	0.021	7	0.972	5	2.203	5	18.334	6	0.126	6	0.034	0.044	0.075	2.203	0.009	0.083
805	M91	5in Dia. Duct	Sec 3 - max	0.199	5	0.005	5	0.104	6	0.561	7	-0.394	6	0.498	5	0.943	6	702.447	7	0.914	7	0.029	0.044	0.076	0.943	0.126	0.014
1269	M147	8in Dia. Duct	Sec 5 - max	-0.100	2	-0.087	8	-0.166	7	0.103	5	0.003	8	1.705	8	-0.021	5	164.322	5	0.138	8	0.013	0.013	0.122	1.706	0.017	0.020
1895	M200	4in Dia. Duct	Sec 3 - max	0.565	5	-0.070	8	0.039	6	-0.998	8	1.674	5	0.425	5	0.034	8	130.227	8	0.287	8	0.054	0.074	0.019	1.674	0.022	0.009
2049	M215	3in Dia. Duct	Sec 5 - max	0.046	1	-0.055	8	0.491	7	-0.263	8	0.271	5	-0.010	7	2.927	6	-6.980	8	-0.030	8	0.005	0.012	0.130	2.927	0.002	0.038
2051	M216	3in Dia. Duct	Sec 1 - max	0.046	1	0.037	5	0.098	8	-0.263	8	0.271	5	-0.010	7	2.927	6	-6.980	8	-0.030	8	0.005	0.012	0.130	2.927	0.002	0.037
2042	M215	3in Dia. Duct	Sec 1 - min	0.046	2	-0.050	5	0.065	8	-0.023	5	0.019	8	-3.220	6	2.921	7	-7.691	5	-0.033	5	0.002	0.001	0.143	3.220	0.003	0.008
803	M91	5in Dia. Duct	Sec 2 - max	0.199	5	0.066	6	0.104	6	0.532	7	-0.379	6	0.485	5	0.937	8	702.447	7	0.914	7	0.029	0.042	0.074	0.937	0.126	0.014
2230	M234	2in Dia. Duct	Sec 2 - max	0.325	5	-0.045	8	-0.049	6	-0.005	5	0.432	8	1.554	2	0.194	1	8.003	5	0.110	5	0.072	0.016	0.059	1.554	0.007	0.003
2225	M233	2in Dia. Duct	Sec 3 - max	0.316	5	0.052	5	0.005	2	1.288	7	-0.745	6	0.738	1	0.140	2	6.003	5	0.110	5	0.071	0.048	0.027	1.288	0.007	0.006
2044	M215	3in Dia. Duct	Sec 2 - min	0.015	2	-0.061	5	0.064	8	-0.003	5	0.075	8	-3.150	8	1.744	7	-7.691	5	-0.033	5	0.002	0.004	0.140	3.150	0.003	0.005
2018	M212	3in Dia. Duct	Sec 4 - min	0.039	5	-0.015	5	-0.073	5	0.810	7	-0.825	6	-2.338	7	1.406	6	-14.055	8	-0.060	8	0.005	0.037	0.104	2.338	0.005	0.006
253	M26	4in Dia. Duct	Sec 2 - max	0.083	6	1.060	5	-0.027	6	-0.011	5	2.690	8	0.484	8	0.028	5	779.135	7	1.712	7	0.005	0.120	0.020	2.690	0.132	0.052
2046	M215	3in Dia. Duct	Sec 3 - min	0.015	2	-0.053	5	0.063	8	-0.144	5	0.138	8	-3.075	6	1.167	7	-7.691	5	-0.033	5	0.002	0.006	0.137	3.075	0.003	0.005
2048	M215	3in Dia. Duct	Sec 4 - min	0.015	2	-0.054	5	0.063	8	-0.207	5	0.109	8	-3.001	6	0.588	7	-7.691	5	-0.033	5	0.002	0.009	0.133	3.001	0.003	0.005
2384	M249	6in Dia. Duct	Sec 2 - min	-0.056	6	-0.015	6	-0.087	6	0.485	7	-0.730	8	0.238	6	-1.165	7	345.041	6	0.269	6	0.007	0.053	0.065	1.165	0.015	0.011
885	M98	6in Dia. Duct	Sec 3 - max	0.012	6	0.087	5	-0.130	8	0.049	6	-0.760	7	-0.096	5	1.049	8	-697.343	6	-0.575	6	0.002	0.068	0.075	1.049	0.071	0.016
886	M98	6in Dia. Duct	Sec 3 - min	-0.012	6	0.054	8	-0.259	7	0.760	7	-0.949	5	+1.049	5	0.096	5	-692.605	7	-0.831	7	0.002	0.068	0.075	1.049	0.103	0.022
2060	M215	3in Dia. Duct	Sec 5 - min	0.015	2	-0.055	5	0.062	8	-0.271	5	0.283	8	-2.927	6	0.010	7	-7.691	5	-0.033	5	0.002	0.012	0.130	2.927	0.003	0.005
2052	M216	3in Dia. Duct	Sec 1 - min	0.015	2	0.037	8	0.000	7	-0.271	5	0.283	8	-2.927	6	0.010	7	-7.691	5	-0.033	5	0.002	0.012	0.130	2.927	0.003	0.003
801	M91	5in Dia. Duct	Sec 1 - max	0.199	5	0.066	8	0.104	6	0.513	7	-0.360	6	0.472	5	0.931	8	702.447	7	0.914	7	0.029	0.041	0.074	0.931	0.126	0.014
2202	M231	2in Dia. Duct	Sec 1 - min	0.191	8	-0.251	5	-0.002	2	-0.809	7	0.041	5	-2.469	5	0.592	6	-64.216	7	-0.875	7	0.022	0.030	0.091	2.469	0.059	0.018
1988	M208	2in Dia. Duct	Sec 4 - min	0.076	8	-0.246	5	-0.271	7	+1.317	7	-0.020	6	-2.088	1	0.126	2	-24.608	6	-0.335	6	0.017	0.049	0.077	2.088	0.021	0.017
334	M38	5in Dia. Duct	Sec 2 - min	-0.133	6	0.085	7	-0.042	7	-0.238	6	-0.093	7	-1.315	6	-0.656	5	320.911	8	0.418	6	0.020	0.018	0.104	1.315	0.058	0.012
810	M91	5in Dia. Duct	Sec 5 - min	-0.136	8	0.064	8	-0.079	7	0.431	6	-0.587	7	-0.956	8	-0.524	5	354.431	6	0.461	6	0.020	0.047	0.076	0.956	0.064	0.011
336	M38	5in Dia. Duct	Sec 3 - min	-0.134	6	0.078	7	-0.039	7	0.039	6	-0.369	7	-1.176	8	-0.716	5	320.911	8	0.418	8	0.020	0.029	0.093	1.176	0.058	0.011
2130	M223	3in Dia. Duct	Sec 5 - min	0.118	8	-0.082	5	-0.057	1	-1.655	5	1.556	8	-1.297	1	-0.927	2	-36.188	6	-0.155	5	0.014	0.074	0.055	1.655	0.012	0.006
2132	M224	3in Dia. Duct	Sec 1 - min	0.118	5	0.051	5	-0.016	2	-1.655	5	1.556	8	-1.297	1	-0.927	2	-36.188	6	-0.155	5	0.014	0.074	0.055	1.655	0.012	0.004
254	M26	4in Dia. Duct	Sec 2 - min	0.013	6	0.110	8	-0.059	6	-2.696	8	0.611	5	-0.028	5	-0.454	6	295.530	6	0.050	6	0.001	0.120	0.020	2.696	0.050	0.006
608	M91	5in Dia. Duct	Sec 4 - min	-0.136	8	0.065	6	-0.080	7	0.412	6	-0.569	7	-0.949	8	-0.511	5	354.431	6	0.461	6	0.020	0.045	0.075	0.949	0.064	0.011
257	M26	4in Dia. Duct	Sec 4 - max	0.054	5	1.055	5	-0.028	8	2.673	6	2.361	6	0.367	8	0.209	5	779.135	7	1.712	7	0.005	0.119	0.018	2.673	0.132	0.051
219	M22	4in Dia. Duct	Sec 5 - max	0.007	7	-0.029	6	0.014	7	-0.976	5	1.040	5	-0.859	8	2.097	5	-74.073	8	-0.164	8	0.001	0.046	0.093	2.097	0.013	0.002
220	M22	4in Dia. Duct	Sec 5 - min	-0.007	6	-0.029	1	-0.014	6	-1.040	5	0.976	8	-2.097	5	0.859	6	-186.824	5	-0.415	5	0.001	0.046	0.093	2.097	0.013	0.002
221	M23	4in Dia. Duct	Sec 1 - max	0.007	5	0.069	5	0.079	8	-0.976	8	1.040	5	-0.859	8	2.097	5	-74.073	8	-0.164	8	0.001	0.046	0.093	2.097	0.013	0.000
222	M23	4in Dia. Duct	Sec 1 - min	-0.007	8	0.048	8	0.003	7	-1.040	5	0.976	8	-2.097	5	0.859	8	-186.824	5	-0.415	5	0.001	0.046	0.093	2.097	0.013	0.004
1977	M208	2in Dia. Duct	Sec 4 - max	0.184	7	0.066	7	0.052	7	0.712	6	-0.650	7	1.048	5	-0.545	8	34.434	6	0.147	6	0.021	0.032	0.087	1.048	0.011	0.004
1999	M210	2in Dia. Duct	Sec 5 - max	0.197	7	-0.064	7	0.089	7	-0.933	7	0.877	6	-0.354	2	1.046	1	-13.162	5	-0.056	5	0.023	0.043	0.073	1.046	0.004	0.003
2001	M211	2in Dia. Duct	Sec 1 - max	0.197	7	0.055	6	0.072	1	-0.933	7	0.877	6	-0.354	2	1.046	1	-13.162	5	-0.056	5	0.023	0.043	0.073	1.046	0.004	0.000
695	M60	6in Dia. Duct	Sec 2 - max	0.213	6	0.027	7	0.066	6	0.519	7	0.349	6	0.946	6	1.074	7	0.000	1	0.000	1	0.020	0.037	0.077	1.074	0.000	0.008
806	M91	5in Dia. Duct	Sec 3 - min	-0.136	8	0.065	8	-0.080	7	0.394	8	-0.551	7	-0.943	8	-0.498	5	354.431	6	0.461	6	0.020	0.044	0.075	0.943	0.064	0.011
696	M60	6in Dia. Duct	Sec 3 - min	-0.206	5	-0.046	8	-0.079	7	-0.349	6	-0.519	7	-1.074	7	-0.946	6	0.000	1	0.000	1	0.023	0.037	0.077	1.074	0.000	0.009
2383	M249	6in Dia. Duct	Sec 2 - max	-0.008	5	0.133	7	0.114	5	0.736	5	-0.488	7	1.186	7	-0.236	6	1859.205	7	1.389	7	0.001	0.053	0.066	1.185	0.171	0.016
1991	M210	2in Dia. Duct	Sec 1 - max	0.192	7	-0.038	7	0.059	7	0.219	8	-0.314	5	-1.223	6	2.367	7	-13.162	5	-0.056	5	0.022	0.010	0.109	2.367	0.004	0.005
804	M91	5in Dia. Duct	Sec 2 - min	-0.136	8	0.060	8	-0.080	7	0.375	5	-0.532	7	-0.937	8	-0.465	5	354.431	6	0.461	6	0.020	0.042	0.074	0.937	0.064	0.011
258	M26	4in Dia. Duct	Sec 4 - min	0.012	6	0.106	6	-0.058	5	-2.301	6	-2.673	5	-0.209	5	-0.387	6	295.530	6	0.050	6	0.001	0.119	0.016	2.673	0.050	0.005
255	M26	4in Dia. Duct	Sec 3 - max	0.053	5	1.057	5	-0.028	8	1.003	6	2.626	6	0.411	6	0.119	5	779.135	7	1.712	7	0.005	0.112	0.018	2.526	0.132	0.051
1010	M111	5in Dia. Duct	Sec 5 - min	-0.037	6	0.038	8	-0.252	7	0.458	5	-0.742	8	-1.084	6	0.250	5	-907.788	7	-0.760	7	0.005	0.053	0.077	1.084	0.094	0.031
802	M91	5in Dia. Duct	Sec 1 - min	-0.136	8	0.066	8	-0.080	7	0.356	5	-0.513	7	-0.931	8	-0.472	5	354.431	6	0.461	6	0.020	0.041	0.074	0.931	0.064	0.011
499	M52	6in Dia. Duct	Sec 5 - max	-0.043	1	0.036	6	0.053	3	-0.644	8	0.540	5	0.550	8	0.876	5	1313.692	4	1.153	4	0.006	0.067	0.063	0.940	0.142	0.007
500	M52	6in Dia. Duct	Sec 5 - min	-0.043	6	-0.036	7	-0.053	4	-0.940	5	0.644	8	-0.876	5	-0.550	8	1103.694	3	0.969	3	0.005	0.067	0.063	0.940	0.120	0.007
377	M40	6in Dia. Duct	Sec 4 - max	0.121	5	-0.100	8	0.034	7	-0.417	6	0.882	7	-0.992	8	0.710	5	997.775	8	0.835	8	0.015	0.059	0.051	0.982	0.103	0.022
2137	M227	3in Dia. Duct	Sec 4 - max	0.212	5	-0.041	5	-0.036	5	-0.085	7	0.693	6	1.582	8	0.233	5	-14.328	8	-0.061	8	0.025	0.040	0.070	1.582	0.005	0.003
1020	M112	5in Dia. Duct	Sec 5 - min	-0.021	6	0.051	8	-0.234	7	0.039	5	-0.942	8	-0.998	8	0.079	5	-904.232	7	-0.607	7	0.003	0.060	0.071	0.998	0.100	0.031
217	M22	4in Dia. Duct	Sec 4 - max	0.006	7	-0.024	8	0.012	7	-0.787	8	0.949	5	-0.904	6	2.051	5	-74.073	8	-0.164	8	0.001	0.042	0.091	2.051	0.013	0.002
216	M22	4in Dia. Duct	Sec 4 - min	-0.006	5	-0.024	1	-0.012	6	-0.949	5	0.787	8	-2.051	5	0.904	6	-186.824	5	-0.415	5	0.001	0.042	0.091	2.051	0.013	0.002
1222	M133	6in Dia. Duct	Sec 1 - min	-0.047	6	-0.051	6	-0.049	5	0.225	7	-0.586	6	-0.579	8	-0.799	5	1134.202	3	0.995	3	0.006	0.070	0.057	0.998	0.123	0.006
1019	M112	5in Dia. Duct	Sec 5 - max	0.006	7	0.093	5	-0.132	6	0.849	6	-0.639	5	-0.078	5	0.998	8	-621.143	6	-0.520	6	0.001	0.050	0.071	0.998	0.054	0.016
1221	M133	6in Dia. Duct	Sec 1 - max	-0.038	7	0.065	7	0.049	8	0.980	6	-0.225	7	0.799	5	0.579	8	1355.624	4	1.190	4	0.006	0.070	0.057	0.998	0.147	0.008
250	M26	4in Dia. Duct	Sec 3 - min	0.012	5	0.100	8	-0.058	5	-2.626	8	-1.003	5	-0.119	5	-0.411	8	295.530	6	0.050	6	0.001	0.112	0.016	2.626	0.050	0.006
1224	M133	6in Dia. Duct	Sec 2 - min	-0.047	8	-0.031	8	-0.048	5	0.243	7	-0.977	6	-0.565	8	-0.785	5	1134.202	3	0.995	3	0.008	0.070	0.058	0.977	0.123	0.006
1009	M111	5in Dia. Duct	Sec 5 - max	-0.007	7	0.093	5	-0.134	8	0.742	8	-0.458	5	-0.250	5	1.084	6	-478.065	6	-0.400	6	0.001	0.053	0.077	1.084	0.049	0.017
1860	M177	16in Dia. Duct	Sec 5 - max	0.124	7	0.074	7	-0.018	3	2.162	6	-1.395	7	0.497	7	0.967	6	-87.054	8	-0.032	8	0.009	0.097	0.025	2.162	0.002	0.073
1039	M118	5in Dia. Duct	Sec 5 - max	0.004	6	-0.015	5	0.008	6	0.210	8	0.639	7	0.719	8	1.004	5	401.076	7	0.522	7	0.001	0.051	0.080	1.004	0.072	0.002
1040	M118	5in Dia. Duct	Sec 5 - min	-0.004	5	-0.015	1	-0.008	8	-0.639	7	-0.219	8	-1.004	5	-0.719	6	274.123	6	0.357	6	0.001	0.051	0.080	1.004	0.049	0.002
1955	M208	2in Dia. Duct	Sec 3 - max	0.158	5	-0.082	8	-0.113	6	0.259	8	0.627	7	0.398	2	1.763	1	-6.898	8	-0.040	8	0.035	0.071	0.065	1.763	0.005	0.007
1223	M133	6in Dia. Duct	Sec 2 - max	-0.037	7	0.064	7	0.048	8	0.977	8	-0.243	7	0.785	5	0.565	8	1355.624	4	1.190	4	0.004	0.070	0.056	0.977	0.147	0.008
1057	M116	5in Dia. Duct	Sec 4 - max	0.003	6	-0.013	5	0.007	6	0.233	8	0.625	7	0.729	8	1.011	5	401.076	7	0.522	7	0.000	0.050	0.080	1.011	0.072	0.002
1058	M116	5in Dia. Duct	Sec 4 - min	-0.003	5	-0.013	1	-0.007	8	-0.625	7	-0.233	8	-1.011	5	-0.729	6	274.123	6	0.357	6	0.000	0.050	0.080	1.011	0.049	0.002
1226	M133	6in Dia. Duct	Sec 3 - min	-0.046	8	-0.030	8	-0.048	5	0.261	7	-0.969	6	-0.592	8	-0.772	5	1134.202	3	0.995	3	0.006	0.069	0.055	0.969	0.123	0.006

D-2250

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_a	f_{by}/σ_b	f_{bz}/σ_b	f_s (ksi)	f_v/v_t	f_t/σ_t
1055	M116	5in Dia. Duct	Sec 3 - max	0.003	6	-0.011	6	0.006	6	0.248	6	0.612	7	0.732	6	1.016	5	401.076	7	0.522	7	0.003	0.049	0.081	1.016	0.072	0.002
1056	M116	5in Dia. Duct	Sec 3 - min	-0.003	5	-0.011	1	-0.006	8	-0.612	7	-0.246	8	-1.016	5	-0.732	8	274.123	6	0.357	6	0.000	0.049	0.081	1.018	0.049	0.002
382	M39	6in Dia. Duct	Sec 1 - min	-0.059	6	0.146	6	-0.039	6	-0.839	7	0.273	8	-0.165	5	-0.872	8	-678.610	7	-0.566	7	0.007	0.060	0.062	0.872	0.070	0.018
651	M68	12in Dia. Duct	Sec 1 - max	0.027	7	1.004	7	-0.016	3	2.182	6	-1.395	7	0.422	7	0.691	6	-211.895	8	-0.089	8	0.002	0.097	0.031	2.182	0.006	0.077
652	M68	12in Dia. Duct	Sec 1 - min	-0.025	6	0.604	6	-0.124	4	1.395	7	-2.162	6	-0.691	6	-0.422	7	-1303.365	5	-0.427	5	0.002	0.097	0.031	2.162	0.033	0.068
1053	M116	5in Dia. Duct	Sec 2 - max	0.002	6	-0.010	5	0.005	6	0.257	6	0.601	7	0.738	6	1.023	5	401.076	7	0.522	7	0.000	0.048	0.081	1.023	0.072	0.001
1054	M116	5in Dia. Duct	Sec 2 - min	-0.002	5	-0.010	1	-0.005	8	-0.601	7	-0.257	6	-1.023	5	-0.738	6	274.123	6	0.357	6	0.000	0.048	0.081	1.023	0.049	0.001
1978	M209	3in Dia. Duct	Sec 4 - min	0.093	6	0.004	6	0.078	6	0.650	7	-0.712	8	0.645	8	-1.948	5	30.864	7	0.132	7	0.011	0.032	0.087	1.948	0.010	0.001
215	M22	4in Dia. Duct	Sec 3 - max	0.005	7	-0.019	8	0.009	7	-0.713	8	0.875	5	-0.941	5	2.014	5	-74.073	8	-0.164	8	0.000	0.039	0.090	2.014	0.013	0.001
216	M22	4in Dia. Duct	Sec 3 - min	-0.005	6	-0.019	1	-0.009	6	-0.875	5	0.713	8	-2.014	5	0.941	8	-186.824	5	-0.415	5	0.000	0.039	0.090	2.014	0.032	0.001
1049	M115	5in Dia. Duct	Sec 6 - max	0.002	6	-0.008	1	0.004	5	0.266	6	0.592	7	0.742	8	1.026	5	401.076	7	0.522	7	0.000	0.047	0.082	1.029	0.072	0.001
1050	M115	5in Dia. Duct	Sec 5 - min	-0.002	5	-0.008	1	-0.004	7	-0.592	7	-0.200	6	-1.028	5	-0.742	8	274.123	6	0.357	8	0.000	0.047	0.082	1.028	0.049	0.001
1051	M116	5in Dia. Duct	Sec 1 - max	0.002	6	-0.006	6	0.004	6	0.266	6	0.592	7	0.742	8	1.028	5	401.076	7	0.522	7	0.000	0.047	0.082	1.028	0.072	0.001
1052	M116	5in Dia. Duct	Sec 1 - min	-0.002	5	-0.006	1	-0.004	8	-0.692	7	-0.266	6	-1.028	5	-0.742	8	274.123	6	0.357	6	0.000	0.047	0.082	1.028	0.049	0.001
1225	M133	6in Dia. Duct	Sec 3 - max	-0.037	7	0.083	7	0.048	8	0.809	6	-0.261	7	0.772	5	0.552	8	1359.824	4	1.190	4	0.004	0.069	0.056	0.960	0.147	0.008
819	M92	5in Dia. Duct	Sec 6 - max	0.176	6	0.062	6	0.232	6	0.194	8	0.164	5	0.747	6	1.100	6	735.306	7	0.957	7	0.028	0.015	0.087	1.100	0.132	0.032
1047	M115	5in Dia. Duct	Sec 4 - max	0.001	6	-0.006	1	0.003	5	0.273	6	0.585	7	0.746	8	1.031	5	401.076	7	0.522	7	0.000	0.046	0.082	1.031	0.072	0.001
1048	M115	5in Dia. Duct	Sec 4 - min	-0.001	5	-0.006	1	-0.003	7	-0.585	7	-0.273	6	-1.031	5	-0.746	8	274.123	6	0.357	6	0.000	0.046	0.082	1.031	0.049	0.001
1000	M110	6in Dia. Duct	Sec 5 - min	-0.048	6	0.012	8	-0.260	7	0.277	6	-0.872	8	-1.040	8	0.405	5	-821.801	7	-0.888	7	0.006	0.048	0.074	1.040	0.085	0.031
1228	M133	6in Dia. Duct	Sec 4 - min	-0.046	6	-0.030	6	-0.047	5	0.279	7	-0.960	6	-0.538	8	-0.759	5	1134.202	3	0.995	3	0.006	0.069	0.054	0.960	0.123	0.008
359	M38	6in Dia. Duct	Sec 5 - max	0.001	6	0.005	7	0.067	6	0.276	6	0.582	7	0.747	6	1.032	5	401.076	7	0.522	7	0.000	0.046	0.082	1.032	0.072	0.009
360	M38	6in Dia. Duct	Sec 6 - min	-0.001	8	0.005	8	-0.074	5	-0.582	7	-0.276	5	-1.032	5	-0.747	8	274.123	6	0.357	6	0.000	0.046	0.082	1.032	0.049	0.010
1031	M114	6in Dia. Duct	Sec 1 - max	0.001	5	0.005	1	0.002	8	0.276	6	0.582	7	0.747	8	1.032	5	401.076	7	0.522	7	0.000	0.046	0.082	1.032	0.072	0.001
1032	M114	5in Dia. Duct	Sec 1 - min	-0.001	6	0.005	8	-0.002	5	-0.582	7	-0.276	6	-1.032	5	-0.747	8	274.123	6	0.357	6	0.000	0.046	0.082	1.032	0.049	0.001
1045	M115	5in Dia. Duct	Sec 3 - max	0.000	6	-0.004	1	0.002	5	0.278	6	0.580	7	0.749	8	1.034	6	401.076	7	0.522	7	0.000	0.046	0.082	1.034	0.072	0.001
1046	M115	5in Dia. Duct	Sec 3 - min	0.000	5	-0.004	1	-0.002	7	-0.580	7	-0.278	6	-1.034	5	-0.749	6	274.123	6	0.357	6	0.000	0.046	0.082	1.034	0.049	0.001
1033	M114	5in Dia. Duct	Sec 2 - max	0.000	5	0.004	1	0.002	8	0.279	6	0.579	7	0.749	8	1.034	5	401.076	7	0.522	7	0.000	0.046	0.082	1.034	0.072	0.001
1034	M114	5in Dia. Duct	Sec 2 - min	0.000	8	0.004	6	-0.002	5	-0.579	7	-0.278	6	-1.034	5	-0.749	8	274.123	6	0.357	6	0.000	0.046	0.082	1.034	0.049	0.001
1035	M114	5in Dia. Duct	Sec 3 - max	0.000	5	0.002	1	0.001	8	0.281	6	0.577	7	0.750	8	1.035	5	401.076	7	0.522	7	0.000	0.046	0.082	1.035	0.072	0.000
1036	M114	5in Dia. Duct	Sec 3 - min	0.000	6	0.002	8	-0.001	5	-0.577	7	-0.281	6	-1.035	5	-0.750	8	274.123	6	0.357	6	0.000	0.046	0.082	1.036	0.049	0.000
1043	M115	5in Dia. Duct	Sec 2 - max	0.000	6	-0.002	1	0.000	5	0.282	6	0.577	7	0.750	8	1.035	5	401.076	7	0.522	7	0.000	0.046	0.082	1.035	0.072	0.000
1044	M115	5in Dia. Duct	Sec 2 - min	0.000	5	-0.002	1	0.000	7	-0.577	7	-0.282	6	-1.035	5	-0.750	8	274.123	6	0.357	6	0.000	0.046	0.082	1.035	0.049	0.000
1037	M114	5in Dia. Duct	Sec 4 - max	0.000	5	0.001	1	0.000	8	0.282	6	0.576	7	0.750	8	1.035	5	401.076	7	0.522	7	0.000	0.046	0.082	1.035	0.072	0.000
1038	M114	5in Dia. Duct	Sec 4 - min	0.000	6	0.001	8	0.000	5	-0.576	7	-0.282	6	-1.035	5	-0.750	8	274.123	8	0.357	6	0.000	0.046	0.082	1.035	0.049	0.000
1039	M114	5in Dia. Duct	Sec 5 - max	0.000	1	0.000	1	0.000	1	0.283	6	0.575	7	0.751	8	1.036	5	401.076	7	0.522	7	0.000	0.046	0.082	1.036	0.072	0.000
1040	M114	5in Dia. Duct	Sec 5 - min	0.000	1	0.000	1	0.000	1	-0.575	7	-0.283	6	-1.036	5	-0.751	8	274.123	8	0.357	6	0.000	0.046	0.082	1.036	0.049	0.000
1041	M115	5in Dia. Duct	Sec 1 - max	0.000	1	0.000	1	0.000	1	0.283	6	0.575	7	0.751	8	1.036	5	401.076	7	0.522	7	0.000	0.046	0.082	1.036	0.072	0.000
1042	M115	5in Dia. Duct	Sec 1 - min	0.000	1	0.000	1	0.000	1	-0.575	7	-0.283	6	-1.036	5	-0.751	8	274.123	6	0.357	6	0.000	0.046	0.082	1.036	0.049	0.000
378	M40	6in Dia. Duct	Sec 4 - min	0.066	8	-0.213	5	-0.133	6	-0.962	7	0.437	8	-0.710	5	0.502	8	472.962	5	0.396	6	0.008	0.069	0.051	0.962	0.049	0.026
361	M39	6in Dia. Duct	Sec 1 - max	-0.042	8	0.240	7	0.039	5	-0.273	6	0.839	7	0.872	8	0.165	5	-119.100	8	-0.100	8	0.005	0.060	0.062	0.872	0.012	0.030
853	M95	6in Dia. Duct	Sec 2 - max	0.012	5	0.089	5	-0.131	6	0.887	8	-0.709	5	0.033	5	0.874	8	-667.343	6	-0.575	6	0.002	0.063	0.062	0.887	0.071	0.016
854	M96	6in Dia. Duct	Sec 2 - min	-0.012	8	0.055	8	-0.255	7	0.708	5	-0.887	8	-0.874	8	-0.033	6	-992.905	7	-0.831	7	0.002	0.063	0.062	0.887	0.103	0.031
1227	M133	6in Dia. Duct	Sec 4 - max	-0.036	7	0.063	7	0.047	6	0.960	6	-0.279	7	0.759	5	0.538	8	1355.824	4	1.190	4	0.004	0.069	0.054	0.960	0.147	0.008
1869	M209	3in Dia. Duct	Sec 5 - max	0.160	7	-0.036	7	-0.111	8	0.073	1	-0.069	2	-1.223	6	2.387	7	-27.019	5	-0.116	5	0.019	0.003	0.105	2.387	0.009	0.009
1230	M133	6in Dia. Duct	Sec 5 - min	-0.045	6	-0.030	6	-0.047	5	0.290	7	-0.952	6	-0.525	8	-0.746	5	1134.202	3	0.995	3	0.005	0.068	0.053	0.952	0.123	0.008
1870	M177	12in Dia. Duct	Sec 5 - min	0.060	6	0.057	6	-0.124	4	1.395	7	-2.162	6	-0.567	6	-0.497	7	-1468.410	5	-0.461	6	0.004	0.097	0.025	2.162	0.037	0.068
1008	M111	6in Dia. Duct	Sec 4 - min	-0.037	6	0.036	8	-0.251	7	0.413	5	-0.725	6	-0.961	8	0.171	6	-907.700	7	-0.760	7	0.005	0.052	0.070	0.961	0.094	0.031
2182	M229	2in Dia. Duct	Sec 1 - min	0.057	8	-0.208	6	-0.008	2	-0.021	7	-0.871	8	-2.203	5	-0.072	8	-61.036	7	-0.843	7	0.013	0.032	0.082	2.203	0.054	0.013
1809	M181	16in Dia. Duct	Sec 5 - max	0.075	2	-0.489	2	0.043	4	-0.569	1	0.921	2	-0.258	7	0.727	6	-853.734	7	-0.109	7	0.008	0.066	0.052	0.821	0.021	0.058
2000	M210	3in Dia. Duct	Sec 5 - min	0.079	6	-0.066	6	-0.010	8	-0.977	8	0.933	7	-1.646	1	0.354	2	-14.055	8	-0.060	8	0.009	0.043	0.073	1.646	0.005	0.005
2002	M211	3in Dia. Duct	Sec 1 - min	0.079	8	0.054	7	0.002	2	-0.977	8	0.933	7	-1.646	1	0.354	2	-14.055	8	-0.060	8	0.009	0.043	0.073	1.646	0.006	0.004
1229	M133	6in Dia. Duct	Sec 5 - max	-0.036	7	0.062	7	0.047	8	0.852	6	-0.296	7	0.746	5	0.525	8	1355.824	4	1.190	4	0.004	0.066	0.053	0.952	0.147	0.006
213	M22	4in Dia. Duct	Sec 2 - max	0.004	7	-0.014	8	0.007	7	-0.656	8	0.816	5	-0.970	8	1.986	5	-74.673	8	-0.184	8	0.000	0.036	0.088	1.986	0.013	0.001
214	M22	4in Dia. Duct	Sec 2 - min	-0.004	8	-0.014	1	-0.007	6	-0.816	5	0.656	8	-1.986	5	0.970	8	-188.824	5	-0.416	5	0.000	0.036	0.088	1.986	0.032	0.001
1018	M112	6in Dia. Duct	Sec 4 - min	-0.021	8	0.052	8	-0.253	7	0.594	5	-0.818	8	-0.894	8	0.000	5	-864.232	7	-0.807	7	0.003	0.056	0.064	0.894	0.100	0.031
373	M40	6in Dia. Duct	Sec 2 - max	0.117	5	-0.168	8	0.027	7	0.702	8	-0.024	7	0.176	8	0.639	5	997.775	8	0.835	8	0.015	0.050	0.060	0.839	0.103	0.021
999	M110	6in Dia. Duct	Sec 5 - max	-0.020	7	0.079	5	-0.136	6	0.672	8	-0.277	5	-0.405	5	1.040	8	-320.560	8	-0.260	6	0.003	0.048	0.074	1.040	0.033	0.017
1992	M210	3in Dia. Duct	Sec 1 - min	0.084	6	-0.040	6	0.000	8	0.214	5	-0.219	8	-2.307	7	1.223	6	-14.055	8	-0.000	8	0.010	0.010	0.105	2.387	0.005	0.003
617	M92	5in Dia. Duct	Sec 4 - max	0.175	5	0.063	6	0.232	6	0.177	8	0.181	5	0.691	6	1.064	6	735.306	7	0.957	7	0.028	0.014	0.084	1.064	0.132	0.032
682	M71	16in Dia. Duct	Sec 1 - min	-0.033	1	-0.470	2	-0.061	3	0.680	2	-1.032	1	-0.650	8	0.054	7	-2517.409	6	-0.499	6	0.004	0.074	0.047	1.032	0.062	0.058
681	M71	16in Dia. Duct	Sec 1 - max	0.030	2	-0.456	1	0.056	4	1.032	1	-0.680	2	-0.054	7	0.659	6	-925.473	7	-0.183	7	0.003	0.074	0.047	1.032	0.023	0.056
1667	M177	12in Dia. Duct	Sec 4 - max	0.124	7	0.975	7	-0.018	3	2.020	5	-1.212	7	0.511	7	0.555	6	-97.854	8	-0.032	8	0.009	0.090	0.025	2.030	0.002	0.075
816	M92	5in Dia. Duct	Sec 3 - max	0.175	6	0.063	6	0.232	6	0.159	8	0.199	5	0.630	5	1.028	8	735.306	7	0.957	7	0.026	0.016	0.082	1.028	0.132	0.032
1017	M112	6in Dia. Duct	Sec 4 - max	0.008	7	0.094	5	-0.132	6	0.818	8	-0.594	5	0.000	5	0.884	8	-621.143	6	-0.520	6	0.001	0.058	0.064	0.894	0.064	0.016
1007	M111	6in Dia. Duct	Sec 4 - max	-0.007	7	0.094	5	-0.134	6	0.725	8	-0.413	5	-0.171	5	0.981	8	-476.065	6	-0.400	6	0.001	0.052	0.070	0.981	0.049	0.017
209	M21	4in Dia. Duct	Sec 5 - max	0.002	5	-0.009	1	0.005	7	-0.616	8	0.778	5	-0.990	8	1.966	6	-74.673	6	-0.164	6	0.000	0.035	0.087	1.966	0.013	0.001
210	M21	4in Dia. Duct	Sec 6 - min	-0.002	6	-0.009	1	-0.005	5	-0.778	5	0.616	8	-1.966	5	0.990	8	-188.824	5	-0.415	6	0.000	0.035	0.087	1.966	0.032	0.001
211	M22	4in Dia. Duct	Sec 1 - max	0.002	7	-0.009	8	0.005	7	-0.616	6	0.778	5	-0.990	8	1.966	5	-74.673	6	-0.164	8	0.000	0.035	0.087	1.966	0.013	0.001
212	M22	4in Dia. Duct	Sec 1 - min	-0.002	8	-0.009	1	-0.006	6	-0.778	5	0.616	8	-1.960	5	0.990	8	-163.824	5	-0.415	5	0.000	0.035	0.087	1.966	0.032	0.001
2475	M258	6in Dia. Duct	Sec 3 - max	0.098	7	-0.017	7	-0.083	8	0.639	7	-0.307	6	0.897	7	-0.286	6	-179.120	6	-0.150	8	0.012	0.048	0.064	0.897	0.019	0.010
1997	M210	3in Dia. Duct	Sec 4 - max	0.196	7	-0.057	7	0.077	7	-0.550	7	0.623	6	-0.769	2	1.609	1	-13.162	5	-0.056	5	0.023	0.028	0.072	1.609	0.004	0.008
2555	M286	3in Dia. Duct	Sec 3 - max	0.191	6	-0.008	5	0.020	2	1.260	1	-1.265	2	0.458	5	0.908	6	-14.328	8	-0.061	8	0.022	0.056	0.044	1.259	0.005	0.002
74	M8	6in Dia. Duct	Sec 2 - min	-0.352	1	-0.138	1	-0.205	8	-0.725	1	0.020	2	-0.358	6	-0.263	8	83.143	7	0.070	7	0.045	0.052	0.025	0.725	0.009	0.025
813	M92	5in Dia. Duct	Sec 2 - max	0.175	5	0.064	6	0.232	6	0.141	8	0.217	5	0.580	5	0.991	8	735.306	7	0.957	7	0.020	0.017	0.079	0.991	0.132	0.032
2149	M235	3in Dia. Duct	Sec 5 - max	0.199	5	-0.002	8	-0.020	6	0.307	8	0.856	5	-0.340	6	1.359	7	-14.328	6	-0.061	8	0.023	0.038	0.060	1.359	0.005	0.002
207	M21	4in Dia. Duct	Sec 4 - max	0.002	5	-0.007	1	0.003	7	-0.603	8	0.785	5	-0.996	8	1.960	6	-74.673	8	-0.164	6	0.000	0.034	0.087	1.960	0.013	0.001
208	M21	4in Dia. Duct	Sec 4 - min	-0.002	6	-0.007	1	-0.003	5	-0.765	5	0.603	8	-1.960	5	0.996	8	-188.824	5	-0.416	5	0.000	0.034	0.087	1.960	0.032	0.001
820	M92	5in Dia. Duct	Sec 6 - min	-0.124	6	0.052	8	-0.183	7	-0.164	5	-0.194	8	-1.100	8	-0.747	5	390.738	6	0.509	6	0.018	0.019	0.087	1.100	0.070	0.022
998	M110	6in Dia. Duct	Sec 4 - min	-0.048	8	0.012	8	-0.249	7	0.239	5	-0.606	8	-0.938	8	0.325	5	-621.801	7	-0.688	7	0.006	0.048	0.067	0.936	0.086	0.031
205	M21	4in Dia. Duct	Sec 3 - max	0.001	5	-0.005	1	0.002	7	-0.594	8	0.756	5	-1.000	8	1.955	5	-74.673	8	-0.164	8	0.000	0.034	0.087	1.955	0.013	0.000
206	M21	4in Dia. Duct	Sec 3 - min	-0.001	6	-0.005	1	-0.002	5	-0.756	5	0.594	8	-1.955	5	1.000	8	-188.824	5	-0.415	5	0.000	0.034	0.087	1.955	0.032	0.000
811	M92	5in Dia. Duct	Sec 1 - max	0.175	5	0.064	6	0.232	5	0.123	6	0.235	6	0.524	5	0.850	8	735.306	7	0.957	7	0.026	0.019	0.076	0.956	0.132	0.032
2224	M233	2in Dia. Duct	Sec 2 - min	0.185	8	0.003	8	0.016	5	0.231	5	-0.736	8	-1.518	2	-0.661	1	-0.009	8	0.000	8	0.037	0.027	0.056	1.518	0.000	0.001
203	M21	4in Dia. Duct	Sec 2 - max	0.000	6	-0.002	1	0.001	7	-0.589	8	0.751	5	-1.003	8	1.952	5	-74.673	8	-0.164	8	0.000	0.033	0.087	1.952	0.013	0.000
204	M21	4in Dia. Duct	Sec 2 - min	0.000	6	-0.002	1	-0.001	5	-0.751	5	0.589	8	-1.952	5	1.003	8	-180.624	5	-0.415	5	0.000	0.033	0.087	1.952	0.032	0.000

D-2250

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_a	f_{by}/σ_b	f_{bz}/σ_b	f_v (ksi)	f/σ_v	f_t/σ_v
201	M21	4in Dia. Duct	Sec 1 - max	0.000	1	0.000	1	0.000	1	-0.587	8	0.749	5	-1.004	8	1.952	6	-74.673	8	-0.164	8	0.000	0.033	0.087	1.952	0.013	0.000
202	M21	4in Dia. Duct	Sec 1 - min	0.000	1	0.000	1	0.000	1	-0.749	5	0.587	8	-1.952	6	1.004	8	-188.824	5	-0.415	5	0.000	0.033	0.087	1.952	0.032	0.000
95	M10	3in Dia. Duct	Sec 3 - max	0.587	7	-0.023	1	-0.264	5	0.135	2	0.130	1	-0.922	4	1.080	3	10.088	4	0.043	4	0.066	0.006	0.048	1.080	0.003	0.020
1810	M181	16in Dia. Duct	Sec 5 - min	0.019	1	-0.477	1	-0.048	3	-0.921	2	0.560	1	-0.727	6	0.250	7	-2168.192	6	-0.430	6	0.002	0.068	0.052	0.921	0.053	0.059
2118	M222	3in Dia. Duct	Sec 4 - min	0.084	7	-0.043	5	-0.166	8	-0.893	6	0.885	7	-0.233	5	-1.582	8	-36.188	5	-0.155	5	0.010	0.040	0.070	1.582	0.012	0.013
1848	M205	2in Dia. Duct	Sec 5 - max	0.155	5	-0.014	6	0.064	2	0.843	1	-0.025	2	1.455	2	1.124	1	-5.895	8	-0.080	8	0.034	0.031	0.054	1.455	0.005	0.004
1951	M206	2in Dia. Duct	Sec 1 - max	0.155	5	-0.078	8	-0.112	6	0.843	1	-0.025	2	1.455	2	1.124	1	-5.695	8	-0.080	8	0.034	0.031	0.054	1.455	0.005	0.007
1668	M177	12in Dia. Duct	Sec 4 - min	0.060	6	0.858	6	-0.123	4	1.212	7	-2.020	6	-0.555	6	-0.511	7	-1468.410	5	-0.481	5	0.004	0.090	0.025	2.020	0.037	0.066
374	M40	6in Dia. Duct	Sec 2 - min	0.069	6	-0.201	5	-0.125	6	0.024	7	-0.702	6	-0.839	5	-0.178	8	472.862	5	0.396	5	0.009	0.050	0.060	0.839	0.049	0.025
1659	M176	12in Dia. Duct	Sec 6 - max	0.302	7	0.823	2	-0.018	3	1.536	6	-0.862	7	0.640	7	0.215	6	183.470	8	0.060	8	0.022	0.069	0.028	1.536	0.005	0.063
2125	M223	3in Dia. Duct	Sec 3 - max	0.181	5	0.008	8	0.021	5	1.266	8	-1.239	5	0.070	1	0.897	2	-14.328	8	-0.061	8	0.019	0.066	0.043	1.268	0.005	0.000
1006	M111	6in Dia. Duct	Sec 3 - min	-0.038	6	0.037	8	-0.261	7	0.368	5	-0.709	8	-0.878	8	0.091	5	-907.768	7	-0.760	7	0.005	0.051	0.063	0.878	0.094	0.031
487	M51	8in Dia. Duct	Sec 4 - max	-0.012	1	0.030	8	0.061	6	-0.377	2	0.898	1	0.920	4	-0.183	3	1313.992	4	1.163	4	0.001	0.050	0.068	0.928	0.142	0.008
488	M51	8in Dia. Duct	Sec 4 - min	-0.012	6	-0.092	5	-0.236	7	-0.698	1	0.377	2	0.183	3	-0.928	4	1103.694	3	0.969	3	0.001	0.050	0.066	0.928	0.120	0.029
997	M110	6in Dia. Duct	Sec 4 - max	-0.021	7	0.080	5	-0.136	6	0.060	8	-0.239	5	-0.325	5	0.938	8	-320.560	6	-0.268	6	0.003	0.046	0.067	0.938	0.033	0.017
810	M92	5in Dia. Duct	Sec 4 - min	-0.124	8	0.063	8	-0.163	7	-0.181	5	-0.177	8	-1.064	8	-0.091	5	390.738	8	0.509	6	0.018	0.014	0.064	1.064	0.070	0.022
2007	M211	3in Dia. Duct	Sec 4 - max	0.215	7	-0.031	6	0.050	2	-0.088	7	0.092	6	1.979	8	-1.518	5	-13.162	5	-0.056	5	0.025	0.004	0.088	1.979	0.004	0.004
244	M25	4in Dia. Duct	Sec 2 - min	-0.034	8	0.010	5	-0.073	6	0.968	8	-1.070	5	-0.181	6	-1.469	7	53.868	5	0.119	5	0.003	0.048	0.069	1.469	0.009	0.006
1665	M177	12in Dia. Duct	Sec 3 - max	0.124	7	0.976	7	-0.017	3	1.859	6	-1.029	7	0.525	7	0.543	6	-97.654	8	-0.032	8	0.009	0.083	0.024	1.859	0.002	0.075
1016	M112	6in Dia. Duct	Sec 3 - min	-0.021	6	0.053	8	-0.253	7	0.549	5	-0.793	8	-0.780	8	-0.079	5	-964.232	7	-0.807	7	0.003	0.057	0.056	0.793	0.100	0.031
616	M92	5in Dia. Duct	Sec 3 - min	-0.124	8	0.063	8	-0.163	7	-0.199	5	-0.159	8	-1.028	8	-0.635	5	390.738	6	0.509	6	0.018	0.018	0.062	1.028	0.070	0.022
1990	M209	3in Dia. Duct	Sec 5 - min	0.060	6	-0.040	6	-0.230	5	0.069	2	-0.072	1	-2.367	7	1.223	6	-26.024	8	-0.120	8	0.007	0.003	0.105	2.367	0.009	0.018
2120	M223	3in Dia. Duct	Sec 3 - min	0.136	8	0.006	5	-0.008	6	1.238	6	-1.260	6	-0.897	2	-0.970	1	-36.188	5	-0.155	5	0.016	0.066	0.043	1.256	0.012	0.000
990	M109	6in Dia. Duct	Sec 5 - min	-0.052	6	-0.017	8	-0.248	7	0.124	5	-0.648	8	-0.873	8	0.619	5	-718.478	7	-0.601	7	0.007	0.046	0.062	0.873	0.074	0.031
243	M25	4in Dia. Duct	Sec 2 - max	-0.024	5	0.064	6	0.073	7	1.070	6	-0.969	8	1.409	7	0.181	6	130.227	8	0.287	8	0.002	0.048	0.065	1.469	0.022	0.006
1005	M111	6in Dia. Duct	Sec 3 - max	-0.007	7	0.096	5	-0.135	6	0.700	8	-0.368	5	-0.091	5	0.878	8	-478.065	6	-0.400	6	0.001	0.051	0.063	0.878	0.049	0.017
614	M92	5in Dia. Duct	Sec 2 - min	-0.123	8	0.064	8	-0.163	7	-0.217	5	-0.141	8	-0.991	8	-0.560	5	390.738	6	0.509	6	0.018	0.017	0.079	0.991	0.070	0.022
1015	M112	6in Dia. Duct	Sec 3 - max	0.007	7	0.098	5	-0.133	6	0.793	8	-0.549	5	0.079	5	0.790	8	-621.143	6	-0.520	6	0.001	0.057	0.058	0.793	0.064	0.016
1657	M176	12in Dia. Duct	Sec 4 - max	0.303	7	0.824	2	-0.019	3	1.395	6	-0.510	7	0.654	7	0.203	6	183.470	8	0.060	8	0.022	0.062	0.029	1.395	0.005	0.063
2478	M254	6in Dia. Duct	Sec 3 - min	0.027	6	-0.038	6	-0.169	7	0.307	6	-0.639	7	0.286	6	-0.897	7	-325.274	7	-0.272	7	0.003	0.046	0.064	0.897	0.034	0.021
998	M110	6in Dia. Duct	Sec 3 - min	-0.049	8	0.012	8	-0.249	7	0.201	5	-0.660	8	-0.836	8	0.244	5	-821.601	7	-0.688	7	0.006	0.047	0.060	0.836	0.085	0.031
1995	M210	3in Dia. Duct	Sec 3 - max	0.195	7	-0.051	7	0.076	7	-0.284	7	0.306	6	-1.070	8	1.725	5	-13.152	5	-0.056	6	0.023	0.014	0.077	1.725	0.004	0.008
1956	M206	2in Dia. Duct	Sec 3 - min	0.076	8	-0.248	5	-0.272	7	-0.827	7	-0.259	6	-1.763	1	-0.398	2	-24.608	5	-0.336	5	0.017	0.031	0.065	1.763	0.021	0.017
664	M71	16in Dia. Duct	Sec 2 - min	-0.030	1	-0.472	2	-0.060	3	0.523	2	-0.880	1	-0.547	6	0.068	7	-2517.459	6	-0.499	6	0.004	0.063	0.046	0.880	0.062	0.058
1660	M178	12in Dia. Duct	Sec 5 - min	0.220	6	0.730	1	-0.122	4	0.662	7	-1.538	8	-0.215	8	-0.640	7	-1610.206	6	-0.528	5	0.016	0.068	0.028	1.536	0.041	0.056
989	M109	6in Dia. Duct	Sec 5 - max	-0.032	7	0.050	5	-0.136	6	0.648	8	-0.124	5	-0.519	5	0.673	8	-173.491	6	-0.145	5	0.004	0.046	0.062	0.873	0.016	0.017
812	M92	5in Dia. Duct	Sec 1 - min	-0.123	8	0.064	8	-0.163	7	-0.235	5	-0.123	8	-0.956	8	-0.524	5	390.738	8	0.509	8	0.016	0.019	0.076	0.956	0.070	0.022
683	M71	16in Dia. Duct	Sec 2 - max	0.030	2	-0.458	1	0.054	4	0.880	1	-0.623	2	-0.060	7	0.647	6	-925.473	7	-0.183	7	0.003	0.063	0.040	0.880	0.023	0.057
2558	M266	3in Dia. Duct	Sec 3 - min	0.105	7	-0.006	8	-0.007	1	1.255	2	-1.269	1	-0.986	8	-0.459	5	-36.198	5	-0.165	5	0.012	0.056	0.044	1.259	0.012	0.001
851	M96	6in Dia. Duct	Sec 1 - max	0.012	5	0.080	5	-0.132	6	0.842	8	-0.639	5	0.163	5	0.700	8	-667.343	6	-0.575	8	0.002	0.060	0.050	0.842	0.071	0.016
852	M98	6in Dia. Duct	Sec 1 - min	-0.012	6	0.057	8	-0.254	7	0.039	5	-0.642	8	-0.700	8	-0.163	6	-992.905	7	-0.831	7	0.002	0.080	0.050	0.842	0.103	0.031
1993	M210	3in Dia. Duct	Sec 2 - max	0.184	7	-0.044	7	0.072	7	-0.018	7	0.026	6	-1.225	6	1.967	7	-13.108	5	-0.056	5	0.023	0.001	0.067	1.907	0.004	0.006
1666	M177	12in Dia. Duct	Sec 3 - min	0.060	6	0.859	6	-0.123	4	1.029	7	-1.859	6	-0.543	6	-0.525	7	-1469.410	5	-0.481	6	0.004	0.083	0.024	1.889	0.037	0.068
1993	M209	3in Dia. Duct	Sec 2 - max	0.165	7	-0.019	7	-0.119	6	0.550	8	-0.523	7	1.538	6	-0.354	8	-27.018	5	-0.115	5	0.016	0.025	0.068	1.538	0.009	0.009
2228	M233	3in Dia. Duct	Sec 3 - min	0.162	8	-0.007	6	0.004	1	0.745	8	-1.288	7	-0.140	2	-0.738	1	-0.009	6	0.000	6	0.036	0.048	0.027	1.288	0.000	0.000
1041	M205	2in Dia. Duct	Sec 1 - max	0.142	5	0.052	6	0.016	3	0.322	7	0.805	5	-0.005	1	1.335	2	-5.895	8	-0.060	8	0.032	0.030	0.048	1.335	0.005	0.003
1894	M200	4in Dia. Duct	Sec 2 - min	0.105	8	-0.094	7	-0.075	7	-0.020	5	-0.684	8	-0.760	6	-1.599	7	53.868	5	0.119	5	0.010	0.030	0.071	1.599	0.009	0.007
1807	M191	16in Dia. Duct	Sec 4 - max	0.076	3	-0.466	2	0.045	4	-0.320	1	0.676	2	-0.239	7	0.743	8	-853.734	7	-0.169	7	0.009	0.046	0.053	0.743	0.021	0.056
1969	M207	3in Dia. Duct	Sec 5 - max	0.172	7	-0.037	6	0.040	2	-0.828	6	0.803	7	0.253	8	1.038	5	34.434	6	0.147	8	0.020	0.044	0.046	1.038	0.011	0.003
1971	M208	3in Dia. Duct	Sec 1 - max	0.172	7	0.062	7	0.073	5	-0.820	8	0.803	7	0.253	8	1.038	5	34.434	6	0.147	8	0.020	0.044	0.046	1.038	0.011	0.006
2160	M225	3in Dia. Duct	Sec 5 - min	0.097	8	-0.051	5	-0.064	7	-0.856	5	-0.207	8	-1.359	7	0.340	6	-36.188	5	-0.155	5	0.011	0.038	0.060	1.359	0.012	0.005
995	M110	6in Dia. Duct	Sec 3 - max	-0.021	7	0.081	5	-0.137	6	0.060	8	-0.201	5	-0.244	5	0.836	8	-320.560	6	-0.268	6	0.003	0.047	0.060	0.836	0.033	0.017
1004	M111	6in Dia. Duct	Sec 2 - min	-0.038	6	0.036	8	-0.250	7	0.323	5	-0.690	8	-0.775	8	0.011	6	-907.768	7	-0.760	7	0.005	0.049	0.055	0.775	0.094	0.031
1663	M177	12in Dia. Duct	Sec 2 - max	0.125	7	0.976	7	-0.018	3	1.698	6	-0.845	7	0.540	7	0.531	6	-97.654	8	-0.032	8	0.009	0.075	0.024	1.698	0.002	0.075
988	M109	6in Dia. Duct	Sec 4 - min	-0.052	6	-0.017	8	-0.247	7	0.100	5	-0.650	8	-0.772	8	0.436	5	-718.476	7	-0.601	7	0.007	0.047	0.055	0.772	0.074	0.030
1996	M210	3in Dia. Duct	Sec 4 - min	0.080	8	-0.059	6	-0.007	6	-0.823	6	0.590	7	-1.609	1	0.789	2	-14.055	8	-0.060	8	0.009	0.028	0.072	1.609	0.006	0.005
2234	M234	2in Dia. Duct	Sec 2 - min	0.156	8	-0.255	5	-0.173	7	-0.432	8	0.005	5	-0.194	1	-1.554	2	-0.009	8	0.000	8	0.034	0.016	0.050	1.554	0.000	0.016
1655	M176	12in Dia. Duct	Sec 3 - max	0.303	7	0.924	2	-0.010	3	1.254	6	-0.358	7	0.669	7	0.191	6	183.470	8	0.000	8	0.022	0.069	0.030	1.264	0.005	0.003
1658	M176	12in Dia. Duct	Sec 4 - min	0.220	8	0.734	1	-0.121	4	0.510	7	-1.395	6	-0.203	6	-0.654	7	-1610.208	5	-0.528	5	0.010	0.062	0.029	1.395	0.041	0.058
1014	M112	6in Dia. Duct	Sec 2 - min	-0.022	6	0.054	8	-0.252	7	0.504	5	-0.766	8	-0.686	8	-0.158	5	-964.232	7	-0.807	7	0.003	0.055	0.049	0.768	0.100	0.031
1953	M206	2in Dia. Duct	Sec 2 - max	0.156	5	-0.080	8	-0.112	6	0.495	8	0.341	7	0.924	2	1.442	1	-5.895	8	-0.080	8	0.035	0.018	0.053	1.442	0.005	0.007
987	M109	6in Dia. Duct	Sec 4 - max	-0.033	7	0.051	6	-0.138	6	0.856	8	-0.100	5	-0.438	5	0.772	8	-173.491	6	-0.146	6	0.004	0.047	0.055	0.772	0.018	0.017
641	M67	12in Dia. Duct	Sec 1 - max	0.526	7	0.088	6	-0.045	6	0.137	1	0.137	2	1.386	4	-1.011	3	872.092	8	0.288	8	0.038	0.006	0.062	1.386	0.022	0.005
1003	M111	6in Dia. Duct	Sec 2 - max	-0.007	7	0.097	6	-0.136	6	0.690	8	-0.323	5	-0.011	6	0.775	8	-478.066	6	-0.400	6	0.001	0.049	0.055	0.775	0.049	0.017
994	M110	6in Dia. Duct	Sec 2 - min	-0.048	8	0.013	8	-0.248	7	0.163	5	-0.054	8	-0.734	8	0.163	5	-821.601	7	-0.685	7	0.006	0.047	0.052	0.734	0.085	0.031
1648	M175	12in Dia. Duct	Sec 5 - max	0.435	7	0.549	2	-0.021	3	0.971	6	-0.054	7	0.682	7	-0.166	8	483.081	8	0.158	8	0.032	0.043	0.030	0.971	0.012	0.042
2553	M286	3in Dia. Duct	Sec 2 - max	0.200	8	0.038	5	0.023	6	0.659	8	-0.650	5	0.165	5	1.165	8	-14.328	8	-0.061	8	0.023	0.029	0.053	1.165	0.005	0.003
1983	M207	3in Dia. Duct	Sec 2 - max	0.159	7	0.029	6	0.031	6	-0.116	7	0.585	6	-0.859	7	1.365	6	34.434	6	0.147	6	0.018	0.026	0.061	1.365	0.011	0.007
223	M23	4in Dia. Duct	Sec 2 - max	0.009	5	0.080	5	0.075	8	-0.624	8	0.870	5	-0.815	8	1.608	5	-74.673	8	-0.164	8	0.001	0.030	0.074	1.668	0.013	0.008
224	M23	4in Dia. Duct	Sec 2 - min	-0.009	8	0.040	8	0.007	7	-0.670	5	0.624	6	-1.560	5	0.615	8	-180.824	5	-0.415	5	0.001	0.030	0.074	1.668	0.032	0.003
1013	M112	6in Dia. Duct	Sec 2 - max	0.007	7	0.097	5	-0.133	6	0.766	8	-0.504	5	0.158	5	0.666	6	-621.143	6	-0.520	6	0.001	0.056	0.049	0.766	0.064	0.018
1664	M177	12in Dia. Duct	Sec 2 - min	0.060	6	0.860	6	-0.122	4	0.845	7	-1.698	6	-0.531	6	-0.540	7	-1468.410	5	-0.481	5	0.004	0.075	0.024	1.698	0.037	0.066
378	M40	6in Dia. Duct	Sec 3 - max	0.119	5	-0.174	8	0.030	7	0.141	6	0.460	7	-0.159	8	0.777	5	997.775	8	0.835	8	0.015	0.033	0.056	0.777	0.103	0.021
1808	M191	16in Dia. Duct	Sec 4 - min	0.018	1	-0.474	1	-0.050	3	-0.676	2	0.320	1	-0.743	8	0.239	7	-2168.192	6	-0.430	6	0.002	0.046	0.053	0.743	0.063	0.059
2163	M227	6in Dia. Duct	Sec 2 - max	0.077	8	0.080	7	0.152	7	-0.571	8	0.647	7	-0.183	6	0.361	7	353.378	8	0.298	8	0.010	0.061	0.033	0.847	0.037	0.019
384	M39	6in Dia. Duct	Sec 2 - min	-0.058	5	0.144	8	-0.037	6	-0.518	7	0.080	6	-0.114	5	-0.822	8	-678.810	7	-0.568	7	0.007	0.037	0.059	0.822	0.070	0.018
1950	M205	2in Dia. Duct	Sec 6 - min	0.077	8	-0.035	7	-0.043	1	0.025	2	-0.843	1	-1.124	1	-1.455	2	-24.608	5	-0.335	5	0.017	0.031	0.054	1.455	0.021	0.003
1952	M206	2in Dia. Duct	Sec 1 - min	0.077	8	-0.244	5	-0.274	7	0.029	2	-0.843	1	-1.124	1	-1.455	2	-24.608	5	-0.335	5	0.017	0.031	0.054	1.455	0.021	0.018
856	M100	6in Dia. Duct	Sec 3 - min	-0.053	6	-0.017	8	-0.247	7	0.076	5	-0.665	8	-0.671	8	0.356	5	-718.478	7	-0.601	7	0.007	0.048	0.046	0.671	0.074	0.030
1651	M177	12in Dia. Duct	Sec 1 - max	0.125	7	0.977	7	-0.018	3	1.536	6	-0.062	7	0.554	7	0.519	6	-97.854	8	-0.032	8	0.009	0.068	0.026	1.536	0.002	0.075
1696	M200	4in Dia. Duct	Sec 3 - min	0.090	8	-0.086	5	-0.060	7	-1.674	5	0.998	8	-0.034	6	-0.425	5	53.868	5	0.119	5	0.009	0.074	0.019	1.674	0.009	0.007
1653	M176	12in Dia. Duct	Sec 2 - max	0.303	7	0.825	2	-0.020	3	1.113	6	-0.206	7	0.683	7	0.179	8	183.470	8	0.060	8	0.022	0.049	0.030	1.113	0.005	0.063
1970	M207	3in Dia. Duct	Sec 5 - min	0.104	6	-0.049	7	-0.014	1	-0.983	7	0.826	6	-1.038	5	-0.253	8	30.864	7	0.132	7	0.012	0.044	0.046	1.038	0.010	0.004
1972	M208	3in Dia. Duct	Sec 1 - min	0.104	6	0.060	6	-0.003	8	-0.983	7	0.826	6	-1.038	5	-0.253	8	30.864	7	0.132	7	0.012	0.044	0.046	1.036	0.010	0.005
993	M110	6in Dia. Duct	Sec 2 - max	-0.021	7	0.082	5	-0.137	6	0.654	8	-0.163	5	-0.163	5	0.734	8	-320.560	6	-0.268	8	0.003	0.047	0.052	0.734	0.033	0.017

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	x bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_a	f_{bt}/σ_a	f_{bb}/σ_a	D-2250	f_t (ksi)		f_t/σ_t	f_t/σ_t	
2016	M812	3in Dia. Duct	Sec 3 - max	0.235	7	0.013	8	-0.055	6	0.853	6	0.000	1	0.616	2	-13.162	5	-0.096	5	0.027	0.038	0.036				0.866		0.004	0.004	
1658	M176	12in Dia. Duct	Sec 3 - min	0.220	6	0.735	1	-0.120	4	0.358	7	-1.254	6	-0.191	6	-0.669	7	-1610.208	5	-0.528	5	0.016	0.056	0.030		1.254		0.041	0.057	
1847	M175	12in Dia. Duct	Sec 4 - max	0.436	7	0.549	2	-0.021	3	0.672	6	0.043	7	0.696	7	-0.178	6	493.081	8	0.158	8	0.032	0.059	0.031		0.672		0.012	0.042	
966	M71	16in Dia. Duct	Sec 3 - min	-0.033	1	-0.474	2	-0.058	3	0.306	2	-0.726	1	-0.635	6	0.082	7	-2517.459	6	-0.499	6	0.004	0.052	0.045		0.728		0.062	0.059	
642	M87	12in Dia. Duct	Sec 1 - min	0.456	6	-0.072	7	-0.095	7	-0.137	2	-0.137	1	1.011	3	+1.365	4	-872.071	5	-0.286	5	0.003	0.006	0.062		1.386		0.022	0.007	
1902	M111	6in Dia. Duct	Sec 1 - min	-0.039	6	0.036	8	-0.250	7	0.277	6	-0.672	8	-0.672	6	-0.068	6	-907.788	7	-0.760	7	0.005	0.048	0.048		0.672		0.034	0.031	
383	M39	6in Dia. Duct	Sec 2 - max	-0.041	8	0.242	7	0.037	5	-0.090	6	0.518	7	0.822	8	0.114	5	-119.100	6	-0.100	6	0.005	0.037	0.059		0.822		0.012	0.030	
96	M10	3in Dia. Duct	Sec 3 - min	0.492	6	-0.029	2	-0.289	8	-0.130	1	-0.135	2	-1.000	3	0.922	4	5.736	5	0.004	3	0.047	0.006	0.048		1.080		0.002	0.022	
695	M71	16in Dia. Duct	Sec 3 - max	0.030	2	-0.460	1	0.053	4	0.722	1	-0.308	2	-0.092	7	0.035	6	-925.473	7	-0.163	7	0.003	0.052	0.045		0.728		0.023	0.057	
1943	M205	2in Dia. Duct	Sec 2 - max	0.145	5	0.036	8	0.020	2	0.774	7	-0.075	8	0.152	1	1.074	2	-5.895	6	-0.080	8	0.032	0.029	0.040		1.074		0.005	0.002	
1964	M209	3in Dia. Duct	Sec 2 - min	0.065	5	-0.021	5	-0.223	7	0.823	7	-0.555	6	0.324	8	-1.538	5	-28.024	6	-0.120	6	0.005	0.025	0.058		1.538		0.009	0.017	
1964	M207	3in Dia. Duct	Sec 2 - min	0.117	5	0.018	7	-0.006	7	-0.585	6	0.116	7	-1.365	6	0.859	7	30.964	7	0.132	7	0.014	0.026	0.061		1.365		0.010	0.001	
643	M67	12in Dia. Duct	Sec 2 - max	0.529	7	0.085	6	-0.044	3	0.191	1	0.199	2	1.198	4	-0.915	3	872.092	8	0.286	8	0.036	0.009	0.053		1.198		0.022	0.005	
1998	M210	3in Dia. Duct	Sec 3 - min	0.062	6	-0.053	6	-0.004	6	-0.306	6	0.284	7	-1.725	5	1.070	8	-14.055	8	-0.060	8	0.010	0.014	0.077		1.725		0.009	0.004	
2164	M227	6in Dia. Duct	Sec 2 - min	0.049	5	0.081	6	0.087	6	-0.647	7	0.571	6	-0.461	7	0.183	6	320.151	7	0.273	7	0.006	0.081	0.033		0.647		0.034	0.012	
905	M109	6in Dia. Duct	Sec 3 - max	-0.033	7	0.032	5	-0.139	6	0.065	8	-0.076	5	-0.356	5	0.571	8	-173.491	6	-0.145	6	0.004	0.049	0.048		0.671		0.016	0.017	
1942	M205	2in Dia. Duct	Sec 1 - min	0.090	8	0.031	7	0.005	4	-0.105	6	-0.122	7	-1.336	2	0.005	1	-24.608	5	-0.035	5	0.020	0.030	0.049		1.335		0.021	0.002	
2008	M211	3in Dia. Duct	Sec 4 - min	0.062	6	-0.031	7	0.019	1	-0.092	6	0.088	7	1.518	5	-1.979	8	-14.055	8	-0.060	8	0.007	0.004	0.088		1.979		0.005	0.002	
1650	M176	12in Dia. Duct	Sec 5 - min	0.346	6	0.492	1	-0.119	4	0.054	7	-0.971	6	0.106	6	-0.662	7	-1491.883	5	-0.488	5	0.025	0.043	0.030		0.971		0.038	0.035	
1994	M210	3in Dia. Duct	Sec 2 - min	0.063	6	-0.046	6	-0.002	6	-0.026	6	0.016	7	-1.967	7	1.225	6	-14.055	8	-0.060	8	0.010	0.001	0.087		1.967		0.005	0.004	
355	M38	5in Dia. Duct	Sec 3 - max	0.008	5	0.031	7	0.081	8	0.007	6	0.851	7	0.180	6	0.371	7	401.076	7	0.622	7	0.001	0.068	0.029		0.851		0.072	0.011	
356	M38	5in Dia. Duct	Sec 3 - min	-0.008	5	0.031	6	-0.067	5	-0.851	7	-0.007	6	-0.373	7	-0.180	6	274.123	6	0.357	6	0.001	0.068	0.029		0.851		0.049	0.012	
992	M110	6in Dia. Duct	Sec 1 - min	-0.050	5	0.013	6	-0.246	7	0.124	5	-0.048	8	-0.633	8	0.082	5	-821.801	7	-0.689	7	0.000	0.046	0.045		0.646		0.086	0.031	
1845	M175	12in Dia. Duct	Sec 3 - max	0.436	7	0.549	2	-0.022	3	0.773	6	0.130	7	0.711	7	-0.189	6	493.081	8	0.158	8	0.032	0.034	0.032		0.773		0.012	0.042	
849	M67	12in Dia. Duct	Sec 5 - max	0.506	7	0.054	6	-0.025	3	0.407	6	0.439	7	0.924	5	-0.339	6	872.092	8	0.286	8	0.037	0.020	0.041		0.924		0.022	0.004	
1012	M112	6in Dia. Duct	Sec 1 - min	-0.022	8	0.065	8	-0.252	7	0.466	6	-0.742	8	-0.582	8	-0.237	5	-964.232	7	-0.607	7	0.003	0.053	0.042		0.742		0.100	0.031	
548	M67	12in Dia. Duct	Sec 3 - max	0.517	7	0.061	6	-0.036	3	0.232	1	0.249	2	1.092	5	-0.757	6	872.092	8	0.286	8	0.036	0.011	0.049		1.092		0.022	0.006	
1662	M177	12in Dia. Duct	Sec 1 - min	0.060	6	0.860	8	-0.122	4	0.662	7	-1.536	6	-0.519	6	-0.554	7	-1468.410	5	-0.481	5	0.004	0.068	0.025		1.536		0.037	0.066	
376	M40	6in Dia. Duct	Sec 3 - min	0.066	8	-0.207	6	-0.129	6	-0.460	7	-0.141	6	-0.777	5	0.159	8	472.962	5	0.396	5	0.009	0.033	0.056		0.777		0.049	0.026	
1001	M111	6in Dia. Duct	Sec 1 - max	-0.007	7	0.058	5	-0.136	6	0.872	8	-0.277	5	0.069	5	0.672	8	-478.065	6	-0.400	6	0.001	0.046	0.046		0.672		0.046	0.017	
1661	M176	12in Dia. Duct	Sec 1 - max	0.304	7	0.825	2	-0.021	3	0.071	8	-0.054	7	0.690	7	0.169	6	183.470	8	0.060	8	0.022	0.043	0.031		0.971		0.005	0.063	
1639	M174	12in Dia. Duct	Sec 5 - max	0.503	7	0.222	6	-0.023	3	0.574	6	0.333	7	0.766	5	-0.367	8	754.611	8	0.247	8	0.037	0.020	0.034		0.766		0.019	0.017	
647	M67	12in Dia. Duct	Sec 4 - max	0.513	7	0.059	6	-0.032	3	0.233	6	0.318	7	1.004	5	-0.541	6	872.092	8	0.286	8	0.037	0.014	0.046		1.004		0.022	0.004	
1654	M176	12in Dia. Duct	Sec 2 - min	0.220	6	0.736	1	-0.120	4	0.356	7	-1.113	6	-0.179	6	-0.663	7	-1610.208	5	-0.528	5	0.016	0.049	0.030		1.113		0.041	0.057	
384	M109	6in Dia. Duct	Sec 2 - min	-0.054	6	-0.018	8	-0.245	7	0.051	6	-0.673	8	-0.570	6	0.274	5	-716.478	7	-0.601	7	0.007	0.046	0.041		0.673		0.074	0.030	
1901	M191	16in Dia. Duct	Sec 1 - max	0.078	2	-0.456	2	0.051	4	0.421	1	-0.090	2	-0.179	7	0.794	8	-853.734	7	-0.169	7	0.009	0.030	0.057		0.794		0.021	0.056	
1911	M112	6in Dia. Duct	Sec 1 - max	0.007	7	0.096	5	-0.134	6	0.742	8	-0.450	6	0.237	5	0.582	8	-621.143	6	-0.520	6	0.001	0.053	0.042		0.742		0.064	0.017	
1648	M176	12in Dia. Duct	Sec 4 - min	0.346	6	0.493	1	-0.119	4	-0.043	7	-0.872	6	0.178	0	-0.696	7	-1491.883	5	-0.489	5	0.025	0.039	0.031		0.872		0.038	0.036	
644	M67	12in Dia. Duct	Sec 2 - min	0.492	6	-0.088	7	-0.096	4	-0.199	2	-0.191	1	0.915	3	-1.199	4	-872.071	5	-0.286	5	0.033	0.009	0.053		1.198		0.022	0.007	
1637	M174	12in Dia. Duct	Sec 4 - max	0.503	7	0.223	6	-0.023	3	0.533	6	0.360	7	0.773	5	-0.366	8	754.611	8	0.247	8	0.037	0.024	0.034		0.773		0.019	0.017	
2133	M224	3in Dia. Duct	Sec 2 - max	0.181	5	0.048	5	0.033	1	-0.843	5	0.920	8	0.738	2	0.703	1	-14.328	8	-0.061	8	0.021	0.041	0.033		0.920		0.005	0.004	
370	M39	6in Dia. Duct	Sec 5 - min	-0.053	5	0.110	6	-0.033	8	0.391	5	-0.649	8	0.026	5	-0.691	8	-678.610	7	-0.558	7	0.007	0.039	0.049		0.651		0.070	0.017	
991	M110	6in Dia. Duct	Sec 1 - max	-0.021	7	0.083	5	-0.138	6	0.646	8	-0.124	5	-0.082	6	0.633	8	-310.560	6	-0.266	6	0.003	0.046	0.045		0.646		0.033	0.017	
1643	M175	12in Dia. Duct	Sec 2 - max	0.437	7	0.549	2	-0.022	3	0.674	6	0.236	7	0.726	7	-0.200	6	493.081	8	0.158	8	0.032	0.030	0.032		0.726		0.012	0.042	
1605	M191	16in Dia. Duct	Sec 3 - max	0.076	2	-0.462	2	0.047	4	-0.072	1	0.432	2	-0.220	7	0.759	6	-853.734	7	-0.169	7	0.009	0.031	0.054		0.759		0.021	0.057	
1635	M174	12in Dia. Duct	Sec 3 - max	0.503	7	0.223	6	-0.024	3	0.491	6	0.366	7	0.780	5	-0.405	8	754.611	8	0.247	8	0.037	0.022	0.035		0.780		0.019	0.017	
2554	M266	3in Dia. Duct	Sec 2 - min	0.096	7	0.036	8	-0.010	7	0.650	5	-0.659	8	-1.185	6	-0.166	5	-36.186	5	-0.155	5	0.011	0.029	0.053		1.185		0.012	0.003	
983	M109	6in Dia. Duct	Sec 2 - max	-0.034	7	0.052	5	-0.139	6	0.673	8	-0.051	5	-0.274	5	0.570	8	-173.491	6	-0.145	6	0.004	0.049	0.041		0.673		0.019	0.017	
2013	M212	3in Dia. Duct	Sec 2 - max	0.236	7	0.042	8	-0.037	1	0.191	6	-0.183	7	1.304	6	-1.000	7	-15.162	5	-0.096	5	0.030	0.005	0.068		1.304		0.004	0.003	
650	M67	12in Dia. Duct	Sec 5 - min	0.439	6	-0.066	7	-0.114	4	-0.439	7	-0.407	6	0.339	8	-0.924	5	-872.071	5	-0.286	5	0.032	0.030	0.041		0.924		0.022	0.009	
389	M39	6in Dia. Duct	Sec 5 - max	-0.037	8	0.240	7	0.033	5	0.549	8	-0.391	5	0.681	8	-0.028	5	-119.100	6	-0.100	6	0.006	0.038	0.049		0.681		0.012	0.030	
649	M67	12in Dia. Duct	Sec 3 - min	0.447	6	-0.055	7	-0.102	4	-0.249	2	-0.232	1	0.737	5	-1.092	5	-872.071	5	-0.286	5	0.033	0.011	0.049		1.092		0.022	0.006	
73	M8	6in Dia. Duct	Sec 2 - max	-0.115	2	-0.129	2	-0.047	5	-0.626	2	0.725	1	0.253	8	0.356	5	139.532	0	0.117	6	0.016	0.052	0.025		0.725		0.014	0.016	
1633	M174	12in Dia. Duct	Sec 2 - max	0.504	7	0.224	6	-0.025	3	0.449	6	0.413	7	0.787	5	-0.424	8	754.611	8	0.247	8	0.037	0.020	0.035		0.787		0.019	0.017	
1631	M174	12in Dia. Duct	Sec 1 - max	0.504	7	0.224	6	-0.025	3	0.407	6	0.439	7	0.795	5	-0.444	8	754.611	8	0.247	8	0.037	0.020	0.035		0.795		0.019	0.017	
1646	M175	12in Dia. Duct	Sec 3 - min	0.346	6	0.494	1	-0.118	4	-0.139	7	-0.773	6	0.189	0	-0.711	7	-1491.883	5	-0.489	5	0.025	0.034	0.032		0.773		0.038	0.036	
646	M67	12in Dia. Duct	Sec 4 - min	0.443	6	-0.062	7	-0.108	4	-0.316	7	-0.293	6	0.541	8	-1.004	6	-872.071	5	-0.286	5	0.032	0.014	0.046		1.004		0.022	0.009	
1975	M208	3in Dia. Duct	Sec 3 - max	0.160	7	0.025	7	0.058	5	0.459	6	-0.405	7	1.072	5	-0.395	8	34.434	9	0.147	5	0.021	0.022	0.048		1.072		0.011	0.004	
1640	M174	12in Dia. Duct	Sec 5 - min	0.493	6	0.142	7	-0.117	4	-0.333	7	-0.574	6	0.367	8	-0.786	5	-1130.158	5	-0.370	5	0.031	0.026	0.034		0.786		0.028	0.011	
1641	M175	12in Dia. Duct	Sec 1 - max	0.437	7	0.549	2	-0.023	3	0.574	6	0.333	7	0.741	7	-0.212	6	493.081	8	0.158	8	0.032	0.026	0.033		0.741		0.012	0.042	
357	M38	5in Dia. Duct	Sec 4 - max	0.005	5	0.018	7	0.074	6	0.191	6	0.667	7	0.223	8	0.481	5	401.076	7	0.622	7	0.001	0.053	0.037		0.667		0.072	0.010	
358	M38	5in Dia. Duct	Sec 4 - min	-0.005	6	0.018	6	-0.060	5	-0.667	7	-0.191	6	-0.401	5	-0.223	8	274.123	6	0.357	6	0.001	0.053	0.037		0.667		0.049	0.011	
1652	M176	12in Dia. Duct	Sec 1 - min	0.220	5	0.737	1	-0.119	4	0.054	7	-0.971	6	-0.109	6	-0.696	7	-1610.208	5	-0.528	5	0.016	0.049	0.031		0.971		0.041	0.057	
693	M60	8in Dia. Duct	Sec 2 - max	0.216	5	0.041	7	0.075	6	0.317	7	0.117	6	0.502	6	0.566	7	0.000	1	0.000	1	0.026	0.023	0.040		0.590		0.000	0.009	
1945	M205	2in Dia. Duct	Sec 3 - max	0.149	5	0.019	6	0.035	2	0.996	5	-0.522	8	0.017	3	0.522	2	-5.895	6	-0.080	8	0.033	0.037	0.019		0.996		0.005	0.002	
689	M71	16in Dia. Duct	Sec 4 - min	-0.033	1	-0.476	2	-0.057	3	0.209	2	-0.574	1	-0.623	6	0.696	7	-2517.459	6	-0.499	6	0.004	0.041	0.045		0.623		0.062	0.059	
1608	M174	12in Dia. Duct	Sec 4 - min	0.424	6	0.142	7	-0.116	4	-0.360	7	-0.533	6	0.386	8	-0.773	5	-1130.158	5	-0.370	5	0.031	0.024	0.034		0.773		0.028	0.011	
992	M109	6in Dia. Duct	Sec 1 - min	-0.054	6	-0.018	6	-0.246	7	0.025	5	-0.681	8	-0.469	6	0.192	5	-716.478	7	-0.601	7	0.007	0.049	0.034		0.681		0.074	0.030	
687	M71	16in Dia. Duct	Sec 4 - max	0.030	2	-0.462	1	0.052	4	0.574	1	-0.208	2	-0.006	7	0.623	6	-925.473	7	-0.163	7	0.003	0.041	0.045		0.623		0.023	0.057	
1069	M117	6in Dia. Duct	Sec 5 - max	0.014	8	-0.056	5	0.025	5	-0.181	6	0.732	7	0.302	6	0.485	5	401.076	7	0.336	7	0.002	0.052	0.035		0.732		0.041	0.007	
1070	M117	6in Dia. Duct	Sec 5 - min	-0.014	5	-0.058	1	-0.029	8	-0.732	7	0.181	6	-0.485	5	0.302	8	274.123	6	0.226	6	0.002	0.052	0.035		0.732		0.028	0.007	
1954	M206	2in Dia. Duct	Sec 2 - min	0.078	8	-0.246	5	-0.273	7	-0.341	7	-0.495	6	-1.442	1	-0.924	2	-24.608	5	-0.035	5	0.017	0.018	0.053		1.442		0.021	0.010	
1902	M193	16in Dia. Duct	Sec 1 - min	0.014	1	-0.487	1	-0.068	3	0.060	2	-0.021	1	-0.784	6	0.179	7	-2158.192	6	-0.430	6	0.002	0.030	0.057		0.784		0.053	0.058	
694	M60	8in Dia. Duct	Sec 2 - min	-0.209	5	-0.028	6	-0.006	7	-0.117	6	-0.317	7	-0.566	7	-0.502	6	0.000	1	0.000	1	0.025	0.023	0.040		0.566		0.000	0.011	
1944	M205	2in Dia. Duct	Sec 2 - min	0.087	6	0.014	7	0.000	1	0.075	6	-0.774	7	-1.074	2	-0.162	1	-24.608	5	-0.035	5	0.019	0.029	0.040		1.074		0.021	0.001	
2057	M216	3in Dia. Duct	Sec 4 - max	0.055	5	-0.032	5	0.052	6	-0.112	7	0.114	6	1.715	8	-0.667	5	-6.980	8	-0.030	8	0.006	0.005	0.076		1.715		0.002	0.006	
1644	M175	12in Dia. Duct	Sec 2 - min	0.348	6	0.495	1	-0.117	4	-0.230	7	-0.674	6	0.200	0	-0.726	7	-1491.883	5	-0.489	5	0.025	0.030	0.032		0.726		0.038	0.036	
1636	M174	12in Dia. Duct	Sec 3 - min	0.424	6	0.141	7	-0.118	4	-0.366	7	-0.491	6	0.405	8	-0.780	5	-1130.158	5	-0.370	5	0.031	0.022	0.035		0.780		0.028	0.011	
2134	M224	3in Dia. Duct	Sec 2 - min	0.115	6	0.036	8	-0.008	2	-0.920	6	0.843	6	-0.703	1	-0.738	2	-36.186	5	-0.155	5	0.013	0.041	0.033		0.938		0.012	0.003	
1608	M191	16in Dia. Duct	Sec 3 - min	0.017	1	-0.472	1	-0.052	3	-0.432	2	0.072	1	-0.759	6	0.229	7	-2158.192	6	-0.430	6	0.002	0.031	0.054		0.759		0.053	0.058	
2211	M232	3in Dia. Duct	Sec 1 - max	0.149	5	0.045	5	0.028	7	0.004	6	0.500	5	-0.045	1	0.986	2	0.093	5	0.035	5	0.017	0.026	0.044		0.986		0.003	0.003	
991	M109	6in Dia. Duct	Sec 1 - max	-0.034	7	0.053	5	-0.140	6	0.681	8	-0.025	5	-0.192	5	0.469	8	-173.491	6	-0.145	6	0.004	0.049	0.034		0.681		0.016	0.017	
2075	M216	3in Dia. Duct	Sec 3 - max	0.069	5	0.033	5	0.462	6	-0.146	5	0.227	8	0.577	5	1.485	8	-6.980	8	-0.030	8	0.010	0.010	0.066		1.485		0.002	0.036	
1700	M180	4in Dia. Duct	Sec 5 - min	-0.036	8	-0.078	7	0.024	5	-0.925	7	0.362	6	0.626	5	-0.935	5	-1.169	5	-0.003	5	0.000	0.041	0.042		0.935		0.000	0.006	
1634	M174	12in Dia. Duct	Sec 2 - min	0.425	6	0.141	7	-0.115	4	-0.413	7	-0.449	6	0.424	5	-0.787	5	-1130.158	5	-0.370	5	0.031	0.020	0.035		0.787		0.028	0.011	

D-2259

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	fa/σa	fby/σb	fbz/σb	fs (ksi)	fv/Fv	ft/σt
1632	M174	12in Dia. Duct	Sec 1 - min	0.425	6	0.141	7	-0.114	4	-0.439	7	-0.407	6	0.444	8	-0.705	5	-1130.158	6	-0.370	5	0.031	0.020	0.035	0.793	0.028	0.011
1067	M117	6in Dia. Duct	Sec 4 - max	0.014	8	-0.055	5	0.027	5	-0.092	8	0.644	7	0.346	8	0.529	5	401.076	7	0.336	7	0.002	0.048	0.038	0.644	0.041	0.007
1068	M117	6in Dia. Duct	Sec 4 - min	-0.014	5	-0.055	1	-0.027	8	-0.644	7	0.092	6	-0.529	5	-0.346	8	274.123	6	0.229	6	0.002	0.048	0.038	0.644	0.028	0.007
1947	M205	3in Dia. Duct	Sec 4 - max	0.152	5	0.003	6	0.049	2	0.987	1	-0.530	2	0.321	2	0.408	1	-5.895	6	-0.080	6	0.034	0.037	0.015	0.987	0.005	0.003
2139	M224	3in Dia. Duct	Sec 5 - max	0.191	5	0.060	5	0.023	7	0.196	5	0.375	6	1.042	2	-0.027	1	-14.328	8	-0.061	6	0.022	0.017	0.048	1.042	0.005	0.002
2141	M225	3in Dia. Duct	Sec 1 - max	0.191	5	0.037	8	-0.004	6	0.196	5	0.375	8	1.042	2	-0.027	1	-14.328	8	-0.061	6	0.022	0.017	0.046	1.042	0.005	0.003
1620	M172	12in Dia. Duct	Sec 5 - min	-0.127	6	-0.217	7	-0.104	6	-1.372	4	0.955	3	-0.321	5	-0.321	6	-693.515	5	-0.227	5	0.009	0.061	0.014	1.372	0.017	0.017
2006	M211	3in Dia. Duct	Sec 3 - max	0.209	7	-0.002	6	0.040	8	0.036	7	-0.313	5	1.024	1	-0.641	2	-13.162	5	-0.056	5	0.024	0.015	0.046	1.024	0.004	0.003
1695	M180	4in Dia. Duct	Sec 4 - min	-0.038	8	-0.077	7	0.024	5	-0.890	7	0.382	6	0.604	8	-0.926	5	-1.169	5	-0.003	5	0.003	0.040	0.041	0.926	0.000	0.006
242	M25	4in Dia. Duct	Sec 1 - min	-0.029	8	0.024	6	-0.067	6	0.495	8	-0.905	5	0.302	6	-0.925	7	53.088	5	0.119	5	0.003	0.040	0.041	0.925	0.009	0.005
1642	M175	12in Dia. Duct	Sec 1 - min	0.349	6	0.490	1	-0.117	4	-0.333	7	-0.574	6	0.212	8	-0.741	7	-1491.663	5	-0.493	5	0.023	0.026	0.023	0.741	0.039	0.036
1692	M180	4in Dia. Duct	Sec 3 - min	-0.035	8	-0.076	7	0.025	5	-0.906	8	0.345	5	0.539	8	-0.898	5	-1.169	5	-0.003	5	0.003	0.040	0.040	0.906	0.000	0.006
1699	M180	4in Dia. Duct	Sec 5 - max	-0.009	5	0.053	6	0.058	8	-0.362	8	0.926	7	0.935	5	-0.626	8	96.077	6	0.215	8	0.001	0.041	0.042	0.935	0.016	0.004
1690	M179	4in Dia. Duct	Sec 5 - min	-0.043	8	-0.080	7	0.026	5	-0.906	8	0.345	5	0.580	7	-0.875	6	-103.048	5	-0.227	5	0.004	0.040	0.039	0.906	0.017	0.006
1694	M180	4in Dia. Duct	Sec 2 - min	-0.035	8	-0.077	7	0.025	6	-0.888	8	0.373	5	0.581	8	-0.908	5	-1.169	5	-0.003	5	0.003	0.039	0.040	0.908	0.000	0.006
241	M25	4in Dia. Duct	Sec 1 - max	-0.019	5	0.058	8	0.087	7	0.905	5	-0.495	8	0.925	7	-0.362	6	130.227	6	0.287	6	0.002	0.040	0.041	0.925	0.022	0.005
1688	M179	4in Dia. Duct	Sec 4 - min	-0.043	8	-0.080	7	0.025	5	-0.909	8	0.318	6	0.559	7	-0.865	6	-103.048	5	-0.227	5	0.004	0.040	0.038	0.909	0.017	0.005
1610	M171	12in Dia. Duct	Sec 5 - min	-0.107	8	-0.260	7	-0.103	6	-1.291	4	0.042	3	-0.399	5	-0.399	8	-498.755	5	-0.163	6	0.008	0.057	0.018	1.291	0.013	0.019
2165	M227	6in Dia. Duct	Sec 3 - max	0.074	8	0.064	7	0.159	7	-0.108	8	0.303	7	0.726	5	-0.508	6	353.378	6	0.298	6	0.009	0.022	0.052	0.726	0.037	0.020
1896	M180	4in Dia. Duct	Sec 3 - min	-0.030	8	-0.077	7	0.025	5	-0.869	8	0.400	5	0.583	8	-0.917	5	-1.169	5	-0.003	5	0.003	0.039	0.041	0.917	0.000	0.005
1818	M172	12in Dia. Duct	Sec 4 - min	-0.126	6	-0.216	7	-0.104	6	-1.352	4	0.927	3	-0.301	5	-0.301	8	-693.515	5	-0.227	5	0.009	0.060	0.013	1.352	0.017	0.017
1866	M179	4in Dia. Duct	Sec 3 - min	-0.042	8	-0.079	7	0.026	5	-0.912	8	0.292	5	0.539	7	-0.854	6	-103.048	5	-0.227	5	0.004	0.041	0.038	0.912	0.017	0.006
1987	M209	3in Dia. Duct	Sec 4 - max	0.159	7	-0.031	7	-0.115	8	0.266	6	-0.254	7	-0.588	6	1.174	7	-27.019	6	-0.115	6	0.018	0.012	0.052	1.174	0.009	0.009
1065	M117	6in Dia. Duct	Sec 3 - max	0.013	8	-0.051	5	0.026	5	-0.009	6	0.561	7	0.397	8	0.570	5	401.076	7	0.330	7	0.002	0.040	0.041	0.570	0.041	0.006
1066	M117	6in Dia. Duct	Sec 3 - min	-0.013	5	-0.051	1	-0.026	8	-0.561	7	0.009	6	-0.570	5	-0.397	8	274.123	6	0.229	6	0.002	0.040	0.041	0.570	0.028	0.006
1684	M179	4in Dia. Duct	Sec 2 - min	-0.042	8	-0.079	7	0.026	6	-0.915	8	0.265	5	0.516	7	-0.844	6	-103.048	5	-0.227	5	0.004	0.041	0.038	0.915	0.017	0.006
2213	M232	3in Dia. Duct	Sec 2 - max	0.143	5	0.043	5	0.029	7	0.089	8	0.522	5	-0.018	1	0.953	2	6.083	5	0.035	5	0.017	0.023	0.042	0.953	0.003	0.003
2068	M218	3in Dia. Duct	Sec 4 - min	0.009	8	-0.032	8	0.027	7	-0.114	6	0.112	7	0.567	5	-1.715	8	-7.691	5	-0.033	5	0.001	0.005	0.076	1.715	0.003	0.002
1682	M179	4in Dia. Duct	Sec 1 - min	-0.042	8	-0.076	7	0.026	5	-0.918	8	0.239	5	0.498	7	-0.833	6	-103.048	5	-0.227	5	0.004	0.041	0.037	0.919	0.017	0.006
1697	M180	4in Dia. Duct	Sec 4 - max	-0.009	5	0.053	8	0.058	8	-0.382	8	0.696	7	0.926	5	-0.804	8	98.677	8	0.213	6	0.001	0.040	0.041	0.926	0.016	0.004
1976	M208	3in Dia. Duct	Sec 3 - min	0.097	8	0.023	6	0.012	8	0.405	7	-0.498	6	0.395	8	-1.072	5	30.864	7	0.132	7	0.011	0.022	0.048	1.072	0.010	0.002
1691	M180	4in Dia. Duct	Sec 1 - max	-0.008	5	0.053	8	0.057	8	-0.345	5	0.908	8	0.898	5	-0.539	8	96.677	8	0.213	6	0.001	0.040	0.040	0.906	0.016	0.004
1616	M172	12in Dia. Duct	Sec 3 - min	-0.128	6	-0.216	7	-0.103	6	-1.331	4	0.888	3	-0.282	5	-0.282	8	-693.515	5	-0.227	6	0.009	0.059	0.013	1.331	0.017	0.017
1693	M180	4in Dia. Duct	Sec 2 - max	-0.009	5	0.053	8	0.058	8	-0.373	5	0.880	8	0.908	5	-0.561	8	96.677	8	0.213	8	0.001	0.039	0.040	0.908	0.016	0.004
1608	M171	12in Dia. Duct	Sec 4 - min	-0.107	6	-0.249	7	-0.102	6	-1.257	4	0.803	3	-0.379	5	-0.379	8	-498.755	5	-0.163	6	0.008	0.056	0.017	1.257	0.013	0.019
2335	M244	6in Dia. Duct	Sec 3 - max	0.051	7	0.046	5	0.091	8	0.098	7	0.149	8	0.880	7	-0.133	6	411.135	8	0.344	8	0.006	0.011	0.063	0.880	0.042	0.011
1619	M172	12in Dia. Duct	Sec 5 - max	-0.069	5	-0.044	6	0.104	6	-0.955	3	1.372	4	0.321	8	0.321	5	693.536	8	0.227	8	0.005	0.061	0.014	1.372	0.017	0.009
1695	M180	4in Dia. Duct	Sec 3 - max	-0.009	6	0.053	8	0.058	8	-0.400	5	0.869	8	0.917	5	-0.583	8	96.677	8	0.213	8	0.001	0.039	0.041	0.917	0.016	0.004
1689	M179	4in Dia. Duct	Sec 5 - max	0.011	5	0.017	6	0.057	8	-0.345	5	0.906	8	0.875	6	-0.580	7	22.461	8	0.049	8	0.001	0.040	0.039	0.906	0.004	0.004
368	M30	6in Dia. Duct	Sec 4 - min	-0.055	6	0.141	6	-0.034	6	0.128	7	-0.290	8	-0.010	5	-0.726	8	-678.610	7	-0.566	7	0.007	0.021	0.052	0.726	0.070	0.017
2147	M225	3in Dia. Duct	Sec 4 - max	0.197	5	0.008	6	-0.015	6	0.180	8	0.474	5	-0.193	6	0.814	7	-14.328	8	-0.061	8	0.023	0.021	0.036	0.814	0.005	0.001
2188	M227	6in Dia. Duct	Sec 3 - min	0.052	5	0.045	6	0.091	8	-0.303	7	0.169	6	0.508	8	-0.726	5	326.161	7	0.273	7	0.007	0.022	0.052	0.726	0.034	0.011
2018	M212	3in Dia. Duct	Sec 3 - min	0.049	6	0.013	6	-0.007	7	0.858	7	-0.865	6	-0.816	2	-0.086	1	-14.055	8	-0.060	8	0.005	0.038	0.036	0.865	0.006	0.005
1687	M179	4in Dia. Duct	Sec 4 - max	0.011	5	0.017	6	0.057	8	-0.318	5	0.909	8	0.805	6	-0.559	7	22.461	8	0.049	8	0.001	0.040	0.035	0.909	0.004	0.004
1630	M173	12in Dia. Duct	Sec 5 - min	-0.127	6	-0.160	7	-0.105	6	-1.386	4	1.011	3	-0.201	6	-0.201	7	-828.032	5	-0.271	5	0.009	0.062	0.009	1.386	0.021	0.012
1063	M117	6in Dia. Duct	Sec 2 - max	0.012	8	-0.048	6	0.024	5	0.068	8	0.464	7	0.428	8	0.609	5	401.076	7	0.338	7	0.002	0.035	0.044	0.609	0.041	0.006
1064	M117	6in Dia. Duct	Sec 2 - min	-0.012	5	-0.048	1	-0.024	8	-0.484	7	-0.068	6	-0.609	5	-0.428	8	274.123	6	0.229	6	0.002	0.035	0.044	0.609	0.028	0.006
1685	M179	4in Dia. Duct	Sec 3 - max	0.011	5	0.017	6	0.057	8	-0.292	5	0.912	8	0.854	6	-0.539	7	22.461	8	0.049	8	0.001	0.041	0.038	0.912	0.004	0.004
2078	M218	3in Dia. Duct	Sec 3 - min	-0.026	8	0.029	8	0.131	7	-0.227	8	0.146	5	-1.485	8	-0.577	5	-7.691	5	-0.033	6	0.003	0.010	0.066	1.485	0.003	0.010
1683	M179	4in Dia. Duct	Sec 2 - max	0.011	5	0.017	5	0.057	6	-0.285	5	0.915	8	0.644	6	-0.518	7	22.461	6	0.049	6	0.001	0.041	0.038	0.915	0.004	0.004
2212	M232	3in Dia. Duct	Sec 1 - min	0.079	8	0.017	8	0.013	6	-0.588	6	-0.084	8	-0.988	2	0.045	1	-0.039	6	0.000	6	0.009	0.026	0.044	0.988	0.000	0.001
1614	M172	12in Dia. Duct	Sec 2 - min	-0.125	8	-0.215	7	-0.103	6	-1.311	4	0.870	3	-0.262	5	-0.262	8	-693.515	5	-0.227	5	0.009	0.058	0.012	1.311	0.017	0.017
1681	M179	4in Dia. Duct	Sec 1 - max	0.011	5	0.017	6	0.056	8	-0.239	5	0.819	8	0.833	6	-0.498	7	22.461	8	0.049	8	0.001	0.041	0.037	0.819	0.004	0.004
1628	M173	12in Dia. Duct	Sec 4 - min	-0.127	8	-0.149	7	-0.105	6	-1.382	4	0.997	3	-0.182	6	-0.162	7	-828.032	5	-0.271	5	0.009	0.061	0.008	1.382	0.021	0.011
1617	M172	12in Dia. Duct	Sec 4 - max	-0.068	5	-0.044	8	0.104	8	-0.927	3	1.352	4	0.301	8	0.301	5	693.538	6	0.227	6	0.005	0.060	0.013	1.352	0.017	0.006
1629	M173	12in Dia. Duct	Sec 5 - max	-0.106	7	0.067	8	0.105	8	-1.011	3	1.386	4	0.201	7	0.201	6	828.054	8	0.271	8	0.008	0.062	0.009	1.386	0.021	0.006
1608	M171	12in Dia. Duct	Sec 3 - min	-0.106	8	-0.248	7	-0.102	6	-1.224	4	0.764	3	-0.360	5	-0.360	8	-498.755	5	-0.163	5	0.008	0.064	0.016	1.224	0.013	0.019
387	M39	6in Dia. Duct	Sec 4 - max	-0.038	8	0.244	7	0.034	5	0.299	6	-0.128	7	0.726	8	0.019	5	-119.100	6	-0.100	6	0.005	0.021	0.052	0.726	0.012	0.030
1626	M173	12in Dia. Duct	Sec 3 - min	-0.126	8	-0.148	7	-0.105	6	-1.379	4	0.963	3	-0.162	6	-0.162	7	-828.032	5	-0.271	5	0.009	0.061	0.007	1.379	0.021	0.011
1803	M191	16in Dia. Duct	Sec 2 - max	0.077	2	-0.459	2	0.049	4	0.175	1	0.190	2	-0.200	7	0.776	6	-653.734	7	-0.169	7	0.009	0.014	0.055	0.778	0.021	0.057
2215	M232	3in Dia. Duct	Sec 3 - max	0.143	5	0.041	5	0.029	7	0.111	8	0.458	5	0.000	1	0.915	2	6.083	5	0.035	6	0.017	0.020	0.041	0.915	0.003	0.003
690	M71	16in Dia. Duct	Sec 5 - min	-0.033	1	-0.478	2	-0.056	3	0.050	2	-0.421	1	-0.611	6	0.110	7	-2517.459	6	-0.499	6	0.004	0.030	0.044	0.611	0.062	0.059
1612	M172	12in Dia. Duct	Sec 1 - min	-0.125	6	-0.214	7	-0.103	6	-1.291	4	0.842	3	-0.243	5	-0.243	8	-693.516	5	-0.227	5	0.009	0.057	0.011	1.291	0.017	0.016
1627	M173	12in Dia. Duct	Sec 4 - max	-0.106	7	0.057	6	0.106	8	-0.997	3	1.382	4	0.162	7	0.162	6	828.054	8	0.271	8	0.006	0.061	0.008	1.382	0.021	0.008
689	M71	16in Dia. Duct	Sec 5 - max	0.030	2	-0.463	1	0.051	4	0.421	1	-0.050	2	-0.110	7	0.811	6	-925.473	7	-0.183	7	0.003	0.030	0.044	0.611	0.023	0.057
2336	M244	6in Dia. Duct	Sec 3 - min	-0.023	8	-0.051	6	0.015	5	-0.149	6	-0.098	7	0.133	6	-0.886	7	-347.388	5	-0.291	5	0.003	0.011	0.063	0.886	0.036	0.006
1061	M117	6in Dia. Duct	Sec 1 - max	0.011	8	-0.044	5	0.022	5	0.141	8	0.411	7	0.462	8	0.645	5	401.076	7	0.338	7	0.001	0.029	0.046	0.645	0.041	0.005
1062	M117	6in Dia. Duct	Sec 1 - min	-0.011	6	-0.044	1	-0.022	8	-0.411	7	-0.141	6	-0.646	5	-0.462	8	274.123	6	0.229	6	0.001	0.029	0.046	0.645	0.028	0.005
1609	M171	12in Dia. Duct	Sec 5 - max	-0.022	7	-0.135	8	0.103	8	-0.842	3	1.291	4	0.399	8	0.399	5	498.771	8	0.163	8	0.002	0.057	0.018	1.291	0.013	0.010
1624	M173	12in Dia. Duct	Sec 2 - min	-0.126	6	-0.148	7	-0.104	6	-1.376	4	0.959	3	-0.142	6	-0.142	7	-828.032	5	-0.271	5	0.009	0.061	0.006	1.376	0.021	0.011
1015	M172	12in Dia. Duct	Sec 3 - max	-0.068	5	-0.043	6	0.103	8	-0.898	3	1.331	4	0.282	8	0.282	5	693.536	6	0.227	8	0.005	0.059	0.013	1.331	0.017	0.008
2477	M268	6in Dia. Duct	Sec 4 - max	0.102	7	-0.033	7	-0.075	6	0.450	7	0.025	6	-0.272	1	0.442	2	-179.120	5	-0.150	6	0.013	0.032	0.032	0.450	0.019	0.009
386	M39	6in Dia. Duct	Sec 3 - min	-0.056	6	0.143	6	-0.036	6	-0.196	7	-0.111	6	-0.066	5	-0.773	8	-678.010	7	-0.588	7	0.007	0.014	0.055	0.773	0.070	0.018
1622	M173	12in Dia. Duct	Sec 1 - min	-0.125	6	-0.148	7	-0.104	6	-1.372	4	0.955	3	-0.138	2	-0.138	1	-828.032	6	-0.271	5	0.009	0.061	0.006	1.372	0.021	0.011
1625	M173	12in Dia. Duct	Sec 3 - max	-0.106	7	0.057	6	0.105	8	-0.963	3	1.379	4	0.162	7	0.162	6	828.054	8	0.271	8	0.008	0.061	0.007	1.379	0.021	0.008
1604	M171	12in Dia. Duct	Sec 2 - min	-0.108	6	-0.247	7	-0.102	8	-1.190	4	0.726	3	-0.341	5	-0.341	8	-498.755	5	-0.163	5	0.008	0.053	0.015	1.190	0.013	0.019
225	M23	4in Dia. Duct	Sec 3 - max	0.011	5	0.052	5	0.071	6	-0.348	5	0.417	8	-0.748	6	1.263	6	-74.673	6	-0.164	8	0.001	0.019	0.056	1.263	0.013	0.005
226	M23	4in Dia. Duct	Sec 3 - min	-0.011	6	0.032	8	0.012	7	-0.417	8	0.348	5	-1.263	5	0.748	8	-188.024	5	-0.415	5	0.001	0.019	0.056	1.263	0.032	0.002
1600	M170	12in Dia. Duct	Sec 5 - min	-0.072	8	-0.244	7	-0.102	6	-1.157	4	0.660	3	-0.422	5	-0.422	8	-409.190	1	-0.134	1	0.005	0.051	0.019	1.167	0.010	0.019
2140	M224	3in Dia. Duct	Sec 5 - min	0.104	8	-0.012	8	0.001	8	-0.375	8	-0.198	5	0.027	1	-1.042	2	-36.188	5	-0.155	5	0.012	0.017	0.046	1.042	0.012	0.001
2142	M225	3in Dia. Duct	Sec 1 - min	0.105	8	-0.013	5	-0.079	7	-0.375	8	-0.190	5	0.027	1	-1.042	2	-36.188	5	-0.156	5	0.012	0.017	0.048	1.042	0.012	0.006
1623	M173	12in Dia. Duct	Sec 2 - max	-0.105	7	0.056	6	0.104	8	-0.989	3	1.376	4	0.142	7	0.142	6	828.054	8	0.271	8	0.008	0.061	0.006	1.376	0.021	0.008
1613	M172	12in Dia. Duct	Sec 2 - max	-0.086	5	-0.043	6	0.103	8	-0.870	3	1.311	4	0.262	8	0.262	5	693.538	8	0.227	8	0.005	0.058	0.012	1.311	0.017	0.008
2135	M224	3in Dia. Duct	Sec 3 - max	0.185	5	0.033	5	0.022	1	-0.264	5	0.506	4	0.694	2	0.315	1	-14.326	8	-0.061	8	0.022	0.022	0.031	0.694	0.005	0.003
1621	M173	12in Dia. Duct	Sec 1 - max	-0.105	7	0.056	8	0.104	8	-0.955	3	1.372	4	0.138	1	0.138	2	828.054	8	0.271	8	0.008	0.061	0.006	1.372	0.021	0.008

D-2250

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_a	f_{by}/σ_b	f_{bz}/σ_b	[redacted]	f_t (ksi)	[redacted]	f/σ_t	f/σ_v	[redacted]
2214	M232	3in Dia. Duct	Sec 2 - min	0.079	8	0.016	0	0.012	6	-0.522	5	-0.089	8	-0.853	2	0.018	1	-0.009	8	0.000	8	0.008	0.023	0.042		0.953		0.000	0.001	
1948	M205	2in Dia. Duct	Sec 3 - min	0.083	8	-0.002	7	-0.014	1	0.522	8	-0.990	5	-0.322	2	-0.017	1	-24.008	5	-0.335	5	0.018	0.037	0.019		0.996		0.021	0.001	
385	M39	6in Dia. Duct	Sec 3 - max	-0.040	8	0.243	7	0.036	6	0.111	6	0.106	7	0.773	0	0.066	6	-119.100	6	-0.100	6	0.005	0.014	0.066		0.773		0.012	0.030	
1607	M171	12in Dia. Duct	Sec 4 - max	-0.021	7	-0.135	6	0.102	8	-0.805	3	1.257	4	0.379	6	0.379	5	498.771	8	0.163	8	0.002	0.056	0.017		1.257		0.013	0.010	
1602	M171	12in Dia. Duct	Sec 1 - min	-0.106	6	-0.248	7	-0.102	6	-1.157	4	0.688	3	-0.322	5	-0.322	8	-498.755	5	-0.163	5	0.006	0.051	0.014		1.157		0.013	0.019	
2333	M244	6in Dia. Duct	Sec 2 - max	0.046	7	0.085	5	0.080	8	0.299	8	0.469	5	0.476	5	0.387	8	411.135	8	0.344	8	0.006	0.034	0.034		0.476		0.042	0.010	
2217	M232	3in Dia. Duct	Sec 4 - max	0.143	5	0.039	5	0.030	7	0.130	8	0.397	5	0.029	1	0.677	2	8.003	5	0.035	5	0.017	0.078	0.039		0.677		0.003	0.003	
1611	M172	12in Dia. Duct	Sec 1 - max	-0.066	6	-0.043	6	0.103	8	-0.842	3	1.281	4	0.243	8	0.243	5	693.636	8	0.227	8	0.005	0.057	0.011		1.281		0.017	0.008	
1987	M207	3in Dia. Duct	Sec 4 - max	0.168	7	-0.016	8	0.030	8	-0.260	7	0.332	6	-0.399	6	0.866	5	34.434	6	0.147	6	0.020	0.016	0.038		0.866		0.011	0.002	
1598	M170	12in Dia. Duct	Sec 4 - min	-0.072	8	-0.243	7	-0.101	6	-1.116	4	0.645	3	-0.403	5	-0.403	8	-409.190	1	-0.134	1	0.005	0.050	0.018		1.116		0.010	0.019	
2014	M212	3in Dia. Duct	Sec 2 - min	0.055	8	0.042	5	-0.085	2	0.103	7	-0.191	6	1.000	7	-1.304	6	-14.056	8	-0.000	8	0.006	0.006	0.058		1.304		0.005	0.007	
1599	M170	12in Dia. Duct	Sec 5 - max	0.028	7	-0.204	6	0.102	8	-0.688	3	1.157	4	0.422	8	0.422	5	409.200	2	0.134	2	0.002	0.051	0.019		1.157		0.010	0.016	
2127	M223	3in Dia. Duct	Sec 4 - max	0.169	5	-0.036	8	0.024	2	0.079	8	-0.620	5	0.383	1	0.502	2	-14.328	8	-0.061	8	0.020	0.030	0.022		0.679		0.005	0.003	
1605	M171	12in Dia. Duct	Sec 3 - max	-0.021	7	-0.134	6	0.102	8	-0.764	3	1.224	4	0.360	8	0.360	5	498.771	8	0.163	8	0.002	0.054	0.016		1.224		0.013	0.010	
2137	M224	3in Dia. Duct	Sec 4 - max	0.188	5	0.016	8	0.017	7	0.082	5	0.323	6	0.795	2	0.071	1	-14.320	8	-0.061	8	0.022	0.014	0.035		0.795		0.006	0.001	
1958	M209	3in Dia. Duct	Sec 4 - min	0.002	6	-0.033	6	-0.227	5	0.254	7	-0.266	6	-1.174	7	0.568	6	-28.024	8	-0.120	8	0.007	0.012	0.052		1.174		0.009	0.017	
1680	M178	4in Dia. Duct	Sec 5 - min	-0.038	6	-0.061	7	0.026	6	-0.919	8	0.239	5	0.376	7	-0.599	6	-172.913	5	-0.380	5	0.004	0.041	0.027		0.919		0.029	0.005	
2053	M216	3in Dia. Duct	Sec 2 - max	0.046	1	0.014	5	0.081	6	0.244	2	-0.238	1	0.068	7	1.232	8	-6.980	8	-0.030	8	0.005	0.011	0.055		1.232		0.002	0.006	
1604	M191	16in Dia. Duct	Sec 2 - min	0.015	1	-0.469	1	-0.064	3	-0.190	2	-0.175	1	-0.770	6	0.200	7	-2168.192	6	-0.430	6	0.002	0.014	0.055		0.776		0.053	0.058	
1965	M207	3in Dia. Duct	Sec 3 - max	0.164	7	0.007	6	0.025	6	0.009	7	0.252	6	-0.847	1	0.098	2	34.434	6	0.147	6	0.019	0.011	0.040		0.895		0.011	0.002	
1596	M170	12in Dia. Duct	Sec 3 - min	-0.072	8	-0.242	7	-0.101	6	-1.075	4	0.603	3	-0.384	5	-0.384	8	-409.190	1	-0.134	1	0.005	0.048	0.017		1.075		0.010	0.019	
2216	M232	3in Dia. Duct	Sec 3 - min	0.078	8	0.014	8	0.011	6	-0.459	5	-0.111	8	-0.915	2	-0.006	1	-0.009	8	0.000	8	0.009	0.020	0.041		0.915		0.000	0.001	
1679	M178	4in Dia. Duct	Sec 5 - max	0.027	6	-0.022	5	0.056	8	-0.239	5	0.919	8	0.599	6	-0.376	7	-48.062	8	-0.106	8	0.003	0.041	0.027		0.919		0.008	0.004	
1678	M178	4in Dia. Duct	Sec 4 - min	-0.038	8	-0.060	7	0.027	5	-0.806	8	0.221	5	0.356	7	-0.588	8	-172.913	5	-0.380	5	0.004	0.040	0.028		0.900		0.029	0.005	
2334	M244	6in Dia. Duct	Sec 2 - min	-0.017	6	-0.032	8	0.026	5	-0.469	5	-0.298	0	-0.367	6	-0.476	5	-347.366	5	-0.291	5	0.002	0.034	0.034		0.476		0.036	0.004	
1603	M171	12in Dia. Duct	Sec 2 - max	-0.021	7	-0.134	6	0.102	8	-0.726	3	1.190	4	0.341	8	0.341	5	498.771	8	0.163	8	0.002	0.053	0.015		1.190		0.013	0.010	
1597	M170	12in Dia. Duct	Sec 4 - max	0.027	7	-0.203	6	0.101	8	-0.645	3	1.116	4	0.403	8	0.403	5	409.200	2	0.134	2	0.002	0.050	0.016		1.116		0.010	0.016	
1948	M205	2in Dia. Duct	Sec 4 - min	0.080	6	-0.019	7	-0.028	1	0.538	2	-0.987	1	-0.408	1	-0.321	2	-24.608	5	-0.335	5	0.018	0.037	0.015		0.987		0.021	0.002	
1677	M178	4in Dia. Duct	Sec 4 - max	0.027	5	-0.022	6	0.056	8	-0.221	5	0.908	8	0.588	6	-0.356	7	-48.062	8	-0.106	8	0.003	0.040	0.026		0.908		0.008	0.004	
1676	M178	4in Dia. Duct	Sec 3 - min	-0.038	8	-0.059	7	0.027	5	-0.893	8	0.203	5	0.336	7	-0.577	6	-172.913	5	-0.380	5	0.004	0.040	0.028		0.893		0.029	0.005	
2219	M232	3in Dia. Duct	Sec 5 - max	0.144	5	0.038	5	0.031	7	0.147	8	0.339	5	0.050	1	0.836	2	8.083	5	0.035	5	0.017	0.016	0.037		0.836		0.003	0.003	
2148	M225	3in Dia. Duct	Sec 4 - min	0.099	8	-0.041	8	-0.068	7	-0.474	5	-0.180	8	-0.814	7	0.193	6	-36.188	5	-0.155	5	0.012	0.021	0.036		0.814		0.012	0.005	
2006	M211	3in Dia. Duct	Sec 3 - min	0.068	8	-0.003	7	0.034	5	0.313	6	-0.330	7	0.641	2	-1.024	1	-14.056	8	-0.060	8	0.008	0.015	0.046		1.024		0.005	0.003	
1674	M178	4in Dia. Duct	Sec 2 - min	-0.036	8	-0.059	7	0.027	5	-0.881	8	0.180	5	0.316	7	-0.560	6	-172.913	5	-0.380	5	0.004	0.039	0.025		0.881		0.029	0.005	
1675	M178	4in Dia. Duct	Sec 3 - max	0.027	5	-0.021	6	0.056	8	-0.203	5	0.893	8	0.577	6	-0.336	7	-48.062	8	-0.106	8	0.003	0.040	0.028		0.893		0.008	0.004	
1594	M170	12in Dia. Duct	Sec 2 - min	-0.071	8	-0.241	7	-0.101	6	-1.034	4	0.560	3	-0.365	5	-0.365	8	-409.190	1	-0.134	1	0.005	0.046	0.016		1.034		0.010	0.019	
2054	M216	3in Dia. Duct	Sec 2 - min	0.015	2	0.014	8	0.009	7	0.238	1	-0.244	2	-1.232	6	-0.088	7	-7.691	5	-0.033	5	0.002	0.011	0.055		1.232		0.003	0.001	
1601	M171	12in Dia. Duct	Sec 1 - max	-0.021	7	-0.133	6	0.102	8	-0.688	3	1.157	4	0.322	8	0.322	5	498.771	8	0.163	8	0.002	0.051	0.014		1.157		0.013	0.010	
2128	M223	3in Dia. Duct	Sec 4 - min	0.127	8	-0.038	5	-0.029	1	0.020	5	-0.670	8	-0.502	2	-0.303	1	-36.188	5	-0.155	5	0.015	0.030	0.022		0.679		0.012	0.003	
1673	M178	4in Dia. Duct	Sec 2 - max	0.027	5	-0.021	6	0.055	8	-0.180	5	0.881	8	0.566	6	-0.316	7	-48.062	8	-0.106	8	0.003	0.039	0.025		0.881		0.008	0.004	
561	M61	12in Dia. Duct	Sec 1 - max	0.000	1	0.000	1	0.000	1	1.142	3	-0.667	4	0.362	6	0.362	7	384.330	2	0.126	2	0.000	0.051	0.016		1.142		0.010	0.000	
562	M61	12in Dia. Duct	Sec 1 - min	0.000	1	0.000	1	0.000	1	0.667	4	-1.142	3	-0.362	7	-0.362	6	-384.324	1	-0.126	1	0.000	0.051	0.016		1.142		0.010	0.000	
1595	M170	12in Dia. Duct	Sec 3 - max	0.027	7	-0.202	6	0.101	8	-0.603	3	1.075	4	0.384	8	0.384	5	409.200	2	0.134	2	0.002	0.048	0.017		1.075		0.010	0.016	
1672	M178	4in Dia. Duct	Sec 1 - min	-0.037	8	-0.058	7	0.027	5	-0.869	8	0.166	5	0.298	7	-0.559	6	-172.913	5	-0.380	5	0.004	0.039	0.026		0.868		0.029	0.004	
563	M61	12in Dia. Duct	Sec 2 - max	0.000	5	-0.005	1	0.003	2	1.140	3	-0.064	4	0.360	6	0.360	7	384.330	2	0.126	2	0.000	0.051	0.016		1.140		0.010	0.000	
564	M61	12in Dia. Duct	Sec 2 - min	0.000	6	-0.005	1	-0.003	1	0.664	4	-1.140	3	-0.360	7	-0.360	6	-384.324	1	-0.126	1	0.000	0.051	0.016		1.140		0.010	0.000	
2476	M258	6in Dia. Duct	Sec 4 - min	0.023	6	-0.052	8	-0.177	7	-0.025	6	-0.450	7	-0.442	2	0.272	1	-325.274	7	-0.272	7	0.003	0.032	0.032		0.450		0.034	0.022	
565	M61	12in Dia. Duct	Sec 3 - max	0.002	5	-0.010	1	0.007	2	1.132	3	-0.656	4	0.357	6	0.357	7	384.330	2	0.126	2	0.000	0.050	0.015		1.132		0.010	0.001	
566	M61	12in Dia. Duct	Sec 3 - min	-0.002	6	-0.010	1	-0.007	1	0.656	4	-1.132	3	-0.357	7	-0.357	6	-384.324	1	-0.126	1	0.000	0.050	0.015		1.132		0.010	0.001	
2130	M224	3in Dia. Duct	Sec 3 - min	0.112	8	0.021	8	0.002	2	-0.505	8	0.284	5	-0.315	1	-0.694	2	-36.188	5	-0.155	5	0.013	0.022	0.031		0.694		0.012	0.002	
1968	M207	3in Dia. Duct	Sec 4 - min	0.109	8	-0.028	7	-0.005	5	-0.332	6	0.280	7	-0.866	5	0.599	8	30.864	7	0.132	7	0.013	0.015	0.036		0.866		0.010	0.002	
1871	M178	4in Dia. Duct	Sec 1 - max	0.027	5	-0.020	6	0.055	8	-0.168	5	0.868	8	0.555	6	-0.298	7	-48.062	8	-0.106	8	0.003	0.039	0.025		0.868		0.008	0.004	
2218	M232	3in Dia. Duct	Sec 4 - min	0.078	8	0.012	8	0.011	6	-0.397	5	-0.130	8	-0.877	2	-0.029	1	-0.009	8	0.000	8	0.009	0.018	0.039		0.877		0.000	0.001	
587	M61	12in Dia. Duct	Sec 4 - max	0.003	5	-0.016	1	0.010	2	1.119	3	-0.643	4	0.352	6	0.352	7	384.330	2	0.126	2	0.000	0.050	0.016		1.119		0.010	0.001	
648	M61	12in Dia. Duct	Sec 4 - min	-0.003	0	-0.014	1	-0.010	1	0.643	4	-1.119	3	-0.352	7	-0.352	6	-384.324	1	-0.128	1	0.000	0.050	0.016		1.119		0.010	0.001	
1592	M170	12in Dia. Duct	Sec 1 - min	-0.071	8	-0.240	7	-0.100	6	-0.993	4	0.518	3	-0.347	5	-0.347	8	-409.190	1	-0.134	1	0.005	0.044	0.015		0.993		0.010	0.018	
569	M61	12in Dia. Duct	Sec 5 - max	0.004	5	-0.019	1	0.014	2	1.101	3	-0.625	4	0.345	6	0.345	7	384.330	2	0.126	2	0.000	0.049	0.015		1.101		0.010	0.001	
590	M61	12in Dia. Duct	Sec 5 - min	-0.004	6	-0.019	1	-0.014	1	0.625	4	-1.101	3	-0.345	7	-0.345	6	-384.324	1	-0.126	1	0.000	0.049	0.016		1.101		0.010	0.001	
639	M66	12in Dia. Duct	Sec 5 - max	0.050	7	-0.225	1	0.100	8	-0.518	3	0.993	4	0.375	8	0.375	5	384.330	2	0.126	2	0.004	0.044	0.017		0.993		0.010	0.017	
640	M66	12in Dia. Duct	Sec 5 - min	-0.050	6	-0.225	8	-0.100	6	-0.993	4	0.518	3	-0.375	5	-0.375	8	-384.324	1	-0.126	1	0.004	0.044	0.017		0.993		0.010	0.017	
1966	M207	3in Dia. Duct	Sec 3 - min	0.113	6	-0.004	7	0.003	7	-0.252	6	-0.009	7	-0.898	2	0.647	1	30.884	7	0.132	7	0.013	0.011	0.040		0.898		0.010	0.000	
1693	M170	12in Dia. Duct	Sec 2 - max	0.027	7	-0.202	6	0.101	6	-0.560	3	1.034	4	0.365	8	0.365	5	409.200	2	0.134	2	0.002	0.048	0.016		1.034		0.010	0.016	
2138	M224	3in Dia. Duct	Sec 4 - min	0.108	8	0.005	8	0.006	0	-0.323	8	-0.082	5	-0.071	1	-0.795	2	-36.188	5	-0.155	5	0.013	0.014	0.035		0.795		0.012	0.001	
1591	M170	12in Dia. Duct	Sec 1 - max	0.027	7	-0.201	6	0.100	8	-0.518	3	0.993	4	0.347	8	0.347	5	409.200	2	0.134	2	0.002	0.044	0.015		0.993		0.010	0.016	
2220	M232	3in Dia. Duct	Sec 5 - min	0.076	8	0.010	8	0.010	8	-0.339	5	-0.147	8	-0.636	2	-0.050	1	-0.009	8	0.000	8	0.009	0.015	0.037		0.836		0.000	0.001	
239	M24	4in Dia. Duct	Sec 5 - max	0.032	7	-0.031	6	0.055	8	-0.160	5	0.868	8	0.409	8	-0.161	5	-74.073	6	-0.164	6	0.003	0.039	0.018		0.868		0.013	0.004	
240	M24	4in Dia. Duct	Sec 5 - min	-0.032	6	-0.051	8	0.027	5	-0.868	8	0.160	5	0.161	5	-0.409	8	-188.824	5	-0.415	5	0.003	0.039	0.018		0.868		0.032	0.004	
637	M66	12in Dia. Duct	Sec 4 - max	0.060	7	-0.222	1	0.099	8	-0.392	3	0.868	4	0.319	8	0.319	5	384.330	2	0.126	2	0.004	0.039	0.014		0.868		0.010	0.017	
636	M66	12in Dia. Duct	Sec 4 - min	-0.060	8	-0.222	8	-0.099	6	-0.668	4	0.392	3	-0.319	5	-0.319	8	-384.324	1	-0.120	1	0.004	0.039	0.014		0.888		0.010	0.017	
1085	M209	3in Dia. Duct	Sec 3 - max	0.157	7	-0.025	7	-0.110	8	0.428	6	-0.406	7	0.352	5	0.288	8	-27.019	6	-0.115	6	0.018	0.019	0.016		0.428		0.009	0.009	
227	M23	4in Dia. Duct	Sec 4 - max	0.013	5	0.044	8	0.067	8	-0.073	6	0.250	5	-0.657	5	0.881	6	-74.673	6	-0.164	6	0.001	0.011	0.039		0.881		0.013	0.005	
228	M23	4in Dia. Duct	Sec 4 - min	-0.013	8	0.024	8	0.016	7	-0.253	8	0.073	5	-0.661	8	0.657	8	-108.024	5	-0.415	5	0.001	0.011	0.039		0.851		0.032	0.002	
2123	M223	3in Dia. Duct	Sec 2 - max	0.165	6	0.050	8	0.028	7	0.201	2	-0.109	1	0.623	2	0.260	2	-14.328	6	-0.061	6	0.019	0.009	0.023		0.523		0.005	0.004	
635	M66	12in Dia. Duct	Sec 3 - max	0.049	7	-0.220	1	0.098	8	-0.268	3	0.743	4	0.263	6	0.263	5	384.330	2	0.126	2	0.004	0.033	0.012		0.743		0.010	0.017	
636	M66	12in Dia. Duct	Sec 3 - min	-0.049	6	-0.220	8	-0.020	6	-0.743	4	0.266	3	-0.263	5	-0.263	8	-384.324	1	-0.126	1	0.004	0.033	0.012		0.743		0.010	0.017	
2124	M223	3in Dia. Duct	Sec 2 - min	0.131	7	0.049	5	-0.031	7	0.199	1	-0.201	1	-0.260	2	-0.523	1	-36.184	5	-0.155	5	0.015	0.009	0.023		0.523		0.012	0.004	
2143	M225	3in Dia. Duct	Sec 2 - max	0.193	5	0.027	6	-0.008	5	0.069	1	0.127	2	0.427	2	0.850	1	-14.328	6	-0.061	6	0.022	0.006	0.019		0.427		0.005	0.002	
2557	M259	3in Dia. Duct	Sec 4 - max	0.182	6	-0.050	5	0.032	6	0.210	5	-0.195	2	0.335	2	0.372	1	-14.328	8	-0.061	8	0.021	0.009	0.017		0.372		0.005	0.004	
2145	M225	3in Dia. Duct	Sec 3 - max	0.195	5	0.018	8	-0.012	8	0.109	6	0.206	7	-0.042	8	0.273	5	-14.320	8	-0.061	8	0.023	0.009	0.012		0.273		0.005	0.001	
1966	M209	3in Dia. Duct	Sec 3 - min	0.003	6	-0.027	8	-0.223	6	0.400	7	-0.428	7	-0.268	8	-0.352	5	-28.024	8	-0.120	8	0.007	0.019	0.016		0.428		0.009	0.017	
2539	M284	2in Dia. Duct	Sec 6 - max	0.165	5	-0.056	5	-0.099	8	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.041	0.000	0.000		0.185		0.000	0.006	
231	M24	4in Dia. Duct	Sec 1 - max	0.025	7	-0.002	5	0.044	6	0.166	5	0.145	6	-0.355	7	0.710	8	-74.673	6	-0.164	6	0.002	0.007	0.032		0.710		0.013	0.003	
232	M24	4in Dia. Duct	Sec 1 - min	-0.025	6	-0.022	8	0.039	7	-0.145	8	-0.155	5	-0.710	7	0.355	8	-188.824	6	-0.415	6	0.002	0.007	0.032		0.710		0.032	0.003	
237	M24	4in Dia. Duct	Sec 4 - max	0.030	7	-0.023	5	0.052	8	-0.034	6	0.635	8	0.216	8	0.056	7	-74.073	8	-0.164	8	0.003	0.028	0.010		0.635		0.013	0.004	
238	M24	4in Dia. Duct	Sec 4 - min	-0.030	6	-0.044	6	0.031	5	-0.635	8	0.034	5	-0.056	7	-0.218	6	-188.824	5	-0.415	5	0.003	0.028	0.010		0.636		0.032	0.003	

A5-1214

D-2250

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_a	f_{sy}/σ_a	f_{sz}/σ_a	f_t (ksi)	f_t/σ_t	f_t/σ_a
633	M66	12in Dia. Duct	Sec 2 - max	0.049	7	-0.216	1	0.097	6	-0.145	3	0.620	4	0.208	8	0.206	5	384.330	2	0.126	2	0.004	0.028	0.009	0.620	0.010	0.017
634	M66	12in Dia. Duct	Sec 2 - min	-0.049	8	-0.218	6	-0.097	8	-0.620	4	0.145	3	-0.209	5	-0.208	8	-384.324	1	-0.126	1	0.004	0.028	0.009	0.620	0.010	0.017
2035	M215	3in Dia. Duct	Sec 3 - max	0.050	5	-0.022	5	0.072	6	0.295	2	-0.201	1	0.474	4	-0.125	3	e -6.980	6	-0.030	6	0.000	0.013	0.021	0.474	0.002	0.006
229	M23	4in Dia. Duct	Sec 5 - max	0.016	5	0.030	5	0.063	6	0.155	5	0.142	5	-0.355	8	0.710	7	-74.673	6	-0.164	6	0.001	0.007	0.032	0.710	0.013	0.005
230	M23	4in Dia. Duct	Sec 5 - min	-0.015	6	0.018	6	0.020	7	-0.145	8	-0.155	6	-0.710	7	0.355	6	-188.824	5	-0.415	5	0.001	0.007	0.032	0.710	0.032	0.002
2588	M285	3in Dia. Duct	Sec 4 - min	0.114	7	-0.050	8	-0.019	5	0.195	8	-0.210	5	-0.372	1	-0.335	2	-36.188	5	-0.155	5	0.013	0.009	0.017	0.372	0.012	0.004
1973	M208	3in Dia. Duct	Sec 2 - max	0.176	7	0.043	7	0.066	5	-0.014	6	0.140	7	0.264	8	-0.077	5	34.434	6	0.147	6	0.020	0.006	0.012	0.264	0.011	0.005
235	M24	4in Dia. Duct	Sec 2 - max	0.027	7	-0.009	5	0.044	8	0.127	5	0.273	8	-0.146	6	0.510	7	-74.673	6	-0.164	6	0.003	0.012	0.023	0.510	0.012	0.003
234	M24	4in Dia. Duct	Sec 2 - min	-0.027	6	-0.029	8	0.038	5	-0.273	6	-0.127	5	-0.510	7	-0.146	6	-188.824	5	-0.415	5	0.003	0.012	0.023	0.510	0.032	0.003
2144	M225	3in Dia. Duct	Sec 2 - min	0.103	8	-0.032	5	-0.076	7	-0.127	2	-0.069	1	-0.060	1	-0.437	2	-36.188	5	-0.155	5	0.012	0.006	0.019	0.427	0.012	0.006
2849	M205	3in Dia. Duct	Sec 5 - max	0.183	5	-0.168	8	-0.121	6	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.036	0.000	0.000	0.183	0.000	0.000
2066	M216	3in Dia. Duct	Sec 3 - min	0.011	8	-0.009	8	0.019	7	0.291	1	-0.394	2	0.125	3	-0.474	4	-7.591	5	-0.033	5	0.001	0.013	0.021	0.474	0.003	0.001
235	M24	4in Dia. Duct	Sec 3 - max	0.028	7	-0.016	5	0.048	8	0.064	5	0.436	6	0.045	6	0.292	7	-74.673	8	-0.164	5	0.003	0.019	0.013	0.436	0.013	0.004
236	M24	4in Dia. Duct	Sec 3 - min	-0.028	6	-0.037	8	0.034	5	-0.436	6	-0.064	5	-0.292	7	-0.045	6	-188.824	5	-0.415	5	0.003	0.019	0.013	0.436	0.032	0.003
2003	M211	3in Dia. Duct	Sec 2 - max	0.203	7	0.026	6	0.054	1	0.049	7	-0.018	6	0.003	6	0.171	5	-13.162	5	-0.056	5	0.024	0.002	0.009	0.203	0.004	0.004
1480	M159	12in Dia. Duct	Sec 5 - min	-0.057	5	-0.063	6	-0.045	2	-0.325	4	-0.272	3	-0.330	2	-0.330	1	-70.689	1	-0.023	1	0.004	0.014	0.015	0.330	0.002	0.005
1491	M160	12in Dia. Duct	Sec 1 - max	0.028	8	0.005	2	0.030	8	0.912	1	-0.298	2	0.186	7	0.187	6	439.952	2	0.144	2	0.002	0.023	0.008	0.512	0.011	0.002
1492	M160	12in Dia. Duct	Sec 1 - min	-0.028	6	-0.006	1	-0.030	7	0.298	2	-0.512	1	-0.187	6	-0.186	7	176.816	1	0.058	1	0.002	0.023	0.008	0.512	0.004	0.002
1511	M162	12in Dia. Duct	Sec 1 - max	0.028	7	0.006	1	0.033	1	0.512	2	-0.298	1	0.186	8	0.187	5	-176.812	2	-0.058	2	0.002	0.023	0.008	0.512	0.004	0.003
1512	M162	12in Dia. Dust	Sec 1 - min	-0.028	8	-0.008	2	-0.033	2	0.298	1	-0.512	2	-0.187	5	-0.186	8	-439.950	1	-0.144	1	0.002	0.023	0.008	0.512	0.011	0.003
2146	M225	3in Dia. Duct	Sec 3 - min	0.101	8	-0.032	5	-0.072	7	-0.206	7	-0.100	8	-0.273	5	0.042	8	-36.188	5	-0.155	5	0.012	0.009	0.012	0.273	0.012	0.005
1489	M159	12in Dia. Duct	Sec 5 - max	-0.045	8	0.021	7	0.046	1	0.272	3	0.325	4	0.330	1	0.330	2	70.689	2	0.023	2	0.004	0.014	0.015	0.330	0.002	0.004
591	M62	12in Dia. Duct	Sec 1 - max	0.020	5	0.007	1	0.035	8	0.505	7	-0.235	1	0.195	5	0.195	8	-241.657	2	-0.079	2	0.001	0.022	0.009	0.505	0.000	0.003
592	M62	12in Dia. Duct	Sec 1 - min	-0.020	8	-0.025	2	-0.036	5	0.235	1	-0.505	2	-0.195	8	-0.195	5	-435.950	1	-0.143	1	0.001	0.022	0.009	0.505	0.011	0.003
611	M64	12in Dia. Duct	Sec 1 - max	0.020	7	0.007	2	0.035	7	0.505	1	-0.235	2	0.195	6	0.195	7	435.951	2	0.143	2	0.001	0.022	0.009	0.505	0.011	0.003
612	M64	12in Dia. Duct	Sec 1 - min	-0.020	6	-0.028	1	-0.036	6	0.235	2	-0.505	1	-0.195	7	-0.195	6	241.659	1	0.079	1	0.001	0.022	0.009	0.505	0.006	0.003
631	M66	12in Dia. Duct	Sec 1 - max	0.046	7	-0.215	1	0.096	8	-0.023	3	0.499	4	0.154	8	0.154	5	384.330	2	0.126	2	0.004	0.022	0.007	0.499	0.010	0.017
632	M66	12in Dia. Duct	Sec 1 - min	-0.046	6	-0.218	8	-0.096	6	-0.499	4	0.023	3	-0.154	5	-0.154	8	-384.324	1	-0.126	1	0.004	0.022	0.007	0.499	0.010	0.017
1488	M159	12in Dia. Duct	Sec 4 - min	-0.056	5	-0.063	6	-0.046	2	-0.315	4	-0.269	3	-0.322	2	-0.322	1	-70.689	1	-0.023	1	0.004	0.014	0.014	0.322	0.002	0.005
1487	M159	12in Dia. Duct	Sec 4 - max	-0.048	8	0.021	7	0.045	1	0.269	3	0.315	4	0.322	1	0.322	2	70.689	2	0.023	2	0.004	0.014	0.014	0.322	0.002	0.003
549	M57	12in Dia. Duct	Sec 5 - max	0.033	8	0.046	2	0.044	4	0.333	2	0.333	1	0.325	4	0.272	3	29.034	1	0.010	1	0.002	0.015	0.014	0.333	0.001	0.004
550	M57	12in Dia. Duct	Sec 5 - min	0.033	7	-0.046	1	-0.044	3	-0.333	1	-0.333	2	-0.272	3	-0.325	4	-29.034	2	-0.010	2	0.002	0.015	0.014	0.333	0.000	0.003
2529	M253	2in Dia. Duct	Sec 5 - max	0.142	5	-0.091	8	-0.049	8	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.032	0.000	0.000	0.142	0.000	0.003
1486	M159	12in Dia. Duct	Sec 3 - min	-0.056	5	-0.062	6	-0.044	2	-0.305	4	-0.267	3	-0.313	2	-0.313	1	-70.689	1	-0.023	1	0.004	0.014	0.014	0.313	0.002	0.005
589	M58	12in Dia. Duct	Sec 5 - max	0.017	8	0.087	6	0.005	6	0.565	3	-0.078	4	0.127	6	0.127	7	384.329	2	0.126	2	0.001	0.025	0.006	0.555	0.010	0.007
590	M58	12in Dia. Duct	Sec 5 - min	-0.017	5	0.087	7	-0.035	7	0.079	4	-0.555	3	-0.127	7	-0.127	6	-384.325	1	-0.126	1	0.001	0.025	0.006	0.555	0.010	0.007
1493	M160	12in Dia. Duct	Sec 2 - max	0.028	8	0.003	2	0.035	8	0.508	3	-0.297	4	0.154	7	0.154	6	439.952	2	0.144	2	0.002	0.023	0.007	0.508	0.011	0.003
1494	M160	12in Dia. Duct	Sec 2 - min	-0.028	7	-0.013	1	-0.033	7	0.297	4	-0.508	3	-0.154	8	-0.154	7	176.816	1	0.058	1	0.002	0.023	0.007	0.508	0.004	0.003
1513	M162	12in Dia. Duct	Sec 2 - max	0.028	8	0.003	1	0.033	1	0.508	3	-0.297	4	0.154	8	0.154	5	-176.812	2	-0.058	2	0.002	0.023	0.007	0.508	0.004	0.003
1514	M162	12in Dia. Duct	Sec 2 - min	-0.028	5	-0.013	2	-0.033	2	0.297	4	-0.508	3	-0.154	5	-0.154	8	-439.950	1	-0.144	1	0.002	0.023	0.007	0.508	0.011	0.003
1485	M159	12in Dia. Duct	Sec 3 - max	-0.046	8	0.021	7	0.044	1	0.267	3	0.305	4	0.313	1	0.313	2	70.689	2	0.023	2	0.004	0.014	0.014	0.313	0.002	0.003
1484	M159	12in Dia. Duct	Sec 2 - min	-0.056	5	-0.062	6	-0.044	2	-0.235	4	-0.305	3	-0.305	2	-0.305	1	-70.689	1	-0.023	1	0.004	0.013	0.014	0.305	0.002	0.005
1483	M159	12in Dia. Duct	Sec 2 - max	-0.047	8	0.021	7	0.044	1	0.265	3	0.235	4	0.305	1	0.305	2	70.689	2	0.023	2	0.003	0.013	0.014	0.305	0.002	0.003
593	M62	12in Dia. Duct	Sec 2 - max	0.020	5	0.003	1	0.038	6	0.480	2	-0.240	1	0.162	5	0.162	8	-241.657	2	-0.079	2	0.001	0.021	0.007	0.480	0.006	0.003
594	M62	12in Dia. Duct	Sec 2 - min	-0.020	6	-0.030	2	-0.038	5	0.240	1	-0.480	2	-0.162	8	-0.162	5	-435.950	1	-0.143	1	0.001	0.021	0.007	0.480	0.011	0.003
613	M64	12in Dia. Duct	Sec 2 - max	0.020	7	0.003	2	0.038	7	0.480	1	-0.240	2	0.162	6	0.162	7	435.951	2	0.143	2	0.001	0.021	0.007	0.480	0.011	0.003
614	M64	12in Dia. Duct	Sec 2 - min	-0.020	6	-0.030	1	-0.038	6	0.240	2	-0.480	1	-0.162	7	-0.162	8	241.659	1	0.079	1	0.001	0.021	0.007	0.480	0.006	0.003
1482	M159	12in Dia. Duct	Sec 1 - min	-0.055	5	-0.061	6	-0.043	2	-0.265	4	-0.263	3	-0.297	2	-0.297	1	-70.689	1	-0.023	1	0.004	0.013	0.013	0.297	0.002	0.005
1874	M208	3in Dia. Duct	Sec 2 - min	0.100	6	0.041	6	0.004	8	-0.140	7	0.014	6	0.077	6	-0.284	8	30.864	7	0.132	7	0.012	0.006	0.012	0.284	0.010	0.003
1495	M160	12in Dia. Duct	Sec 3 - max	0.029	8	-0.001	2	0.035	6	0.500	3	-0.290	4	0.118	7	0.118	6	439.952	2	0.144	2	0.002	0.022	0.005	0.500	0.011	0.003
1496	M160	12in Dia. Duct	Sec 3 - min	-0.029	7	-0.017	1	-0.035	7	0.290	4	-0.500	3	-0.118	6	-0.118	7	176.816	1	0.058	1	0.002	0.022	0.005	0.500	0.004	0.003
1515	M162	12in Dia. Duct	Sec 3 - max	0.029	8	-0.001	1	0.035	5	0.500	3	-0.290	4	0.118	8	0.118	5	-176.812	2	-0.058	2	0.002	0.022	0.005	0.500	0.004	0.003
1516	M162	12in Dia. Duct	Sec 3 - min	-0.029	5	-0.017	2	-0.035	8	0.290	4	-0.500	3	-0.118	5	-0.118	8	-439.950	1	-0.144	1	0.002	0.022	0.005	0.500	0.011	0.003
587	M58	12in Dia. Duct	Sec 4 - max	0.018	8	0.089	6	0.036	8	0.516	3	-0.042	4	0.112	6	0.112	7	384.329	2	0.126	2	0.001	0.023	0.006	0.518	0.010	0.007
588	M58	12in Dia. Duct	Sec 4 - min	-0.018	5	0.089	7	-0.035	7	0.042	4	-0.518	3	-0.112	7	-0.112	6	-384.325	1	-0.126	1	0.001	0.023	0.006	0.518	0.010	0.007
1491	M159	12in Dia. Duct	Sec 1 - max	0.047	8	0.020	7	0.043	1	0.283	3	0.285	4	0.297	1	0.297	2	70.689	2	0.023	2	0.003	0.013	0.013	0.297	0.002	0.003
1501	M161	12in Dia. Duct	Sec 1 - max	0.035	8	-0.010	2	0.008	6	0.537	3	-0.300	4	0.049	8	0.049	5	163.236	2	0.060	2	0.003	0.024	0.002	0.537	0.005	0.001
1502	M161	12in Dia. Duct	Sec 1 - min	-0.035	7	-0.020	1	-0.008	7	0.300	4	-0.537	3	-0.049	5	-0.049	8	-153.910	1	-0.050	1	0.003	0.024	0.002	0.537	0.004	0.002
1521	M163	12in Dia. Duct	Sec 1 - max	0.035	6	-0.010	1	0.008	5	0.537	3	-0.300	4	0.049	7	0.049	6	153.913	2	0.050	2	0.003	0.024	0.002	0.537	0.004	0.001
1522	M163	12in Dia. Duct	Sec 1 - min	-0.035	5	-0.020	2	-0.008	8	0.300	4	-0.537	3	-0.049	6	-0.049	7	-153.235	1	-0.050	1	0.003	0.024	0.002	0.537	0.005	0.002
1503	M161	12in Dia. Duct	Sec 2 - max	0.035	6	-0.011	2	0.009	6	0.534	3	-0.297	4	0.048	8	0.048	5	163.236	2	0.060	2	0.003	0.024	0.002	0.534	0.005	0.001
1504	M161	12in Dia. Duct	Sec 2 - min	-0.036	7	-0.027	1	-0.008	7	0.297	4	-0.534	3	-0.048	5	-0.048	8	-153.910	1	-0.050	1	0.003	0.024	0.002	0.534	0.004	0.001
1523	M163	12in Dia. Duct	Sec 2 - max	0.036	8	-0.011	1	0.008	5	0.534	3	-0.297	4	0.048	7	0.048	6	153.913	2	0.050	2	0.003	0.024	0.002	0.534	0.005	0.002
1524	M163	12in Dia. Duct	Sec 2 - min	-0.036	5	-0.027	2	-0.008	8	0.297	4	-0.534	3	-0.048	6	-0.048	7	-153.235	1	-0.050	1	0.003	0.024	0.002	0.534	0.005	0.001
1505	M161	12in Dia. Duct	Sec 3 - max	0.035	6	-0.012	2	0.009	6	0.531	3	-0.294	4	0.047	8	0.047	5	163.236	2	0.060	2	0.003	0.024	0.002	0.531	0.005	0.001
1506	M161	12in Dia. Duct	Sec 3 - min	-0.036	7	-0.028	1	-0.009	7	0.294	4	-0.531	3	-0.047	5	-0.047	8	-153.910	1	-0.050	1	0.003	0.024	0.002	0.531	0.004	0.002
1525	M163	12in Dia. Duct	Sec 3 - max	0.036	8	-0.012	1	0.009	5	0.531	3	-0.294	4	0.047	7	0.047	6	153.913	2	0.050	2	0.003	0.024	0.002	0.531	0.004	0.001
1526	M163	12in Dia. Duct	Sec 3 - min	-0.036	5	-0.028	2	-0.009	8	0.294	4	-0.531	3	-0.047	6	-0.047	7	-153.235	1	-0.050	1	0.003	0.024	0.002	0.531	0.005	0.002
1507	M161	12in Dia. Duct	Sec 4 - max	0.036	8	-0.012	2	0.009	6	0.528	3	-0.290	4	0.046	8	0.046	5	163.236	2	0.060	2	0.003	0.023	0.002	0.528	0.005	0.001
1508	M161	12in Dia. Duct	Sec 4 - min	-0.036	7	-0.028	1	-0.009	7	0.290	4	-0.528	3	-0.046	5	-0.046	8	-153.910	1	-0.050	1	0.003	0.023	0.002	0.528	0.004	0.002
1527	M163	12in Dia. Duct	Sec 4 - max	0.036	8	-0.012	1	0.009	5	0.528	3	-0.290	4	0.046	7	0.046	6	153.913	2	0.050	2	0.003	0.023	0.002	0.528	0.004	0.001
1528	M163	12in Dia. Duct	Sec 4 - min	-0.036	5	-0.028	2	-0.009	8	0.290	4	-0.528	3	-0.046	6	-0.046	7	-153.235	1	-0.050	1	0.003	0.023	0.002	0.528	0.005	0.002
1480	M168	12in Dia. Duct	Sec 5 - min	-0.055	5	-0.092	6	-0.043	2	-0.265	4	-0.263	3	-0.257	2	-0.257	1	-238.593	1	-0.078	1	0.004	0.013	0.011	0.235	0.005	0.007
2062	M217	3in Dia. Duct	Sec 2 - max	0.066	5	0.030	8	-0.050	5	0.236	1	-0.235	2	0.222	6	0.200	7	-6.980	8	-0.030	8	0.003	0.010	0.010	0.236	0.002	0.004
1509	M161	12in Dia. Duct	Sec 5 - max	0.035	6	-0.013	2	0.008	8	0.525	3	-0.287	4	0.045	8	0.045	5	163.236	2	0.060	2	0.003	0.023	0.002	0.525	0.005	0.001
1510	M161	12in Dia. Duct	Sec 5 - min	-0.036	7	-0.029	1	-0.009	7	0.287	4	-0.525	3	-0.045	5	-0.045	8	-153.910	1	-0.050	1	0.003	0.023	0.002	0.525	0.004	0.002
1529	M163	12in Dia. Duct	Sec 5 - max	0.036	8	-0.013	1	0.009	5	0.525	3	-0.287	4	0.045	7	0.045	6	153.913	2	0.050	2	0.003	0.023	0.002	0.525	0.004	0.001
1530	M163	12in Dia. Duct	Sec 5 - min	-0.036	5	-0.029	2	-0.009	8	0.287	4	-0.525	3	-0.045	6	-0.045	7	-153.235	1	-0.050	1	0.003	0.023	0.002	0.525	0.005	0.002
1497	M160	12in Dia. Duct	Sec 4 - max	0.029	8	-0.008	2	0.038	6	0.489	3	-0.278	4	0.082	8	0.082	5	439.952	2	0.144	2	0.002	0.022	0.004	0.489	0.011	0.003
1498	M160	12in Dia. Duct	Sec 4 - min	-0.029	7	-0.022	1	-0.038	7	0.278	4	-0.489	3	-0.082	5	-0.082	8	176.816	1	0.058	1	0.002	0.022	0.004	0.489	0.004	0.003
1517	M162	12in Dia. Duct	Sec 4 - max	0.029	8	-0.008	1	0.038	5	0.489	3	-0.278	4	0.082	7	0.082	6	-176.812	2	-0.058	2	0.002	0.022	0.004	0.489	0.004	0.003
1518	M162	12in Dia. Duct	Sec 4 - min	-0.029	5	-0.022	2	-0.038	8	0.278	4	-0.489	3	-0.082	6	-0.082	7	-439.950	1	-0.144	1	0.002	0.022	0.004	0.489	0.011	0.003
1579	M166	12in Dia. Duct	Sec 5 - max	0.030	5	0.042	2	0.016	8	0.497	3	-0.259	4	0.064	7	0.064	6	106.722	2	0.035	2	0.002	0.022	0.003	0.497	0.008	0.003
1580	M166	12in Dia. Duct	Sec 5 - min	-0.030	8	0.005	1	-0.016	5	0.259	4	-0.497	3	-0.064	6	-0.064	7	-176.892	1	-0.059	1	0.002	0.022	0.003	0.497	0.005	0.003
1589	M169	12in Dia. Duct	Sec 5 - max	0.030	7	0.042	1	0.016	7	0.497	3	-0.259	4	0.064	6	0.064	5	176.905	2	0.059	2	0.002	0.022	0.003	0.497	0.008	0.003

A5-1215

D-2250

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/F_a	f_{by}/F_b	f_{bz}/F_b	[illegible]	f_t (ksi)	[illegible]	f_v/F_v	f_t/F_t	[illegible]
1590	M160	12in Dia. Duct	Sec 5 - min	-0.030	8	0.009	2	-0.016	8	0.259	4	-0.497	3	-0.064	5	-0.064	8	-106.720	1	-0.035	1	0.002	0.022	0.003	[illegible]	0.497	[illegible]	0.003	0.001	[illegible]
595	M62	12in Dia. Duct	Sec 3 - max	0.020	5	0.000	1	0.049	8	0.451	2	-0.241	1	0.126	5	0.126	8	-241.657	2	-0.079	2	0.001	0.020	0.005	[illegible]	0.451	[illegible]	0.005	0.003	[illegible]
598	M62	12in Dia. Duct	Sec 3 - min	-0.020	8	-0.034	2	-0.040	5	0.241	1	-0.451	2	-0.126	6	-0.126	5	-435.950	1	-0.143	1	0.001	0.020	0.005	[illegible]	0.451	[illegible]	0.011	0.003	[illegible]
615	M64	12in Dia. Duct	Sec 3 - max	0.020	7	0.000	2	0.040	7	0.451	1	-0.241	2	0.126	8	0.126	7	435.951	2	0.143	2	0.001	0.020	0.005	[illegible]	0.451	[illegible]	0.011	0.003	[illegible]
616	M64	12in Dia. Duct	Sec 3 - min	-0.020	6	-0.034	1	-0.040	8	0.241	2	-0.461	1	-0.126	7	-0.126	6	241.659	1	0.079	1	0.001	0.020	0.005	[illegible]	0.451	[illegible]	0.006	0.003	[illegible]
1478	M156	12in Dia. Duct	Sec 4 - min	-0.054	5	-0.092	6	-0.043	2	-0.269	4	-0.268	3	-0.249	2	-0.249	1	-238.593	1	-0.078	1	0.004	0.012	0.011	[illegible]	0.269	[illegible]	0.006	0.007	[illegible]
555	M56	12in Dia. Duct	Sec 3 - max	0.018	8	0.091	8	0.036	8	0.480	3	-0.004	4	0.097	6	0.097	7	364.325	2	0.126	2	0.001	0.021	0.004	[illegible]	0.480	[illegible]	0.010	0.007	[illegible]
556	M56	12in Dia. Duct	Sec 3 - min	-0.018	6	0.091	7	-0.036	7	0.004	4	-0.480	3	-0.097	7	-0.097	6	-384.325	1	-0.126	1	0.001	0.021	0.004	[illegible]	0.480	[illegible]	0.010	0.007	[illegible]
691	M80	8in Dia. Duct	Sec 1 - max	0.223	8	0.060	7	0.065	6	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.027	0.000	0.000	[illegible]	0.223	[illegible]	0.000	0.010	[illegible]
1476	M158	12in Dia. Duct	Sec 3 - min	-0.054	5	-0.091	6	-0.042	2	-0.253	4	-0.274	3	-0.241	2	-0.241	1	-238.593	1	-0.078	1	0.004	0.012	0.011	[illegible]	0.274	[illegible]	0.006	0.007	[illegible]
1474	M158	12in Dia. Duct	Sec 2 - min	-0.054	5	-0.090	6	-0.041	2	-0.238	4	-0.260	3	-0.233	2	-0.233	1	-238.593	1	-0.076	1	0.004	0.012	0.010	[illegible]	0.260	[illegible]	0.006	0.007	[illegible]
1472	M158	12in Dia. Duct	Sec 1 - min	-0.053	5	-0.088	6	-0.041	2	-0.222	4	-0.288	3	-0.225	2	-0.225	1	-238.593	1	-0.078	1	0.004	0.013	0.010	[illegible]	0.288	[illegible]	0.006	0.007	[illegible]
1479	M156	12in Dia. Duct	Sec 6 - max	-0.032	8	-0.023	7	0.043	1	0.263	3	0.285	4	0.257	1	0.257	2	238.594	2	0.078	2	0.002	0.013	0.011	[illegible]	0.285	[illegible]	0.006	0.003	[illegible]
1577	M168	12in Dia. Duct	Sec 4 - max	0.030	5	0.046	2	0.017	8	0.474	3	-0.236	4	0.060	7	0.060	6	106.722	2	0.035	2	0.002	0.021	0.003	[illegible]	0.474	[illegible]	0.003	0.004	[illegible]
1578	M168	12in Dia. Duct	Sec 4 - min	-0.030	8	0.012	1	-0.017	6	0.236	4	-0.474	3	-0.060	5	-0.060	7	-178.962	1	-0.059	1	0.002	0.021	0.003	[illegible]	0.474	[illegible]	0.005	0.001	[illegible]
1587	M169	12in Dia. Duct	Sec 4 - max	0.030	7	0.046	1	0.017	7	0.474	3	-0.236	4	0.060	8	0.060	5	178.965	2	0.059	2	0.002	0.021	0.003	[illegible]	0.474	[illegible]	0.005	0.004	[illegible]
1588	M169	12in Dia. Duct	Sec 4 - min	-0.030	6	0.012	2	-0.017	6	0.236	4	-0.474	3	-0.060	5	-0.060	8	-106.720	1	-0.035	1	0.002	0.021	0.003	[illegible]	0.474	[illegible]	0.003	0.001	[illegible]
692	M80	8in Dia. Duct	Sec 1 - min	-0.214	5	-0.009	6	-0.005	7	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.026	0.000	0.000	[illegible]	0.214	[illegible]	0.000	0.012	[illegible]
1575	M168	12in Dia. Duct	Sec 3 - max	0.044	5	0.101	2	0.044	8	0.448	3	-0.210	4	0.054	7	0.054	6	106.722	2	0.035	2	0.003	0.020	0.002	[illegible]	0.448	[illegible]	0.003	0.008	[illegible]
1576	M168	12in Dia. Duct	Sec 3 - min	-0.044	8	0.067	1	-0.044	5	0.210	4	-0.448	3	-0.054	6	-0.054	7	-178.962	1	-0.059	1	0.003	0.020	0.002	[illegible]	0.448	[illegible]	0.005	0.005	[illegible]
1585	M169	12in Dia. Duct	Sec 3 - max	0.044	7	0.101	1	0.044	7	0.448	3	-0.210	4	0.054	8	0.054	5	178.965	2	0.059	2	0.003	0.020	0.002	[illegible]	0.448	[illegible]	0.005	0.008	[illegible]
1586	M169	12in Dia. Duct	Sec 3 - min	-0.044	6	0.067	2	-0.044	6	0.210	4	-0.448	3	-0.054	5	-0.054	8	-106.720	1	-0.035	1	0.003	0.020	0.002	[illegible]	0.448	[illegible]	0.003	0.005	[illegible]
1499	M160	12in Dia. Duct	Sec 5 - max	0.030	6	-0.010	2	0.040	6	0.472	3	-0.261	4	0.049	8	0.049	5	439.952	2	0.144	2	0.002	0.021	0.002	[illegible]	0.472	[illegible]	0.011	0.003	[illegible]
1500	M160	12in Dia. Duct	Sec 5 - min	-0.030	7	-0.026	1	-0.040	7	0.261	4	-0.472	3	-0.049	5	-0.049	6	176.816	1	0.058	1	0.002	0.021	0.002	[illegible]	0.472	[illegible]	0.004	0.003	[illegible]
1510	M162	12in Dia. Duct	Sec 5 - max	0.030	8	-0.010	1	0.040	5	0.472	3	-0.261	4	0.049	7	0.049	6	-176.812	2	-0.058	2	0.002	0.021	0.002	[illegible]	0.472	[illegible]	0.004	0.003	[illegible]
1520	M162	12in Dia. Duct	Sec 5 - min	-0.030	5	-0.026	2	-0.040	8	0.261	4	-0.472	3	-0.049	6	-0.049	7	-439.950	1	-0.144	1	0.002	0.021	0.002	[illegible]	0.472	[illegible]	0.011	0.003	[illegible]
1477	M156	12in Dia. Duct	Sec 4 - max	-0.031	8	-0.023	7	0.043	1	0.268	3	0.269	4	0.249	1	0.249	2	230.594	2	0.076	2	0.002	0.012	0.011	[illegible]	0.269	[illegible]	0.006	0.003	[illegible]
1475	M156	12in Dia. Duct	Sec 3 - max	-0.031	8	-0.023	7	0.042	1	0.274	3	0.253	4	0.241	1	0.241	2	230.594	2	0.076	2	0.002	0.012	0.011	[illegible]	0.274	[illegible]	0.006	0.003	[illegible]
1473	M158	12in Dia. Duct	Sec 2 - max	-0.031	8	-0.023	7	0.041	1	0.280	3	0.238	4	0.233	1	0.233	2	238.594	2	0.076	2	0.002	0.012	0.010	[illegible]	0.280	[illegible]	0.006	0.003	[illegible]
1471	M156	12in Dia. Duct	Sec 1 - max	-0.031	8	-0.022	7	0.041	1	0.286	3	0.222	4	0.225	1	0.225	2	238.594	2	0.076	2	0.002	0.013	0.010	[illegible]	0.286	[illegible]	0.006	0.003	[illegible]
597	M62	12in Dia. Duct	Sec 4 - max	0.021	8	-0.005	1	0.043	8	0.429	3	-0.228	4	0.089	5	0.089	8	-241.657	2	-0.079	2	0.002	0.019	0.004	[illegible]	0.429	[illegible]	0.006	0.003	[illegible]
596	M62	12in Dia. Duct	Sec 4 - min	-0.021	8	-0.038	2	-0.043	5	0.228	4	-0.429	3	-0.089	8	-0.089	6	-435.950	1	-0.143	1	0.002	0.019	0.004	[illegible]	0.429	[illegible]	0.011	0.003	[illegible]
617	M64	12in Dia. Duct	Sec 4 - max	0.021	7	-0.005	2	0.043	7	0.429	3	-0.228	4	0.089	8	0.089	7	435.951	2	0.143	2	0.002	0.019	0.004	[illegible]	0.429	[illegible]	0.011	0.003	[illegible]
618	M64	12in Dia. Duct	Sec 4 - min	-0.021	6	-0.038	1	-0.043	6	0.228	4	-0.429	3	-0.089	7	-0.089	6	241.069	1	0.079	1	0.002	0.019	0.004	[illegible]	0.429	[illegible]	0.006	0.003	[illegible]
553	M58	12in Dia. Duct	Sec 2 - max	0.018	8	0.092	6	0.037	6	0.441	3	0.034	4	0.081	6	0.081	7	364.329	2	0.126	2	0.001	0.020	0.004	[illegible]	0.441	[illegible]	0.010	0.007	[illegible]
554	M58	12in Dia. Duct	Sec 2 - min	-0.018	5	0.032	7	-0.037	7	-0.034	4	-0.441	3	-0.081	7	-0.081	6	-364.325	1	-0.126	1	0.001	0.020	0.004	[illegible]	0.441	[illegible]	0.010	0.007	[illegible]
609	M63	12in Dia. Duct	Sec 5 - max	0.056	5	-0.081	1	0.036	7	-0.065	1	0.334	2	0.120	7	0.120	6	211.907	2	0.069	2	0.004	0.015	0.005	[illegible]	0.334	[illegible]	0.006	0.007	[illegible]
610	M63	12in Dia. Duct	Sec 5 - min	-0.055	8	-0.124	2	-0.036	6	-0.334	2	0.065	1	-0.120	8	-0.120	7	14.418	1	0.005	1	0.004	0.015	0.005	[illegible]	0.334	[illegible]	0.000	0.010	[illegible]
629	M65	12in Dia. Duct	Sec 6 - max	0.055	7	-0.091	2	0.036	8	-0.065	2	0.334	1	0.120	6	0.120	5	-14.416	2	-0.005	2	0.004	0.015	0.005	[illegible]	0.334	[illegible]	0.000	0.007	[illegible]
630	M65	12in Dia. Duct	Sec 5 - min	-0.055	6	-0.124	1	-0.036	6	-0.334	1	0.065	2	-0.120	5	-0.120	8	-211.906	1	-0.069	1	0.004	0.015	0.005	[illegible]	0.334	[illegible]	0.005	0.010	[illegible]
1462	M157	12in Dia. Duct	Sec 1 - min	-0.043	5	-0.103	6	-0.039	7	-0.148	4	-0.336	3	-0.118	2	-0.118	1	-351.616	1	-0.115	1	0.003	0.015	0.005	[illegible]	0.335	[illegible]	0.009	0.008	[illegible]
1464	M157	12in Dia. Duct	Sec 2 - min	-0.044	5	-0.104	6	-0.039	7	-0.187	4	-0.323	3	-0.125	2	-0.125	1	-351.616	1	-0.115	1	0.003	0.014	0.006	[illegible]	0.323	[illegible]	0.009	0.008	[illegible]
1466	M157	12in Dia. Duct	Sec 3 - min	-0.044	5	-0.104	6	-0.040	2	-0.165	4	-0.311	3	-0.133	2	-0.133	1	-351.616	1	-0.115	1	0.003	0.014	0.006	[illegible]	0.311	[illegible]	0.009	0.008	[illegible]
1468	M157	12in Dia. Duct	Sec 4 - min	-0.044	5	-0.108	6	-0.040	2	-0.204	4	-0.298	3	-0.140	2	-0.140	1	-351.616	1	-0.115	1	0.003	0.013	0.006	[illegible]	0.298	[illegible]	0.009	0.008	[illegible]
1470	M157	12in Dia. Duct	Sec 5 - min	-0.045	5	-0.106	6	-0.041	2	-0.222	4	-0.286	3	-0.148	2	-0.148	1	-351.616	1	-0.115	1	0.003	0.013	0.007	[illegible]	0.286	[illegible]	0.009	0.008	[illegible]
599	M62	12in Dia. Duct	Sec 5 - max	0.021	5	-0.008	1	0.045	8	0.408	3	-0.207	4	0.064	8	0.064	7	-241.657	2	-0.079	2	0.002	0.018	0.003	[illegible]	0.408	[illegible]	0.006	0.003	[illegible]
600	M62	12in Dia. Duct	Sec 5 - min	-0.021	8	-0.042	2	-0.045	5	0.207	4	-0.408	3	-0.064	7	-0.064	6	-435.950	1	-0.143	1	0.002	0.019	0.003	[illegible]	0.408	[illegible]	0.011	0.003	[illegible]
619	M64	12in Dia. Duct	Sec 5 - max	0.021	7	-0.008	2	0.046	7	0.408	3	-0.207	4	0.064	5	0.064	8	435.951	2	0.143	2	0.002	0.019	0.003	[illegible]	0.408	[illegible]	0.011	0.003	[illegible]
620	M64	12in Dia. Duct	Sec 5 - min	-0.021	6	-0.042	1	-0.045	6	0.207	4	-0.408	3	-0.064	8	-0.064	5	241.659	1	0.079	1	0.002	0.018	0.003	[illegible]	0.408	[illegible]	0.006	0.003	[illegible]
551	M58	12in Dia. Duct	Sec 1 - max	0.019	8	0.094	6	0.036	6	0.402	3	0.074	4	0.066	6	0.066	7	364.329	2	0.126	2	0.001	0.018	0.003	[illegible]	0.402	[illegible]	0.010	0.007	[illegible]
552	M58	12in Dia. Duct	Sec 1 - min	-0.019	5	0.094	7	-0.038	7	-0.074	4	-0.402	3	-0.066	7	-0.066	6	-384.325	1	-0.126	1	0.001	0.018	0.003	[illegible]	0.402	[illegible]	0.010	0.007	[illegible]
1531	M164	12in Dia. Duct	Sec 1 - max	0.036	6	-0.013	2	0.009	8	0.428	3	-0.190	4	0.010	8	0.010	5	183.236	2	0.060	2	0.003	0.019	0.000	[illegible]	0.428	[illegible]	0.005	0.001	[illegible]
1532	M164	12in Dia. Duct	Sec 1 - min	-0.036	7	-0.029	1	-0.009	7	0.190	4	-0.428	3	-0.010	5	-0.010	8	-153.910	1	-0.050	1	0.003	0.019	0.000	[illegible]	0.428	[illegible]	0.004	0.002	[illegible]
1541	M165	12in Dia. Duct	Sec 1 - max	0.036	6	-0.013	1	0.009	5	0.428	3	-0.190	4	0.010	7	0.010	6	153.913	2	0.050	2	0.003	0.019	0.000	[illegible]	0.428	[illegible]	0.004	0.001	[illegible]
1542	M165	12in Dia. Duct	Sec 1 - min	-0.036	5	-0.029	2	-0.009	6	0.190	4	-0.428	3	-0.010	8	-0.010	7	-183.235	1	-0.060	1	0.003	0.019	0.000	[illegible]	0.428	[illegible]	0.005	0.002	[illegible]
1533	M164	12in Dia. Duct	Sec 2 - max	0.036	8	-0.014	2	0.010	8	0.425	3	-0.187	4	0.010	6	0.010	7	183.236	2	0.060	2	0.003	0.019	0.000	[illegible]	0.425	[illegible]	0.005	0.001	[illegible]
1534	M164	12in Dia. Duct	Sec 2 - min	-0.036	7	-0.030	1	-0.010	7	0.187	4	-0.425	3	-0.010	7	-0.010	6	-153.910	1	-0.050	1	0.003	0.019	0.000	[illegible]	0.425	[illegible]	0.004	0.002	[illegible]
1543	M165	12in Dia. Duct	Sec 2 - max	0.036	8	-0.014	1	0.010	5	0.425	3	-0.187	4	0.010	5	0.010	8	153.913	2	0.050	2	0.003	0.019	0.000	[illegible]	0.425	[illegible]	0.004	0.001	[illegible]
1544	M165	12in Dia. Duct	Sec 2 - min	-0.036	5	-0.030	2	-0.010	6	0.187	4	-0.425	3	-0.010	6	-0.010	5	-183.235	1	-0.060	1	0.003	0.019	0.000	[illegible]	0.425	[illegible]	0.005	0.002	[illegible]
1535	M164	12in Dia. Duct	Sec 3 - max	0.036	6	-0.014	2	0.010	6	0.421	3	-0.183	4	0.011	6	0.011	7	183.236	2	0.060	2	0.003	0.019	0.000	[illegible]	0.421	[illegible]	0.005	0.001	[illegible]
1536	M164	12in Dia. Duct	Sec 3 - min	-0.036	7	-0.030	1	-0.010	7	0.183	4	-0.421	3	-0.011	7	-0.011	6	-153.910	1	-0.050	1	0.003	0.019	0.000	[illegible]	0.421	[illegible]	0.004	0.002	[illegible]
1545	M165	12in Dia. Duct	Sec 3 - max	0.036	8	-0.014	1	0.010	5	0.421	3	-0.183	4	0.011	5	0.011	8	153.913	2	0.050	2	0.003	0.019	0.000	[illegible]	0.421	[illegible]	0.004	0.001	[illegible]
1546	M165	12in Dia. Duct	Sec 3 - min	-0.036	5	-0.030	2	-0.010	8	0.183	4	-0.421	3	-0.011	8	-0.011	5	-183.235	1	-0.060	1	0.003	0.019	0.000	[illegible]	0.421	[illegible]	0.005	0.002	[illegible]
1452	M158	12in Dia. Duct	Sec 1 - min	-0.028	5	-0.100	6	-0.038	7	-0.074	4	-0.402	3	-0.043	6	-0.043	7	-394.024	1	-0.129	1	0.002	0.018	0.002	[illegible]	0.402	[illegible]	0.010	0.008	[illegible]
547	M57	12in Dia. Duct	Sec 4 - max	0.027	6	0.038	2	0.035	4	0.223	2	0.223	1	0.223	4	0.169	3	29.034	1	0.010	1	0.002	0.010	0.010	[illegible]	0.223	[illegible]	0.001	0.003	[illegible]
548	M57	12in Dia. Duct	Sec 4 - min	0.027	7	-0.038	1	-0.035	3	-0.223	1	-0.223	2	-0.169	3	-0.223	4	-29.034	2	-0.010	2	0.002	0.010	0.010	[illegible]	0.223	[illegible]	0.001	0.003	[illegible]
1539	M164	12in Dia. Duct	Sec 5 - max	0.037	8	-0.018	2	0.010	8	0.414	3	-0.176	4	0.015	6	0.015	7	183.236	2	0.060	2	0.003	0.018	0.001	[illegible]	0.414	[illegible]	0.005	0.001	[illegible]
1540	M164	12in Dia. Duct	Sec 5 - min	-0.037	7	-0.032	1	-0.010	7	0.176	4	-0.414	3	-0.015	7	-0.015	6	-153.910	1	-0.050	1	0.003	0.018	0.001	[illegible]	0.414	[illegible]	0.004	0.002	[illegible]
1549	M165	12in Dia. Duct	Sec 5 - max	0.037	8	-0.018	1	0.010	5	0.414	3	-0.176	4	0.015	5	0.015	8	153.913	2	0.050	2	0.003	0.018	0.001	[illegible]	0.414	[illegible]	0.004	0.001	[illegible]
1550	M165	12in Dia. Duct	Sec 5 - min	-0.037	5	-0.032	2	-0.010	8	0.176	4	-0.414	3	-0.015	8	-0.015	5	-183.235	1	-0.060	1	0.003	0.018	0.001	[illegible]	0.414	[illegible]	0.005	0.002	[illegible]
1537	M164	12in Dia. Duct	Sec 4 - max	0.036	6	-0.015	2	0.010	6	0.417	3	-0.180	4	0.013	6	0.013	7	183.236	2	0.060	2	0.003	0.019	0.001	[illegible]	0.417	[illegible]	0.005	0.001	[illegible]
1538	M164	12in Dia. Duct	Sec 4 - min	-0.036	7	-0.031	1	-0.010	7	0.180	4	-0.417	3	-0.013	7	-0.013	6	-153.910	1	-0.050	1	0.003	0.019	0.001	[illegible]	0.417	[illegible]	0.004	0.002	[illegible]
1547	M165	12in Dia. Duct	Sec 4 - max	0.036	8	-0.015	1	0.010	5	0.417	3	-0.180	4	0.013	5	0.013	8	153.913	2	0.050	2	0.003	0.019	0.001	[illegible]	0.417	[illegible]	0.004	0.001	[illegible]
1548	M165	12in Dia. Duct	Sec 4 - min	-0.036	5	-0.031	2	-0.010	6	0.183	4	-0.417	3	-0.013	8	-0.013	5	-183.235	1	-0.060	1	0.003	0.019	0.001	[illegible]	0.417	[illegible]	0.005	0.002	[illegible]
1573	M168	12in Dia. Duct	Sec 2 - max	0.045	5	0.105	2	0.040	8	0.374	3	-0.137	4	0.025	7	0.025	6	106.722	2	0.035	2	0.003	0.017	0.001	[illegible]	0.374	[illegible]	0.003	0.008	[illegible]
1574	M168	12in Dia. Duct	Sec 2 - min	-0.045	8	0.071	1	-0.046	5	0.137	4	-0.374	3	-0.025	6	-0.025	7	-178.962	1	-0.059	1	0.003	0.017	0.001	[illegible]	0.374	[illegible]	0.005	0.005	[illegible]
1583	M169	12in Dia. Duct	Sec 2 - max	0.045	7	0.105	1	0.046	7	0.374	3	-0.137	4	0.025	8	0.025	6	178.965	2	0.059	2	0.003	0.017	0.001	[illegible]	0.374	[illegible]	0.005	0.006	[illegible]
1584	M169	12in Dia. Duct	Sec 2 - min	-0.045	6	0.071	2	-0.046	6	0.137	4	-0.374	3	-0.025	5	-0.025	8	-106.720	1	-0.035	1	0.003	0.017	0.001	[illegible]	0.374	[illegible]	0.003	0.005	[illegible]
2064	M217	3in Dia. Duct	Sec 2 - min	-0.005	8	0.030	5	-0.108	8	0.236	2	-0.236	1	-0.200	7	-0.222	6	-7.691	5	-0.033	5	0.001	0.010	0.010	[illegible]	0.236	[illegible]	0.003	0.008	[illegible]
1461	M157	12in Dia. Duct	Sec 1 - max	-0.011	6	-0.069	7	0.039	8	0.335	3	0.148	4	0.118	1	0.118	2	361.816	2	0.115	2	0.001	0.015	0.005	[illegible]	0.335	[illegible]	0.009	0.006	[illegible]
1454	M158	12in Dia. Duct	Sec 2 - min	-0.028	5	-0.101	6	-0.036	7	-0.092	4	-0.366	3	-0.030	6	-0.036	7	-304.024	1	-0.129	1	0.002	0.017	0.002	[illegible]	0.366	[illegible]	0.010	0.008	[illegible]
1463	M157	12in Dia. Duct	Sec 2 - max	-0.011	8	-0.060	7	0.039	8	0.323	3	0.167	4	0.125	1	0.125	2	351.816	2	0.115	2	0.001	0.014	0.006	[illegible]	0.323	[illegible]	0.009	0.005	[illegible]
1465	M157	12in Dia. Duct	Sec 3 - max	-0.011	8	-0.060	7	0.040	1	0.311	3	0.185	4	0.133	1	0.133	2	351.816	2	0.115	2	0.001	0.014	0.006	[illegible]	0.311	[illegible]	0.009	0.005	[illegible]
1451	M158	12in Dia. Duct	Sec 1 - max	0.009	8	-0.085	7	0.036	6	0.402	3	0.074	4	0.043	7	0.043	6	394.027	2	0.129	2	0.001	0.018	0.002	[illegible]	0.402	[illegible]	0.010	0.007	[illegible]
1457	M157	12in Dia. Duct	Sec 4 - max	-0.011	8	-0.081	7	0.040	1	0.298	3	0.204	4	0.140	1	0.140	2	351.816	2	0.115	2	0.001	0.013	0.006	[illegible]	0.298	[illegible]	0.009	0.005	[illegible]

D-2230

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_a	f_b/σ_a	f_s/σ_a		f_s (ksi)		f_t/σ_a	f_t/σ_a
1469	M157	12in Dia. Duct	Sec 6 - max	-0.011	6	-0.061	7	0.041	1	0.286	3	0.222	4	0.148	1	0.148	2	361.818	2	0.115	2	0.001	0.013	0.007		0.290		0.009	0.005
569	M59	12in Dia. Duct	Sec 6 - max	0.035	6	0.032	1	0.022	7	0.378	3	-0.163	4	0.016	7	0.015	6	-41.869	2	-0.014	2	0.003	0.017	0.001		0.378		0.001	0.002
570	M59	12in Dia. Duct	Sec 6 - min	-0.035	6	0.015	2	-0.022	6	0.163	4	-0.378	3	-0.015	6	-0.016	7	-317.552	1	-0.104	1	0.003	0.017	0.001		0.378		0.009	0.002
579	M60	12in Dia. Duct	Sec 6 - max	0.035	6	0.032	2	0.022	6	0.378	3	-0.163	4	0.016	6	0.015	6	317.554	2	0.104	2	0.003	0.017	0.001		0.378		0.001	0.002
580	M60	12in Dia. Duct	Sec 6 - min	-0.035	6	0.016	1	-0.022	6	0.163	4	-0.378	3	-0.015	6	-0.015	6	41.871	1	0.014	1	0.003	0.017	0.001		0.378		0.010	0.008
1466	M156	12in Dia. Duct	Sec 3 - min	-0.028	5	-0.101	6	-0.038	7	-0.111	4	-0.369	3	-0.020	6	-0.029	7	-394.024	1	-0.129	1	0.002	0.015	0.001		0.389		0.010	0.007
1453	M156	12in Dia. Duct	Sec 2 - max	0.009	8	-0.066	7	0.038	6	0.366	3	0.092	4	0.036	7	0.036	6	394.027	2	0.129	2	0.001	0.017	0.002		0.396		0.010	0.007
1571	M168	12in Dia. Duct	Sec 1 - max	0.045	5	0.108	2	0.047	8	0.298	3	-0.060	4	0.058	5	0.058	6	106.722	2	0.035	2	0.003	0.013	0.003		0.298		0.003	0.003
1572	M106	12in Dia. Duct	Sec 1 - min	-0.045	8	0.075	1	-0.047	8	0.060	4	-0.298	3	-0.058	8	-0.058	5	-176.902	1	-0.058	1	0.003	0.013	0.003		0.298		0.005	0.006
1561	M169	12in Dia. Duct	Sec 1 - max	0.045	7	0.108	1	0.047	7	0.298	3	-0.060	4	0.058	6	0.058	7	178.365	2	0.059	2	0.003	0.013	0.003		0.298		0.005	0.008
1562	M169	12in Dia. Duct	Sec 1 - min	-0.045	6	0.075	2	-0.047	6	0.060	4	-0.298	3	-0.058	7	-0.058	5	-106.720	1	-0.035	1	0.003	0.013	0.003		0.298		0.003	0.005
567	M59	12in Dia. Duct	Sec 4 - max	0.037	6	0.037	1	0.021	7	0.348	3	-0.133	4	0.021	5	0.021	6	41.869	2	-0.014	2	0.003	0.015	0.001		0.348		0.001	0.003
568	M59	12in Dia. Duct	Sec 4 - min	-0.037	7	0.021	2	-0.021	6	0.133	4	-0.348	3	-0.021	8	-0.021	6	-317.552	1	-0.104	1	0.003	0.015	0.001		0.348		0.008	0.002
577	M60	12in Dia. Duct	Sec 4 - max	0.037	8	0.037	2	0.021	8	0.348	3	-0.133	4	0.021	6	0.021	7	317.554	2	0.104	2	0.003	0.015	0.001		0.348		0.001	0.002
578	M60	12in Dia. Duct	Sec 4 - min	-0.037	5	0.021	1	-0.021	6	0.133	4	-0.348	3	-0.021	7	-0.021	6	41.871	1	0.014	1	0.003	0.015	0.001		0.352		0.010	0.005
1459	M156	12in Dia. Duct	Sec 4 - min	-0.028	5	-0.102	8	-0.039	7	-0.129	4	-0.352	3	-0.022	6	-0.022	7	-394.024	1	-0.129	1	0.002	0.016	0.001		0.393		0.000	0.026
2540	M284	2in Dia. Duct	Sec 5 - min	0.083	8	-0.188	5	-0.398	8	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.018	0.000	0.000		0.369		0.010	0.007
1455	M156	12in Dia. Duct	Sec 3 - min	0.009	8	-0.087	7	0.038	6	0.369	3	0.111	4	0.029	7	0.029	6	394.027	2	0.129	2	0.001	0.016	0.001		0.171		0.005	0.002
2004	M211	3in Dia. Duct	Sec 2 - min	0.073	6	0.026	7	0.020	2	0.018	6	-0.049	7	-0.171	5	-0.003	5	-14.055	8	-0.050	5	0.008	0.002	0.006		0.313		0.001	0.003
565	M59	12in Dia. Duct	Sec 3 - max	0.038	6	0.042	1	0.020	7	0.313	3	-0.098	4	0.033	5	0.033	6	41.869	2	-0.014	2	0.003	0.014	0.001		0.313		0.008	0.002
566	M59	12in Dia. Duct	Sec 3 - min	-0.038	7	0.026	2	-0.020	6	0.098	4	-0.313	3	-0.033	6	-0.033	5	-317.552	1	-0.104	1	0.003	0.014	0.001		0.313		0.008	0.003
575	M60	12in Dia. Duct	Sec 3 - max	0.038	6	0.042	2	0.020	6	0.313	3	-0.098	4	0.033	6	0.033	7	317.554	2	0.104	2	0.003	0.014	0.001		0.313		0.001	0.002
576	M60	12in Dia. Duct	Sec 3 - min	-0.038	5	0.026	1	-0.020	5	0.098	4	-0.313	3	-0.033	7	-0.033	6	41.871	1	0.014	1	0.003	0.014	0.001		0.313		0.005	0.006
601	M63	12in Dia. Duct	Sec 1 - max	0.051	5	-0.075	1	0.027	7	0.266	3	-0.064	4	0.058	8	0.058	5	211.907	2	0.059	2	0.004	0.012	0.003		0.266		0.000	0.008
602	M63	12in Dia. Duct	Sec 1 - min	-0.051	8	-0.108	2	-0.027	8	0.064	4	-0.266	3	-0.058	5	-0.058	6	14.416	1	0.005	1	0.004	0.012	0.003		0.266		0.009	0.006
621	M65	12in Dia. Duct	Sec 1 - max	0.051	7	-0.075	2	0.027	8	0.266	3	-0.064	4	0.058	7	0.058	6	-14.416	2	-0.005	2	0.004	0.012	0.003		0.266		0.008	0.005
622	M65	12in Dia. Duct	Sec 1 - min	-0.051	6	-0.108	1	-0.027	5	0.064	4	-0.266	3	-0.058	6	-0.058	7	-211.906	1	-0.059	1	0.004	0.012	0.003		0.081		0.000	0.022
2555	M265	2in Dia. Duct	Sec 6 - min	0.061	6	-0.269	5	-0.243	5	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.016	0.000	0.000		0.335		0.010	0.006
1460	M156	12in Dia. Duct	Sec 6 - min	-0.029	6	-0.103	6	-0.039	7	-0.148	4	-0.335	3	-0.021	2	-0.021	1	-394.024	1	-0.129	1	0.002	0.015	0.001		0.222		0.005	0.007
607	M63	12in Dia. Duct	Sec 4 - max	0.054	5	-0.067	1	0.034	7	0.016	1	0.222	2	0.058	7	0.086	6	211.907	2	0.089	2	0.004	0.010	0.004		0.222		0.000	0.008
608	M63	12in Dia. Duct	Sec 4 - min	-0.054	8	-0.120	2	-0.034	8	-0.222	2	-0.016	1	-0.086	6	-0.086	7	14.416	1	0.005	1	0.004	0.010	0.004		0.222		0.000	0.007
627	M65	12in Dia. Duct	Sec 4 - max	0.054	7	-0.067	2	0.034	8	0.016	2	0.222	1	0.086	6	0.086	5	-14.416	2	-0.005	2	0.004	0.010	0.004		0.222		0.005	0.009
628	M65	12in Dia. Duct	Sec 4 - min	-0.054	6	-0.120	1	-0.034	5	-0.222	1	-0.016	2	-0.086	5	-0.086	6	-211.906	1	-0.059	1	0.004	0.010	0.004		0.273		0.001	0.004
563	M59	12in Dia. Duct	Sec 2 - max	0.039	8	0.047	1	0.019	7	0.273	3	-0.056	4	0.055	6	0.055	7	-41.869	2	-0.014	2	0.003	0.012	0.002		0.273		0.008	0.002
564	M59	12in Dia. Duct	Sec 2 - min	-0.039	7	0.030	2	-0.019	8	0.059	4	-0.273	3	-0.055	7	-0.055	6	-317.552	1	-0.104	1	0.003	0.012	0.002		0.273		0.008	0.004
573	M60	12in Dia. Duct	Sec 2 - max	0.039	8	0.047	2	0.019	8	0.273	3	-0.056	4	0.055	5	0.055	8	317.554	2	0.104	2	0.003	0.012	0.002		0.273		0.001	0.003
574	M60	12in Dia. Duct	Sec 2 - min	-0.039	5	0.030	1	-0.019	5	0.056	4	-0.273	3	-0.055	8	-0.055	5	41.871	1	0.014	1	0.003	0.012	0.002		0.352		0.010	0.007
1457	M156	12in Dia. Duct	Sec 4 - max	0.010	5	-0.097	7	0.039	8	0.352	3	0.129	4	0.022	7	0.022	8	394.027	2	0.129	2	0.001	0.016	0.001		0.335		0.010	0.007
1458	M156	12in Dia. Duct	Sec 6 - max	0.010	8	-0.086	7	0.039	8	0.335	3	0.146	4	0.021	1	0.021	2	394.027	2	0.129	2	0.001	0.016	0.001		0.227		0.001	0.004
561	M59	12in Dia. Duct	Sec 1 - max	0.041	6	0.051	1	0.018	7	0.227	3	-0.012	4	0.076	6	0.076	7	41.869	2	-0.014	2	0.003	0.010	0.003		0.227		0.008	0.003
562	M59	12in Dia. Duct	Sec 1 - min	-0.041	7	0.035	2	-0.018	8	0.012	4	-0.227	3	-0.076	7	-0.076	6	-317.552	1	-0.104	1	0.003	0.010	0.003		0.227		0.008	0.004
571	M60	12in Dia. Duct	Sec 1 - max	0.041	8	0.051	2	0.018	8	0.227	3	-0.012	4	0.076	5	0.076	8	317.554	2	0.104	2	0.003	0.010	0.003		0.227		0.001	0.003
572	M60	12in Dia. Duct	Sec 1 - min	-0.041	5	0.035	1	-0.018	5	0.012	4	-0.227	3	-0.076	8	-0.076	5	41.871	1	0.014	1	0.003	0.010	0.003		0.160		0.005	0.006
603	M63	12in Dia. Duct	Sec 2 - max	0.052	5	-0.079	1	0.029	7	0.160	3	0.022	4	0.051	5	0.051	5	211.907	2	0.059	2	0.004	0.008	0.002		0.160		0.000	0.009
604	M63	12in Dia. Duct	Sec 2 - min	-0.052	8	-0.112	2	-0.029	8	-0.022	4	-0.160	3	-0.051	5	-0.051	8	14.416	1	0.005	1	0.004	0.008	0.002		0.160		0.000	0.006
623	M65	12in Dia. Duct	Sec 2 - max	0.052	7	-0.079	2	0.029	8	0.160	3	0.022	4	0.051	7	0.051	5	-14.416	2	-0.005	2	0.004	0.008	0.002		0.160		0.005	0.009
624	M65	12in Dia. Duct	Sec 2 - min	-0.052	6	-0.112	1	-0.029	5	-0.022	4	-0.160	3	-0.051	6	-0.051	7	-211.906	1	-0.059	1	0.004	0.008	0.002		0.141		0.001	0.002
545	M57	12in Dia. Duct	Sec 3 - max	0.021	6	0.030	2	0.027	4	0.134	2	0.134	1	0.141	4	0.089	3	29.034	1	0.010	1	0.002	0.008	0.006		0.141		0.001	0.002
546	M57	12in Dia. Duct	Sec 3 - min	0.021	7	-0.030	1	-0.027	3	-0.134	1	-0.134	2	-0.089	3	-0.141	4	-29.034	2	-0.010	2	0.002	0.008	0.006		0.058		0.000	0.018
2530	M263	2in Dia. Duct	Sec 5 - min	0.058	8	-0.219	5	-0.275	5	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.013	0.000	0.000		0.114		0.005	0.006
605	M63	12in Dia. Duct	Sec 3 - max	0.053	5	-0.083	1	0.031	7	0.094	1	0.114	2	0.056	7	0.056	5	211.907	2	0.058	2	0.004	0.006	0.003		0.114		0.000	0.009
606	M63	12in Dia. Duct	Sec 3 - min	-0.053	8	-0.116	2	-0.031	6	-0.114	2	-0.094	1	-0.056	8	-0.056	7	14.416	1	0.005	1	0.004	0.005	0.003		0.114		0.000	0.006
625	M65	12in Dia. Duct	Sec 3 - max	0.053	7	-0.083	2	0.031	8	0.094	2	0.114	1	0.056	8	0.056	5	-14.416	2	-0.005	2	0.004	0.005	0.003		0.114		0.005	0.009
626	M65	12in Dia. Duct	Sec 3 - min	-0.053	6	-0.116	1	-0.031	5	-0.114	1	-0.094	2	-0.056	5	-0.056	8	-211.906	1	-0.059	1	0.004	0.005	0.003		0.080		0.001	0.002
543	M57	12in Dia. Duct	Sec 2 - max	0.016	8	0.022	2	0.019	4	0.066	2	0.066	1	0.080	4	0.027	3	29.034	1	0.010	1	0.001	0.003	0.004		0.040		0.001	0.002
544	M57	12in Dia. Duct	Sec 2 - min	0.016	7	-0.022	1	-0.019	3	-0.066	1	-0.066	2	-0.027	3	-0.080	4	-29.034	2	-0.010	2	0.001	0.003	0.004		0.041		0.001	0.001
1401	M151	12in Dia. Duct	Sec 1 - max	0.011	3	0.015	4	0.014	2	-0.013	3	0.041	4	0.023	1	0.023	2	21.400	1	0.007	1	0.001	0.002	0.001		0.041		0.001	0.001
1402	M151	12in Dia. Duct	Sec 1 - min	0.008	4	-0.006	3	-0.014	1	-0.041	4	0.013	3	-0.023	2	-0.023	1	-21.400	2	-0.007	2	0.001	0.002	0.001		0.041		0.001	0.001
541	M57	12in Dia. Duct	Sec 1 - max	0.010	6	0.014	2	0.011	4	0.019	2	0.019	1	0.011	4	-0.013	3	29.034	1	0.010	1	0.001	0.001	0.002		0.041		0.001	0.001
542	M57	12in Dia. Duct	Sec 1 - min	0.010	7	-0.014	1	-0.011	3	-0.019	1	-0.019	2	0.013	3	-0.041	4	-29.034	2	-0.010	2	0.001	0.001	0.002		0.037		0.001	0.001
1403	M151	12in Dia. Duct	Sec 2 - max	0.010	3	0.015	4	0.013	2	-0.014	3	0.037	4	0.020	1	0.020	2	21.400	1	0.007	1	0.001	0.002	0.001		0.037		0.001	0.001
1404	M151	12in Dia. Duct	Sec 2 - min	0.008	4	-0.006	3	-0.013	1	-0.037	4	0.014	3	-0.020	2	-0.020	1	-21.400	2	-0.007	2	0.001	0.002	0.001		0.034		0.001	0.001
1405	M151	12in Dia. Duct	Sec 3 - max	0.010	3	0.014	4	0.013	2	-0.015	3	0.034	4	0.017	1	0.017	2	21.400	1	0.007	1	0.001	0.002	0.001		0.034		0.001	0.001
1408	M151	12in Dia. Duct	Sec 3 - min	0.007	4	-0.005	3	-0.013	1	-0.034	4	0.015	3	-0.017	2	-0.017	1	-21.400	2	-0.007	2	0.001	0.002	0.001		0.028		0.000	0.001
1411	M152	12in Dia. Duct	Sec 1 - max	0.008	3	0.017	4	0.011	2	-0.016	3	0.026	4	0.017	1	0.017	2	10.922	1	0.004	1	0.001	0.001	0.001		0.031		0.001	0.001
1407	M151	12in Dia. Duct	Sec 4 - max	0.009	3	0.013	4	0.012	2	-0.017	3	0.031	4	0.014	1	0.014	2	21.400	1	0.007	1	0.001	0.001	0.001		0.031		0.001	0.001
1406	M151	12in Dia. Duct	Sec 4 - min	0.007	4	-0.005	3	-0.012	1	-0.031	4	0.017	3	-0.014	2	-0.014	1	-21.400	2	-0.007	2	0.001	0.001	0.001		0.028		0.000	0.001
1409	M151	12in Dia. Duct	Sec 6 - max	0.008	3	0.012	4	0.011	2	-0.016	3	0.028	4	0.012	1	0.012	2	21.400	1	0.007	1	0.001	0.001	0.001		0.025		0.000	0.001
1413	M152	12in Dia. Duct	Sec 2 - max	0.008	3	0.015	4	0.011	2	-0.017	3	0.025	4	0.014	1	0.014	2	10.922	1	0.004	1	0.001	0.001	0.001		0.028		0.000	0.001
1410	M151	12in Dia. Duct	Sec 6 - min	0.007	4	-0.004	3	-0.011	1	-0.028	4	0.019	3	-0.012	2	-0.012	1	-21.400	2	-0.007	2	0.001	0.001	0.001		0.028		0.000	0.001
1412	M152	12in Dia. Duct	Sec 1 - min	0.003	4	0.004	3	-0.011	1	-0.026	4	0.016	3	-0.017	2	-0.017	1	-10.922	2	-0.004	2	0.000	0.001	0.001		0.021		0.000	0.001
1415	M152	12in Dia. Duct	Sec 3 - max	0.008	3	0.014	4	0.010	2	-0.016	3	0.021	4	0.012	1	0.012	2	10.922	1	0.004	1	0.001	0.001	0.001		0.025		0.000	0.001
1414	M152	12in Dia. Duct	Sec 2 - min	0.003	4	0.004	3	-0.011	1	-0.025	4	0.017	3	-0.014	2	-0.014	1	-10.922	2	-0.004	2	0.000	0.001	0.001		0.016		0.000	0.001
1417	M152	12in Dia. Duct	Sec 4 - max	0.007	3	0.013	4	0.009	2	-0.016	3	0.018	4	0.010	1	0.010	2	10.922	1	0.004	1	0.001	0.001	0.000		0.021		0.000	0.001
1416	M152	12in Dia. Duct	Sec 3 - min	0.003	4	0.004	3	-0.010	1	-0.021	4	0.016	3	-0.012	2	-0.012	1	-10.922	2	-0.004	2	0.000	0.001	0.001		0.016		0.000	0.001
1421	M153	12in Dia. Duct	Sec 1 - max	0.005	3	0.013	4	0.008	2	-0.014	3	0.016	4	0.010	1	0.010	2	4.171	1	0.001	1	0.000	0.001	0.000		0.016		0.000	0.001
1419	M152	12in Dia. Duct	Sec 5 - max	0.006	3	0.012	4	0.009	2	-0.014	3	0.016	4	0.008	1	0.008	2	10.922	1	0.004	1	0.000	0.001	0.000		0.016		0.000	0.001
1418	M152	12in Dia. Duct	Sec 4 - min	0.003	4	0.004	3	-0.009	1	-0.018	4	0.016	3	-0.010	2	-0.010	1	-10.922	2	-0.004	2	0.000	0.001	0.000		0.016		0.000	0.001
1420	M152	12in Dia. Duct	Sec 6 - min	0.003	4	0.003	3	-0.008	1	-0.016	4	0.014	3	-0.008	2	-0.008	1	-10.922	2	-0.004	2	0.000	0.001	0.000		0.013		0.000	0.001
1423	M153	12in Dia. Duct	Sec 2 - max	0.004	3	0.012	4	0.008	2	-0.012	3	0.013	4	0.009	1	0.009	2	4.171	1	0.001	1	0.000	0.001	0.000		0.016		0.000	0.001
1422	M153	12in Dia. Duct	Sec 1 - min	0.000	4	0.009	3	-0.008	1	-0.010	4	0.014	3	-0.010	2	-0.010	1	-4.171	2	-0.001	2	0.000	0.001	0.000		0.011		0.000	0.001
1425	M153	12in Dia. Duct	Sec 3 - max	0.004	3	0.011	4	0.007	2	-0.010	4	0.011	3	0.007	1	0.007	2	4.171	1	0.001	1	0.000	0.000	0.000		0.013		0.000	0.001
1424	M153	12in Dia. Duct	Sec 2 - min	0.000	4	0.008	3	-0.008	1	-0.013	4	0.012	3	-0.009	2	-0.009	1	-4.171	2	-0.001	2	0.000	0.001	0.000		0.009		0.000	0.001
1427	M153	12in Dia. Duct	Sec 4 - max	0.003	5	0.010	6	0.006	2	-0.008	4	0.009	3	0.005	1	0.005	2	4.171	1	0.001	1	0.000	0.000	0.000		0.011		0.000	0.001
1426	M153	12in Dia. Duct	Sec 3 - min	0.000	4	0.007	3	-0.007	1	-0.011	3	0.010	4	-0.007	2	-0.007	1	-4.171	2	-0.001	2	0.000	0.000	0.000					

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_a	f_y/σ_a	f_z/σ_a		f_t (ksi)		f_t/σ_t	f_t/σ_a	
																						C-2250									
1429	M153	12in Dia. Duct	Sec 5 - max	0.003	5	0.006	6	0.006	2	-0.006	4	0.008	3	0.004	1	0.004	2	-4.171	1	0.001	1	0.000	0.000	0.000		0.008		0.000	0.001		
1432	M154	12in Dia. Duct	Sec 1 - min	-0.002	6	0.008	6	-0.006	1	-0.008	3	0.009	4	-0.005	2	-0.005	1	-0.873	2	0.000	2	0.000	0.000	0.000		0.005		0.000	0.001		
1431	M154	12in Dia. Duct	Sec 1 - max	0.001	5	0.008	7	0.006	2	-0.006	4	0.008	3	0.005	1	0.005	2	0.873	1	0.000	1	0.000	0.000	0.000		0.008		0.000	0.001		
1428	M153	12in Dia. Duct	Sec 4 - min	0.000	6	0.007	7	-0.006	1	-0.009	3	0.008	4	-0.005	2	-0.005	1	-4.171	2	-0.001	2	0.000	0.000	0.000		0.009		0.000	0.001		
1434	M154	12in Dia. Duct	Sec 2 - min	-0.002	4	0.007	4	-0.005	1	-0.006	3	0.004	4	-0.004	2	-0.004	1	-0.873	2	0.000	2	0.000	0.000	0.000		0.006		0.000	0.000		
1430	M153	12in Dia. Duct	Sec 5 - min	0.000	5	0.006	7	-0.005	1	-0.008	3	0.006	4	-0.004	2	-0.004	1	-4.171	2	-0.001	2	0.000	0.000	0.000		0.008		0.000	0.001		
1433	M154	12in Dia. Duct	Sec 2 - max	0.001	3	0.007	3	0.005	2	-0.004	4	0.006	3	0.004	1	0.004	2	0.873	1	0.000	1	0.000	0.000	0.000		0.006		0.000	0.000		
1436	M154	12in Dia. Duct	Sec 3 - min	-0.002	4	0.006	4	-0.004	1	-0.004	3	0.003	4	-0.003	2	-0.003	1	-0.873	2	0.000	2	0.000	0.000	0.000		0.004		0.000	0.000		
1435	M154	12in Dia. Duct	Sec 3 - max	0.001	3	0.006	3	0.004	2	-0.003	4	0.004	3	0.003	1	0.003	2	0.873	1	0.000	1	0.000	0.000	0.000		0.004		0.000	0.000		
1438	M154	12in Dia. Duct	Sec 4 - min	-0.002	4	0.005	4	-0.004	1	-0.003	3	0.002	4	-0.002	2	-0.002	1	-0.873	2	0.000	2	0.000	0.000	0.000		0.003		0.000	0.000		
1437	M154	12in Dia. Duct	Sec 4 - max	0.001	3	0.005	3	0.004	2	-0.002	4	0.003	3	0.002	1	0.002	2	0.873	1	0.000	1	0.000	0.000	0.000		0.003		0.000	0.000		
1440	M154	12in Dia. Duct	Sec 5 - min	-0.002	4	0.004	4	-0.003	1	-0.002	3	0.000	4	-0.001	2	-0.001	1	-0.873	2	0.000	2	0.000	0.000	0.000		0.002		0.000	0.000		
1442	M155	12in Dia. Duct	Sec 1 - min	-0.002	4	0.002	4	-0.003	1	-0.002	3	0.000	4	-0.001	2	-0.001	1	0.000	1	0.000	1	0.000	0.000	0.000		0.002		0.000	0.000		
1439	M154	12in Dia. Duct	Sec 5 - max	0.001	3	0.004	3	0.003	2	0.000	4	0.002	3	0.001	1	0.001	2	0.873	1	0.000	1	0.000	0.000	0.000		0.002		0.000	0.000		
1444	M155	12in Dia. Duct	Sec 2 - min	-0.002	4	0.001	4	-0.002	1	-0.001	3	0.000	4	0.000	2	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000		0.002		0.000	0.000		
1441	M155	12in Dia. Duct	Sec 1 - max	0.000	3	0.000	3	0.003	2	0.000	4	0.002	3	0.001	1	0.001	2	0.000	1	0.000	1	0.000	0.000	0.000		0.002		0.000	0.000		
1445	M155	12in Dia. Duct	Sec 3 - min	-0.001	4	0.000	4	-0.001	1	0.000	3	0.000	4	0.000	2	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000		0.001		0.000	0.000		
1443	M155	12in Dia. Duct	Sec 2 - max	0.000	3	0.004	3	0.002	2	0.000	4	0.001	3	0.000	1	0.000	2	0.000	1	0.000	1	0.000	0.000	0.000		0.001		0.000	0.000		
1446	M155	12in Dia. Duct	Sec 3 - max	0.000	3	0.002	3	0.001	2	0.000	4	0.000	3	0.000	1	0.000	2	0.000	1	0.000	1	0.000	0.000	0.000		0.000		0.000	0.000		
1447	M155	12in Dia. Duct	Sec 4 - max	0.000	3	0.001	3	0.000	2	0.000	4	0.000	3	0.000	1	0.000	2	0.000	1	0.000	1	0.000	0.000	0.000		0.000		0.000	0.000		
1448	M155	12in Dia. Duct	Sec 4 - min	0.000	4	0.000	4	0.000	1	0.000	3	0.000	4	0.000	2	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000		0.000		0.000	0.000		
1449	M155	12in Dia. Duct	Sec 5 - max	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000		0.000		0.000	0.000		
1450	M155	12in Dia. Duct	Sec 5 - min	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000		0.000		0.000	0.000		

amec

CALCULATION SHEET

CALC. NO.:	145579-V-CA-005	REV:	1	DATE:	March 26, 2006
CALC. TITLE:	Off-Gas Treatment System Pipe Stress Analysis				
PROJECT NO.:	145579	PROJECT TITLE:	Final DBVS Design		

Attachment 10: Excel Spreadsheet – Model 2 AG-1 Analysis and Unity Checks

NOTE: This cover sheet represents the approval signatures of the originator and checker for all pages of this attachment

ORIGINATOR:	DATE:	CHECKER:	DATE:
Kevin M. Jones KMJ	3/26/06	J. Van Corbach JVC	3/26/06

Duct Size	σ_c (ksi) Eq. 1b	σ_s (ksi) Eq. 8 or 7	ϵ_c (ksi) Eq. 5	ϵ_s (ksi) Eq. 8	v_c (ksi) Eq. 9	σ_v (ksi) Eq. 10	Temp
2in Dia. Duct Sch 40S	3.9	14.0	11.7	28.4	8.1	8.1	572
2in Dia Duct Sch 80S	3.7	14.0	11.7	43.6	8.1	8.1	572
2.5in Dia Duct Sch 80S	5.1	14.0	11.7	51.0	8.1	8.1	572
2.5in Dia Duct Sch 160S	4.9	14.0	11.7	74.8	8.1	8.1	572
6in Dia. Duct	7.0	14.0	11.7	27.8	8.1	8.1	572
8in Dia. Duct	8.3	14.0	11.7	10.3	8.1	8.1	572
12in Dia. Duct	8.7	14.0	11.7	9.8	8.1	8.1	572

Model 2

D-2250

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_c	f_{by}/σ_s	f_{bz}/σ_s		f_c (ksi)		
231	M24	RIGID	Sec 1 - min	0.000	8	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	77.526	8	0.000	1	0.000	0.000	0.000		0.000		
232	M24	RIGID	Sec 1 - min	0.000	7	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	50.057	1	0.000	1	0.000	0.000	0.000		0.000		
233	M24	RIGID	Sec 2 - max	0.000	8	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	77.526	8	0.000	1	0.000	0.000	0.000		0.000		
234	M24	RIGID	Sec 2 - min	0.000	7	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	50.057	1	0.000	1	0.000	0.000	0.000		0.000		
235	M24	RIGID	Sec 3 - max	0.000	8	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	77.526	8	0.000	1	0.000	0.000	0.000		0.000		
236	M24	RIGID	Sec 3 - min	0.000	7	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	50.057	1	0.000	1	0.000	0.000	0.000		0.000		
237	M24	RIGID	Sec 4 - max	0.000	8	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	77.526	8	0.000	1	0.000	0.000	0.000		0.000		
238	M24	RIGID	Sec 4 - min	0.000	7	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	50.057	1	0.000	1	0.000	0.000	0.000		0.000		
239	M24	RIGID	Sec 5 - max	0.000	8	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	77.526	8	0.000	1	0.000	0.000	0.000		0.000		
240	M24	RIGID	Sec 5 - min	0.000	7	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	50.057	1	0.000	1	0.000	0.000	0.000		0.000		
221	M23	2.5in Dia. Duct Sch 80S	Sec 1 - max	0.139	8	0.149	6	0.033	7	2.455	9	8.796	6	1.158	8	1.172	7	22.002	7	0.114	7	0.027	0.028	0.084		8.796		
221	M23	6in Dia. Duct	Sec 1 - max	0.029	8	0.022	6	-0.010	1	-0.072	1	0.085	8	10.164	9	-0.059	1	77.526	8	0.065	8	0.004	0.006	0.726		10.164		
222	M23	6in Dia. Duct	Sec 1 - min	-0.015	7	0.021	1	-0.797	9	-0.085	8	0.072	1	9.059	1	-10.164	9	50.057	1	0.042	1	0.002	0.006	0.726		10.164		
322	M33	2.5in Dia. Duct Sch 80S	Sec 1 - min	0.044	1	-0.149	8	-0.033	8	-8.796	6	-2.455	9	-1.172	7	-1.158	8	-21.324	8	-0.110	8	0.009	0.828	0.084		8.796		
223	M23	6in Dia. Duct	Sec 2 - max	0.031	8	0.017	8	-0.010	1	-0.026	1	0.038	8	8.245	9	-0.029	1	77.526	8	0.065	8	0.004	0.003	0.569		8.245		
224	M23	6in Dia. Duct	Sec 2 - min	-0.016	7	0.019	1	-0.794	9	-0.038	8	0.026	1	8.245	9	-8.245	9	50.057	1	0.042	1	0.002	0.003	0.569		8.245		
323	M33	2.5in Dia. Duct Sch 80S	Sec 2 - max	0.132	8	0.142	8	0.026	7	0.100	9	6.441	6	0.861	8	0.899	7	22.002	7	0.114	7	0.026	0.480	0.050		6.441		
324	M33	2.5in Dia. Duct Sch 80S	Sec 2 - min	0.037	1	-0.142	8	-0.026	8	-6.441	6	-0.100	9	-0.699	7	-0.661	8	-21.324	8	-0.110	8	0.007	0.460	0.050		6.441		
631	M54	2.5in Dia. Duct Sch 80S	Sec 1 - max	0.122	8	0.148	6	0.005	7	0.163	7	6.396	8	0.200	7	0.224	8	11.167	9	0.058	9	0.024	0.457	0.016		6.396		
633	M54	2.5in Dia. Duct Sch 80S	Sec 2 - max	0.121	8	0.148	6	0.005	7	0.242	7	6.368	8	0.211	7	0.228	8	11.167	9	0.058	9	0.024	0.455	0.016		6.368		
635	M54	2.5in Dia. Duct Sch 80S	Sec 3 - max	0.121	8	0.146	6	0.004	7	0.300	7	6.339	8	0.213	7	0.228	8	11.167	9	0.058	9	0.024	0.453	0.016		6.339		
629	M53	2.5in Dia. Duct Sch 80S	Sec 6 - max	0.123	8	0.140	6	0.005	7	0.163	7	6.395	8	0.123	7	0.146	8	19.786	7	0.102	7	0.024	0.457	0.011		6.396		
637	M54	2.5in Dia. Duct Sch 80S	Sec 4 - max	0.121	8	0.147	6	0.004	7	0.358	7	6.311	8	0.214	7	0.229	8	11.167	9	0.058	9	0.024	0.451	0.016		6.311		
627	M53	2.5in Dia. Duct Sch 80S	Sec 4 - max	0.123	8	0.140	6	0.005	7	0.127	7	6.372	8	0.121	7	0.147	8	19.786	7	0.102	7	0.024	0.455	0.011		6.372		
639	M54	2.5in Dia. Duct Sch 80S	Sec 5 - max	0.121	8	0.147	6	0.004	7	0.417	7	6.283	8	0.216	7	0.231	8	11.167	9	0.058	9	0.024	0.449	0.017		6.283		
625	M53	2.5in Dia. Duct Sch 80S	Sec 3 - max	0.124	8	0.141	6	0.005	7	0.072	7	6.349	8	0.119	7	0.145	8	19.786	7	0.102	7	0.024	0.454	0.010		6.325		
623	M53	2.5in Dia. Duct Sch 80S	Sec 2 - max	0.124	8	0.141	6	0.005	7	0.016	7	6.325	8	0.117	7	0.142	8	19.786	7	0.102	7	0.024	0.452	0.010		6.301		
621	M53	2.5in Dia. Duct Sch 80S	Sec 1 - max	0.124	8	0.141	6	0.005	7	-0.039	7	6.301	8	0.115	7	0.140	8	19.786	7	0.102	7	0.024	0.450	0.010		6.283		
641	M55	2.5in Dia. Duct Sch 80S	Sec 1 - max	0.087	8	0.162	8	0.004	7	0.417	7	6.283	8	0.245	7	0.245	8	3.807	8	0.019	8	0.017	0.449	0.018		6.211		
643	M55	2.5in Dia. Duct Sch 80S	Sec 2 - max	0.087	8	0.162	8	0.004	7	0.462	7	6.211	8	0.246	7	0.247	8	3.807	8	0.019	8	0.017	0.444	0.018		6.301		
329	M33	2.5in Dia. Duct Sch 80S	Sec 6 - max	0.112	8	0.122	6	0.005	7	-0.039	7	6.301	8	0.059	7	0.065	8	22.002	7	0.114	7	0.022	0.450	0.006		6.283		
642	M55	2.5in Dia. Duct Sch 80S	Sec 1 - min	-0.047	7	0.029	1	-0.004	8	-6.283	6	-0.417	7	-0.245	8	-0.245	7	-0.799	7	-0.004	7	0.009	0.449	0.018		6.396		
632	M54	2.5in Dia. Duct Sch 80S	Sec 1 - min	-0.012	7	0.022	1	-0.005	6	-6.396	8	-0.163	7	-0.224	6	-0.209	7	-8.778	6	-0.045	6	0.002	0.457	0.016		6.368		
634	M54	2.5in Dia. Duct Sch 80S	Sec 2 - min	-0.012	7	0.022	1	-0.005	8	-6.368	8	-0.242	7	-0.226	6	-0.211	7	-8.778	6	-0.045	6	0.002	0.455	0.016		6.139		
545	M55	2.5in Dia. Duct Sch 80S	Sec 3 - max	0.087	8	0.162	8	0.004	7	0.508	7	6.139	8	0.248	7	0.248	8	3.807	8	0.019	8	0.017	0.439	0.018		6.339		
636	M54	2.5in Dia. Duct Sch 80S	Sec 3 - min	-0.012	7	0.022	1	-0.005	6	-6.339	8	-0.300	7	-0.226	6	-0.213	7	-8.778	6	-0.045	6	0.002	0.453	0.016		6.211		
644	M55	2.5in Dia. Duct Sch 80S	Sec 2 - min	-0.047	7	0.029	1	-0.004	8	-6.211	8	-0.462	7	-0.247	6	-0.248	7	-0.799	7	-0.004	7	0.009	0.444	0.018		6.396		
630	M53	2.5in Dia. Duct Sch 80S	Sec 6 - min	0.015	1	-0.090	9	-0.005	8	-6.396	8	-0.163	7	-0.149	6	-0.123	7	-18.438	8	-0.096	6	0.003	0.457	0.011		6.311		
638	M54	2.5in Dia. Duct Sch 80S	Sec 4 - min	-0.012	7	0.021	1	-0.004	8	-6.311	8	-0.358	7	-0.229	6	-0.214	7	-8.778	6	-0.045	6	0.002	0.451	0.016		6.372		
628	M53	2.5in Dia. Duct Sch 80S	Sec 4 - min	0.015	1	-0.090	9	-0.005	8	-0.372	8	-0.127	7	-0.147	6	-0.121	7	-18.438	8	-0.096	6	0.003	0.465	0.011		6.087		
647	M55	2.5in Dia. Duct Sch 80S	Sec 4 - max	0.087	8	0.162	8	0.004	7	0.553	7	6.067	8	0.249	7	0.250	8	3.807	8	0.019	8	0.017	0.433	0.018		6.283		
640	M54	2.5in Dia. Duct Sch 80S	Sec 5 - min	-0.012	7	0.021	1	-0.004	8	-6.283	8	-0.417	7	-0.231	6	-0.218	7	-8.778	6	-0.045	6	0.002	0.449	0.017		6.349		
626	M53	2.5in Dia. Duct Sch 80S	Sec 3 - min	0.015	1	-0.090	9	-0.005	8	-6.349	8	-0.072	7	-0.145	6	-0.119	7	-18.438	8	-0.096	6	0.003	0.454	0.010		6.109		
649	M55	2.5in Dia. Duct Sch 80S	Sec 3 - min	-0.047	7	0.029	1	-0.004	8	-6.109	6	-0.508	7	-0.249	6	-0.248	7	-0.799	7	-0.004	7	0.009	0.439	0.018		6.325		
624	M53	2.5in Dia. Duct Sch 80S	Sec 2 - min	0.016	1	-0.090	9	-0.005	8	-6.325	8	-0.016	7	-0.142	6	-0.117	7	-18.438	8	-0.096	6	0.003	0.452	0.010		6.301		
622	M53	2.5in Dia. Duct Sch 80S	Sec 1 - min	0.016	1	-0.090	9	-0.005	8	-6.301	8	0.039	7	-0.140	6	-0.115	7	-18.438	8	-0.096	6	0.003	0.450	0.010		5.996		
648	M55	2.5in Dia. Duct Sch 80S	Sec 6 - max	0.086	8	0.161	6	0.003	7	0.596	7	5.996	8	0.250	7	0.252	8	3.807	8	0.019	8	0.017	0.428	0.018		6.087		
646	M55	2.5in Dia. Duct Sch 80S	Sec 4 - min	-0.047	7	0.029	1	-0.004	8	-6.087	6	-0.553	7	-0.250	6	-0.249	7	-0.799	7	-0.004	7	0.009	0.433	0.018		6.301		
330	M33	2.5in Dia. Duct Sch 80S	Sec 6 - min	0.016	1	-0.122	8	-0.006	8	-6.301	8	0.039	7	-0.088	6	-0.059	7	-21.324	8	-0.110	8	0.003	0.450	0.006		6.349		
225	M23	6in Dia. Duct	Sec 3 - max	0.032	8	0.012	8	-0.010	1	0.007	1	0.003	8	6.349	8	0.000	1	77.526	8	0.065	8	0.004	0.001	0.484		5.996		
1	M1	2.5in Dia. Duct Sch 80S	Sec 1 - max	0.099	8	0.228	8	0.003	7	0.596	7	5.996	8	0.240	7	0.233	8	5.768	8	0.051	8	0.012	0.428	0.017		5.996		
2	M1	2.5in Dia. Duct Sch 80S	Sec 1 - min	-0.060	7	0.029	1	-0.004	8	-5.996	8	-0.596	7	-0.233	8	-0.240	7	-7.047	7	-0.035	7	0.012	0.001	0.454		6.349		
228	M23	6in Dia. Duct	Sec 3 - min	-0.017	7	0.011	1	-0.791	9	-0.003	8	-0.007	1	0.000	1	-8.349	6	50.057	1	0.042	1	0.002	0.428	0.018		5.996		
550	M55	2.5in Dia. Duct Sch 80S	Sec 6 - min	-0.047	7	0.028	1	-0.004	8	-5.996	8	-0.598	7	-0.252	8	-0.250	7	-0.799	7	-0.004	7	0.009	0.172	0.227		3.173		
161	M17	2in Dia. Duct Sch 80S	Sec 1 - max	0.030	8	0.142	1	0.150	1	-1.644	1	2.404	6	-1.518	1	3.173	7	77.526	8	0.734	8	0.008	0.172	0.227		3.173		
161	M19	2in Dia. Duct Sch 80S	Sec 1 - max	0.030	8	0.176	8	-0.046	8	-1.544	1	2.404	6	3.173	7	-1.518	1	77.526	8	0.734	8	0.008	0.172	0.227		3.173		
162	M17	2in Dia. Duct Sch 80S	Sec 1 - min	0.009	1	0.090	8	0.017	8	-2.404	6	1.644	1	-3.173	7	1.518	1	50.057	1	0.474	1	0.002	0.172	0.227		3.173		
162	M19	2in Dia. Duct Sch 80S	Sec 1 - min	0.009	1	0.135	1	-0.160	1	-2.404	6	1.644	1	1.518	1	-3.173	7	50.057	1	0.474	1	0.002	0.172	0.227		3.173		
227	M23	6in Dia. Duct	Sec 4 - max	0.033	8	0.007	8	-0.010	1	0.027	1	-0.020	8	5.233	6	0.028	1	77.526	8	0.065	8	0.004	0.002	0.374		5.233		
79	M6	2in Dia. Duct Sch 80S	Sec 5 - max	0.018	7	0.096	8	0.012	8	4.775	8	-2.687	1	0.460	1	0.231	7	0.207	1	0.002	1	0.005	0.341	0.003		4.775		
80	M6	2in Dia. Duct Sch 80S	Sec 5 - min	-0.016	8	0.044	1	-0.014	7	2.667	1	-4.775	8	-0.231	7	-0.460	1	0.041	7	0.000	7	0.005	0.341	0.003		5.233		
228	M23	6in Dia. Duct	Sec 4 - min	-0.018	7	0.006	1	-0.789	9	0.020	8	-0.027	1	-0.028	1	-5.233	6	50.057	1	0.042	1	0.002	0.002	0.374		2.972		
163	M17	2in Dia. Duct Sch 80S	Sec 2 - max	0.030	8	0.140	1	0.150	1	-1.234	1	2.161	6	-1.188	1	2.972	7	77.526	8	0.734	8	0.008	0.156	0.212		2.972		
164	M17	2in Dia. Duct Sch 80S	Sec 2 - min	0.009	1	0.089	8	0.017	8	-2.161	6	1.234	1	-2.972	7	1.188	1	50.057	1	0.474	1	0.002	0.156	0.212		3.488		
152	M18	2in Dia. Duct Sch 80S	Sec 1 - min	-0.048	6	-0.057	1	-0.150	1	-0.627	6	-1.513	1	-0.715	7	-3.488	1	31.057	1	0.294	1	0.013	0.108	0.249		4.007		
9	M1	2.5in Dia. Duct Sch 80S	Sec 6 - max	0.035	8	0.120	8	0.048	6	4.007	8	1.201	1	1.029	6	1.033	8	9.788	8	0.051	8	0.007	0.266	0.074		4.007		
10	M1	2.5in Dia. Duct Sch 80S	Sec 5 - min	-0.035	7	-0.071	1	-0.047	9	-1.201	1	-4.007	8	-1.033	9	-1.029	8	-7.047	7	-0.036	7	0.007	0.266	0.074		4.007		
261	M39	2.5in Dia. Duct Sch 80S	Sec 1 - max	0.035	8	0.057	1	0.033	9	4.007	8	1.201	1	1.029	6	1.033	9	9.788	8	0.051	8	0.007	0.266	0.074				

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (K-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_a	f_b/σ_a	f_s/σ_a	f_t (ksi)
																						0.2250			
362	M39	2.5in Dia. Duct Sch 80S	Sec 1 - min	-0.035	9	0.003	8	-0.033	6	-1.201	1	-4.007	8	-1.033	9	-1.028	6	-7.047	7	-0.036	7	0.007	0.288	0.074	4.007
363	M39	2.5in Dia. DuctSch 80S	Sec 2 - max	0.034	8	0.054	1	0.032	9	1.013	8	1.042	1	0.936	6	0.942	9	9.768	8	0.051	8	0.007	0.287	0.067	4.013
364	M39	2.5in Dia. Duct Sch 80S	Sec 2 - min	-0.034	8	0.001	6	-0.032	6	-1.042	1	-4.013	8	-0.942	9	-0.936	6	-7.047	7	-0.036	7	0.007	0.287	0.067	4.013
151	M16	2in Dia. Duct Sch 80S	Sec 1 - max	-0.007	9	-0.008	8	-0.023	9	1.513	1	0.527	6	3.468	1	0.715	7	53.440	8	0.506	6	0.002	0.108	0.249	3.488
365	M39	2.5in Dia. Duct Sch 80S	Sec 3 - max	0.034	8	0.057	1	0.030	9	4.013	8	0.891	1	0.847	6	0.853	9	9.788	8	0.051	8	0.007	0.287	0.061	4.013
366	M39	2.5in Dia. Duct Sch 80S	Sec 3 - min	-0.034	8	-0.001	6	-0.030	6	-0.891	1	-4.013	8	-0.853	9	-0.847	6	-7.047	7	-0.036	7	0.007	0.287	0.061	4.013
325	M33	2.5in Dia. Duct Sch 80S	Sec 3 - max	0.126	8	0.136	6	0.019	7	-0.050	1	4.197	6	0.515	8	0.536	7	22.002	7	0.114	7	0.023	0.300	0.024	4.197
367	M39	2.5in Dia. Duct Sch 80S	Sec 4 - max	0.033	6	0.050	1	0.020	9	4.005	8	0.746	1	0.762	6	0.769	9	9.788	8	0.051	8	0.006	0.286	0.055	4.005
368	M39	2.5in Dia. Duct Sch 80S	Sec 4 - min	-0.033	8	-0.004	6	-0.029	6	-0.746	1	-4.005	8	-0.769	9	-0.762	6	-7.047	7	-0.036	7	0.006	0.286	0.056	2.773
165	M17	2in Dia. Duct Sch 80S	Sec 3 - max	0.030	8	0.139	1	0.150	1	-0.927	1	1.961	6	-0.857	1	2.773	7	77.526	8	0.734	6	0.008	0.140	0.198	3.991
371	M38	2.5in Dia. Duct Sch 80S	Sec 1 - max	0.033	9	0.047	1	0.028	9	3.991	8	0.608	1	0.680	6	0.667	9	9.788	8	0.051	8	0.006	0.285	0.049	3.991
372	M38	2.5in Dia. Duct Sch 80S	Sec 1 - min	-0.033	6	-0.008	8	-0.028	6	-0.608	1	-3.991	8	-0.667	9	-0.680	6	-7.047	7	-0.036	7	0.006	0.285	0.049	3.991
369	M39	2.5in Dia. Duct Sch 80S	Sec 6 - max	0.033	8	0.047	1	0.028	9	3.991	8	0.608	1	0.680	6	0.667	9	9.788	8	0.051	8	0.006	0.285	0.049	3.991
370	M39	2.5in Dia. Duct Sch 80S	Sec 6 - min	-0.033	8	-0.006	8	-0.028	6	-0.608	1	-3.991	8	-0.667	9	-0.680	6	-7.047	7	-0.036	7	0.006	0.285	0.049	2.773
166	M17	2in Dia. Duct Sch 80S	Sec 3 - min	0.009	1	0.067	8	0.018	8	-1.961	6	0.927	1	-2.773	7	0.857	1	50.057	1	0.474	1	0.002	0.140	0.198	4.278
327	M33	2.5in Dia. Duct Sch 80S	Sec 4 - max	0.119	8	0.129	6	0.012	7	-0.050	1	4.278	6	0.059	8	0.084	7	22.002	7	0.114	7	0.023	0.306	0.006	3.975
373	M38	2.5in Dia. Duct Sch 80S	Sec 2 - max	0.032	9	0.040	1	0.027	9	3.975	8	0.504	1	0.818	6	0.625	9	9.788	8	0.051	8	0.006	0.284	0.046	3.975
374	M38	2.5in Dia. Duct Sch 80S	Sec 2 - min	-0.032	6	-0.008	8	-0.027	8	-0.504	1	-3.975	8	-0.625	9	-0.818	6	-7.047	7	-0.036	7	0.006	0.284	0.046	4.197
328	M33	2.5in Dia. Duct Sch 80S	Sec 3 - min	0.030	1	-0.136	8	-0.019	8	-4.197	8	0.050	1	-0.306	7	-0.315	8	-21.324	8	-0.110	8	0.005	0.300	0.024	3.955
375	M38	2.5in Dia. Duct Sch 80S	Sec 3 - max	0.032	9	0.043	1	0.026	9	3.955	8	0.404	1	0.558	6	0.566	9	9.788	8	0.051	8	0.006	0.283	0.040	3.955
376	M38	2.5in Dia. Duct Sch 80S	Sec 3 - min	-0.032	6	-0.010	9	-0.026	6	-0.404	1	-3.955	8	-0.566	9	-0.558	6	-7.047	7	-0.036	7	0.006	0.283	0.040	3.808
451	M46	2in Dia. Duct Sch 80S	Sec 1 - max	0.062	9	0.088	1	0.100	8	-0.439	9	0.511	1	3.805	7	0.004	1	-13.576	1	-0.129	1	0.017	0.027	0.272	3.931
377	M38	2.5in Dia. Duct Sch 80S	Sec 4 - max	0.031	9	0.042	1	0.026	9	3.931	8	0.309	1	0.501	6	0.505	9	9.788	8	0.051	8	0.006	0.281	0.036	3.931
378	M38	2.5in Dia. Duct Sch 80S	Sec 4 - min	-0.031	8	-0.012	8	-0.025	6	-0.309	1	-3.931	8	-0.505	9	-0.501	6	-7.047	7	-0.036	7	0.006	0.281	0.036	3.743
453	M46	2in Dia. Duct Sch 80S	Sec 2 - max	0.062	6	0.067	1	0.099	8	-0.407	9	0.479	1	3.743	7	0.004	1	-13.576	1	-0.129	1	0.017	0.034	0.267	3.902
361	M37	2.5in Dia. Duct Sch 80S	Sec 1 - max	0.031	9	0.040	1	0.024	9	3.902	8	0.216	1	0.445	6	0.453	9	9.788	8	0.051	8	0.006	0.279	0.032	3.902
362	M37	2.5in Dia. Duct Sch 80S	Sec 1 - min	-0.031	6	-0.014	8	-0.024	6	-0.216	1	-3.902	8	-0.453	9	-0.445	6	-7.047	7	-0.036	7	0.006	0.279	0.032	3.902
379	M38	2.5in Dia. Duct Sch 80S	Sec 5 - max	0.031	9	0.040	1	0.024	9	3.902	8	0.216	1	0.445	6	0.453	9	9.788	8	0.051	8	0.006	0.279	0.032	3.902
380	M38	2.5in Dia. Duct Sch 80S	Sec 5 - min	-0.031	6	-0.014	8	-0.024	6	-0.216	1	-3.902	8	-0.453	9	-0.445	6	-7.047	7	-0.036	7	0.006	0.279	0.032	2.576
167	M17	2in Dia. Duct Sch 80S	Sec 4 - max	0.029	8	0.137	1	0.160	1	-0.623	1	1.745	6	-0.527	1	2.576	7	77.526	8	0.734	6	0.008	0.126	0.184	4.278
328	M33	2.5in Dia. Duct Sch 80S	Sec 4 - min	0.023	1	-0.129	8	-0.012	8	-4.278	8	0.050	1	-0.064	7	-0.059	8	-21.324	8	-0.110	8	0.005	0.306	0.008	3.808
61	M7	2in Dia. Duct Sch 80S	Sec 1 - max	0.049	6	0.046	8	0.101	7	-0.356	9	0.427	1	0.004	1	3.805	7	-19.861	7	-0.166	7	0.013	0.031	0.272	3.581
455	M46	2in Dia. Duct Sch 80S	Sec 3 - max	0.062	6	0.067	1	0.099	8	-0.375	9	0.447	1	3.681	7	0.004	1	-13.576	1	-0.129	1	0.017	0.032	0.263	2.578
166	M17	2in Dia. Duct Sch 80S	Sec 4 - min	0.009	1	0.086	8	0.018	8	-1.745	6	0.623	1	-2.576	7	0.527	1	50.057	1	0.474	1	0.002	0.125	0.184	2.465
163	M19	2in Dia. Duct Sch 80S	Sec 2 - max	0.031	8	0.174	6	-0.047	8	-1.029	1	1.735	6	2.465	7	-1.246	1	77.526	8	0.734	8	0.008	0.124	0.176	3.605
452	M46	2in Dia. Duct Sch 80S	Sec 1 - min	-0.003	9	0.067	8	-0.131	7	-0.511	1	0.439	9	-0.004	1	-3.805	7	-14.513	6	-0.137	6	0.001	0.037	0.272	3.557
461	M47	2in Dia. Duct Sch 80S	Sec 1 - max	0.073	6	0.066	1	0.058	8	-0.404	9	0.481	1	3.557	7	0.004	1	-1.625	1	-0.015	1	0.020	0.033	0.254	3.619
457	M46	2in Dia. Duct Sch 80S	Sec 4 - max	0.062	6	0.087	1	0.099	8	-0.343	9	0.415	1	3.619	7	0.004	1	-13.576	1	-0.129	1	0.017	0.030	0.269	-2.465
164	M19	2in Dia. Duct Sch 80S	Sec 2 - min	0.009	1	0.133	1	-0.179	7	-1.735	6	1.029	1	1.246	1	-2.465	7	50.057	1	0.474	1	0.002	0.124	0.176	2.086
570	M57	2in Dia. Duct Sch 80S	Sec 6 - min	-0.062	1	-0.098	1	0.052	8	-1.925	6	0.698	1	-0.240	1	-2.086	7	30.609	1	0.290	1	0.017	0.136	0.149	3.743
454	M46	2in Dia. Duct Sch 80S	Sec 2 - min	-0.003	9	0.067	8	-0.131	7	-0.479	1	0.407	9	-0.004	1	-3.743	7	-14.513	6	-0.137	6	0.001	0.034	0.267	3.805
62	M7	2in Dia. Duct Sch 80S	Sec 1 - min	0.000	1	0.043	1	0.000	1	-0.427	1	0.356	9	-3.805	7	-0.004	1	-20.094	1	-0.190	1	0.000	0.031	0.272	4.110
191	M11	6in Dia. Duct	Sec 1 - max	0.035	8	0.002	8	-0.010	1	0.035	1	-0.030	8	4.110	6	0.051	1	77.526	8	0.065	8	0.004	0.003	0.294	4.110
229	M23	6in Dia. Duct	Sec 5 - max	0.035	8	0.002	8	-0.010	1	0.035	1	-0.030	6	4.110	6	0.051	1	77.526	8	0.065	8	0.004	0.003	0.294	4.110
660	M56	2in Dia. Duct Sch 80S	Sec 5 - min	-0.092	1	-0.071	8	0.060	8	-1.597	6	0.834	1	-0.320	1	-2.251	6	8.566	1	0.081	1	0.025	0.114	0.161	2.251
463	M47	2in Dia. Duct Sch 80S	Sec 2 - max	0.073	6	0.066	1	0.058	8	-0.373	9	0.429	1	3.486	7	0.004	1	-1.625	1	-0.015	1	0.020	0.031	0.243	3.486
102	M11	6in Dia. Duct	Sec 1 - min	-0.020	7	0.000	1	-0.788	8	0.030	8	-0.035	1	-0.051	1	-4.110	6	50.057	1	0.042	1	0.003	0.003	0.294	4.110
230	M23	6in Dia. Duct	Sec 5 - min	-0.020	7	0.000	1	-0.788	8	0.030	8	-0.035	1	-0.051	1	-4.110	6	50.057	1	0.042	1	0.003	0.003	0.294	3.557
459	M46	2in Dia. Duct Sch 80S	Sec 6 - max	0.062	6	0.066	1	0.099	8	-0.312	9	0.384	1	3.557	7	0.004	1	-13.576	1	-0.129	1	0.017	0.027	0.254	2.047
568	M57	2in Dia. Duct Sch 80S	Sec 4 - min	-0.062	1	-0.098	1	0.052	8	-1.809	6	0.662	1	-0.286	1	-2.047	7	30.609	1	0.290	1	0.017	0.135	0.146	2.828
160	M16	2in Dia. Duct Sch 80S	Sec 5 - min	-0.085	1	-0.003	1	0.018	1	0.598	1	-1.006	8	1.462	9	-2.828	6	-3.051	1	-0.029	1	0.020	0.072	0.202	2.225
558	M56	2in Dia. Duct Sch 80S	Sec 4 - min	-0.092	1	-0.071	8	0.060	8	-1.571	6	0.815	1	-0.343	1	-2.225	6	8.566	1	0.081	1	0.025	0.112	0.159	3.581
468	M48	2in Dia. Duct Sch 80S	Sec 3 - min	-0.003	9	0.067	8	-0.131	7	-0.447	1	0.375	9	-0.004	1	-3.581	7	-14.513	6	-0.137	6	0.001	0.032	0.263	3.780
363	M37	2.5in Dia. Duct Sch 80S	Sec 2 - max	0.020	6	0.035	1	0.022	9	3.780	8	-0.073	1	0.266	6	0.275	7	9.788	6	0.051	6	0.006	0.270	0.020	3.780
364	M37	2.5in Dia. Duct Sch 80S	Sec 2 - min	-0.020	6	-0.016	8	-0.022	6	0.073	1	-3.780	8	-0.275	7	-0.266	6	-7.047	7	-0.036	7	0.006	0.270	0.020	2.260
579	M58	2in Dia. Duct Sch 80S	Sec 5 - max	0.020	6	-0.090	8	0.150	1	-0.528	1	1.800	6	2.260	7	-0.090	1	72.103	8	0.683	6	0.005	0.129	0.161	3.557
462	M47	2in Dia. Duct Sch 80S	Sec 1 - min	-0.030	9	0.086	8	-0.145	7	-0.491	1	0.404	9	-0.004	1	-3.557	7	-4.210	6	-0.040	6	0.008	0.033	0.254	2.260
580	M58	2in Dia. Duct Sch 80S	Sec 5 - min	-0.017	1	-0.132	1	0.032	8	-1.800	6	0.528	1	0.090	1	-2.260	7	45.895	1	0.435	1	0.005	0.129	0.181	3.425
465	M47	2in Dia. Duct Sch 80S	Sec 3 - max	0.073	6	0.066	1	0.058	8	-0.342	9	0.398	1	3.425	6	0.004	1	-1.625	1	-0.015	1	0.020	0.028	0.245	2.009
566	M57	2in Dia. Duct Sch 80S	Sec 3 - min	-0.062	1	-0.097	1	0.052	8	-1.854	6	0.625	1	-0.335	1	-2.009	7	30.609	1	0.290	1	0.017	0.132	0.144	2.199
556	M56	2in Dia. Duct Sch 80S	Sec 3 - min	-0.092	1	-0.071	8	0.060	8	-1.545	6	0.795	1	-0.368	1	-2.199	6	8.566	1	0.081	1	0.025	0.110	0.157	3.992
103	M11	6in Dia. Duct	Sec 2 - max	0.035	8	0.000	8	-0.010	1	0.035	1	-0.030	8	3.992	6	0.053	1	77.526	8	0.065	8	0.004	0.003	0.288	3.429
467	M47	2in Dia. Duct Sch 80S	Sec 4 - max	0.073	6	0.065	1	0.056	8	-0.311	9	0.357	1	3.429	6	0.004	1	-1.625	1	-0.015	1	0.020	0.028	0.245	3.015
602	M61	2in Dia. Duct Sch 80S	Sec 1 - min	-0.064	1	-0.011	9	-0.026	1	0.358	1	-0.730	8	-3.015	6	1.591	1	5.789	1	0.055	1	0.023	0.052	0.215	3.992
104	M11	6in Dia. Duct	Sec 2 - min	-0.020	7	0.000	1	-0.788	8	0.030	8	-0.035	1	-0.053	1	-3.992	6	50.057	1	0.042	1	0.003	0.003	0.285	2.223
577	M58	2in Dia. Duct Sch 80S	Sec 4 - max	0.020	6	-0.090	8	0.150	1	-0.477	1	1.762	8	2.223	7	-0.033	1	72.103	8	0.683	8	0.005	0.126	0.159	2.223
578	M58	2in Dia. Duct Sch 80S	Sec 4 - min	-0.017	1	-0.132	1	0.032	8	-1.762	6	0.477	1	0.033	1	-2.223	7	45.895	1	0.435	1	0.005	0.126	0.159	2.687
590	M59	2in Dia. Duct Sch 80S	Sec 5 - min	-0.052	6	-0.072	1	-0.142	1	-1.162	6	0.472	1	-2.687	6	1.286	1	29.524	1	0.280	1	0.014	0.083	0.192	3.619
458	M46	2in Dia. Duct Sch 80S	Sec 4 - min	-0.003	9	0.066	8	-0.131	7	-0.415	1	0.343	9	-0.004	1	-3.619	7	-14.513	6	-0.137	6	0.001	0.030	0.259	3.433
469	M47	2in Dia. Duct Sch 80S	Sec 5 - max	0.073	6	0.065	1	0.056	8	-0.280	9	0.336	1	3.433	6	0.004	1	-1.625	1	-0.015	1	0.020	0.024	0.245	2.993
604	M61	2in Dia. Duct Sch 80S	Sec 2 - min	-0.064	1	-0.011	9	-0.026	1	0.358	1	-0.730	8	-2.993	6	1.595	9	5.789	1	0.055	1	0.023	0.052	0.214	2.173
554	M56	2in Dia. Duct Sch 80S	Sec 2 - min	-0.092	1	-0.070	8	0.060	8	-1.519	6	0.775	1	-0.368	1	-2.173	6	8.566	1	0.081	1	0.026	0.109	0.155	3.486
464	M47	2in Dia. Duct Sch 80S	Sec 2 - min	-0.030	9	0.086	8	-0.145	7	-0.429	1	0.373	9	-0.004	1	-3.486	7	-4.210	6	-0.040	6	0.008	0.031	0.249	1.971
564	M57	2in Dia. Duct Sch 80S	Sec 2 - min	-0.062	1	-0.097	1	0.052	8	-1.819	6	0.589	1	-0.382	1	-1.971	7	30.609	1	0.290	1	0.017	0.130	0.141	2.360
159	M17	2in Dia. Duct Sch 80S	Sec 5 - max	0.029	8	0.136	1	0.150	1	-0.323	1	1.632	6	-0.197	1	2.360	7	77.526	8	0.734	8	0.008	0.109	0.170	2.971
606	M61	2in Dia. Duct Sch 80S	Sec 3 - min	-0.064	1	-0.011	9	-0.026	1	0.357	1	-0.729	8	-2.971	6	1.690	9	5.789	1	0.055	1	0.023	0.052	0.212	2.607
555	M56	2in Dia. Duct Sch 80S	Sec 4 - min	-0.052	6	-0.072	1	-0.142	1	-1.151	6	0.444	1	-2.607	6	1.234	1	29.524	1	0.280	1	0.014	0.082	0.191	2.086
565	M57	2in Dia. Duct Sch 80S	Sec 5 - max	0.000	6	-0.003	9	0.125	1	-0.895	1	1.625	6	2.035	7	0.240	1	49.978	8	0.473	8	0.000	0.138	0.149	2.479
160	M16	2in Dia. Duct Sch 80S	Sec 5 - min	-0.043	6	-0.076	1	-0.150	1	-1.381	6	0.807	1	-2.479	6	0.995	1	31.057	1	0.294	1	0.012	0.097	0.177	

D-2250

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_t/σ_c	f_{sy}/σ_c	f_{sz}/σ_c		f_t (ksi)	
172	M16	2in Dia. Duct Sch 80S	Sec 1- min	-0.098	1	0.042	1	0.018	1	-1.290	6	0.821	1	-2.340	6	-0.288	1	-3.051	1	-0.029	1	0.026	0.092	0.167		2.949	
609	M61	2in Dia. Duct Sch 80S	Sec 4 - min	-0.084	1	-0.011	9	-0.026	1	0.356	1	-0.729	6	-2.849	6	1.564	9	5.789	1	0.055	1	0.023	0.052	0.211		2.949	
552	M58	2in Dia. Duct Sch 80S	Sec 1- min	-0.092	1	-0.070	8	0.060	8	-1.493	6	0.759	1	-0.412	1	-2.146	6	6.969	1	0.001	1	0.026	0.107	0.163		2.146	
675	M58	2in Dia. Duct Sch 80S	Sec 3 - max	0.020	8	-0.089	6	0.150	1	-0.427	1	1.724	6	2.186	7	0.024	1	72.103	8	0.693	8	0.005	0.123	0.150		2.186	
471	M46	2in Dia. Duct Sch 80S	Sec 1 - max	0.065	8	0.065	1	0.002	8	-0.281	9	0.306	1	3.430	6	0.004	1	7.459	1	0.071	1	0.018	0.022	0.245		3.433	
589	M59	2in Dia. Duct Sch 80S	Sec 3 - min	-0.052	8	-0.072	1	-0.142	1	-1.141	6	0.417	1	-2.647	6	1.180	1	29.524	1	0.280	1	0.014	0.082	0.169		2.647	
610	M61	2in Dia. Duct Sch 80S	Sec 5 - min	-0.085	1	-0.011	9	-0.026	1	0.355	1	-0.729	8	-2.927	6	1.578	9	5.789	1	0.055	1	0.023	0.053	0.209		2.927	
576	M58	2in Dia. Duct Sch 80S	Sec 3 - min	-0.017	1	-0.132	1	0.032	8	-1.724	6	0.427	1	-0.024	1	-2.186	7	45.895	1	0.435	1	0.005	0.123	0.156		2.186	
105	M11	6in Dia. Duct	Sec 3 - max	0.035	8	0.000	8	-0.010	1	0.035	1	-0.030	8	3.874	6	0.056	1	77.526	8	0.085	8	0.004	0.003	0.277		3.874	
562	M57	2in Dia. Duct Sch 80S	Sec 1- min	-0.092	1	-0.097	1	0.062	8	-1.784	6	0.552	1	-0.429	1	-1.938	6	30.000	1	0.290	1	0.017	0.127	0.138		1.938	
584	M59	2in Dia. Duct Sch 80S	Sec 2 - min	-0.052	6	-0.072	1	-0.142	1	-1.131	8	0.398	1	-2.627	6	1.127	1	29.524	1	0.280	1	0.014	0.081	0.166		2.627	
460	M46	2in Dia. Duct Sch 80S	Sec 5 - min	-0.003	9	0.066	8	-0.130	7	-0.384	1	0.312	9	-0.004	1	-3.557	7	-14.513	8	-0.137	8	0.001	0.027	0.254		3.557	
170	M17	2in Dia. Duct Sch 80S	Sec 6 - min	0.009	1	0.084	8	0.020	8	-1.532	6	0.323	1	-2.380	7	0.197	1	50.057	1	0.474	1	0.002	0.109	0.170		2.380	
106	M11	6in Dia. Duct	Sec 3 - min	-0.020	7	0.000	1	-0.788	8	0.030	8	-0.035	1	-0.056	1	-3.874	8	50.057	1	0.042	1	0.003	0.003	0.277		3.874	
460	M47	2in Dia. Duct Sch 80S	Sec 3 - min	-0.030	9	0.065	6	-0.144	7	-0.398	1	0.342	9	-0.004	1	-3.425	6	-4.210	8	-0.040	8	0.008	0.028	0.245		3.425	
567	M57	2in Dia. Duct Sch 80S	Sec 4 - max	0.000	6	-0.083	9	0.125	1	-0.662	1	1.689	6	2.047	7	0.286	1	49.979	8	0.470	8	0.000	0.135	0.149		2.047	
659	M59	2in Dia. Duct Sch 80S	Sec 5 - max	-0.021	6	-0.053	1	0.078	7	-0.834	1	1.597	6	2.251	6	0.320	1	17.438	9	0.165	9	0.006	0.114	0.161		2.251	
179	M18	2in Dia. Duct Sch 80S	Sec 6 - max	-0.024	9	0.013	9	0.084	6	1.006	8	-0.596	1	2.628	6	-1.462	9	1.880	9	0.016	9	0.008	0.072	0.202		2.628	
562	M59	2in Dia. Duct Sch 80S	Sec 1- min	-0.092	6	-0.071	1	-0.142	1	-1.121	6	0.363	1	-2.607	6	1.073	1	29.524	1	0.280	1	0.014	0.080	0.166		2.607	
472	M46	2in Dia. Duct Sch 80S	Sec 1- min	-0.049	9	0.066	8	-0.120	7	-0.309	1	0.261	9	-0.004	1	-3.433	6	3.863	9	0.037	9	0.013	0.022	0.245		3.401	
473	M46	2in Dia. Duct Sch 80S	Sec 2 - max	0.065	6	0.065	1	0.001	8	-0.250	9	0.275	1	3.401	6	0.004	1	7.459	1	0.071	1	0.018	0.020	0.243		3.401	
589	M59	2in Dia. Duct Sch 80S	Sec 5 - max	-0.016	9	-0.023	6	-0.028	9	-0.472	1	1.162	6	-1.288	1	2.687	6	51.499	8	0.488	8	0.005	0.080	0.192		2.687	
579	M58	2in Dia. Duct Sch 80S	Sec 2 - max	0.020	8	-0.089	8	0.150	1	-0.377	1	1.686	6	2.146	7	0.081	1	72.103	8	0.693	8	0.005	0.120	0.153		2.146	
460	M47	2in Dia. Duct Sch 80S	Sec 4 - min	-0.030	9	0.065	8	-0.144	7	-0.367	1	0.311	9	-0.004	1	-3.429	6	-4.210	8	-0.040	8	0.008	0.028	0.245		3.429	
574	M58	2in Dia. Duct Sch 80S	Sec 2 - min	-0.016	1	-0.132	1	0.032	8	-1.666	6	0.377	1	-0.081	1	-2.146	7	45.895	1	0.435	1	0.004	0.120	0.153		2.146	
567	M59	2in Dia. Duct Sch 80S	Sec 4 - max	-0.019	9	-0.023	8	-0.026	9	-0.444	1	1.151	6	-1.234	1	2.667	6	51.499	8	0.488	8	0.005	0.082	0.191		2.667	
470	M47	2in Dia. Duct Sch 80S	Sec 5 - min	-0.030	9	0.065	8	-0.144	7	-0.306	1	0.280	9	-0.004	1	-3.433	6	-4.210	8	-0.040	8	0.008	0.024	0.245		3.433	
657	M56	2in Dia. Duct Sch 80S	Sec 4 - max	-0.021	8	-0.053	1	0.079	7	-0.816	1	1.671	6	2.225	6	0.343	1	17.438	9	0.165	9	0.006	0.112	0.159		2.225	
159	M16	2in Dia. Duct Sch 80S	Sec 5 - max	-0.009	1	-0.027	8	-0.034	9	-0.507	1	1.361	6	-0.866	1	2.479	6	53.440	8	0.506	8	0.002	0.097	0.177		2.479	
565	M57	2in Dia. Duct Sch 80S	Sec 3 - max	0.000	8	-0.083	9	0.125	1	-0.625	1	1.854	6	2.009	7	0.335	1	49.979	8	0.473	8	0.000	0.132	0.144		2.009	
474	M46	2in Dia. Duct Sch 80S	Sec 2 - min	-0.049	9	0.064	8	-0.119	7	-0.276	1	0.250	9	-0.004	1	-3.401	6	3.863	9	0.037	9	0.013	0.020	0.243		3.401	
475	M46	2in Dia. Duct Sch 80S	Sec 3 - max	0.065	8	0.064	1	0.001	8	-0.219	9	0.246	1	3.370	6	0.003	1	7.459	1	0.071	1	0.018	0.018	0.241		3.370	
586	M59	2in Dia. Duct Sch 80S	Sec 3 - max	-0.018	9	-0.022	8	-0.028	9	-0.417	1	1.141	6	-1.160	1	2.647	6	51.499	8	0.488	8	0.005	0.082	0.189		2.647	
107	M11	6in Dia. Duct	Sec 4 - max	0.035	8	0.000	8	-0.010	1	0.035	1	-0.030	8	3.768	6	0.059	1	77.526	8	0.085	8	0.004	0.003	0.268		3.768	
119	M12	2.5in Dia. Duct Sch 160S	Sec 5 - max	0.005	6	-0.064	1	0.000	1	-1.023	1	1.041	6	0.002	1	2.795	8	9.713	1	0.040	1	0.001	0.074	0.200		2.795	
120	M12	2.5in Dia. Duct Sch 160S	Sec 5 - min	-0.005	7	-0.064	0	-0.057	8	-1.041	6	1.023	1	-2.795	8	-0.002	1	5.692	9	0.024	9	0.001	0.074	0.200		2.795	
619	M62	2.5in Dia. Duct Sch 160S	Sec 6 - max	0.005	6	-0.040	7	0.085	6	-1.023	1	1.041	6	2.795	8	0.002	1	9.713	1	0.040	1	0.001	0.074	0.200		2.795	
620	M62	2.5in Dia. Duct Sch 160S	Sec 6 - min	-0.005	7	-0.044	8	0.000	1	-1.041	6	1.023	1	-2.795	8	-0.002	1	5.692	9	0.024	9	0.001	0.074	0.200		2.795	
601	M61	2in Dia. Duct Sch 80S	Sec 1 - max	-0.026	9	0.009	6	0.060	7	0.730	8	-0.355	1	-1.591	1	3.015	6	15.572	9	0.147	9	0.007	0.052	0.215		3.015	
671	M58	2in Dia. Duct Sch 80S	Sec 1 - max	0.020	6	-0.089	8	0.150	1	-0.327	1	1.646	6	2.111	7	0.137	1	72.103	8	0.693	8	0.005	0.116	0.151		2.756	
108	M11	6in Dia. Duct	Sec 4 - min	-0.020	7	-0.001	1	-0.789	8	0.030	8	-0.035	1	-0.069	1	-3.756	6	50.057	1	0.042	1	0.003	0.003	0.268		3.627	
563	M59	2in Dia. Duct Sch 80S	Sec 2 - max	-0.018	9	-0.022	8	-0.027	9	-0.390	1	1.131	6	-1.127	1	2.627	6	51.490	8	0.468	8	0.005	0.081	0.188		2.199	
656	M56	2in Dia. Duct Sch 80S	Sec 3 - max	-0.021	8	-0.053	1	0.079	7	-0.795	1	1.546	6	2.199	6	0.386	1	17.438	9	0.165	9	0.006	0.110	0.167		2.199	
600	M61	2in Dia. Duct Sch 80S	Sec 2 - max	-0.026	9	0.008	6	0.060	7	0.730	8	-0.355	1	-1.595	9	2.693	6	15.572	9	0.147	9	0.007	0.052	0.214		2.093	
572	M58	2in Dia. Duct Sch 80S	Sec 1- min	-0.016	1	-0.133	1	0.032	8	-1.648	6	0.327	1	-0.137	1	-2.111	7	45.895	1	0.435	1	0.004	0.116	0.151		2.111	
385	M37	2.5in Dia. Duct Sch 80S	Sec 3 - max	0.028	9	0.021	1	0.020	9	3.624	9	-0.330	1	0.104	8	0.114	7	9.786	8	0.051	8	0.006	0.259	0.006		3.624	
386	M37	2.5in Dia. Duct Sch 80S	Sec 3 - min	-0.028	8	-0.022	8	-0.020	0	0.330	1	-3.624	9	-0.114	7	-0.104	8	-7.047	7	-0.036	7	0.006	0.259	0.006		3.624	
605	M61	2in Dia. Duct Sch 80S	Sec 3 - max	-0.027	9	0.005	6	0.059	7	0.729	8	-0.357	1	-1.590	9	2.071	6	15.572	9	0.147	9	0.007	0.052	0.212		2.071	
476	M46	2in Dia. Duct Sch 80S	Sec 3 - min	-0.049	9	0.064	8	-0.119	7	-0.245	1	0.219	9	-0.003	1	-3.370	6	3.863	9	0.037	9	0.013	0.018	0.241		3.370	
477	M46	2in Dia. Duct Sch 80S	Sec 4 - max	0.065	6	0.064	1	0.001	8	-0.189	9	0.214	1	3.339	6	0.003	1	7.459	1	0.071	1	0.018	0.015	0.239		3.339	
591	M59	2in Dia. Duct Sch 80S	Sec 1 - max	-0.018	9	-0.022	8	-0.027	9	-0.383	1	1.121	6	-1.073	1	2.607	6	51.499	8	0.488	8	0.005	0.080	0.186		2.607	
583	M57	2in Dia. Duct Sch 80S	Sec 2 - max	0.000	8	-0.082	9	0.125	1	-0.589	1	1.819	6	1.971	7	0.362	1	49.979	8	0.473	8	0.000	0.130	0.141		1.971	
607	M61	2in Dia. Duct Sch 80S	Sec 4 - max	-0.027	9	0.008	6	0.059	7	0.729	8	-0.355	1	-1.594	9	2.949	6	15.572	9	0.147	9	0.007	0.052	0.211		2.949	
553	M56	2in Dia. Duct Sch 80S	Sec 2 - max	-0.021	6	-0.053	1	0.079	7	-0.775	1	1.619	6	2.173	6	0.359	1	17.438	9	0.165	9	0.006	0.109	0.165		2.173	
609	M61	2in Dia. Duct Sch 80S	Sec 5 - max	-0.027	9	0.007	6	0.059	7	0.726	8	-0.355	1	-1.570	9	2.927	6	15.572	9	0.147	9	0.007	0.052	0.209		2.927	
77	M8	2in Dia. Duct Sch 80S	Sec 4 - max	0.016	7	0.105	9	0.009	1	0.349	9	-1.959	1	0.037	1	0.000	7	0.207	1	0.002	1	0.004	0.239	0.024		3.346	
76	M8	2in Dia. Duct Sch 80S	Sec 4 - min	-0.016	6	0.054	1	-0.009	7	1.958	1	-0.348	9	-0.066	7	-0.037	1	0.041	7	0.000	7	0.004	0.092	0.167		2.340	
171	M18	2in Dia. Duct Sch 80S	Sec 1 - max	-0.029	8	0.060	8	0.089	6	-0.821	1	1.290	8	0.298	1	2.340	6	1.880	9	0.016	9	0.008	0.092	0.167		2.340	
478	M46	2in Dia. Duct Sch 80S	Sec 4 - min	-0.049	9	0.064	8	-0.119	7	-0.214	1	0.189	9	-0.003	1	-3.339	6	3.863	9	0.037	9	0.013	0.015	0.239		3.339	
479	M46	2in Dia. Duct Sch 80S	Sec 5 - max	0.065	6	0.064	1	0.000	8	-0.156	9	0.164	1	3.307	6	0.003	1	7.459	1	0.071	1	0.018	0.013	0.236		3.307	
109	M11	6in Dia. Duct	Sec 5 - max	0.035	8	0.000	8	-0.010	1	0.034	1	-0.030	8	3.638	6	0.061	1	77.526	8	0.085	8	0.004	0.002	0.260		3.638	
241	M25	6in Dia. Duct	Sec 1 - max	0.035	8	0.000	8	-0.010	1	0.034	1	-0.030	8	3.638	6	0.061	1	77.526	8	0.085	8	0.004	0.002	0.260		3.638	
561	M57	2in Dia. Duct Sch 80S	Sec 1 - max	0.000	8	-0.082	9	0.125	1	-0.552	1	1.784	6	1.938	6	0.429	1	49.979	8	0.473	8	0.000	0.127	0.138		1.938	
551	M56	2in Dia. Duct Sch 80S	Sec 1 - max	-0.021	8	-0.052	1	0.070	7	-0.750	1	1.480	6	2.146	6	0.412	1	17.438	9	0.165	9	0.006	0.107	0.153		2.146	
110	M11	6in Dia. Duct	Sec 5 - min	-0.020	7	-0.002	1	-0.789	8	0.030	8	-0.034	1	-0.061	1	-3.638	6	50.057	1	0.042	1	0.003	0.002	0.260		3.638	
242	M25	6in Dia. Duct	Sec 1 - min	-0.020	7	-0.002	1	-0.789	8	0.030	8	-0.034	1	-0.061	1	-3.638	6	50.057	1	0.042	1	0.003	0.002	0.260		3.207	
480	M46	2in Dia. Duct Sch 80S	Sec 5 - min	-0.049	9	0.063	8	-0.119	7	-0.164	1	0.156	9	-0.003	1	-3.307	6	3.863	9	0.037	9	0.013	0.013	0.236		2.952	
592	M60	2in Dia. Duct Sch 80S	Sec 1 - min	-0.066	1	-0.037	1	-0.102	1	-0.468	6	-0.092	9	-2.952	6	1.427	1	20.588	1	0.195	1	0.018	0.033	0.211		2.953	
598	M60	2in Dia. Duct Sch 80S	Sec 4 - min	-0.066	1	-0.038	1	-0.102	1	-0.467	6	-0.073	9	-2.953	6	1.542	1	20.588	1	0.195	1	0.018	0.033	0.211		2.953	
600	M60	2in Dia. Duct Sch 80S	Sec 5 - min	-0.066	1	-0.038	1	-0.102	1	-0.467	6	-0.088	9	-2.953	6	1.581	1	20.588	1	0.195	1	0.018	0.033	0.211		2.952	
594	M60	2in Dia. Duct Sch 80S	Sec 2 - min	-0.066	1	-0.037	1	-0.102	1	-0.467	6	-0.086	9	-2.952	6	1.465	1	20.588	1	0.195	1	0.018	0.033	0.211		2.952	
596	M60	2in Dia. Duct Sch 80S	Sec 3 - min	-0.066	1	-0.037	1	-0.102	1	-0.467	6	-0.079	9	-2.952	6	1.504	1	20.588	1	0.195	1	0.018	0.033	0.211		2.952	
481	M46	2in Dia. Duct Sch 80S	Sec 1 - max	0.054	6	0.064	1	0.000	1	-0.133	7	0.142	8	3.307	8	0.003	1	9.713	1	0.092	1	0.016	0.010	0.236		3.307	
482	M46	2in Dia. Duct Sch 80S	Sec 1- min	-0.054	7	0.063	8	-0.097	6	-0.142	8	0.133	7	-0.003	1	-3.307	6	5.692	9	0.056	9	0.016	0.010	0.236		3.307	
184	M16	2in Dia. Duct Sch 80S	Sec 2 - min	-0.047	6	-0.062	1	-0.150	1	-0.670	6	-1.067	1	-1.092	7	-2.367	1	31.057	1	0.294	1	0.013	0.076	0.169		2.367	
367	M37	2.5in Dia. Duct Sch 80S	Sec 4 - max	0.028	9	0.027	1	0.018	9	3.435	9	-0.555	1	0.035	9	0.045	6	9.786	8	0.051	8	0.005	0.245	0.003		3.435	
368	M37	2.5in Dia. Duct Sch 80S	Sec 4 - min	-0.028	0	-0.027	8	-0.018	8	0.555	1	-3.435	9	-0.045	6	-0.035	9	-7.047	7	-0.036	7	0.005	0.246	0.003		3.359	
311	M32	2in Dia. Duct Sch 80S	Sec 1 - max	0.006	7	0.143	8	0.011	9	-1.550	1	3.359	8	0.158	6	0.129	1	0.207	1	0.002	1	0.002	0.240	0.011		3.359	
312	M32	2in Dia. Duct Sch 80S	Sec 1- min	-0.006	9	0.092	1	-0.013	0	-3.369	8	1.658	1	-0.120	1	-0.158	6	0.041	7	0.000	7	0.002	0.240	0.011			

D-2250

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_a	f_b/σ_a	f_s/σ_a		f_t (ksi)	
336	M34	2in Dia. Duct Sch 80S	Sec 6 - max	0.006	6	-0.035	1	0.013	6	-1.958	1	3.359	8	0.168	6	0.129	1	0.207	1	0.002	1	0.002	0.240	0.011		3.359	
340	M34	2in Dia. Duct Sch 80S	Sec 6 - min	-0.006	9	-0.003	8	-0.010	9	-3.359	8	1.958	1	-0.129	1	-0.159	6	0.041	7	0.000	7	0.002	0.240	0.011		3.359	
597	M60	2in Dia. Duct Sch 80S	Sec 4 - max	-0.026	9	0.000	6	0.007	7	0.073	9	0.467	6	-1.542	1	2.953	6	38.325	9	0.363	9	0.007	0.033	0.211		2.953	
599	M60	2in Dia. Duct Sch 80S	Sec 5 - max	-0.026	0	0.000	6	0.007	7	0.066	9	0.467	6	-1.581	1	2.953	6	38.325	9	0.363	9	0.007	0.033	0.211		2.953	
593	M60	2in Dia. Duct Sch 80S	Sec 2 - max	-0.026	9	0.000	6	0.008	7	0.066	9	0.467	6	-1.469	1	2.952	6	38.325	9	0.363	9	0.007	0.033	0.211		2.952	
595	M60	2in Dia. Duct Sch 80S	Sec 3 - max	-0.026	9	0.000	6	0.007	7	0.079	9	0.467	6	-1.504	1	2.952	6	38.325	9	0.363	9	0.007	0.033	0.211		2.952	
691	M60	2in Dia. Duct Sch 80S	Sec 1 - max	-0.025	9	0.001	6	0.008	7	0.092	9	0.468	6	-1.427	1	2.952	6	38.325	9	0.363	9	0.007	0.033	0.211		2.952	
243	M25	6in Dia. Duct	Sec 2 - max	0.036	8	+0.002	8	-0.010	1	0.033	1	-0.029	6	3.411	6	0.086	1	77.526	8	0.086	8	0.004	0.002	0.244		3.411	
244	M25	6in Dia. Duct	Sec 2 - min	-0.021	7	-0.003	1	-0.789	8	0.029	8	-0.033	1	-0.056	1	-3.411	6	50.057	1	0.042	1	0.003	0.002	0.244		3.411	
153	M16	2in Dia. Duct Sch 80S	Sec 2 - max	-0.009	1	-0.011	8	-0.026	9	1.087	1	0.676	6	2.367	1	1.092	7	53.440	8	0.558	8	0.002	0.076	0.169		2.367	
389	M37	2.5in Dia. Duct Sch 80S	Sec 6 - max	0.026	0	0.023	1	0.016	9	3.213	9	-0.746	1	0.184	9	0.175	6	9.788	8	0.051	8	0.005	0.230	0.013		3.213	
376	M37	2.5in Dia. Duct Sch 80S	Sec 5 - min	-0.026	6	-0.031	8	-0.016	8	0.746	1	-3.213	9	-0.175	6	-0.184	9	-7.047	7	-0.035	7	0.005	0.230	0.013		3.213	
7	M1	2.5in Dia. Duct Sch 80S	Sec 4 - max	0.041	8	0.145	6	0.034	6	2.743	6	0.340	1	0.438	6	0.440	9	9.788	8	0.051	8	0.006	0.198	0.031		2.743	
5	M1	2.5in Dia. Duct Sch 80S	Sec 4 - min	-0.041	7	-0.046	1	-0.034	9	-0.340	1	-2.743	6	-0.440	9	-0.438	6	-7.047	7	-0.035	7	0.006	0.198	0.031		2.743	
3	M1	2.5in Dia. Duct Sch 80S	Sec 2 - max	0.054	8	0.195	8	0.009	6	1.686	6	2.945	9	0.198	7	0.199	8	9.788	8	0.051	8	0.011	0.210	0.014		2.945	
4	M1	2.5in Dia. Duct Sch 80S	Sec 2 - min	-0.054	7	0.004	1	-0.009	9	-2.945	6	-1.880	6	-0.195	8	-0.198	7	-7.047	7	-0.038	7	0.011	0.210	0.014		2.945	
617	M62	2.5in Dia. Duct Sch 160S	Sec 4 - max	0.005	8	-0.037	7	0.083	8	-0.649	1	0.853	9	2.423	8	0.002	1	9.713	1	0.040	1	0.001	0.061	0.173		2.423	
616	M62	2.5in Dia. Duct Sch 160S	Sec 4 - min	-0.005	7	-0.041	6	0.000	1	-0.853	9	0.649	1	-0.002	1	-2.423	8	5.892	9	0.024	9	0.001	0.061	0.173		2.423	
246	M25	6in Dia. Duct	Sec 3 - max	0.038	8	-0.003	8	-0.010	1	0.032	1	-0.026	6	3.183	6	0.072	1	77.526	8	0.086	8	0.005	0.002	0.227		3.183	
248	M25	6in Dia. Duct	Sec 3 - min	-0.021	7	-0.004	1	-0.750	8	0.026	8	-0.032	1	-0.072	1	-3.183	6	50.057	1	0.042	1	0.003	0.002	0.227		3.183	
489	M49	2in Dia. Duct Sch 80S	Sec 5 - max	0.054	6	0.050	1	0.000	1	0.992	7	-0.978	8	2.027	8	0.002	1	9.713	1	0.092	1	0.014	0.071	0.145		2.027	
490	M49	2in Dia. Duct Sch 80S	Sec 5 - min	-0.051	7	0.049	8	-0.000	6	0.978	8	-0.992	7	-0.002	1	-2.027	8	5.892	9	0.056	9	0.014	0.071	0.145		2.027	
483	M49	2in Dia. Duct Sch 80S	Sec 2 - max	0.053	6	0.060	1	0.000	1	0.174	7	-0.164	8	2.831	6	0.003	1	9.713	1	0.092	1	0.014	0.012	0.202		2.831	
484	M49	2in Dia. Duct Sch 80S	Sec 2 - min	-0.053	7	0.058	8	-0.095	6	0.164	8	-0.174	7	-0.003	1	-2.831	6	5.892	9	0.056	9	0.014	0.012	0.202		2.831	
159	M16	2in Dia. Duct Sch 80S	Sec 4 - min	-0.044	6	-0.073	1	-0.150	1	-1.094	6	-0.057	1	-1.915	6	-0.129	1	31.057	1	0.294	1	0.012	0.076	0.137		1.915	
165	M19	2in Dia. Duct Sch 80S	Sec 3 - max	0.032	8	0.171	8	-0.049	8	-0.924	1	1.076	6	1.962	6	-0.974	1	77.526	8	0.734	8	0.006	0.077	0.140		1.962	
487	M49	2in Dia. Duct Sch 80S	Sec 4 - max	0.091	6	0.053	1	0.000	1	0.739	7	-0.724	8	2.196	8	0.003	1	9.713	1	0.092	1	0.014	0.053	0.157		2.196	
488	M49	2in Dia. Duct Sch 80S	Sec 4 - min	-0.051	7	0.053	8	-0.092	6	0.724	8	-0.736	7	-0.003	1	-2.196	8	5.892	9	0.056	9	0.014	0.053	0.157		2.196	
337	M34	2in Dia. Duct Sch 80S	Sec 4 - max	0.005	6	-0.031	1	0.011	6	-1.750	1	2.986	8	0.082	6	0.111	1	0.207	1	0.002	1	0.001	0.213	0.008		2.986	
338	M34	2in Dia. Duct Sch 80S	Sec 4 - min	-0.005	9	-0.055	8	-0.008	9	-2.980	8	1.750	1	-0.111	1	-0.082	6	0.041	7	0.000	7	0.001	0.213	0.008		2.980	
313	M32	2in Dia. Duct Sch 80S	Sec 2 - max	0.007	7	0.141	6	0.010	9	-1.701	1	2.958	8	0.123	8	0.105	1	0.207	1	0.002	1	0.002	0.211	0.009		2.958	
314	M32	2in Dia. Duct Sch 80S	Sec 2 - min	-0.007	9	0.090	1	-0.012	6	-2.958	8	1.701	1	-0.105	1	-0.123	6	0.041	7	0.000	7	0.002	0.211	0.009		2.958	
19	M2	2.5in Dia. Duct Sch 160S	Sec 5 - max	0.002	6	-0.064	1	0.024	0	-1.034	1	2.669	8	0.394	8	0.411	7	9.788	8	0.041	8	0.000	0.191	0.029		2.669	
20	M2	2.5in Dia. Duct Sch 160S	Sec 5 - min	-0.002	5	-0.064	8	-0.024	7	-2.669	8	1.034	1	-0.411	7	-0.394	8	-7.047	7	-0.029	7	0.000	0.191	0.029		2.669	
411	M42	2.5in Dia. Duct Sch 160S	Sec 1 - max	0.002	6	0.071	8	0.016	7	-1.034	1	2.669	8	0.394	8	0.411	7	9.788	8	0.041	8	0.000	0.191	0.029		2.669	
412	M42	2.5in Dia. Duct Sch 160S	Sec 1 - min	-0.002	6	0.039	1	-0.023	8	-2.669	8	1.034	1	-0.411	7	-0.394	8	-7.047	7	-0.029	7	0.000	0.191	0.029		2.669	
198	M19	2in Dia. Duct Sch 80S	Sec 3 - min	0.009	1	0.131	1	-0.178	7	-1.076	6	0.524	1	0.974	1	-1.962	6	50.057	1	0.474	1	0.002	0.077	0.140		1.962	
247	M25	6in Dia. Duct	Sec 4 - max	0.036	8	-0.004	8	-0.010	1	0.030	1	-0.027	8	2.955	6	0.077	1	77.526	8	0.085	8	0.005	0.002	0.211		2.955	
157	M16	2in Dia. Duct Sch 80S	Sec 4 - max	-0.009	1	-0.022	8	-0.031	9	0.057	1	1.094	8	0.125	1	1.916	8	53.440	8	0.558	8	0.002	0.076	0.137		1.915	
485	M49	2in Dia. Duct Sch 80S	Sec 3 - max	0.062	6	0.057	1	0.000	1	0.464	7	-0.453	8	2.363	6	0.003	1	9.713	1	0.092	1	0.014	0.033	0.169		2.363	
486	M49	2in Dia. Duct Sch 80S	Sec 3 - min	-0.052	7	0.050	8	-0.093	6	0.453	8	-0.464	7	-0.003	1	-2.363	6	5.892	9	0.056	9	0.014	0.033	0.169		2.363	
246	M25	6in Dia. Duct	Sec 4 - min	-0.021	7	-0.005	1	-0.750	8	0.027	8	-0.030	1	-0.077	1	-2.955	6	50.057	1	0.042	1	0.003	0.002	0.211		2.955	
251	M26	6in Dia. Duct	Sec 1 - max	0.098	8	-0.005	8	-0.010	1	0.014	1	-0.004	8	2.727	6	0.082	1	78.875	8	0.086	8	0.012	0.001	0.195		2.727	
413	M42	2.5in Dia. Duct Sch 160S	Sec 2 - max	0.002	8	0.009	8	0.017	7	-0.919	1	2.458	8	0.326	8	0.359	7	9.788	8	0.041	8	0.000	0.176	0.020		2.458	
414	M42	2.5in Dia. Duct Sch 160S	Sec 2 - min	-0.002	8	0.037	1	-0.021	8	-2.458	8	0.919	1	-0.359	7	-0.326	8	-7.047	7	-0.029	7	0.000	0.176	0.020		2.458	
249	M25	6in Dia. Duct	Sec 5 - max	0.036	8	-0.005	8	-0.010	1	0.027	1	-0.025	8	2.727	6	0.082	1	77.526	8	0.085	8	0.005	0.002	0.195		2.727	
250	M26	6in Dia. Duct	Sec 2 - max	0.098	8	-0.005	8	-0.010	1	0.012	1	-0.003	8	2.620	6	0.054	1	78.875	8	0.086	8	0.012	0.001	0.187		2.620	
250	M26	6in Dia. Duct	Sec 5 - min	-0.021	7	-0.008	1	-0.791	8	0.025	8	-0.027	1	-0.082	1	-2.727	6	50.057	1	0.042	1	0.003	0.002	0.195		2.727	
11	M2	2.5in Dia. Duct Sch 160S	Sec 1 - max	0.020	8	0.017	1	0.012	9	2.579	9	-0.599	1	0.132	9	0.141	8	9.788	8	0.041	8	0.004	0.184	0.010		2.579	
12	M2	2.5in Dia. Duct Sch 160S	Sec 1 - min	-0.020	6	-0.023	8	0.012	6	0.596	1	-2.579	9	-0.141	6	-0.132	9	-7.047	7	-0.029	7	0.004	0.184	0.010		2.579	
615	M62	2.5in Dia. Duct Sch 160S	Sec 3 - max	0.004	8	+0.033	7	0.061	8	-0.677	6	0.697	9	2.059	8	0.001	1	9.713	1	0.040	1	0.001	0.050	0.147		2.059	
616	M62	2.5in Dia. Duct Sch 160S	Sec 3 - min	-0.004	7	-0.037	8	0.000	1	-0.697	9	0.677	6	-0.001	1	-2.059	6	5.892	9	0.024	9	0.001	0.050	0.147		2.059	
252	M26	6in Dia. Duct	Sec 1 - min	0.003	1	-0.008	1	-0.770	8	0.004	8	-0.014	1	-0.082	1	-2.727	6	51.989	1	0.044	1	0.000	0.001	0.195		2.727	
335	M34	2in Dia. Duct Sch 80S	Sec 3 - max	0.004	6	-0.027	1	0.009	6	-1.570	1	2.628	8	0.093	1	0.207	1	0.002	1	0.001	1	0.001	0.188	0.007		2.628	
338	M34	2in Dia. Duct Sch 80S	Sec 3 - min	-0.004	9	-0.054	8	-0.008	9	-2.628	8	1.570	1	-0.093	1	-0.021	6	0.041	7	0.000	7	0.001	0.188	0.007		2.628	
301	M31	6in Dia. Duct	Sec 1 - max	0.398	8	0.030	8	0.077	8	-0.119	1	0.182	8	1.241	7	1.867	8	0.000	1	0.000	1	0.050	0.012	0.133		1.867	
299	M30	6in Dia. Duct	Sec 6 - max	0.399	8	-0.015	8	0.003	1	-0.117	1	0.160	8	1.241	7	1.867	8	15.118	8	0.013	8	0.051	0.011	0.133		1.867	
297	M30	6in Dia. Duct	Sec 4 - max	0.399	8	-0.014	8	0.003	1	-0.114	1	0.157	8	1.268	7	1.856	8	15.118	8	0.013	8	0.051	0.011	0.133		1.856	
201	M27	6in Dia. Duct	Sec 1 - max	0.213	8	-0.007	6	-0.007	1	-0.020	1	0.042	8	2.298	6	0.486	9	74.780	8	0.063	8	0.027	0.003	0.164		2.298	
295	M30	6in Dia. Duct	Sec 3 - max	0.399	8	-0.014	8	0.003	1	-0.110	1	0.154	8	1.295	7	1.845	8	15.118	8	0.013	8	0.051	0.011	0.132		1.845	
255	M26	6in Dia. Duct	Sec 3 - max	0.098	8	-0.006	8	-0.010	1	0.011	1	-0.002	8	2.513	6	0.138	9	78.875	8	0.086	8	0.012	0.001	0.180		2.513	
293	M30	6in Dia. Duct	Sec 2 - max	0.399	8	-0.013	8	0.003	1	-0.107	1	0.150	8	1.322	7	1.834	8	15.118	8	0.013	8	0.051	0.011	0.131		1.834	
315	M32	2in Dia. Duct Sch 80S	Sec 3 - max	0.007	7	0.139	6	0.009	9	-1.450	1	2.563	8	0.090	6	0.080	1	0.207	1	0.002	1	0.002	0.183	0.006		2.563	
316	M32	2in Dia. Duct Sch 80S	Sec 3 - min	-0.007	9	0.088	1	-0.011	6	-2.563	8	1.450	1	-0.080	1	-0.090	6	0.041	7	0.000	7	0.002	0.183	0.006		2.563	
291	M30	6in Dia. Duct	Sec 1 - max	0.399	8	-0.013	8	0.003	1	-0.104	1	0.147	8	1.349	7	1.823	8	15.118	8	0.013	8	0.051	0.011	0.130		1.823	
254	M26	6in Dia. Duct	Sec 2 - min	0.003	1	-0.009	1	-0.770	8	0.003	8	-0.012	1	-0.084	1	-2.620	6	51.989	1	0.044	1	0.000	0.001	0.187		2.620	
283	M27	6in Dia. Duct	Sec 2 - max	0.210	8	-0.007	8	-0.007	1	-0.021	1	0.044	8	2.198	6	0.036	9	74.780	8	0.063	8	0.027	0.003	0.157		2.198	
289	M29	6in Dia. Duct	Sec 5 - max	0.371	8	-0.013	8	0.000	1	-0.093	1	0.132	8	1.349	7	1.823	8	41.631	8	0.035	8	0.047	0.009	0.100		1.823	
257	M26	6in Dia. Duct	Sec 4 - max	0.098	8	-0.006	8	-0.010	1	0.009	1	0.000	8	2.405	6	0.311	9	78.875	8	0.086	8	0.012	0.001	0.172		2.405	
415	M42	2.5in Dia. Duct Sch 160S	Sec 3 - max	0.001	8	0.009	8	0.016	7	-0.811	1	2.255	9	0.265	6	0.311	7	9.788	8	0.041	8	0.000	0.161	0.022		2.255	
416	M42	2.5in Dia. Duct Sch 160S	Sec 3 - min	-0.001	6	0.035	1	-0.020	8	-2.255	9	0.811	1	-0.311	7	-0.265	6	-7.047	7	-0.029	7	0.000	0.161	0.022		2.255	
5	M1	2.5in Dia. Duct Sch 80S	Sec 3 - max	0.048	8	0.170	8	0.021	6	2.395	6	0.261	0	0.031	6	0.031	9	9.788	8	0.051	8	0.009	0.171	0.002		2.395	
6	M1	2.5in Dia. Duct Sch 80S	Sec 3 - min	-0.048	7	-0.021	1	-0.022	9	-0.261	0	-2.395	6	-0.031	9	-0.031	6	-7.047	7	-0.035	7	0.009	0.171	0.002		2.395	
287	M29	6in Dia. Duct	Sec 4 - max	0.371	8	-0.012	8	0.000	1	-0.086	1	0.130	8	1.495	7	1.756	8	41.631	8	0.035	8	0.047	0.009	0.125		1.756	
271	M28	6in Dia. Duct	Sec 1 - max	0.307	8	+0.009	9	-0.004	1	-0.052	1	0.085	8	1.601	7	1.093	8	62.057	8	0.052	8	0.039	0.006	0.136		1.601	
256	M28	6in Dia. Duct	Sec 3 - min	0.003	1	-0.007	1	-0.770	8	0.002	8	-0.011	1	-0.136	9	-2.513	6	51.989	1	0.044	1	0.000	0.001	0.180		2.513	
156	M16	2in Dia. Duct Sch 80S	Sec 3 - min	-0.046	6	-0.088	1	-0.150	1	-0.885	0	-0.582	1	-1.489	7	-1.240	1	31.057	1	0.294	1	0.012	0.062	0.108		1.489	
265	M27	6in Dia. Duct	Sec 3 - max	0.213	8	-0.008	8	-0.007	1	-0.023	1	0.045	8	2.098	6	0.787	9	74.780	8	0.063	8	0.027	0.003	0.150		2.098	
178	M16	2in Dia. Duct Sch 80S	Sec 4 - min	-0.088	1	0.009	1	0.015	1	0.543	1	-0.817	8	0.914	9	-1.364	6	-3.051	1	-0.029	1	0.024	0.088	0.097		1.364	

0-2250

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_c	f_b/σ_c	f_v/σ_c		f_t (ksi)	
259	M26	6in Dia. Duct	Sec 5 - max	0.066	8	-0.007	8	-0.010	1	0.008	1	0.001	8	2.298	6	0.485	9	76.875	8	0.066	8	0.012	0.001	0.164		2.295	
265	M29	6in Dia. Duct	Sec 3 - max	0.371	8	-0.012	8	0.000	1	-0.087	1	0.127	8	1.462	7	1.800	8	41.631	8	0.035	8	0.047	0.009	0.121		1.690	
273	M26	6in Dia. Duct	Sec 2 - max	0.307	8	-0.009	8	-0.004	1	-0.055	1	0.087	8	1.620	7	1.209	8	62.057	8	0.052	8	0.039	0.006	0.130		1.620	
207	M27	6in Dia. Duct	Sec 4 - max	0.213	6	-0.008	8	-0.007	1	-0.025	1	0.047	8	1.999	7	0.940	8	74.760	8	0.063	8	0.027	0.003	0.143		1.999	
258	M26	6in Dia. Duct	Sec 4 - min	0.003	1	-0.007	1	-0.770	8	0.000	8	-0.009	1	-0.311	9	-2.405	8	51.959	1	0.044	1	0.000	0.001	0.172		2.405	
283	M29	6in Dia. Duct	Sec 2 - max	0.371	8	-0.011	8	0.000	1	-0.084	1	0.124	8	1.819	7	1.620	8	41.631	8	0.035	8	0.047	0.009	0.116		1.623	
333	M34	2in Dia. Duct Sch 80S	Sec 2 - max	0.003	6	-0.022	1	0.006	8	-1.417	1	2.305	8	0.034	7	0.075	1	0.207	1	0.002	1	0.001	0.165	0.005		2.305	
334	M34	2in Dia. Duct Sch 80S	Sec 2 - min	-0.003	9	-0.049	8	-0.004	9	-2.305	8	1.417	1	-0.075	1	-0.034	7	0.041	7	0.000	7	0.001	0.165	0.005		2.305	
155	M16	2in Dia. Duct Sch 80S	Sec 3 - max	-0.009	1	-0.016	8	-0.029	9	0.562	1	0.865	6	1.245	1	1.489	7	53.448	8	0.045	8	0.002	0.062	0.108		1.489	
275	M28	6in Dia. Duct	Sec 3 - max	0.307	8	-0.010	8	-0.004	1	-0.057	1	0.090	8	1.738	7	1.328	8	62.057	8	0.052	8	0.039	0.006	0.124		1.738	
281	M29	6in Dia. Duct	Sec 1 - max	0.371	8	-0.011	8	0.000	1	-0.082	1	0.122	8	1.576	7	1.555	8	41.631	8	0.035	8	0.047	0.009	0.113		1.670	
282	M27	6in Dia. Duct	Sec 1 - min	0.004	1	-0.008	1	-0.672	8	-0.042	8	0.020	1	-0.455	9	-2.196	8	50.861	1	0.043	1	0.001	0.003	0.164		2.298	
417	M42	2.5in Dia. Duct Sch 160S	Sec 4 - max	0.000	8	0.084	8	0.014	7	-0.710	1	2.059	9	0.214	6	0.274	8	9.788	8	0.041	8	0.000	0.147	0.029		2.059	
418	M42	2.5in Dia. Duct Sch 160S	Sec 4 - min	0.000	8	0.032	1	-0.019	8	-2.059	9	0.710	1	-0.274	9	-0.214	6	-7.047	7	-0.029	7	0.000	0.147	0.030		2.059	
269	M27	6in Dia. Duct	Sec 5 - max	0.213	8	-0.008	8	-0.007	1	-0.025	1	0.049	8	1.991	7	1.993	6	74.760	8	0.063	8	0.027	0.004	0.138		1.991	
260	M26	6in Dia. Duct	Sec 5 - min	0.003	1	-0.008	1	-0.771	8	-0.001	8	-0.006	1	-0.485	9	-2.298	6	51.959	1	0.044	1	0.000	0.001	0.164		2.298	
277	M28	6in Dia. Duct	Sec 4 - max	0.307	6	-0.010	8	-0.004	1	-0.060	1	0.092	6	1.657	7	1.440	8	62.057	8	0.052	8	0.039	0.007	0.119		1.657	
177	M18	2in Dia. Duct Sch 80S	Sec 4 - max	-0.038	8	0.021	9	0.078	6	0.617	6	-0.543	1	1.164	6	-0.914	9	1.880	9	0.018	9	0.008	0.058	0.097		1.164	
813	M62	2.5in Dia. Duct Sch 160S	Sec 2 - max	0.000	6	-0.030	7	0.079	8	-0.519	6	0.559	9	1.702	8	0.001	1	9.713	1	0.040	1	0.001	0.040	0.122		1.702	
814	M62	2.5in Dia. Duct Sch 160S	Sec 2 - min	-0.003	7	-0.034	8	0.000	1	-0.556	9	0.519	6	-0.001	1	-1.702	8	5.892	9	0.024	9	0.001	0.040	0.122		1.702	
317	M32	2in Dia. Duct Sch 80S	Sec 4 - max	0.006	7	0.137	8	0.009	1	-1.204	1	2.173	8	0.061	6	0.055	1	0.207	1	0.002	1	0.002	0.165	0.004		2.173	
318	M32	2in Dia. Duct Sch 80S	Sec 4 - min	-0.006	9	0.086	1	-0.010	6	-2.173	8	1.204	1	-0.055	1	-0.061	8	0.041	7	0.000	7	0.002	0.155	0.004		2.173	
264	M27	6in Dia. Duct	Sec 2 - min	0.004	1	-0.008	1	-0.672	8	-0.044	8	0.021	1	-0.838	9	-2.198	6	50.861	1	0.043	1	0.001	0.003	0.157		2.198	
93	M7	2in Dia. Duct Sch 80S	Sec 2 - max	0.054	6	0.026	8	0.092	7	0.500	8	-0.404	1	0.800	1	1.518	7	19.681	7	-0.168	7	0.015	0.036	0.108		1.518	
279	M28	6in Dia. Duct	Sec 6 - max	0.307	8	-0.011	8	-0.004	1	-0.062	1	0.094	8	1.576	7	1.550	8	62.057	8	0.052	8	0.039	0.007	0.113		1.576	
13	M2	2.5in Dia. Duct Sch 160S	Sec 2 - max	0.016	8	0.000	1	0.063	9	1.860	9	-0.783	1	0.297	9	0.308	6	9.788	8	0.041	8	0.003	0.133	0.022		1.860	
14	M2	2.5in Dia. Duct Sch 160S	Sec 2 - min	-0.016	6	-0.041	8	-0.003	6	0.783	1	-1.860	9	-0.308	6	-0.297	9	-7.047	7	-0.029	7	0.003	0.133	0.022		1.860	
300	M31	6in Dia. Duct	Sec 2 - max	0.401	8	0.019	8	0.063	8	0.000	1	0.032	8	0.975	7	1.445	8	0.000	1	0.000	1	0.051	0.002	0.193		1.445	
256	M27	6in Dia. Duct	Sec 3 - min	0.004	1	-0.009	1	-0.672	8	-0.045	8	0.023	1	-0.767	9	-2.098	6	50.861	1	0.043	1	0.001	0.003	0.150		2.098	
197	M16	2in Dia. Duct Sch 80S	Sec 4 - max	0.032	8	0.168	8	-0.060	8	-0.030	1	0.428	6	1.589	6	-0.646	9	77.526	8	0.734	6	0.009	0.031	0.114		1.589	
67	M7	2in Dia. Duct Sch 80S	Sec 4 - max	0.009	8	-0.107	8	0.002	1	1.875	8	-1.047	1	0.206	7	0.000	1	0.207	1	0.002	1	0.002	0.134	0.015		1.875	
68	M7	2in Dia. Duct Sch 80S	Sec 4 - min	-0.009	8	-0.109	1	-0.012	8	1.047	1	-1.875	8	0.000	1	-0.206	7	0.041	7	0.000	7	0.002	0.134	0.015		1.875	
401	M41	2.5in Dia. Duct Sch 160S	Sec 1 - max	0.000	1	0.062	8	0.013	7	-0.617	1	1.870	9	0.188	6	0.242	9	9.788	8	0.041	8	0.000	0.134	0.017		1.870	
402	M41	2.5in Dia. Duct Sch 160S	Sec 1 - min	0.000	1	0.030	1	-0.015	8	-1.870	9	0.617	1	-0.242	9	-0.188	6	-7.047	7	-0.029	7	0.000	0.134	0.017		1.870	
419	M42	2.5in Dia. Duct Sch 160S	Sec 5 - max	0.000	1	0.062	8	0.013	7	-0.617	1	1.870	9	0.188	6	0.242	9	9.788	8	0.041	8	0.000	0.134	0.017		1.870	
420	M42	2.5in Dia. Duct Sch 160S	Sec 5 - min	0.000	1	0.030	1	-0.015	8	-1.870	9	0.617	1	-0.242	9	-0.188	6	-7.047	7	-0.029	7	0.000	0.134	0.017		1.870	
331	M34	2in Dia. Duct Sch 80S	Sec 1 - max	0.002	6	-0.016	1	0.004	8	-1.293	1	2.009	8	0.047	7	0.063	8	0.207	1	0.002	1	0.001	0.144	0.005		2.009	
332	M34	2in Dia. Duct Sch 80S	Sec 1 - min	-0.002	9	-0.045	8	-0.003	1	-2.009	8	1.293	1	-0.063	6	-0.047	7	0.041	7	0.000	7	0.001	0.144	0.005		2.009	
349	M35	2in Dia. Duct Sch 80S	Sec 5 - max	0.002	6	-0.016	1	0.004	6	-1.293	1	2.009	8	0.047	7	0.063	8	0.207	1	0.002	1	0.001	0.144	0.005		2.009	
350	M35	2in Dia. Duct Sch 80S	Sec 5 - min	-0.002	8	-0.045	8	-0.003	1	-2.009	8	1.293	1	-0.063	6	-0.047	7	0.041	7	0.000	7	0.001	0.144	0.005		2.009	
266	M27	6in Dia. Duct	Sec 4 - min	0.004	1	-0.009	1	-0.673	8	-0.047	8	0.025	1	-0.940	8	-1.999	7	50.861	1	0.043	1	0.001	0.003	0.149		1.999	
166	M19	2in Dia. Duct Sch 80S	Sec 4 - min	0.009	1	0.126	1	-0.176	7	-0.428	6	0.030	1	0.846	9	-1.569	6	50.057	1	0.474	1	0.002	0.031	0.114		1.569	
75	M8	2in Dia. Duct Sch 80S	Sec 3 - max	0.013	7	0.115	8	0.009	1	1.776	8	-1.146	1	0.214	1	0.077	6	0.207	1	0.002	1	0.004	0.127	0.015		1.776	
76	M8	2in Dia. Duct Sch 80S	Sec 3 - min	-0.013	8	0.064	1	-0.004	7	1.146	1	-1.776	8	-0.077	6	-0.214	1	0.041	7	0.000	7	0.004	0.127	0.015		1.776	
302	M31	6in Dia. Duct	Sec 1 - min	0.005	1	0.020	1	-0.040	7	-0.162	8	0.119	1	-1.667	8	-1.241	7	0.000	1	0.000	1	0.001	0.012	0.133		1.667	
300	M30	6in Dia. Duct	Sec 5 - min	0.006	1	-0.016	1	-0.120	6	-0.160	8	0.117	1	-1.667	8	-1.241	7	11.088	1	0.009	1	0.001	0.011	0.133		1.856	
298	M30	6in Dia. Duct	Sec 4 - min	0.006	1	-0.015	1	-0.120	6	-0.157	8	0.114	1	-1.656	8	-1.206	7	11.088	1	0.009	1	0.001	0.011	0.133		1.518	
64	M7	2in Dia. Duct Sch 80S	Sec 2 - min	0.000	1	0.027	1	0.000	1	0.404	1	-0.590	8	-1.616	7	0.000	1	-20.094	1	-0.190	1	0.000	0.056	0.198		1.845	
296	M30	6in Dia. Duct	Sec 3 - min	-0.006	1	-0.016	1	-0.120	6	-0.154	8	0.110	1	-1.645	8	-1.195	7	11.088	1	0.009	1	0.001	0.011	0.132		1.801	
272	M28	6in Dia. Duct	Sec 1 - min	0.005	1	-0.010	1	-0.508	8	-0.065	8	0.052	1	-1.083	8	-1.901	7	43.297	1	0.038	1	0.001	0.006	0.136		1.834	
294	M30	6in Dia. Duct	Sec 2 - min	0.006	1	-0.014	1	-0.120	6	-0.150	8	0.107	1	-1.634	8	-1.322	7	11.088	1	0.009	1	0.001	0.011	0.131		1.221	
174	M18	2in Dia. Duct Sch 80S	Sec 2 - min	-0.005	1	0.031	1	0.018	1	-0.408	6	0.168	1	-1.221	6	-0.814	1	-3.051	1	-0.029	1	0.026	0.029	0.087		1.623	
292	M30	6in Dia. Duct	Sec 1 - min	0.006	1	-0.014	1	-0.119	6	-0.147	8	0.104	1	-1.623	8	-1.349	7	11.088	1	0.009	1	0.001	0.011	0.130		1.684	
347	M35	2in Dia. Duct Sch 80S	Sec 4 - max	0.001	6	-0.016	1	0.003	8	-1.249	1	1.894	8	0.046	7	0.071	8	0.207	1	0.002	1	0.000	0.135	0.005		1.894	
348	M35	2in Dia. Duct Sch 80S	Sec 4 - min	-0.001	8	-0.043	0	-0.003	1	-1.894	8	1.249	1	-0.071	8	-0.046	7	0.041	7	0.000	7	0.000	0.135	0.005		1.894	
268	M29	6in Dia. Duct	Sec 5 - min	0.006	1	-0.014	1	-0.293	8	-0.132	8	0.093	1	-1.623	8	-1.349	7	29.712	1	0.025	1	0.001	0.009	0.130		1.623	
270	M27	6in Dia. Duct	Sec 6 - min	0.004	1	-0.010	1	-0.673	8	-0.049	8	0.026	1	-1.083	8	-1.901	7	50.861	1	0.043	1	0.001	0.004	0.136		1.901	
403	M41	2.5in Dia. Duct Sch 160S	Sec 2 - max	0.000	6	0.060	8	0.012	7	-0.549	1	1.727	9	0.135	6	0.220	9	9.788	8	0.041	8	0.000	0.123	0.016		1.727	
404	M41	2.5in Dia. Duct Sch 160S	Sec 2 - min	0.000	8	0.028	1	-0.017	8	-1.727	9	0.549	1	-0.220	9	-0.135	6	-7.047	7	-0.029	7	0.000	0.123	0.016		1.820	
274	M28	6in Dia. Duct	Sec 2 - min	0.005	1	-0.010	1	-0.508	8	-0.067	8	0.055	1	-1.208	8	-1.820	7	43.297	1	0.038	1	0.001	0.006	0.130		1.759	
268	M29	6in Dia. Duct	Sec 4 - min	0.006	1	-0.013	1	-0.293	8	-0.130	8	0.090	1	-1.759	8	-1.435	7	29.712	1	0.025	1	0.001	0.009	0.125		1.784	
345	M35	2in Dia. Duct Sch 80S	Sec 3 - max	0.000	6	-0.014	1	0.002	6	-1.210	1	1.784	8	0.046	9	0.079	6	0.207	1	0.002	1	0.000	0.127	0.006		1.784	
346	M35	2in Dia. Duct Sch 80S	Sec 3 - min	0.000	8	-0.041	8	-0.003	1	-1.784	8	1.210	1	-0.079	6	-0.046	9	0.041	7	0.000	7	0.000	0.127	0.006		1.789	
71	M8	2in Dia. Duct Sch 80S	Sec 1 - max	0.008	7	0.135	8	0.009	1	-0.964	1	1.789	8	0.035	6	0.032	1	0.207	1	0.002	1	0.002	0.128	0.003		1.789	
72	M8	2in Dia. Duct Sch 80S	Sec 1 - min	-0.008	8	0.084	1	-0.009	6	-1.789	8	0.964	1	-0.032	1	-0.035	6	0.041	7	0.000	7	0.002	0.128	0.003		1.789	
319	M32	2in Dia. Duct Sch 80S	Sec 5 - max	0.008	7	0.135	8	0.009	1	-0.964	1	1.789	8	0.035	8	0.032	1	0.207	1	0.002	1	0.002	0.128	0.003		1.789	
320	M32	2in Dia. Duct Sch 80S	Sec 5 - min	-0.008	9	0.084	1	-0.009	6	-1.789	8	0.964	1	-0.032	1	-0.035	6	0.041	7	0.000	7	0.002	0.128	0.003		1.739	
278	M28	6in Dia. Duct	Sec 3 - min	0.005	1	-0.011	1	-0.508	8	-0.090	8	0.057	1	-1.325	8	-1.738	7	43.297	1	0.038	1	0.001	0.006	0.124		1.107	
115	M12	2.5in Dia. Duct Sch 160S	Sec 3 - max	0.016	8	-0.015	1	0.000	1	0.682	7	-0.671	8	0.000	1	1.107	7	9.713	1	0.040	1	0.003	0.049	0.079		1.107	
116	M12	2.5in Dia. Duct Sch 160S	Sec 3 - min	-0.015	7	-0.015	8	-0.937	8	0.671	8	-0.682	7	-1.107	7	0.000	1	5.892	9	0.024	9	0.003	0.049	0.079		1.690	
266	M29	6in Dia. Duct	Sec 3 - min	0.006	1	-0.013	1	-0.293	8	-0.127	8	0.087	1	-1.690	8	-1.462	7	29.712	1	0.025	1	0.001	0.009	0.121		1.359	
39	M4	2.5in Dia. Duct Sch 160S	Sec 6 - max	0.002	6	-0.026	7	0.078	8	-0.377	8	0.432	7	1.359	9	0.001	1	9.713	1	0.040	1	0.000	0.031	0.097		1.359	
40	M4	2.5in Dia. Duct Sch 160S	Sec 6 - min	-0.002	7	-0.030	8	0.000	1	-0.432	7	0.377	8	-0.001	1	-1.359	9	5.892	9	0.024	9	0.000	0.031	0.097		1.359	
811	M62	2.5in Dia. Duct Sch 160S	Sec 1 - max	0.002	6	-0.026	7	0.078	8	-0.377	8	0.432	7	1.359	9	0.001	1	9.713	1	0.040	1	0.000	0.031	0.097		1.359	
812	M62	2.5in Dia. Duct Sch 160S	Sec 1 - min	-0.002	7	-0.030	8	0.000	1	-0.432	7	0.377	8	-0.001	1	-1.359	9	5.892	9	0.024	9	0.000	0.031	0.097		1.210	
169	M18	2in Dia. Duct Sch 80S	Sec 5 - max	0.033	8	0.185	6	-0.051	8	0.454	1	-0.210	6	1.210	6	-0.160	9	77.526	8	0.734	8	0.009	0.032	0.086		1.589	
405	M41	2.5in Dia. Duct Sch 160S	Sec 3 - max	0.000	6	0.056	8	0.011	7	-0.485	1	1.588	9	0.103	6	0.200	9	9.788	8	0.041	8	0.000	0.113	0.014		1.588	
406	M41	2.5in Dia. Duct Sch 160S	Sec 3 - min	0.000	8	0.026	1	-0.018	8	-1.588	9	0.485	1	-0.200	9	-0.103	6	-7.047	7	-0.029	7	0.000	0.113	0.014		0.993	
305	M31	6in Dia. Duct	Sec 3 - max	0.404	8	0.005	8	0.069	8	0.060	1	-0.038	8	0.986	7	0.993	8	0.000	1	0.000	1	0.051	0.004	0.071			

D-2250

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_a	f_b/σ_b	f_v/σ_v	[redacted]	f_c(ksi)	[redacted]
343	M35	2in Dia. Duct Sch 80S	Sec 2 - max	0.000	8	-0.012	1	0.002	7	-1.176	1	1.679	8	0.046	9	0.083	8	0.207	1	0.002	1	0.000	0.120	0.006		1.679	
344	M35	2in Dia. Duct Sch 80S	Sec 2 - min	0.000	8	-0.040	8	-0.003	1	-1.679	8	1.176	1	-0.083	6	-0.046	9	0.041	7	0.000	7	0.000	0.120	0.006		1.679	
278	M28	6in Dia. Duct	Sec 4 - min	0.006	1	-0.011	1	-0.509	8	-0.092	8	0.060	1	-1.440	9	-1.857	7	43.297	1	0.038	1	0.001	0.007	0.118		1.657	
284	M29	6in Dia. Duct	Sec 2 - min	0.006	1	-0.012	1	-0.293	8	-0.124	8	0.084	1	-1.623	8	-1.519	7	28.712	1	0.025	1	0.001	0.009	0.116		1.623	
65	M7	2in Dia. Duct Sch 80S	Sec 3 - max	0.058	8	0.011	8	0.088	6	0.960	8	-0.638	1	0.571	7	0.004	1	-10.661	7	-0.186	7	0.010	0.069	0.041		0.960	
173	M18	2in Dia. Duct Sch 80S	Sec 2 - max	-0.029	8	0.046	8	0.086	6	-0.186	1	0.408	9	0.614	1	1.221	8	1.880	9	0.018	8	0.008	0.029	0.087		1.221	
282	M29	6in Dia. Duct	Sec 1 - min	0.006	1	-0.012	1	-0.293	8	-0.122	8	0.082	1	-1.556	8	-1.576	7	29.712	1	0.025	1	0.001	0.009	0.113		1.576	
190	M10	2in Dia. Duct Sch 80S	Sec 5 - min	0.009	1	0.125	1	-0.175	7	0.210	8	-0.454	1	0.160	9	-1.210	6	50.057	1	0.474	1	0.002	0.032	0.086		1.210	
117	M12	2.5in Dia. Duct Sch 160S	Sec 4 - max	0.010	6	-0.034	1	0.000	1	0.074	7	-0.059	8	0.001	1	1.593	6	9.713	1	0.040	1	0.002	0.005	0.114		1.593	
116	M12	2.5in Dia. Duct Sch 160S	Sec 4 - min	-0.010	7	-0.035	6	-0.047	8	0.059	8	-0.074	7	-1.593	6	-0.001	1	5.892	9	0.024	9	0.002	0.005	0.114		1.593	
280	M28	6in Dia. Duct	Sec 6 - min	0.005	1	-0.012	1	-0.508	8	-0.004	8	0.062	1	-1.556	8	-1.570	7	43.207	1	0.036	1	0.001	0.007	0.113		1.576	
341	M35	2in Dia. Duct Sch 80S	Sec 1 - max	0.000	1	-0.010	1	0.003	7	-1.147	1	1.578	8	0.042	9	0.086	6	0.207	1	0.002	1	0.000	0.113	0.008		1.578	
342	M35	2in Dia. Duct Sch 80S	Sec 1 - min	0.000	1	-0.038	8	-0.003	1	-1.578	8	1.147	1	-0.086	6	-0.042	9	0.041	7	0.000	7	0.000	0.113	0.008		1.578	
359	M36	2in Dia. Duct Sch 80S	Sec 5 - max	0.000	1	-0.010	1	0.003	7	-1.147	1	1.578	8	0.042	9	0.086	6	0.207	1	0.002	1	0.000	0.113	0.008		1.578	
360	M36	2in Dia. Duct Sch 80S	Sec 5 - min	0.000	1	-0.038	8	-0.003	1	-1.578	8	1.147	1	-0.086	6	-0.042	9	0.041	7	0.000	7	0.000	0.113	0.006		1.578	
170	M18	2in Dia. Duct Sch 80S	Sec 3 - min	-0.091	1	0.020	1	0.018	1	0.192	9	-0.373	6	-0.027	7	-0.931	1	-3.051	1	-0.029	1	0.025	0.027	0.067		0.931	
407	M41	2.5in Dia. Duct Sch 160S	Sec 4 - max	0.001	8	0.050	8	0.010	7	-0.426	1	1.454	9	0.074	6	0.183	9	9.788	8	0.041	8	0.000	0.104	0.013		1.454	
408	M41	2.5in Dia. Duct Sch 160S	Sec 4 - min	-0.001	8	0.024	1	-0.015	8	-1.454	9	0.425	1	-0.183	9	-0.074	6	-7.047	7	-0.029	7	0.000	0.104	0.013		1.454	
37	M4	2.5in Dia. Duct Sch 160S	Sec 4 - max	0.001	6	-0.024	7	0.077	8	-0.307	8	0.372	7	1.185	9	0.000	1	9.713	1	0.040	1	0.000	0.027	0.085		1.185	
38	M4	2.5in Dia. Duct Sch 160S	Sec 4 - min	-0.001	7	-0.028	8	0.000	1	-0.372	7	0.307	8	0.000	1	-1.185	9	5.892	9	0.024	9	0.000	0.027	0.085		1.185	
64	M7	2in Dia. Duct Sch 80S	Sec 3 - min	0.000	1	0.010	1	0.000	1	0.636	1	-0.960	8	-0.004	1	-0.571	7	-20.094	1	-0.190	1	0.000	0.069	0.041		0.960	
391	M40	2.5in Dia. Duct Sch 160S	Sec 1 - max	0.002	7	0.054	8	0.009	7	-0.370	1	1.324	9	0.047	6	0.167	9	9.788	8	0.041	8	0.000	0.095	0.012		1.324	
392	M40	2.5in Dia. Duct Sch 160S	Sec 1 - min	-0.002	8	0.022	1	-0.014	8	-1.324	9	0.370	1	-0.167	9	-0.047	8	-7.047	7	-0.029	7	0.000	0.095	0.012		1.324	
400	M41	2.5in Dia. Duct Sch 160S	Sec 5 - max	0.002	6	0.054	8	0.009	7	-0.370	1	1.324	9	0.047	6	0.167	9	9.788	8	0.041	8	0.000	0.095	0.012		1.324	
410	M41	2.5in Dia. Duct Sch 160S	Sec 5 - min	-0.002	8	0.022	1	-0.014	8	-1.324	9	0.370	1	-0.167	9	-0.047	6	-7.047	7	-0.029	7	0.000	0.095	0.012		1.324	
304	M31	6in Dia. Duct	Sec 2 - min	0.005	1	0.017	1	-0.053	7	-0.032	8	0.000	1	-1.446	8	-0.976	7	0.000	1	0.000	1	0.001	0.002	0.103		1.445	
357	M36	2in Dia. Duct Sch 80S	Sec 4 - max	0.001	8	-0.006	1	0.005	7	-1.096	1	1.356	8	0.022	9	0.083	6	0.207	1	0.002	1	0.000	0.097	0.006		1.356	
358	M36	2in Dia. Duct Sch 80S	Sec 4 - min	-0.001	6	-0.033	8	-0.000	1	-1.356	8	1.096	1	-0.083	6	-0.022	8	0.041	7	0.000	7	0.000	0.097	0.006		1.356	
175	M18	2in Dia. Duct Sch 80S	Sec 3 - max	-0.028	8	0.032	8	0.072	8	0.373	6	-0.192	9	0.931	1	0.027	7	1.880	9	0.018	9	0.008	0.027	0.087		0.931	
111	M12	2.5in Dia. Duct Sch 160S	Sec 1 - max	0.026	8	0.025	1	0.000	1	0.434	7	-0.428	8	0.887	8	0.000	1	9.713	1	0.040	1	0.005	0.031	0.063		0.887	
112	M12	2.5in Dia. Duct Sch 160S	Sec 1 - min	-0.025	7	0.025	8	-0.048	6	0.428	8	-0.434	7	0.000	1	-0.887	8	5.892	9	0.024	9	0.005	0.031	0.063		0.887	
35	M4	2.5in Dia. Duct Sch 160S	Sec 3 - max	0.000	8	-0.022	7	0.076	8	-0.242	8	0.316	7	1.013	9	0.000	1	9.713	1	0.040	1	0.000	0.023	0.072		1.013	
36	M4	2.5in Dia. Duct Sch 160S	Sec 3 - min	0.000	7	-0.027	8	0.000	1	-0.316	7	0.242	8	0.000	1	-1.013	9	5.892	9	0.024	9	0.000	0.023	0.072		1.013	
307	M31	6in Dia. Duct	Sec 4 - max	0.408	8	-0.004	8	0.094	8	0.060	1	-0.049	8	0.356	7	0.512	8	0.000	1	0.000	1	0.051	0.004	0.037		0.612	
69	M7	2in Dia. Duct Sch 80S	Sec 5 - max	0.004	8	-0.124	8	0.002	1	-0.855	8	1.109	1	0.046	1	0.143	7	0.207	1	0.002	1	0.001	0.079	0.010		1.109	
70	M7	2in Dia. Duct Sch 80S	Sec 6 - min	-0.004	6	-0.125	1	-0.010	7	-1.109	1	0.855	8	-0.143	7	-0.046	1	0.041	7	0.000	7	0.001	0.079	0.010		1.109	
351	M36	2in Dia. Duct Sch 80S	Sec 1 - max	0.004	8	0.007	1	0.012	7	-0.855	8	1.109	1	0.046	1	0.143	7	0.207	1	0.002	1	0.001	0.079	0.010		1.109	
352	M36	2in Dia. Duct Sch 80S	Sec 1 - min	-0.004	8	-0.020	8	-0.009	6	-1.109	1	0.855	8	-0.143	7	-0.046	1	0.041	7	0.000	7	0.001	0.079	0.010		1.109	
113	M12	2.5in Dia. Duct Sch 160S	Sec 2 - max	0.020	6	0.005	1	0.000	1	0.802	7	-0.794	8	0.332	6	0.400	7	9.713	1	0.040	1	0.004	0.057	0.029		0.802	
114	M12	2.5in Dia. Duct Sch 160S	Sec 2 - min	-0.020	7	0.005	8	-0.035	8	0.794	8	-0.802	7	-0.400	7	-0.332	8	5.892	9	0.024	9	0.004	0.057	0.029		0.802	
355	M36	2in Dia. Duct Sch 80S	Sec 3 - max	0.002	8	-0.002	1	0.007	7	-1.073	1	1.161	8	0.010	1	0.066	6	0.207	1	0.002	1	0.001	0.083	0.005		1.161	
356	M36	2in Dia. Duct Sch 80S	Sec 3 - min	-0.002	8	-0.029	8	-0.004	8	-1.161	8	1.073	1	-0.066	6	-0.010	1	0.041	7	0.000	7	0.001	0.083	0.005		1.161	
353	M36	2in Dia. Duct Sch 80S	Sec 2 - max	0.003	8	0.003	1	0.009	7	-0.994	8	1.077	1	0.028	1	0.077	7	0.207	1	0.002	1	0.001	0.077	0.006		1.077	
354	M36	2in Dia. Duct Sch 80S	Sec 2 - min	-0.003	8	-0.024	8	-0.007	8	-1.077	1	0.994	8	-0.077	7	-0.028	1	0.041	7	0.000	7	0.001	0.077	0.006		1.077	
33	M4	2.5in Dia. Duct Sch 160S	Sec 2 - max	0.000	8	-0.021	7	0.075	8	-0.182	8	0.265	7	0.843	9	0.000	1	9.713	1	0.040	1	0.000	0.019	0.060		0.843	
34	M4	2.5in Dia. Duct Sch 160S	Sec 2 - min	0.000	7	-0.026	8	0.000	1	-0.265	7	0.182	8	0.000	1	-0.843	9	5.892	9	0.024	9	0.000	0.019	0.060		0.843	
393	M40	2.5in Dia. Duct Sch 160S	Sec 2 - max	0.003	7	0.048	8	0.008	7	-0.228	1	0.949	8	0.000	1	0.133	9	9.788	8	0.041	8	0.001	0.068	0.010		0.949	
394	M40	2.5in Dia. Duct Sch 160S	Sec 2 - min	-0.003	8	0.016	1	-0.011	8	-0.949	9	0.228	1	-0.133	9	0.000	1	-7.047	7	-0.029	7	0.001	0.068	0.010		0.949	
306	M31	6in Dia. Duct	Sec 3 - min	0.005	1	0.006	1	-0.050	7	0.036	8	-0.060	1	-0.993	8	-0.680	7	0.000	1	0.000	1	0.001	0.004	0.071		0.993	
15	M2	2.5in Dia. Duct Sch 160S	Sec 3 - max	0.011	8	-0.018	1	0.006	8	0.745	9	-0.572	1	0.266	9	0.279	8	9.788	8	0.041	8	0.002	0.053	0.020		0.745	
16	M2	2.5in Dia. Duct Sch 160S	Sec 3 - min	-0.011	6	-0.059	8	-0.008	7	0.572	1	-0.745	8	-0.279	6	-0.268	9	-7.047	7	-0.029	7	0.002	0.053	0.020		0.745	
29	M3	2.5in Dia. Duct Sch 160S	Sec 6 - max	0.000	1	-0.019	7	0.074	8	-0.125	8	0.218	7	0.675	9	0.000	1	9.713	1	0.040	1	0.000	0.016	0.048		0.675	
30	M3	2.5in Dia. Duct Sch 160S	Sec 6 - min	0.000	1	-0.023	8	0.000	1	-0.218	7	0.125	8	0.000	1	-0.675	9	5.892	9	0.024	9	0.000	0.016	0.048		0.675	
31	M4	2.5in Dia. Duct Sch 160S	Sec 1 - max	0.000	1	-0.019	7	0.074	6	-0.125	8	0.218	7	0.675	9	0.000	1	9.713	1	0.040	1	0.000	0.016	0.048		0.675	
32	M4	2.5in Dia. Duct Sch 160S	Sec 1 - min	0.000	1	-0.023	8	0.000	1	-0.218	7	0.125	8	0.000	1	-0.675	9	5.892	9	0.024	8	0.000	0.016	0.048		0.675	
17	M2	2.5in Dia. Duct Sch 160S	Sec 4 - max	0.007	8	-0.036	1	0.015	8	-0.034	1	0.785	8	0.037	9	0.052	6	9.788	8	0.041	8	0.001	0.055	0.004		0.765	
18	M2	2.5in Dia. Duct Sch 160S	Sec 4 - min	-0.007	8	-0.077	8	-0.015	7	-0.765	8	0.034	1	-0.052	6	-0.037	9	-7.047	7	-0.020	7	0.001	0.055	0.004		0.765	
395	M40	2.5in Dia. Duct Sch 160S	Sec 3 - max	0.005	7	0.042	8	0.003	7	-0.129	1	0.618	9	0.000	1	0.161	8	9.788	8	0.041	8	0.001	0.044	0.012		0.618	
396	M40	2.5in Dia. Duct Sch 160S	Sec 3 - min	-0.005	8	0.011	1	-0.006	8	-0.618	9	0.129	1	-0.161	8	0.000	1	-7.047	7	-0.029	7	0.001	0.044	0.012		0.616	
99	M10	8in Dia. Duct	Sec 5 - max	-0.075	2	0.046	9	0.066	8	0.007	9	0.389	8	0.151	6	0.265	7	25.554	7	0.022	7	0.009	0.028	0.019		0.389	
100	M10	8in Dia. Duct	Sec 5 - min	-0.075	1	-0.102	8	-0.084	7	-0.389	6	-0.007	8	-0.265	7	-0.151	6	-159.847	1	-0.140	1	0.009	0.028	0.019		0.389	
219	M22	6in Dia. Duct	Sec 5 - max	0.025	8	-0.022	6	0.000	9	0.036	6	0.106	1	-0.175	9	0.630	6	77.626	8	0.065	8	0.003	0.008	0.045		0.630	
220	M22	6in Dia. Duct	Sec 5 - min	-0.010	7	-0.032	1	-0.060	8	-0.105	1	-0.038	6	-0.630	6	0.175	9	50.067	1	0.042	1	0.001	0.008	0.045		0.630	
97	M10	8in Dia. Duct	Sec 4 - max	-0.075	2	0.044	9	0.068	8	-0.004	9	0.364	6	0.135	8	0.245	7	25.554	7	0.022	7	0.009	0.026	0.018		0.364	
98	M10	8in Dia. Duct	Sec 4 - min	-0.075	1	-0.102	6	-0.083	7	-0.364	6	0.004	9	-0.245	7	-0.135	8	-159.847	1	-0.140	1	0.009	0.025	0.018		0.364	
309	M31	6in Dia. Duct	Sec 6 - max	0.409	8	-0.016	8	0.100	8	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.052	0.000	0.000		0.409	
95	M10	8in Dia. Duct	Sec 3 - max	-0.075	2	0.044	9	0.065	8	-0.014	9	0.339	6	0.110	8	0.225	7	25.554	7	0.022	7	0.009	0.024	0.016		0.339	
96	M10	8in Dia. Duct	Sec 3 - min	-0.075	1	-0.102	6	-0.083	7	-0.339	6	0.014	9	-0.225	7	-0.119	8	-159.847	1	-0.140	1	0.009	0.024	0.016		0.339	
27	M3	2.5in Dia. Duct Sch 160S	Sec 4 - max	0.000	7	-0.017	7	0.073	8	-0.074	8	0.178	7	0.510	9	0.000	1	9.713	1	0.040	1	0.000	0.013	0.036		0.510	
28	M3	2.5in Dia. Duct Sch 160S	Sec 4 - min	0.000	6	-0.021	8	0.000	1	-0.176	7	0.074	8	0.000	1	-0.510	9	5.892	9	0.024	9	0.000	0.013	0.036		0.510	
59	M6	8in Dia. Duct	Sec 5 - max	-0.075	2	0.089	8	0.070	8	0.301	8	0.085	7	0.176	8	0.257	7	66.102	7	0.057	7	0.009	0.022	0.018		0.301	
60	M6	8in Dia. Duct	Sec 6 - min	-0.075	1	-0.056	7	-0.083	7	-0.085	7	-0.301	8	-0.267	7	-0.175	8	0.883	1	0.000	1	0.009	0.022	0.018		0.301	
139	M14	8in Dia. Duct	Sec 5 - max	0.017	1	0.011	9	0.060	1	0.470	6	-0.098	1	0.151	1	-0.097	9	25.554	7	0.022	7	0.002	0.034	0.011		0.479	
140	M14	8in Dia. Duct	Sec 5 - min	0.017	2	-0.053	8	0.002	9	0.098	1	-0.479	8	0.097	9	-0.151	1	-159.847	1	-0.140	1	0.002	0.034	0.011		0.479	
141	M15	8in Dia. Duct	Sec 1 - max	0.017	1	-0.007	1	0.009	9	0.479	8	-0.098	1	0.151	1	-0.097	9	25.554	7	0.022	7	0.002	0.034	0.011		0.479	
142	M15	8in Dia. Duct	Sec 1 - min	0.017	2	-0.050	8	-0.026	6	0.098	1	-0.479	8	0.097	9	-0.151	1	-159.847	1	-0.140	1	0.002	0.034	0.011		0.479	
83	M10	8in Dia. Duct	Sec 2 - max	-0.074	2	0.044	9	0.065	8	-0.025	9	0.315	8	0.103	8	0.205	7	25.554	7	0.022	7	0.009	0.023	0.015		0.315	
84	M10	8in Dia. Duct	Sec 2 - min	-0.074	1	-0.101	6	-0.063	7	-0.315	6	0.026	9	-0.205	7	-0.103	8	-159.847	1	-0.140	1	0.009	0.023	0.015		0.315	
57	M6	8in Dia. Duct	Sec 4 - max	-0.075	2	0.089	8	0.070	8	0.280	6	0.071	7	0.158	8	0.237	7	66.102	7	0.057	7	0.009	0.020	0.017		0.280	

D-2260

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_a	f_{by}/σ_a	f_{bz}/σ_a	f_c (ksi)
58	M6	6in Dia. Duct	Sec 4 - min	-0.075	1	-0.056	7	-0.082	7	-0.071	7	-0.260	8	-0.237	7	-0.158	8	0.863	1	0.000	1	0.009	0.020	0.017	0.260
137	M14	6in Dia. Duct	Sec 4 - max	0.017	1	0.010	9	0.060	1	0.475	8	-0.101	1	0.130	6	-0.099	9	25.554	7	0.022	7	0.002	0.034	0.009	0.475
138	M14	6in Dia. Duct	Sec 4 - min	0.017	2	-0.082	6	0.002	8	0.101	1	-0.475	8	0.098	9	-0.130	8	-159.847	1	-0.140	1	0.002	0.034	0.009	0.475
135	M14	6in Dia. Duct	Sec 3 - max	0.016	1	0.009	9	0.060	1	0.471	8	-0.103	1	0.116	8	-0.094	7	25.554	7	0.022	7	0.002	0.034	0.008	0.471
136	M14	6in Dia. Duct	Sec 3 - min	0.016	2	-0.052	6	0.003	9	0.103	1	-0.471	8	0.094	7	-0.116	8	-159.847	1	-0.140	1	0.002	0.034	0.008	0.471
217	M22	6in Dia. Duct	Sec 4 - max	0.024	8	-0.016	6	-0.004	0	0.084	0	0.033	1	-0.169	9	0.489	8	77.526	8	0.065	8	0.003	0.005	0.035	0.489
133	M14	6in Dia. Duct	Sec 2 - max	0.019	1	0.009	9	0.060	1	0.468	8	-0.106	1	0.105	8	-0.078	1	25.554	7	0.022	7	0.002	0.033	0.008	0.468
134	M14	6in Dia. Duct	Sec 2 - min	0.019	2	-0.051	6	0.003	9	0.106	1	-0.468	8	0.078	1	-0.105	8	-159.847	1	-0.140	1	0.002	0.033	0.008	0.468
55	M6	6in Dia. Duct	Sec 3 - max	-0.075	2	0.069	8	0.089	8	0.258	8	0.056	7	0.141	8	0.217	7	65.102	7	0.057	7	0.009	0.018	0.016	0.258
56	M6	6in Dia. Duct	Sec 3 - min	-0.075	1	-0.056	7	-0.082	7	-0.055	7	-0.256	8	-0.217	7	-0.141	8	0.863	1	0.000	1	0.009	0.018	0.016	0.258
91	M10	6in Dia. Duct	Sec 1 - max	-0.074	2	0.043	9	0.085	8	-0.035	9	0.290	9	0.087	8	0.185	7	25.554	7	0.022	7	0.009	0.021	0.013	0.290
92	M10	6in Dia. Duct	Sec 1 - min	-0.074	1	-0.101	6	-0.082	7	-0.290	8	0.035	9	-0.185	7	-0.087	8	-159.847	1	-0.140	1	0.009	0.021	0.013	0.290
131	M14	6in Dia. Duct	Sec 1 - max	0.019	1	0.008	9	0.060	1	0.465	8	-0.109	1	0.094	8	-0.054	1	25.554	7	0.022	7	0.002	0.033	0.007	0.465
132	M14	6in Dia. Duct	Sec 1 - min	0.019	2	-0.051	8	0.004	9	0.109	1	-0.465	8	0.054	1	-0.094	8	-159.847	1	-0.140	1	0.002	0.033	0.007	0.465
216	M22	6in Dia. Duct	Sec 4 - min	-0.009	7	-0.027	1	-0.057	8	-0.033	1	-0.084	8	-0.489	8	0.169	9	50.057	1	0.042	1	0.001	0.006	0.035	0.489
309	M31	6in Dia. Duct	Sec 4 - min	0.005	1	-0.006	1	-0.065	7	0.049	8	-0.060	1	-0.512	8	-0.355	7	0.000	1	0.000	1	0.001	0.004	0.007	0.512
53	M6	6in Dia. Duct	Sec 2 - max	-0.074	2	0.088	8	0.069	8	0.237	8	0.044	7	0.124	8	0.198	7	65.102	7	0.057	7	0.009	0.017	0.014	0.237
54	M6	6in Dia. Duct	Sec 2 - min	-0.074	1	-0.055	7	-0.081	7	-0.044	7	-0.237	8	-0.198	7	-0.124	8	0.863	1	0.000	1	0.009	0.017	0.014	0.237
397	M40	2.5in Dia. Duct Sch 160S	Sec 4 - max	0.006	7	0.038	8	0.000	7	-0.072	1	0.327	9	0.000	1	0.210	8	9.768	8	0.041	8	0.001	0.023	0.015	0.327
398	M40	2.5in Dia. Duct Sch 160S	Sec 4 - min	-0.006	8	0.005	1	-0.005	8	-0.327	9	0.072	1	-0.210	8	0.000	1	-7.047	7	-0.029	7	0.001	0.023	0.015	0.327
89	M9	6in Dia. Duct	Sec 5 - max	-0.043	2	0.012	9	0.034	8	-0.035	9	0.290	8	0.097	8	0.185	7	25.554	7	0.022	7	0.005	0.021	0.013	0.290
90	M9	6in Dia. Duct	Sec 5 - min	-0.043	1	-0.070	8	-0.051	7	-0.290	8	0.035	9	-0.185	7	-0.097	8	-159.847	1	-0.140	1	0.005	0.021	0.013	0.290
51	M6	6in Dia. Duct	Sec 1 - max	-0.074	2	0.088	8	0.059	8	0.215	8	0.031	7	0.108	8	0.178	7	65.102	7	0.057	7	0.009	0.015	0.013	0.215
52	M6	6in Dia. Duct	Sec 1 - min	-0.074	1	-0.055	7	-0.081	7	-0.031	7	-0.215	8	-0.178	7	-0.108	8	0.863	1	0.000	1	0.009	0.015	0.013	0.215
216	M22	6in Dia. Duct	Sec 3 - max	0.023	8	-0.011	6	-0.006	9	0.117	8	-0.026	1	-0.159	9	0.355	8	77.526	8	0.065	8	0.003	0.005	0.023	0.355
25	M3	2.5in Dia. Duct Sch 160S	Sec 3 - max	0.000	7	-0.015	7	0.072	8	-0.028	8	0.139	7	0.387	7	0.000	1	9.713	1	0.040	1	0.000	0.010	0.026	0.387
26	M3	2.5in Dia. Duct Sch 160S	Sec 3 - min	0.000	6	-0.019	8	0.000	1	-0.139	7	0.028	8	0.000	1	-0.387	7	5.892	9	0.024	9	0.000	0.010	0.026	0.387
216	M22	6in Dia. Duct	Sec 3 - min	-0.006	7	-0.022	1	-0.054	8	0.026	1	-0.117	6	-0.355	6	0.158	9	50.057	1	0.042	1	0.001	0.006	0.025	0.355
143	M15	6in Dia. Duct	Sec 2 - max	0.013	1	-0.007	1	0.005	9	0.341	8	-0.076	1	0.121	7	-0.071	8	25.554	7	0.022	7	0.002	0.024	0.009	0.341
144	M15	6in Dia. Duct	Sec 2 - min	0.013	2	-0.046	8	-0.022	8	0.076	1	-0.341	8	0.071	8	-0.121	7	-159.847	1	-0.140	1	0.002	0.024	0.009	0.341
49	M6	6in Dia. Duct	Sec 5 - max	-0.043	2	0.087	8	0.038	8	0.215	8	0.031	7	0.108	8	0.178	7	65.102	7	0.057	7	0.005	0.015	0.013	0.215
50	M6	6in Dia. Duct	Sec 5 - min	-0.043	1	-0.024	7	-0.060	7	-0.031	7	-0.215	8	-0.178	7	-0.108	8	0.863	1	0.000	1	0.005	0.015	0.013	0.215
145	M15	6in Dia. Duct	Sec 3 - max	0.006	1	-0.007	1	0.000	9	0.279	8	-0.058	1	0.126	7	-0.016	8	25.554	7	0.022	7	0.001	0.020	0.009	0.279
146	M15	6in Dia. Duct	Sec 3 - min	0.006	2	-0.042	8	0.016	8	0.058	1	-0.279	8	0.016	8	-0.126	7	-159.847	1	-0.140	1	0.001	0.020	0.009	0.279
129	M13	6in Dia. Duct	Sec 5 - max	0.017	1	0.010	9	0.044	8	-0.176	9	0.280	8	0.104	8	-0.034	1	65.102	7	0.057	7	0.002	0.020	0.007	0.280
130	M13	6in Dia. Duct	Sec 5 - min	0.017	2	-0.058	8	0.000	1	-0.280	8	0.176	9	0.034	1	-0.104	8	0.863	1	0.000	1	0.002	0.020	0.007	0.280
441	M45	6in Dia. Duct	Sec 1 - max	0.017	1	0.036	8	0.011	9	-0.176	9	0.280	8	0.104	8	-0.034	1	65.102	7	0.057	7	0.002	0.020	0.007	0.280
442	M45	6in Dia. Duct	Sec 1 - min	0.017	2	-0.003	9	-0.023	8	-0.280	8	0.170	9	0.034	1	-0.104	8	0.863	1	0.000	1	0.002	0.020	0.007	0.280
215	M22	6in Dia. Duct	Sec 2 - max	0.021	8	-0.005	8	-0.009	9	0.136	8	-0.022	1	-0.115	1	0.227	8	77.526	8	0.065	8	0.003	0.004	0.016	0.227
87	M9	6in Dia. Duct	Sec 4 - max	-0.041	2	0.010	9	0.032	8	-0.030	1	0.196	8	0.042	8	0.116	7	25.554	7	0.022	7	0.005	0.014	0.006	0.196
88	M9	6in Dia. Duct	Sec 4 - min	-0.041	1	-0.068	8	-0.049	7	-0.196	8	0.030	1	-0.116	7	-0.042	8	-159.847	1	-0.140	1	0.005	0.014	0.006	0.196
214	M22	6in Dia. Duct	Sec 2 - min	-0.006	7	-0.017	1	-0.052	8	0.072	1	-0.136	6	-0.227	6	0.115	1	50.057	1	0.042	1	0.001	0.010	0.016	0.227
127	M13	6in Dia. Duct	Sec 4 - max	0.017	1	0.008	9	0.043	8	-0.180	9	0.258	8	0.066	8	-0.035	1	65.102	7	0.057	7	0.002	0.018	0.006	0.258
128	M13	6in Dia. Duct	Sec 4 - min	0.017	2	-0.056	8	0.000	1	-0.258	8	0.180	9	0.035	1	-0.066	8	0.863	1	0.000	1	0.002	0.018	0.006	0.258
510	M51	2.5in Dia. Duct Sch 160S	Sec 5 - min	-0.028	8	0.009	7	0.000	1	-0.093	7	-0.046	8	0.000	1	-0.234	8	-1.000	9	-0.004	9	0.005	0.005	0.017	0.234
508	M51	2.5in Dia. Duct Sch 160S	Sec 4 - min	-0.028	8	0.009	7	0.000	1	-0.067	7	-0.041	8	0.000	1	-0.215	8	-1.000	9	-0.004	9	0.005	0.005	0.015	0.215
23	M3	2.5in Dia. Duct Sch 160S	Sec 2 - max	0.001	7	-0.013	7	0.071	8	0.016	8	0.105	7	0.246	7	0.000	1	9.713	1	0.040	1	0.000	0.008	0.018	0.246
24	M3	2.5in Dia. Duct Sch 160S	Sec 2 - min	-0.001	6	-0.017	8	0.000	1	-0.105	7	-0.016	8	0.000	1	-0.246	7	5.892	9	0.024	9	0.000	0.008	0.018	0.246
519	M52	2.5in Dia. Duct Sch 160S	Sec 5 - max	0.006	6	0.001	1	0.002	8	-0.048	8	0.093	9	0.238	8	0.000	1	11.845	8	0.049	8	0.002	0.007	0.017	0.238
520	M52	2.5in Dia. Duct Sch 160S	Sec 6 - min	-0.006	9	-0.031	8	-0.009	7	-0.093	9	0.048	8	0.000	1	-0.238	8	-4.445	7	-0.018	7	0.002	0.007	0.017	0.238
147	M15	6in Dia. Duct	Sec 4 - max	0.004	1	-0.007	1	-0.004	9	0.219	8	-0.037	1	0.120	7	0.027	8	25.554	7	0.022	7	0.000	0.018	0.009	0.219
148	M15	6in Dia. Duct	Sec 4 - min	0.004	2	-0.037	8	-0.013	8	0.037	1	-0.219	8	-0.027	8	-0.120	7	-159.847	1	-0.140	1	0.000	0.018	0.009	0.219
209	M21	6in Dia. Duct	Sec 5 - max	0.020	8	0.000	8	-0.011	9	0.146	8	-0.108	1	-0.058	8	0.163	7	77.526	8	0.065	8	0.003	0.010	0.012	0.163
211	M22	6in Dia. Duct	Sec 1 - max	0.020	8	0.000	8	-0.011	9	0.146	8	-0.108	1	-0.058	8	0.163	7	77.526	8	0.065	8	0.003	0.010	0.012	0.163
399	M40	2.5in Dia. Duct Sch 160S	Sec 5 - max	0.008	7	0.031	8	0.000	8	-0.060	1	0.081	9	0.000	1	0.238	8	9.768	8	0.041	8	0.002	0.009	0.017	0.238
400	M40	2.5in Dia. Duct Sch 160S	Sec 5 - min	-0.008	8	-0.001	1	-0.005	9	-0.081	9	0.060	1	-0.238	8	0.000	1	-7.047	7	-0.029	7	0.002	0.009	0.017	0.238
517	M52	2.5in Dia. Duct Sch 160S	Sec 4 - max	0.008	6	0.002	1	0.002	8	-0.038	8	0.081	9	0.237	8	0.000	1	11.845	8	0.049	8	0.002	0.006	0.017	0.237
518	M52	2.5in Dia. Duct Sch 160S	Sec 4 - min	-0.008	9	-0.030	8	-0.007	7	-0.081	9	0.038	8	0.000	1	-0.237	8	-4.445	7	-0.018	7	0.002	0.006	0.017	0.237
505	M51	2.5in Dia. Duct Sch 160S	Sec 3 - min	-0.028	8	0.009	7	0.000	1	-0.070	7	-0.036	8	0.000	7	-0.196	8	-1.000	9	-0.004	9	0.005	0.005	0.014	0.198
125	M13	6in Dia. Duct	Sec 3 - max	0.016	1	0.008	9	0.042	8	-0.183	1	0.236	8	0.069	8	-0.035	1	65.102	7	0.057	7	0.002	0.017	0.005	0.236
126	M13	6in Dia. Duct	Sec 3 - min	0.016	2	-0.055	8	0.000	1	-0.236	8	0.183	1	0.035	1	-0.069	8	0.863	1	0.000	1	0.002	0.017	0.005	0.236
516	M52	2.5in Dia. Duct Sch 160S	Sec 3 - max	0.008	6	0.002	1	0.002	8	-0.028	8	0.070	7	0.236	8	0.000	1	11.845	8	0.049	8	0.002	0.005	0.017	0.236
518	M52	2.5in Dia. Duct Sch 160S	Sec 3 - min	-0.008	9	-0.030	8	-0.007	7	-0.070	7	0.028	8	0.000	1	-0.236	8	-4.445	7	-0.018	7	0.002	0.005	0.017	0.236
207	M21	6in Dia. Duct	Sec 4 - max	0.020	8	0.000	8	-0.012	9	0.140	8	-0.114	1	-0.034	8	0.148	7	77.526	8	0.065	8	0.003	0.010	0.010	0.148
504	M51	2.5in Dia. Duct Sch 160S	Sec 2 - min	-0.028	8	0.010	7	0.000	1	-0.074	7	-0.030	8	-0.018	7	-0.177	8	-1.000	9	-0.004	9	0.005	0.005	0.013	0.177
514	M52	2.5in Dia. Duct Sch 160S	Sec 2 - min	-0.009	9	-0.030	8	-0.007	7	-0.080	7	0.015	8	0.000	1	-0.235	8	-4.445	7	-0.018	7	0.002	0.004	0.017	0.235
47	M5	6in Dia. Duct	Sec 4 - max	-0.041	2	0.055	8	0.036	8	0.139	8	0.000	7	0.058	8	0.111	7	65.102	7	0.057	7	0.005	0.010	0.008	0.139
48	M5	6in Dia. Duct	Sec 4 - min	-0.041	1	-0.022	7	-0.046	7	0.000	7	-0.139	8	-0.111	7	-0.058	8	0.863	1	0.000	1	0.005	0.010	0.008	0.139
210	M21	6in Dia. Duct	Sec 5 - min	-0.005	7	-0.011	1	-0.049	8	0.106	1	-0.146	6	-0.163	7	0.058	8	50.057	1	0.042	1	0.001	0.010	0.012	0.163
212	M22	6in Dia. Duct	Sec 1 - min	-0.005	7	-0.011	1	-0.049	8	0.106	1	-0.146	6	-0.163	7	0.058	8	50.057	1	0.042	1	0.001	0.010	0.012	0.163
513	M52	2.5in Dia. Duct Sch 160S	Sec 2 - max	0.008	6	0.002	1	0.002	8	-0.015	8	0.060	7	0.235	8	0.000	1	11.845	8	0.049	8	0.002	0.004	0.017	0.235
512	M52	2.5in Dia. Duct Sch 160S	Sec 1 - min	-0.008	9	-0.029	8	-0.007	7	-0.058	1	0.003	8	0.000	1	-0.234	8	-4.445	7	-0.018	7	0.002	0.004	0.017	0.234
511	M52	2.5in Dia. Duct Sch 160S	Sec 1 - max	0.008	6	0.003	1	0.003	8	-0.003	8	0.058	1	0.234	8	0.000	1	11.845	8	0.049	8	0.002	0.004	0.017	0.234
443	M45	6in Dia. Duct	Sec 2 - max	0.013	1	0.032	8	0.005	9	-0.145	1	0.164	8	0.107	7	-0.027	1	65.102	7	0.057	7	0.002	0.013	0.008	0.164
444	M45	6in Dia. Duct	Sec 2 - min	0.013	2	0.001	9	-0.019	8	-0.164	8	0.145	1	0.027	1	-0.107	7	0.863	1	0.000	1	0.002	0.013	0.008	0.164
502	M51	2.5in Dia. Duct Sch 160S	Sec 1 - min	-0.028	8	0.010	7	0.000	1	-0.075	7	-0.024	8	-0.035	7	-0.158	8	-1.000	9	-0.004	9	0.005	0.005	0.011	0.158
205	M21	6in Dia. Duct	Sec 3 - max	0.019	8	0.002	0	-0.013	9	0.145	8	-0.120	1	-0.010	8	0.129	7	77.526	8	0.065	8	0.002	0.010	0.009	0.145
208	M21	6in Dia. Duct	Sec 4 - min	-0.005	7	-0.010	1	-0.048	8	0.114	1	-0.145	8	-0.145	7	0.034	8	50.057	1	0.042	1	0.001	0.010	0.010	0.146
445	M45	6in Dia. Duct	Sec 3 - max	0.005	1	0.027	8	0.002	9	-0.096	7	0.171	8	0.116	7	0.014	8	65.102	7	0.057	7	0.001	0.012	0.006	0.171

D-2250

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_a	f_{by}/σ_a	f_{bz}/σ_a	f_s (ksi)
448	M45	6in Dia. Duct	Sec 3 - min	0.008	2	0.006	9	-0.015	6	-0.171	8	0.098	7	-0.014	8	-0.116	7	0.863	1	0.000	1	0.001	0.012	0.008	0.171
123	M13	6in Dia. Duct	Sec 2 - max	0.016	1	0.006	9	0.042	6	-0.163	1	0.214	6	0.052	6	-0.035	1	65.102	7	0.057	7	0.002	0.015	0.004	0.214
124	M13	6in Dia. Duct	Sec 2 - min	0.016	2	-0.054	8	0.000	1	-0.214	6	0.163	1	0.035	1	-0.052	6	0.863	1	0.000	1	0.002	0.016	0.004	0.214
509	M51	2.5in Dia. Duct Sch 160S	Sec 5 - max	0.000	1	0.013	8	0.050	9	0.046	8	0.063	7	0.234	8	0.000	1	10.699	6	0.044	6	0.000	0.005	0.017	0.234
73	M8	2in Dia. Duct Sch 80S	Sec 2 - max	0.011	7	0.125	6	0.009	1	0.162	1	-0.056	8	0.091	1	0.057	6	0.207	1	0.002	1	0.003	0.012	0.007	0.162
74	M8	2in Dia. Duct Sch 80S	Sec 2 - min	-0.011	8	0.074	1	-0.004	6	0.066	8	-0.162	1	-0.057	6	-0.091	1	0.041	7	0.000	7	0.003	0.012	0.007	0.162
203	M21	6in Dia. Duct	Sec 2 - max	0.019	8	0.004	6	-0.014	9	0.143	6	-0.125	1	0.013	6	0.112	7	77.526	8	0.065	8	0.002	0.010	0.006	0.143
507	M51	2.5in Dia. Duct Sch 160S	Sec 4 - max	0.000	1	0.013	8	0.050	9	0.041	8	0.067	7	0.215	8	0.000	1	10.699	6	0.044	6	0.000	0.005	0.016	0.215
206	M21	6in Dia. Duct	Sec 3 - min	-0.004	7	-0.009	1	-0.046	6	0.120	1	-0.145	6	-0.129	7	0.010	8	50.057	1	0.042	1	0.001	0.010	0.009	0.148
447	M45	6in Dia. Duct	Sec 4 - max	0.004	1	0.023	6	-0.002	9	-0.026	7	0.149	8	0.110	7	0.047	8	65.102	7	0.057	7	0.000	0.011	0.008	0.149
448	M45	6in Dia. Duct	Sec 4 - min	0.004	2	0.010	9	-0.010	6	-0.149	8	0.026	7	-0.047	8	-0.113	7	0.863	1	0.000	1	0.000	0.011	0.006	0.149
201	M21	6in Dia. Duct	Sec 1 - max	0.019	8	0.005	8	-0.014	9	0.140	6	-0.130	1	0.036	8	0.093	7	77.526	8	0.065	8	0.002	0.010	0.007	0.140
505	M51	2.5in Dia. Duct Sch 160S	Sec 3 - max	0.000	1	0.013	8	0.050	9	0.036	8	0.070	7	0.196	8	0.000	7	10.699	6	0.044	6	0.000	0.005	0.014	0.196
204	M21	6in Dia. Duct	Sec 2 - min	-0.004	7	-0.007	1	-0.047	6	0.125	1	-0.143	6	-0.112	7	-0.013	8	50.057	1	0.042	1	0.001	0.010	0.008	0.143
500	M50	2.5in Dia. Duct Sch 160S	Sec 6 - min	-0.011	8	0.010	7	0.000	1	-0.071	7	-0.064	8	-0.035	7	-0.159	8	3.408	9	0.014	9	0.002	0.005	0.011	0.158
121	M13	6in Dia. Duct	Sec 1 - max	0.010	1	0.007	9	0.041	6	-0.163	1	0.192	6	0.036	1	-0.035	7	65.102	7	0.057	7	0.002	0.014	0.003	0.192
122	M13	6in Dia. Duct	Sec 1 - min	0.010	2	-0.054	6	0.000	1	-0.192	6	0.163	1	0.035	7	-0.036	1	0.863	1	0.000	1	0.002	0.014	0.003	0.192
503	M51	2.5in Dia. Duct Sch 160S	Sec 2 - max	0.000	1	0.014	8	0.050	9	0.030	8	0.074	7	0.177	8	0.018	7	10.699	6	0.044	6	0.000	0.005	0.013	0.177
199	M20	6in Dia. Duct	Sec 6 - max	0.010	8	0.036	6	-0.017	8	0.140	6	-0.130	1	0.036	8	0.093	7	77.526	8	0.065	8	0.001	0.010	0.007	0.140
149	M15	6in Dia. Duct	Sec 6 - max	0.000	1	-0.007	1	-0.008	9	0.147	6	0.005	9	0.101	7	0.059	8	25.554	7	0.022	7	0.000	0.011	0.007	0.147
150	M15	6in Dia. Duct	Sec 5 - min	0.000	1	-0.033	8	-0.011	1	-0.005	9	-0.147	6	-0.059	8	-0.101	7	-159.847	1	-0.140	1	0.000	0.011	0.007	0.147
421	M43	6in Dia. Duct	Sec 1 - max	0.000	1	-0.007	1	-0.008	9	0.147	6	0.005	9	0.101	7	0.059	8	25.554	7	0.022	7	0.000	0.011	0.007	0.147
422	M43	6in Dia. Duct	Sec 1 - min	0.000	1	-0.033	8	-0.011	1	-0.005	9	-0.147	6	-0.059	8	-0.101	7	-159.847	1	-0.140	1	0.000	0.011	0.007	0.147
492	M50	2.5in Dia. Duct Sch 160S	Sec 1 - min	-0.011	8	0.011	7	0.000	1	-0.089	7	-0.040	8	-0.122	7	-0.047	8	3.408	9	0.014	9	0.002	0.006	0.009	0.122
202	M21	6in Dia. Duct	Sec 1 - min	-0.004	7	-0.008	1	-0.046	6	0.130	1	-0.140	6	-0.093	7	-0.036	8	50.057	1	0.042	1	0.001	0.010	0.007	0.140
200	M20	6in Dia. Duct	Sec 5 - min	0.002	1	0.027	1	-0.044	7	0.130	1	-0.140	6	-0.093	7	-0.036	8	50.057	1	0.042	1	0.000	0.010	0.007	0.130
496	M50	2.5in Dia. Duct Sch 160S	Sec 4 - min	-0.011	8	0.010	7	0.000	1	-0.075	7	-0.058	8	-0.057	7	-0.130	8	3.408	9	0.014	9	0.002	0.005	0.009	0.130
501	M51	2.5in Dia. Duct Sch 160S	Sec 1 - max	0.000	1	0.014	8	0.050	9	0.024	8	0.078	7	0.158	8	0.035	7	10.699	6	0.044	6	0.000	0.005	0.011	0.158
499	M50	2.5in Dia. Duct Sch 160S	Sec 5 - max	0.000	1	0.014	8	0.066	8	0.064	8	0.071	7	0.158	8	0.035	7	8.693	1	0.038	1	0.000	0.005	0.011	0.158
423	M43	6in Dia. Duct	Sec 2 - max	0.000	1	-0.007	1	-0.008	8	0.129	6	0.025	9	0.095	7	0.064	8	25.554	7	0.022	7	0.000	0.009	0.007	0.129
424	M43	6in Dia. Duct	Sec 2 - min	0.000	1	-0.032	8	-0.011	1	-0.025	9	-0.129	6	-0.064	8	-0.095	7	-159.847	1	-0.140	1	0.000	0.009	0.007	0.129
85	M9	6in Dia. Duct	Sec 3 - max	-0.039	2	0.008	9	0.030	8	-0.020	1	0.104	8	0.050	7	0.050	8	25.554	7	0.022	7	0.005	0.007	0.004	0.104
86	M9	6in Dia. Duct	Sec 3 - min	-0.039	1	-0.060	8	-0.047	7	-0.104	8	0.020	1	-0.050	7	0.000	8	-159.847	1	-0.140	1	0.005	0.007	0.004	0.104
61	M9	6in Dia. Duct	Sec 1 - max	-0.035	2	0.004	9	0.026	8	0.071	7	0.081	8	0.074	9	0.077	8	25.554	7	0.022	7	0.004	0.006	0.006	0.081
62	M9	6in Dia. Duct	Sec 1 - min	-0.035	1	-0.062	8	-0.043	7	-0.081	8	-0.071	7	-0.077	8	-0.074	9	-159.847	1	-0.140	1	0.004	0.006	0.006	0.081
494	M50	2.5in Dia. Duct Sch 160S	Sec 2 - min	-0.011	8	0.011	7	0.000	1	-0.084	7	-0.046	8	-0.101	7	-0.075	8	3.408	9	0.014	9	0.002	0.005	0.007	0.101
41	M5	6in Dia. Duct	Sec 1 - max	-0.035	2	0.049	8	0.000	8	0.076	8	0.073	9	0.074	9	0.076	8	65.102	7	0.057	7	0.004	0.008	0.005	0.076
42	M5	6in Dia. Duct	Sec 1 - min	-0.035	1	-0.016	7	-0.042	7	-0.073	9	-0.076	8	-0.074	9	-0.076	8	0.863	1	0.000	1	0.004	0.008	0.005	0.076
431	M44	6in Dia. Duct	Sec 1 - max	0.000	1	0.019	8	-0.002	1	0.034	7	0.115	8	0.098	7	0.058	8	65.102	7	0.057	7	0.000	0.008	0.007	0.115
432	M44	6in Dia. Duct	Sec 1 - min	0.000	1	0.013	1	-0.007	7	-0.115	8	-0.034	7	-0.058	8	-0.098	7	0.863	1	0.000	1	0.000	0.008	0.007	0.115
449	M45	6in Dia. Duct	Sec 5 - max	0.000	1	0.019	8	-0.002	1	0.034	7	0.115	8	0.098	7	0.058	8	65.102	7	0.057	7	0.000	0.008	0.007	0.115
450	M45	6in Dia. Duct	Sec 5 - min	0.000	1	0.013	1	-0.007	7	-0.115	8	-0.034	7	-0.058	8	-0.098	7	0.863	1	0.000	1	0.000	0.008	0.007	0.115
496	M50	2.5in Dia. Duct Sch 160S	Sec 3 - min	-0.011	8	0.011	7	0.000	1	-0.079	7	-0.052	8	-0.079	7	-0.102	8	3.408	9	0.014	9	0.002	0.006	0.007	0.102
491	M50	2.5in Dia. Duct Sch 160S	Sec 1 - max	0.000	1	0.015	8	0.057	8	0.040	8	0.089	7	0.047	8	0.122	7	8.693	1	0.038	1	0.000	0.006	0.009	0.122
497	M50	2.5in Dia. Duct Sch 160S	Sec 4 - max	0.000	1	0.014	8	0.066	8	0.055	8	0.075	7	0.130	8	0.057	7	8.693	1	0.038	1	0.000	0.005	0.009	0.130
21	M3	2.5in Dia. Duct Sch 160S	Sec 1 - max	0.002	7	-0.011	7	0.070	8	0.055	8	0.077	7	0.122	7	0.047	8	9.713	1	0.040	1	0.000	0.006	0.009	0.122
22	M3	2.5in Dia. Duct Sch 160S	Sec 1 - min	-0.002	6	-0.016	8	0.000	1	-0.077	7	-0.055	8	-0.047	8	-0.122	7	5.892	9	0.024	9	0.000	0.006	0.009	0.122
425	M43	6in Dia. Duct	Sec 3 - max	-0.002	1	-0.007	1	-0.007	8	0.110	6	0.044	9	0.089	7	0.069	8	25.554	7	0.022	7	0.000	0.008	0.006	0.110
426	M43	6in Dia. Duct	Sec 3 - min	-0.002	1	-0.031	8	-0.011	1	-0.044	9	-0.110	6	-0.089	8	-0.069	7	-159.847	1	-0.140	1	0.000	0.008	0.006	0.110
433	M44	6in Dia. Duct	Sec 2 - max	0.000	1	0.016	8	-0.002	1	0.046	7	0.105	8	0.093	7	0.071	8	65.102	7	0.057	7	0.000	0.008	0.007	0.105
434	M44	6in Dia. Duct	Sec 2 - min	0.000	1	0.013	1	-0.008	7	-0.105	8	-0.046	7	-0.071	8	-0.093	7	0.863	1	0.000	1	0.000	0.008	0.007	0.105
197	M20	6in Dia. Duct	Sec 4 - max	0.010	8	0.039	6	-0.016	8	0.111	6	-0.109	1	0.046	8	0.061	7	77.526	8	0.065	8	0.001	0.005	0.004	0.111
435	M44	6in Dia. Duct	Sec 3 - max	-0.002	1	0.017	6	-0.002	1	0.058	7	0.095	8	0.087	7	0.073	8	65.102	7	0.057	7	0.000	0.007	0.006	0.095
436	M44	6in Dia. Duct	Sec 3 - min	-0.002	1	0.013	1	-0.009	7	-0.095	8	-0.058	7	-0.073	8	-0.087	7	0.863	1	0.000	1	0.000	0.007	0.006	0.095
493	M50	2.5in Dia. Duct Sch 160S	Sec 2 - max	0.000	1	0.015	8	0.057	8	0.046	8	0.084	7	0.075	8	0.101	7	8.693	1	0.038	1	0.000	0.006	0.007	0.101
495	M50	2.5in Dia. Duct Sch 160S	Sec 3 - max	0.000	1	0.016	8	0.066	8	0.062	8	0.079	7	0.102	8	0.079	7	8.693	1	0.038	1	0.000	0.006	0.007	0.102
83	M9	6in Dia. Duct	Sec 2 - max	-0.037	2	0.006	9	0.028	8	-0.011	1	0.077	8	0.014	9	0.041	8	25.554	7	0.022	7	0.004	0.006	0.003	0.077
84	M9	6in Dia. Duct	Sec 2 - min	-0.037	1	-0.064	8	-0.045	7	-0.077	8	0.011	1	-0.041	8	-0.014	9	-159.847	1	-0.140	1	0.004	0.006	0.003	0.077
45	M5	6in Dia. Duct	Sec 3 - max	-0.039	2	0.051	8	0.034	8	0.068	8	-0.029	7	0.010	8	0.047	7	65.102	7	0.057	7	0.005	0.005	0.003	0.068
46	M5	6in Dia. Duct	Sec 3 - min	-0.039	1	-0.020	7	-0.046	7	0.029	7	-0.086	8	-0.047	7	-0.010	8	0.863	1	0.000	1	0.005	0.005	0.003	0.091
427	M43	6in Dia. Duct	Sec 4 - max	-0.003	1	-0.007	1	-0.008	8	0.091	6	0.093	9	0.082	7	0.073	8	25.554	7	0.022	7	0.000	0.007	0.006	0.091
428	M43	6in Dia. Duct	Sec 4 - min	-0.003	1	-0.030	8	-0.011	7	-0.093	9	-0.091	6	-0.073	8	-0.082	7	-159.847	1	-0.140	1	0.000	0.007	0.006	0.091
198	M20	6in Dia. Duct	Sec 4 - min	0.002	1	0.029	1	-0.044	7	0.109	1	-0.111	6	-0.061	7	-0.046	8	50.057	1	0.042	1	0.000	0.008	0.004	0.111
195	M20	6in Dia. Duct	Sec 3 - max	0.010	8	0.041	6	-0.016	8	0.087	1	-0.082	6	0.056	6	0.035	9	77.526	8	0.065	8	0.001	0.006	0.005	0.087
437	M44	6in Dia. Duct	Sec 4 - max	-0.003	1	0.017	6	-0.002	8	0.068	7	0.084	8	0.081	7	0.075	8	65.102	7	0.057	7	0.000	0.009	0.006	0.084
438	M44	6in Dia. Duct	Sec 4 - min	-0.003	1	0.013	1	-0.010	7	-0.064	8	-0.086	7	-0.075	8	-0.081	7	0.863	1	0.000	1	0.000	0.009	0.006	0.084
193	M20	6in Dia. Duct	Sec 2 - max	0.009	8	0.043	6	-0.014	8	0.064	1	-0.051	6	0.087	6	0.011	9	77.526	8	0.065	8	0.001	0.005	0.006	0.087
429	M43	6in Dia. Duct	Sec 5 - max	-0.004	1	-0.007	1	-0.005	8	0.071	7	0.081	8	0.074	9	0.077	8	25.554	7	0.022	7	0.000	0.005	0.006	0.081
430	M43	6in Dia. Duct	Sec 5 - min	-0.004	1	-0.031	8	-0.012	7	-0.081	8	-0.071	7	-0.077	8	-0.074	9	-159.847	1	-0.140	1	0.000	0.005	0.006	0.081
191	M20	6in Dia. Duct	Sec 1 - max	0.009	8	0.044	6	-0.014	8	0.040	1	-0.019	6	0.107	6	-0.014	9	77.526	8	0.065	8	0.001	0.003	0.008	0.107
439	M44	6in Dia. Duct	Sec 5 - max	-0.004	1	0.018	8	-0.001	8	0.076	6	0.073	9	0.074	9	0.076	8	65.102	7	0.057	7	0.000	0.008	0.005	0.078
440	M44	6in Dia. Duct	Sec 5 - min	-0.004	1	0.013	1	-0.011	7	-0.073	9	-0.076	8	-0.074	9	-0.076	8	0.863	1	0.000	1	0.000	0.008	0.005	0.078
196	M20	6in Dia. Duct	Sec 3 - min	0.002	1	0.039	1	-0.046	7	0.082	8	-0.087	1	-0.035	9	-0.066	8	50.057	1	0.042	1	0.000	0.005	0.006	0.087
194	M20	6in Dia. Duct	Sec 2 - min	0.002	1	0.032	1	-0.046	7	0.051	8	-0.064	1	-0.011	9	-0.087	8	50.057	1	0.042	1	0.000	0.005	0.006	0.055
43	M5	6in Dia. Duct	Sec 2 - max	-0.037	2	0.061	8	0.032	8	0.055	8	0.065	9	0.017	9	0.038	8	65.102	7	0.057	7	0.004	0.004	0.003	0.055
44	M5	6in Dia. Duct	Sec 2 - min	-0.037	1	-0.018	7	-0.044	7	-0.005	9	-0.055	8	-0.036	8	-0.017	9	0.863	1	0.000	1	0.004	0.004	0.003	0.107
192	M20	6in Dia. Duct	Sec 1 - min	0.002	1	0.030	1	-0.047	7	0.019	8	-0.040	1	0.014	9	-0.107	8	50.057	1	0.042	1	0.000	0.003	0.008	0.005
310	M31	6in Dia. Duct	Sec 5 - min	0.005	1	-0.017	1	-0.070	7	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.001	0.000	0.000	

amec

CALCULATION SHEET

CALC. NO.:	145579-V-CA-005	REV:	1	DATE:	March 26, 2006
CALC. TITLE:	Off-Gas Treatment System Pipe Stress Analysis				
PROJECT NO.:	145579	PROJECT TITLE:	Final DBVS Design		

Attachment 11: Excel Spreadsheet – Model 3 AG-1 Analysis and Unity Checks

NOTE: This cover sheet represents the approval signatures of the originator and checker for all pages of this attachment

ORIGINATOR:		DATE:	CHECKER:		DATE:
Kevin M. Jones	KMJ	3/26/06	J. Van Corbach	JVC	3/26/06

Duct Size	σ_x (ksi) Eq. 1b	σ_z (ksi) Eq. 6 or 7	σ_y (ksi) Eq. 5	σ_y (ksi) Eq. 9	τ_t (ksi) Eq. 9	σ_y (ksi) Eq. 10	Temp
3in Dia. Duct	8.8	22.5	18.8	35.7	13.0	13.0	100
4in Dia. Duct	10.4	22.5	18.8	33.2	13.0	13.0	100
5in Dia. Duct	11.5	22.5	18.8	31.5	13.0	13.0	100
8in Dia. Duct	12.2	22.5	18.8	30.8	13.0	13.0	100
6in Dia. Duct	13.0	22.5	18.8	11.3	13.0	13.0	100
12in Dia. Duct	13.7	22.5	18.8	10.8	13.0	13.0	100

Model 3

D-2250

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_x/σ_x	f_y/σ_y	f_z/σ_z		f_c (ksi)	
131	M14	RIGID	Sec 1 - max	0.000	9	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	-0.044	8	0.000	1	0.000	0.000	0.000		0.000	
132	M14	RIGID	Sec 1 - min	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	+0.112	1	0.000	1	0.000	0.000	0.000		0.000	
133	M14	RIGID	Sec 2 - max	0.000	9	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	+0.044	8	0.000	1	0.000	0.000	0.000		0.000	
134	M14	RIGID	Sec 2 - min	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	-0.112	1	0.000	1	0.000	0.000	0.000		0.000	
135	M14	RIGID	Sec 3 - max	0.000	9	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	+0.044	8	0.000	1	0.000	0.000	0.000		0.000	
136	M14	RIGID	Sec 3 - min	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	-0.112	1	0.000	1	0.000	0.000	0.000		0.000	
137	M14	RIGID	Sec 4 - max	0.000	9	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	-0.044	8	0.000	1	0.000	0.000	0.000		0.000	
138	M14	RIGID	Sec 4 - min	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	+0.112	1	0.000	1	0.000	0.000	0.000		0.000	
139	M14	RIGID	Sec 5 - max	0.000	9	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	-0.044	8	0.000	1	0.000	0.000	0.000		0.000	
140	M14	RIGID	Sec 5 - min	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	-0.112	1	0.000	1	0.000	0.000	0.000		0.000	
291	M30	RIGID	Sec 1 - max	0.000	6	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.009	1	0.000	1	0.000	0.000	0.000		0.000	
292	M30	RIGID	Sec 1 - min	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	-0.924	6	0.000	1	0.000	0.000	0.000		0.000	
293	M30	RIGID	Sec 2 - max	0.000	6	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.009	1	0.000	1	0.000	0.000	0.000		0.000	
294	M30	RIGID	Sec 2 - min	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	-0.924	6	0.000	1	0.000	0.000	0.000		0.000	
295	M30	RIGID	Sec 3 - max	0.000	6	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.009	1	0.000	1	0.000	0.000	0.000		0.000	
296	M30	RIGID	Sec 3 - min	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	-0.924	6	0.000	1	0.000	0.000	0.000		0.000	
297	M30	RIGID	Sec 4 - max	0.000	6	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.009	1	0.000	1	0.000	0.000	0.000		0.000	
298	M30	RIGID	Sec 4 - min	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	-0.924	6	0.000	1	0.000	0.000	0.000		0.000	
299	M30	RIGID	Sec 5 - max	0.000	6	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.009	1	0.000	1	0.000	0.000	0.000		0.000	
300	M30	RIGID	Sec 5 - min	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	+0.924	6	0.000	1	0.000	0.000	0.000		0.000	
179	M18	4in Dia. Duct	Sec 5 - max	0.358	6	0.000	1	0.000	1	-0.012	1	2.051	8	-0.044	1	6.985	6	0.128	6	0.282	6	0.034	0.113	0.310		6.985	
180	M18	4in Dia. Duct	Sec 5 - min	0.024	1	-0.110	8	-0.218	6	-2.551	8	0.012	1	-6.986	6	0.044	1	0.000	1	-0.002	1	0.002	0.113	0.310		6.985	
1	M1	4in Dia. Duct	Sec 1 - max	0.000	1	-0.099	1	0.174	9	5.675	8	-0.257	1	0.000	8	3.387	9	-0.037	1	-0.081	1	0.000	0.252	0.161		5.675	
2	M1	4in Dia. Duct	Sec 1 - min	0.000	1	-0.558	8	-0.041	6	0.297	1	-5.675	6	-3.387	9	0.000	6	+0.114	8	-0.251	8	0.000	0.252	0.161		5.675	
151	M16	4in Dia. Duct	Sec 1 - max	0.000	1	0.219	8	0.103	6	-0.457	1	5.173	8	1.629	9	3.476	6	0.128	8	0.277	8	0.000	0.230	0.154		5.173	
152	M16	4in Dia. Duct	Sec 1 - min	0.000	1	0.004	7	-0.055	9	-5.173	8	0.457	1	-3.476	6	-1.629	9	-0.021	7	-0.045	7	0.000	0.230	0.154		5.173	
154	M16	4in Dia. Duct	Sec 2 - min	-0.001	9	0.000	7	-0.053	9	-4.470	8	0.291	1	-3.146	6	-1.455	9	-0.021	7	-0.045	7	0.000	0.199	0.140		4.470	
153	M16	4in Dia. Duct	Sec 2 - max	0.000	8	0.214	6	0.100	6	-0.291	1	4.470	6	1.455	9	3.146	6	0.128	8	0.277	8	0.000	0.199	0.140		4.470	
4	M1	4in Dia. Duct	Sec 2 - min	-0.001	8	-0.563	8	-0.039	6	-0.074	1	-3.853	6	-2.825	9	0.054	1	-0.114	8	-0.251	8	0.000	0.171	0.126		3.853	
3	M1	4in Dia. Duct	Sec 2 - max	0.000	7	-0.104	1	0.172	9	3.853	8	0.074	1	-0.054	1	2.825	9	-0.037	1	-0.081	1	0.000	0.171	0.126		3.853	
156	M16	4in Dia. Duct	Sec 3 - min	-0.003	9	-0.006	7	-0.050	9	-3.782	8	0.140	1	-2.924	6	-1.287	9	-0.021	7	-0.045	7	0.000	0.188	0.126		3.782	
155	M16	4in Dia. Duct	Sec 3 - max	0.002	8	0.209	6	0.098	6	-0.140	1	3.782	8	1.287	9	2.924	6	0.128	6	0.277	6	0.000	0.188	0.126		3.782	
177	M18	4in Dia. Duct	Sec 4 - max	0.394	6	0.000	1	0.000	1	1.085	8	0.184	7	-0.071	1	3.988	7	0.128	6	0.282	6	0.035	0.048	0.177		3.988	
156	M16	4in Dia. Duct	Sec 4 - min	-0.004	9	-0.009	7	-0.048	9	-3.110	8	0.004	1	-2.509	6	-1.128	9	-0.021	7	-0.045	7	0.000	0.138	0.112		3.110	
157	M16	4in Dia. Duct	Sec 4 - max	0.003	8	0.204	6	0.096	6	-0.004	1	3.110	8	1.128	9	2.509	6	0.128	6	0.277	6	0.000	0.138	0.112		3.110	
178	M18	4in Dia. Duct	Sec 4 - min	0.000	1	-0.146	8	-0.252	6	-0.184	7	-1.085	8	-3.988	7	0.071	1	0.000	1	-0.002	1	0.008	0.048	0.177		3.988	
129	M13	4in Dia. Duct	Sec 5 - max	0.063	9	-0.075	8	0.184	7	-1.654	8	1.700	1	3.352	7	-0.105	1	0.055	8	0.120	8	0.006	0.078	0.149		3.352	
130	M13	4in Dia. Duct	Sec 5 - min	-0.031	6	-0.084	1	-0.031	8	-1.700	1	1.654	6	0.105	1	-3.352	7	0.002	1	0.005	1	0.003	0.078	0.149		3.352	
127	M13	4in Dia. Duct	Sec 4 - max	0.063	9	-0.074	8	0.163	7	-1.570	8	1.608	1	3.169	7	-0.097	1	0.055	8	0.120	8	0.006	0.071	0.141		3.169	
128	M13	4in Dia. Duct	Sec 4 - min	-0.031	6	-0.083	1	-0.030	8	-1.608	1	1.570	6	0.097	1	-3.169	7	0.002	1	0.005	1	0.003	0.071	0.141		3.169	
160	M16	4in Dia. Duct	Sec 5 - min	-0.006	9	-0.014	7	-0.046	9	-2.454	8	-0.117	1	-2.202	6	-0.975	9	-0.021	7	-0.045	7	0.000	0.109	0.098		2.454	
162	M17	4in Dia. Duct	Sec 1 - min	-0.005	9	-0.015	7	-0.046	9	-2.454	8	-0.117	1	-2.201	6	-1.013	9	0.000	1	0.000	1	0.000	0.109	0.098		2.454	
159	M16	4in Dia. Duct	Sec 5 - max	0.004	8	0.199	8	0.093	6	0.117	1	2.454	8	0.975	9	2.202	6	0.128	8	0.277	8	0.000	0.109	0.098		2.454	
161	M17	4in Dia. Duct	Sec 1 - max	-0.002	1	0.199	8	0.093	6	0.117	1	2.454	8	1.013	9	2.201	6	0.110	8	0.241	8	0.000	0.109	0.098		2.454	
125	M13	4in Dia. Duct	Sec 3 - max	0.062	9	-0.072	8	0.163	7	-1.489	8	1.614	1	2.986	7	-0.088	1	0.055	8	0.120	8	0.006	0.067	0.133		2.986	
126	M13	4in Dia. Duct	Sec 3 - min	-0.030	6	-0.081	1	-0.030	8	-1.614	1	1.489	6	0.088	1	-2.986	7	0.002	1	0.005	1	0.003	0.067	0.133		2.986	
123	M13	4in Dia. Duct	Sec 2 - max	0.062	9	-0.071	8	0.162	7	-1.406	8	1.424	1	2.804	7	-0.080	1	0.055	8	0.120	8	0.006	0.063	0.125		2.804	
6	M1	4in Dia. Duct	Sec 3 - min	-0.003	8	-0.567	6	-0.038	6	-0.420	1	-2.017	6	-2.270	9	0.030	1	-0.114	8	-0.251	9	0.000	0.090	0.101		2.270	
124	M13	4in Dia. Duct	Sec 2 - min	-0.030	6	-0.080	1	-0.029	8	-1.424	1	1.406	6	0.080	1	-2.804	7	0.002	1	0.005	1	0.003	0.063	0.125		2.804	
5	M1	4in Dia. Duct	Sec 3 - max	0.002	7	-0.109	1	0.169	9	2.017	8	0.420	1	-0.030	1	2.270	9	-0.037	1	-0.081	1	0.000	0.090	0.101		2.270	
172	M18	4in Dia. Duct	Sec 1 - min	-0.067	7	0.000	1	-0.060	9	-0.517	8	-0.465	7	-3.229	6	-3.629	7	0.000	1	-0.002	1	0.005	0.023	0.161		3.629	
171	M18	4in Dia. Duct	Sec 1 - max	0.061	8	0.043	6	0.044	6	0.465	7	0.517	8	3.629	7	3.229	8	0.128	6	0.282	6	0.005	0.023	0.161		3.629	
164	M17	4in Dia. Duct	Sec 2 - min	-0.006	9	-0.017	7	-0.044	9	-2.130	8	-0.171	1	-2.049	6	-0.939	9	0.000	1	0.000	1	0.001	0.095	0.091		2.130	
163	M17	4in Dia. Duct	Sec 2 - max	-0.002	1	0.197	8	0.092	6	-0.171	1	2.130	8	0.939	9	2.049	6	0.110	8	0.241	6	0.000	0.095	0.091		2.130	
119	M12	4in Dia. Duct	Sec 5 - max	0.061	9	-0.069	8	0.161	7	-1.326	9	1.336	1	2.624	7	-0.071	1	0.055	8	0.120	8	0.006	0.059	0.117		2.624	
121	M13	4in Dia. Duct	Sec 1 - max	0.061	9	-0.068	8	0.161	7	-1.326	9	1.336	1	2.624	7	-0.071	1	0.055	8	0.120	8	0.006	0.059	0.117		2.624	
176	M18	4in Dia. Duct	Sec 3 - min	-0.128	7	-0.031	7	-0.132	9	-0.002	1	-1.895	8	-1.907	9	-1.363	8	0.000	1	-0.002	1	0.012	0.084	0.095		1.907	
120	M12	4in Dia. Duct	Sec 5 - min	-0.029	6	-0.076	1	-0.028	8	-1.336	1	1.326	9	0.071	1	-2.624	7	0.002	1	0.005	1	0.003	0.059	0.117		2.624	
122	M13	4in Dia. Duct	Sec 1 - min	-0.029	6	-0.076	1	-0.028	8	-1.336	1	1.326	9	0.071	1	-2.624	7	0.002	1	0.005	1	0.003	0.059	0.117		2.624	
166	M17	4in Dia. Duct	Sec 3 - min	-0.006	9	-0.019	7	-0.043	9	-1.966	9	-0.222	1	-1.899	6	-0.867	9	0.000	1	0.000	1	0.001	0.087	0.084		1.966	
165	M17	4in Dia. Duct	Sec 3 - max	-0.002	1	0.195	8	0.091	6	0.222	1	1.966	9	0.867	9	1.899	8	0.110	8	0.241	6	0.000	0.087	0.084		1.966	
175	M18	4in Dia. Duct	Sec 3 - max	-0.021	8	0.078	8	0.115	6	1.895	8	0.002	1	1.363	6	1.907	9	0.128	6	0.282	8	0.002	0.084	0.095		1.907	
191	M20	8in Dia. Duct	Sec 1 - max	0.191	6	0.182	8	0.052	6	-0.016	1	2.657	8	0.753	6	-0.002	1	-0.003	1	-0.002	1	0.016	0.116	0.033		2.657	
166	M17	4in Dia. Duct	Sec 4 - min	-0.007	9	-0.022	7	-0.042	9	-1.995	9	-0.269	1	-1.751	6	-0.797	9	0.000	1	0.000	1	0.001	0.089	0.078		1.995	
167	M17	4in Dia. Duct	Sec 4 - max	-0.002	6	0.192	8	0.090	6	0.269	1	1.995	9	0.797	9	1.751	6	0.110	8	0.241	8	0.000	0.089	0.078		1.995	

D-2250

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_a	f_y/σ_a	f_z/σ_a		f_c (ksi)	
170	M17	4in Dia. Duct	Sec 6 - min	-0.007	9	-0.024	7	-0.041	9	-2.030	7	-0.312	1	+1.605	6	-0.729	9	0.000	1	0.000	1	0.001	0.090	0.071		2.030	
169	M17	4in Dia. Duct	Sec 5 - max	-0.001	6	0.190	8	0.089	6	0.312	1	2.030	7	0.729	9	1.605	6	0.110	8	0.241	8	0.000	0.090	0.071		2.030	
199	M20	6in Dia. Duct	Sec 5 - max	0.168	6	0.168	6	0.070	6	1.266	9	-0.017	1	1.976	6	-0.005	1	-0.003	1	-0.002	1	0.014	0.056	0.088		1.976	
192	M20	6in Dia. Duct	Sec 1 - min	0.000	1	0.017	1	0.000	1	-2.657	6	0.016	1	0.002	1	-0.753	8	-0.367	8	-0.308	8	0.001	0.118	0.033		2.657	
209	M21	6in Dia. Duct	Sec 5 - max	0.164	6	0.178	8	0.049	7	0.895	7	-0.003	1	2.160	6	-0.006	1	-0.005	1	-0.004	1	0.013	0.040	0.096		2.160	
207	M21	6in Dia. Duct	Sec 4 - max	0.165	6	0.179	6	0.048	7	0.872	7	-0.006	1	2.153	6	-0.006	1	-0.005	1	-0.004	1	0.014	0.039	0.096		2.153	
205	M21	6in Dia. Duct	Sec 3 - max	0.166	6	0.179	8	0.048	7	0.850	7	-0.009	1	2.145	6	-0.006	1	-0.005	1	-0.004	1	0.014	0.038	0.095		2.145	
203	M21	6in Dia. Duct	Sec 2 - max	0.166	6	0.179	6	0.048	7	0.827	7	-0.012	1	2.137	6	-0.006	1	-0.005	1	-0.004	1	0.014	0.037	0.095		2.137	
200	M20	6in Dia. Duct	Sec 5 - min	-0.006	1	-0.014	1	0.000	1	0.017	1	-1.266	9	0.005	1	-1.976	6	-0.367	8	-0.308	8	0.001	0.056	0.088		1.976	
309	M31	6in Dia. Duct	Sec 5 - max	0.060	6	0.006	1	0.000	1	0.035	1	0.052	9	0.029	1	3.086	9	0.009	1	0.008	1	0.005	0.002	0.137		3.086	
201	M21	6in Dia. Duct	Sec 1 - max	0.165	6	0.179	8	0.048	7	0.804	7	-0.016	1	2.129	6	-0.006	1	-0.005	1	-0.004	1	0.014	0.036	0.095		2.129	
310	M31	6in Dia. Duct	Sec 5 - min	-0.006	9	-0.023	9	-0.103	7	-0.052	9	-0.035	1	-3.086	9	-0.029	1	-0.824	8	-0.773	6	0.001	0.002	0.137		3.086	
193	M20	6in Dia. Duct	Sec 2 - max	0.165	6	0.179	8	0.056	8	0.056	1	1.666	8	1.076	8	-0.003	1	-0.003	1	-0.002	1	0.015	0.074	0.048		1.666	
210	M21	6in Dia. Duct	Sec 5 - min	-0.008	1	-0.017	1	0.000	1	0.003	1	-0.895	7	0.008	1	-2.160	6	-0.552	8	-0.462	6	0.001	0.040	0.096		2.160	
208	M21	6in Dia. Duct	Sec 4 - min	-0.008	1	-0.016	1	0.000	1	0.006	1	-0.872	7	0.008	1	-2.153	6	-0.552	8	-0.462	6	0.001	0.039	0.096		2.153	
206	M21	6in Dia. Duct	Sec 3 - min	-0.008	1	-0.016	1	0.000	1	0.009	1	-0.850	7	0.008	1	-2.145	6	-0.552	8	-0.462	6	0.001	0.038	0.095		2.145	
204	M21	6in Dia. Duct	Sec 2 - min	-0.008	1	-0.016	1	0.000	1	0.012	1	-0.827	7	0.008	1	-2.137	6	-0.552	8	-0.462	6	0.001	0.037	0.095		2.137	
307	M31	6in Dia. Duct	Sec 4 - max	0.059	6	0.013	1	0.000	1	0.008	1	0.002	9	0.028	1	2.846	9	0.009	1	0.008	1	0.005	0.000	0.126		2.846	
202	M21	6in Dia. Duct	Sec 1 - min	-0.008	1	-0.016	1	0.000	1	0.015	1	-0.804	7	0.008	1	-2.129	6	-0.552	8	-0.462	8	0.001	0.036	0.095		2.129	
11	M2	4in Dia. Duct	Sec 1 - max	0.016	6	0.112	6	0.165	9	-1.158	1	1.699	8	0.008	1	1.213	8	-0.037	1	-0.082	1	0.002	0.076	0.054		1.699	
51	M6	4in Dia. Duct	Sec 1 - max	0.070	9	0.036	8	0.012	8	0.008	1	0.299	8	2.473	9	0.797	6	-0.060	6	-0.132	6	0.007	0.013	0.110		2.473	
12	M2	4in Dia. Duct	Sec 1 - min	0.004	1	0.103	1	-0.032	6	-1.699	8	1.158	1	-1.213	8	-0.008	1	-0.094	8	-0.206	8	0.000	0.076	0.054		1.699	
38	M4	4in Dia. Duct	Sec 5 - max	0.050	9	0.038	8	0.105	9	0.399	1	-0.031	8	2.411	9	0.809	6	-0.060	1	-0.132	1	0.005	0.018	0.107		2.411	
63	M6	4in Dia. Duct	Sec 2 - max	0.070	9	0.036	8	0.012	8	0.019	1	0.286	8	2.459	9	0.794	6	-0.060	6	-0.132	6	0.007	0.013	0.109		2.459	
10	M1	4in Dia. Duct	Sec 5 - min	-0.005	8	-0.576	8	-0.032	6	-1.699	8	1.158	1	-1.184	8	-0.020	1	-0.114	8	-0.261	8	0.000	0.076	0.053		1.699	
9	M1	4in Dia. Duct	Sec 5 - max	0.004	7	-0.118	1	0.165	9	-1.158	1	1.699	8	0.020	1	1.184	9	-0.037	1	-0.081	1	0.000	0.076	0.053		1.699	
49	M6	4in Dia. Duct	Sec 5 - max	0.070	9	0.036	8	0.040	9	0.257	1	0.127	8	2.473	9	0.797	6	-0.085	8	-0.187	6	0.007	0.011	0.110		2.473	
55	M6	4in Dia. Duct	Sec 3 - max	0.070	9	0.035	8	0.012	8	0.029	1	0.273	8	2.446	9	0.791	6	-0.060	6	-0.132	6	0.007	0.012	0.109		2.446	
37	M4	4in Dia. Duct	Sec 4 - max	0.050	9	0.039	8	0.105	9	0.388	1	-0.016	8	2.372	9	0.811	6	-0.060	1	-0.132	1	0.005	0.017	0.105		2.372	
308	M31	6in Dia. Duct	Sec 4 - min	-0.007	9	-0.018	9	-0.100	7	-0.002	9	-0.008	1	-2.846	9	-0.028	1	-0.824	8	-0.773	6	0.001	0.000	0.126		2.846	
61	M7	4in Dia. Duct	Sec 1 - max	0.083	9	0.034	8	0.007	8	-0.083	1	0.306	8	2.419	9	0.784	6	-0.044	8	-0.096	8	0.006	0.014	0.108		2.419	
174	M18	4in Dia. Duct	Sec 2 - min	-0.092	7	0.000	1	-0.086	9	0.000	1	-1.171	8	-1.487	8	-1.415	7	0.000	1	-0.002	1	0.009	0.052	0.066		1.487	
47	M5	4in Dia. Duct	Sec 4 - max	0.070	9	0.037	8	0.040	9	0.246	1	0.141	8	2.457	9	0.800	6	-0.085	6	-0.187	8	0.007	0.011	0.109		2.457	
221	M23	6in Dia. Duct	Sec 1 - max	0.119	6	0.285	8	0.000	1	-0.021	1	0.863	8	1.777	6	-0.003	1	-0.002	1	-0.002	1	0.010	0.038	0.079		1.777	
57	M6	4in Dia. Duct	Sec 4 - max	0.070	9	0.035	8	0.013	8	0.038	1	0.259	8	2.433	9	0.788	6	-0.060	6	-0.132	6	0.007	0.012	0.108		2.433	
91	M10	4in Dia. Duct	Sec 1 - max	0.083	7	-0.020	8	0.046	6	0.360	1	-0.322	8	0.810	6	2.276	7	0.014	8	0.031	8	0.008	0.017	0.101		2.275	
45	M5	4in Dia. Duct	Sec 3 - max	0.070	9	0.037	8	0.041	9	0.236	1	0.155	8	2.442	9	0.803	6	-0.085	6	-0.187	6	0.007	0.010	0.109		2.442	
101	M11	4in Dia. Duct	Sec 1 - max	0.066	7	-0.022	8	0.107	7	0.442	1	-0.221	8	0.842	8	2.235	7	0.045	8	0.099	8	0.006	0.020	0.099		2.235	
35	M4	4in Dia. Duct	Sec 3 - max	0.050	9	0.040	8	0.105	9	0.377	1	-0.001	8	2.332	9	0.813	6	-0.060	1	-0.132	1	0.005	0.017	0.104		2.332	
59	M6	4in Dia. Duct	Sec 5 - max	0.070	9	0.034	8	0.013	8	0.040	1	0.246	8	2.419	9	0.784	6	-0.060	6	-0.132	6	0.007	0.011	0.108		2.419	
40	M4	4in Dia. Duct	Sec 5 - min	-0.002	8	0.029	1	0.005	1	0.031	8	-0.399	1	-0.809	6	-2.411	9	-0.095	8	-0.210	8	0.000	0.018	0.107		2.411	
93	M10	4in Dia. Duct	Sec 2 - max	0.083	7	-0.020	8	0.049	8	0.369	1	-0.315	8	0.816	8	2.265	7	0.014	6	0.031	8	0.008	0.016	0.101		2.265	
43	M5	4in Dia. Duct	Sec 2 - max	0.070	9	0.039	6	0.041	9	0.225	1	0.169	8	2.427	9	0.808	6	-0.085	6	-0.187	6	0.007	0.010	0.108		2.427	
95	M10	4in Dia. Duct	Sec 3 - max	0.083	7	-0.021	8	0.049	8	0.358	1	-0.307	8	0.828	8	2.255	7	0.014	8	0.031	8	0.008	0.016	0.100		2.255	
223	M23	6in Dia. Duct	Sec 2 - max	0.119	6	0.285	8	0.000	1	-0.025	1	0.799	8	1.787	6	-0.003	1	-0.002	1	-0.002	1	0.010	0.038	0.079		1.787	
62	M9	4in Dia. Duct	Sec 1 - min	0.002	6	0.027	1	-0.040	7	-0.269	8	-0.009	1	-0.797	6	-2.473	9	-0.113	1	-0.249	1	0.000	0.013	0.110		2.473	
41	M5	4in Dia. Duct	Sec 1 - max	0.070	9	0.039	8	0.041	9	0.214	1	0.183	8	2.411	9	0.809	6	-0.085	6	-0.187	6	0.007	0.010	0.107		2.411	
97	M10	4in Dia. Duct	Sec 4 - max	0.083	7	-0.021	8	0.049	6	0.347	1	-0.298	8	0.834	8	2.245	7	0.014	8	0.031	8	0.008	0.015	0.100		2.245	
103	M11	4in Dia. Duct	Sec 2 - max	0.066	7	-0.022	8	0.107	7	0.430	1	-0.213	8	0.844	8	2.194	7	0.045	8	0.099	8	0.006	0.019	0.098		2.194	
36	M4	4in Dia. Duct	Sec 4 - min	-0.002	6	0.030	1	0.005	1	0.016	8	-0.388	1	-0.811	6	-2.372	9	-0.095	8	-0.210	8	0.000	0.017	0.106		2.372	
33	M4	4in Dia. Duct	Sec 2 - max	0.050	9	0.040	8	0.106	9	0.365	1	0.014	8	2.292	9	0.815	6	-0.060	1	-0.132	1	0.005	0.016	0.102		2.292	
305	M31	6in Dia. Duct	Sec 3 - max	0.057	6	0.019	1	0.000	1	0.036	9	0.032	1	0.027	1	2.613	9	0.009	1	0.008	1	0.005	0.002	0.116		2.613	
68	M9	4in Dia. Duct	Sec 5 - max	0.078	7	-0.020	8	0.042	8	0.319	8	-0.177	1	0.810	8	2.275	7	-0.024	8	-0.054	8	0.008	0.014	0.101		2.275	
194	M20	6in Dia. Duct	Sec 2 - min	0.005	1	0.009	1	0.000	1	-1.666	8	-0.058	1	0.003	1	-1.076	8	-0.367	8	-0.308	8	0.000	0.074	0.048		1.666	
99	M10	4in Dia. Duct	Sec 5 - max	0.084	7	-0.022	8	0.050	8	0.335	1	-0.291	8	0.842	8	2.235	7	0.014	8	0.031	8	0.008	0.016	0.099		2.235	
64	M9	4in Dia. Duct	Sec 2 - min	0.002	6	0.027	1	-0.040	7	-0.280	8	-0.019	1	-0.794	6	-2.459	9	-0.113	1	-0.249	1	0.000	0.013	0.109		2.459	
67	M9	4in Dia. Duct	Sec 4 - max	0.078	7	-0.019	8	0.041	8	0.317	8	-0.188	1	0.798	8	2.253	7	-0.024	8	-0.054	8	0.008	0.014	0.100		2.253	
29	M3	4in Dia. Duct	Sec 5 - max	0.034	9	0.041	8	0.129	9	0.409	1	-0.081	8	2.252	9	0.817	6	-0.037	1	-0.082	1	0.003	0.018	0.100		2.252	
62	M7	4in Dia. Duct	Sec 1 - min	0.004	6	0.025	1	-0.071	9	-0.306	8	0.083	1	-0.784	6	-2.419	9	-0.112	1	-0.247	1	0.000	0.014	0.108		2.419	
50	M5	4in Dia. Duct	Sec 5 - min	0.000	6	0.027	1	0.000	1	-0.127	8	-0.257	1	-0.797	6	-2.473	9	-0.097	1	-0.214	1	0.000	0.011	0.110		2.473	
66	M9	4in Dia. Duct	Sec 3 - min	0.002	6	0.029	1	-0.040	7	-0.273	8	-0.029	1	-0.791	6	-2.446	9	-0.113	1	-0.249	1	0.000	0.012	0.109		2.446	
65	M9	4in Dia. Duct	Sec 2 - max	0.078	7	-0.019	8	0.041	6	0.324	8	-0.198	1	0.786	8	2.231	7	-0.024	8	-0.054	8	0.008	0.014	0.099		2.231	
225	M23	6in Dia. Duct	Sec 3 - max	0.119	6	0.285	6	0.000	1	-0.030	1	0.745	8	1.756	8	-0.003	1	-0.002	1	-0.002	1	0.010	0.038	0.078		1.756	
105	M11	4in Dia. Duct	Sec 3 - max	0.066	7	-0.023	8	0.107	7	0.419	1	-0.205	8	0.846	8	2.154	7	0.045	8	0.099	8	0.006	0.019	0.096		2.154	
102	M11	4in Dia. Duct	Sec 1 - min	-0.017	8	-0.031	1	0.005	8	0.221	8	-0.442	1	-2.235	7	-0.842	8	-0.022	1	-0.048	1	0.002	0.020	0.099		2.235	
30	M4	4in Dia. Duct	Sec 3 - min	-0.002	6	0.031	1	0.005	1	0.001	8	-0.377	1	-0.813	6	-2.332	9	-0.095	8	-0.210	8	0.000	0.017	0.104		2.332	
31	M4	4in Dia. Duct	Sec 1 - max	0.050	9	0.041	8	0.107	9	0.353	1	0.029	8	2.252	9	0.817	6	-0.060	1	-0.132	1	0.005	0.018	0.100		2.252	
53	M7	4in Dia. Duct	Sec 2 - max	0.062	9	0.032	8	0.006	6	-0.049	1	0.259	8	2.317	9	0.774	6	-0.044	8	-0.096	8	0.008	0.012	0.103		2.317	
63	M9	4in Dia. Duct	Sec 2 - max	0.078	7	-0.018	8	0.041	6	0.331	6	-0.208	1	0.774	8	2.209	7	-0.024	8	-0.054	8	0.008	0.015	0.098		2.209	
46	M5	4in Dia. Duct	Sec 4 - min	0.000	6	0.028	1	0.000	1	-0.141	8	-0.246	1	-0.800	6	-2.457	9	-0.097	1	-0.214	1	0.000	0.011	0.109		2.457	
58	M6	4in Dia. Duct	Sec 4 - min	0.003	6	0.026	1	-0.040	7	-0.260	8	-0.038	1	-0.788	6	-2.433	9	-0.113	1	-0.249	1	0.000	0.012	0.108		2.433	
61	M9	4in Dia. Duct	Sec 1 - max	0.078	7	-0.017	8	0.040	6	0.338	6	-0.216	1	0.763	8	2.187	7	-0.024	8	-0.054	8	0.008	0.015	0.097		2.187	
173	M18	4in Dia. Duct	Sec 2 - max	0.015	8	0.042	8	0.079	8	1.171	6	0.000	1	1.415	7	1.487	8	0.128	6	0.282	6	0.001	0.052	0.066		1.487	
92	M10	4in Dia. Duct	Sec 1 - min	-0.013	8	-0.029	1	0.000	1	0.322	8	-0.380	1	-2.275	7	-0.610	8	-0.069	1	-0.152	1	0.001	0.017	0.101		2.275	
46	M5	4in Dia. Duct	Sec 3 - min	0.000	6	0.028	1	0.000	1	-0.155	8	-0.239	1	-0.803	6	-2.442	9	-0.097	1	-0.214	1	0.000	0.010	0.109		2.442	

D-2250

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	x bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_a	f_b/σ_b	f_s/σ_s		f_c (ksi)	
60	M6	4in Dia. Duct	Sec 6 - min	0.003	6	0.025	1	-0.040	7	-0.246	8	-0.048	1	-0.784	6	-2.419	9	-0.113	1	-0.249	1	0.000	0.011	0.108		2.419	
30	M3	4in Dia. Duct	Sec 5 - min	-0.002	8	0.037	1	0.084	6	0.051	6	-0.409	1	-0.617	6	-2.252	9	-0.094	8	-0.208	8	0.000	0.018	0.100		2.252	
104	M11	4in Dia. Duct	Sec 2 - min	-0.018	8	-0.031	1	0.005	6	0.213	8	-0.430	1	-2.184	7	-0.844	8	-0.022	1	-0.048	1	0.002	0.019	0.098		2.184	
107	M11	4in Dia. Duct	Sec 4 - max	0.066	7	-0.023	8	0.108	7	0.407	1	-0.196	8	0.847	8	2.114	7	0.045	8	0.099	8	0.006	0.018	0.094		2.114	
94	M10	4in Dia. Duct	Sec 2 - min	-0.013	8	-0.029	1	0.000	9	0.315	8	-0.369	1	-2.265	7	-0.816	8	-0.089	1	-0.152	1	0.001	0.016	0.101		2.265	
211	M22	6in Dia. Duct	Sec 1 - max	0.153	6	0.223	8	0.010	7	-0.003	1	0.236	6	2.142	6	-0.007	1	-0.005	1	-0.004	1	0.013	0.010	0.095		2.142	
306	M31	6in Dia. Duct	Sec 3 - min	-0.006	9	-0.012	9	-0.096	7	-0.032	1	-0.036	9	-2.613	9	-0.027	1	-0.924	6	-0.773	6	0.000	0.002	0.116		2.613	
34	M4	4in Dia. Duct	Sec 2 - min	-0.001	6	0.031	1	0.005	6	-0.014	8	-0.365	1	-0.615	6	-2.292	9	-0.095	8	-0.210	8	0.000	0.016	0.102		2.292	
227	M23	6in Dia. Duct	Sec 4 - max	0.119	6	0.284	8	0.000	1	-0.034	1	0.691	6	1.745	6	-0.003	1	-0.002	1	-0.002	1	0.010	0.031	0.078		1.745	
44	M5	4in Dia. Duct	Sec 2 - min	0.000	8	0.029	1	0.000	1	-0.169	8	-0.225	1	-0.808	6	-2.427	9	-0.097	1	-0.214	1	0.000	0.010	0.108		2.427	
96	M10	4in Dia. Duct	Sec 3 - min	-0.013	8	-0.030	1	0.000	9	0.307	8	-0.356	1	-2.255	7	-0.826	8	-0.059	1	-0.152	1	0.001	0.016	0.100		2.255	
222	M23	6in Dia. Duct	Sec 1 - min	-0.005	1	-0.023	1	-0.087	8	-0.853	8	0.021	1	0.003	1	-1.777	6	-0.916	8	-0.767	8	0.000	0.036	0.079		1.777	
79	M6	4in Dia. Duct	Sec 5 - max	0.068	7	-0.017	8	0.033	6	0.298	8	-0.094	1	0.763	8	2.187	7	-0.044	6	-0.096	6	0.007	0.013	0.097		2.187	
42	M5	4in Dia. Duct	Sec 1 - min	0.000	6	0.029	1	0.000	1	-0.183	8	-0.214	1	-0.809	6	-2.411	9	-0.097	1	-0.214	1	0.000	0.010	0.107		2.411	
98	M10	4in Dia. Duct	Sec 4 - min	-0.014	8	-0.030	1	0.000	9	0.299	8	-0.347	1	-2.246	7	-0.834	8	-0.089	1	-0.152	1	0.001	0.016	0.100		2.246	
213	M22	6in Dia. Duct	Sec 2 - max	0.153	6	0.223	8	0.010	7	-0.007	1	0.194	8	2.139	6	-0.007	1	-0.005	1	-0.004	1	0.013	0.009	0.095		2.139	
106	M11	4in Dia. Duct	Sec 3 - min	-0.018	8	-0.032	1	0.004	8	0.205	8	-0.419	1	-2.154	7	-0.846	8	-0.022	1	-0.048	1	0.002	0.019	0.098		2.154	
109	M11	4in Dia. Duct	Sec 5 - max	0.066	7	-0.024	8	0.108	7	0.394	1	-0.187	8	0.849	8	2.073	7	0.045	8	0.099	8	0.006	0.018	0.092		2.073	
32	M4	4in Dia. Duct	Sec 1 - min	-0.001	6	0.032	1	0.005	6	-0.029	8	-0.353	1	-0.617	6	-2.252	9	-0.095	8	-0.210	8	0.000	0.016	0.100		2.252	
100	M10	4in Dia. Duct	Sec 6 - min	-0.014	8	-0.031	1	-0.001	9	0.291	8	-0.335	1	-2.235	7	-0.842	8	-0.089	1	-0.152	1	0.001	0.015	0.099		2.235	
80	M9	4in Dia. Duct	Sec 5 - min	-0.006	8	-0.029	1	-0.099	9	0.177	1	-0.310	8	-2.275	7	-0.810	8	-0.103	1	-0.227	1	0.001	0.014	0.101		2.275	
231	M24	6in Dia. Duct	Sec 1 - max	0.067	6	0.338	6	0.000	1	-0.039	1	1.197	6	1.275	6	0.000	1	0.004	1	0.004	1	0.005	0.053	0.057		1.275	
229	M23	6in Dia. Duct	Sec 5 - max	0.119	6	0.284	6	0.000	1	-0.039	1	0.838	8	1.735	6	-0.003	1	-0.002	1	-0.002	1	0.010	0.028	0.077		1.735	
111	M12	4in Dia. Duct	Sec 1 - max	0.060	9	-0.024	8	0.138	7	0.406	1	-0.129	6	0.849	8	2.073	7	0.055	8	0.120	8	0.006	0.018	0.092		2.073	
64	M7	4in Dia. Duct	Sec 2 - min	0.004	1	0.023	1	-0.072	9	-0.259	8	0.049	1	-0.774	6	-2.317	9	-0.112	1	-0.247	1	0.000	0.012	0.103		2.317	
89	M9	4in Dia. Duct	Sec 4 - min	-0.006	8	-0.028	1	-0.089	9	0.188	1	-0.317	8	-2.253	7	-0.798	8	-0.103	1	-0.227	1	0.001	0.014	0.100		2.253	
303	M31	6in Dia. Duct	Sec 2 - max	0.056	6	0.024	1	0.000	1	0.060	9	0.066	1	0.025	1	2.386	9	0.009	1	0.008	1	0.005	0.004	0.106		2.386	
224	M23	6in Dia. Duct	Sec 2 - min	-0.005	1	-0.024	1	-0.067	8	-0.799	8	0.025	1	0.003	1	-1.767	6	-0.916	8	-0.767	8	0.000	0.038	0.079		1.767	
215	M22	6in Dia. Duct	Sec 3 - max	0.153	6	0.222	8	0.010	7	0.004	7	0.152	8	2.136	6	-0.007	1	-0.005	1	-0.004	1	0.013	0.007	0.095		2.136	
88	M9	4in Dia. Duct	Sec 3 - min	-0.006	8	-0.029	1	-0.089	9	0.198	1	-0.324	8	-2.231	7	-0.788	8	-0.103	1	-0.227	1	0.001	0.014	0.099		2.231	
65	M7	4in Dia. Duct	Sec 3 - max	0.062	9	0.030	8	0.009	6	-0.017	1	0.215	6	2.213	9	0.761	6	-0.044	8	-0.096	6	0.006	0.010	0.088		2.213	
108	M11	4in Dia. Duct	Sec 4 - min	-0.018	8	-0.032	1	0.004	8	0.195	8	-0.407	1	-2.114	7	-0.847	8	-0.022	1	-0.048	1	0.002	0.019	0.094		2.114	
187	M20	6in Dia. Duct	Sec 4 - max	0.172	8	0.172	6	0.064	8	0.914	9	-0.075	1	1.625	8	-0.005	1	-0.003	1	-0.002	1	0.014	0.027	0.072		1.625	
84	M9	4in Dia. Duct	Sec 2 - min	-0.006	8	-0.027	1	-0.088	9	0.208	1	-0.331	8	-2.209	7	-0.774	8	-0.103	1	-0.227	1	0.000	0.015	0.098		2.209	
82	M9	4in Dia. Duct	Sec 1 - min	-0.005	8	-0.026	1	-0.088	9	0.218	1	-0.338	8	-2.187	7	-0.763	8	-0.103	1	-0.227	1	0.000	0.015	0.097		2.187	
217	M22	6in Dia. Duct	Sec 4 - max	0.153	6	0.222	8	0.010	7	0.030	7	0.110	8	2.134	6	-0.006	1	-0.005	1	-0.004	1	0.013	0.005	0.095		2.134	
112	M12	4in Dia. Duct	Sec 1 - min	-0.018	6	-0.033	1	-0.005	8	0.129	9	-0.409	1	-2.073	7	-0.849	8	0.002	1	0.005	1	0.002	0.018	0.092		2.073	
233	M24	6in Dia. Duct	Sec 2 - max	0.067	6	0.336	6	0.000	1	-0.044	1	1.134	8	1.269	6	0.000	1	0.004	1	0.004	1	0.006	0.050	0.056		1.269	
8	M1	4in Dia. Duct	Sec 4 - min	-0.004	8	-0.572	8	-0.034	6	-0.781	1	-0.166	8	-1.723	8	0.005	1	-0.114	8	-0.231	8	0.000	0.036	0.077		1.723	
7	M1	4in Dia. Duct	Sec 4 - max	0.003	7	-0.113	1	0.167	9	0.166	8	0.781	1	-0.005	1	1.723	9	-0.037	1	-0.061	1	0.000	0.036	0.077		1.723	
228	M23	6in Dia. Duct	Sec 3 - min	-0.005	1	-0.024	1	-0.067	8	-0.745	8	0.030	1	0.003	1	-1.756	6	-0.916	8	-0.767	8	0.000	0.033	0.076		1.756	
110	M11	4in Dia. Duct	Sec 5 - min	-0.018	8	-0.033	1	0.004	8	0.187	8	-0.394	1	-2.073	7	-0.849	8	-0.022	1	-0.048	1	0.002	0.018	0.092		2.073	
80	M8	4in Dia. Duct	Sec 5 - min	-0.001	8	-0.028	1	-0.097	9	0.094	1	-0.298	8	-2.187	7	-0.763	8	-0.112	1	-0.247	1	0.000	0.013	0.097		2.187	
299	M27	6in Dia. Duct	Sec 5 - max	0.054	6	-0.010	9	0.000	1	0.070	9	0.153	1	0.024	1	2.231	8	0.009	1	0.008	1	0.004	0.007	0.099		2.231	
301	M31	6in Dia. Duct	Sec 1 - max	0.054	6	0.030	1	0.000	1	0.070	9	0.153	1	0.024	1	2.231	8	0.009	1	0.008	1	0.004	0.007	0.099		2.231	
219	M22	6in Dia. Duct	Sec 6 - max	0.153	6	0.222	8	0.010	7	0.055	7	0.066	8	2.131	6	-0.006	1	-0.005	1	-0.004	1	0.013	0.003	0.095		2.131	
304	M31	6in Dia. Duct	Sec 2 - min	-0.004	9	-0.007	9	-0.095	7	-0.088	1	-0.050	9	-2.386	9	-0.025	1	-0.924	6	-0.773	6	0.000	0.004	0.106		2.386	
232	M24	6in Dia. Duct	Sec 1 - min	-0.002	1	-0.027	1	-0.085	6	-1.197	8	0.039	1	0.000	1	-1.275	6	-0.946	8	-0.792	8	0.000	0.053	0.057		1.275	
13	M2	4in Dia. Duct	Sec 2 - max	0.017	9	0.108	6	0.163	9	-0.879	1	1.396	8	0.028	1	1.043	8	-0.037	1	-0.062	1	0.002	0.062	0.046		1.396	
14	M2	4in Dia. Duct	Sec 2 - min	0.004	1	0.100	1	-0.030	6	-1.396	8	0.079	1	-1.043	8	-0.028	1	-0.064	8	-0.206	8	0.000	0.062	0.046		1.396	
228	M23	6in Dia. Duct	Sec 4 - min	-0.005	1	-0.024	1	-0.067	8	-0.691	8	0.034	1	0.003	1	-1.745	6	-0.916	8	-0.767	8	0.000	0.031	0.076		1.745	
235	M24	6in Dia. Duct	Sec 3 - max	0.067	6	0.337	6	0.000	1	-0.049	1	1.070	9	1.243	6	0.000	1	0.004	1	0.004	1	0.005	0.048	0.055		1.243	
66	M7	4in Dia. Duct	Sec 3 - min	0.004	1	0.021	1	-0.073	9	-0.215	6	0.017	1	-0.761	6	-2.213	9	-0.112	1	-0.247	1	0.000	0.010	0.088		2.213	
67	M7	4in Dia. Duct	Sec 4 - max	0.061	9	0.028	8	0.010	6	0.011	1	0.174	6	2.108	9	0.748	6	-0.044	8	-0.098	8	0.006	0.008	0.094		2.108	
234	M24	6in Dia. Duct	Sec 2 - min	-0.002	1	-0.027	1	-0.085	6	-1.134	8	0.044	1	0.000	1	-1.269	6	-0.946	8	-0.792	8	0.000	0.050	0.056		1.269	
212	M22	6in Dia. Duct	Sec 1 - min	-0.007	1	-0.019	1	-0.036	8	-0.236	8	0.003	1	0.007	1	-2.142	6	-0.778	8	-0.651	8	0.001	0.010	0.095		2.142	
270	M27	6in Dia. Duct	Sec 5 - min	-0.003	9	-0.034	1	-0.092	7	-0.153	1	-0.070	9	-2.231	6	-0.024	1	-0.924	6	-0.773	6	0.000	0.007	0.099		2.231	
302	M31	6in Dia. Duct	Sec 1 - min	-0.003	9	-0.002	9	-0.092	7	-0.153	1	-0.070	9	-2.231	6	-0.024	1	-0.924	6	-0.773	6	0.000	0.007	0.099		2.231	
195	M20	6in Dia. Duct	Sec 3 - max	0.176	6	0.175	6	0.058	6	0.088	1	0.694	6	1.367	8	-0.004	1	-0.003	1	-0.002	1	0.015	0.031	0.061		1.367	
237	M24	6in Dia. Duct	Sec 4 - max	0.067	6	0.337	6	0.000	1	-0.064	1	1.037	9	1.227	6	0.000	1	0.004	1	0.004	1	0.005	0.046	0.055		1.227	
230	M23	6in Dia. Duct	Sec 6 - min	-0.005	1	-0.025	1	-0.068	8	-0.638	8	0.039	1	0.003	1	-1.735	6	-0.916	8	-0.767	8	0.000	0.028	0.077		1.735	
214	M22	6in Dia. Duct	Sec 2 - min	-0.007	1	-0.018	1	-0.035	8	-0.194	8	0.007	1	0.007	1	-2.139	6	-0.778	8	-0.651	8	0.001	0.009	0.095		2.139	
117	M12	4in Dia. Duct	Sec 4 - max	0.059	9	-0.058	8	0.155	7	-0.768	1	0.835	6	1.383	7	-0.012	1	0.055	8	0.120	8	0.006	0.037	0.061		1.383	
238	M24	6in Dia. Duct	Sec 5 - max	0.067	6	0.337	6	0.000	1	-0.059	1	0.998	9	1.211	6	0.000	1	0.004	1	0.004	1	0.005	0.044	0.054		1.211	
236	M24	6in Dia. Duct	Sec 3 - min	-0.002	1	-0.027	1	-0.084	6	-1.076	8	0.049	1	0.000	1	-1.243	6	-0.946	8	-0.792	8	0.000	0.048	0.055		1.243	
216	M22	6in Dia. Duct	Sec 3 - min	-0.007	1	-0.020	1	-0.036	8	-0.182	8	-0.004	7	0.007	1	-2.136	8	-0.778	8	-0.651	8	0.001	0.007	0.095		2.136	
68	M7	4in Dia. Duct	Sec 4 - min	0.004	1	0.019	1	-0.074	9	-0.174	8	-0.011	1	-0.748	6	-2.108	9	-0.112	1	-0.247	1	0.000	0.008	0.094		2.108	
118	M12	4in Dia. Duct	Sec 4 - min	-0.027	8	-0.067	1	-0.022	8	-0.835	6	0.708	1	0.012	1	-1.383	7	0.002	1	0.005	1	0.003	0.037	0.061		1.383	
241	M25	6in Dia. Duct	Sec 1 - max	0.037	6	0.352	6	0.000	1	-0.058	1	1.218	9	0.986	6	-0.002	1	0.009	1	0.008	1	0.003	0.054	0.044		1.218	
69	M7	4in Dia. Duct	Sec 5 - max	0.081	9	0.026	8	0.011	6	0.037	1	0.136	8	2.002	9	0.732	6	-0.044	8	-0.096	6	0.006	0.008	0.089		2.002	
238	M24	6in Dia. Duct	Sec 4 - min	-0.002	1	-0.026	1	-0.084	6	-1.037	8	0.054	1	0.000	1	-1.227	6	-0.946	8	-0.792	8	0.000	0.046	0.055		1.227	
218	M22	6in Dia. Duct	Sec 4 - min	-0.007	1	-0.020	1	-0.036	8	-0.110	8	-0.030	7	0.008	1	-2.134	6	-0.778	8	-0.651	8	0.001	0.005	0.095		2.134	
196	M20	6in Dia. Duct	Sec 4 - min	-0.004	1	-0.006	1	0.000	1	0.075	1	-0.814	9	0.005	1	-1.625	6	-0.387	8	-0.309	8	0.000	0.027	0.072		1.625	
287	M27	6in Dia. Duct	Sec 4 - max	0.052	6	-0.002	9	0.000	1	0.093	9	0.043	1	0.022	1	2.026	8	0.009	1	0.008	1	0.004	0.004	0.090		2.026	
220	M22	6in Dia. Duct	Sec 6 - min	-0.008	1	-0.020	1	-0.036	8	-0.088	8	-0.055	7	0.008	1	-2.131	8	-0.778	8	-0.651	8	0.001	0.003	0.095		2.131	

D-2250

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_a	f_{sy}/σ_s	f_{sz}/σ_s	[redacted]	f_t (ksi)	[redacted]
240	M24	6in Dia. Duct	Sec 5 - min	-0.002	1	-0.028	1	-0.054	8	-0.999	9	0.059	1	0.000	1	-1.211	6	-0.946	8	-0.792	8	0.000	0.044	0.054	[redacted]	1.211	[redacted]
27	M3	4in Dia. Duct	Sec 4 - max	0.033	9	0.045	8	0.131	9	0.302	1	0.056	8	1.838	9	0.828	6	-0.037	1	-0.082	1	0.003	0.013	0.082	[redacted]	1.838	[redacted]
242	M25	6in Dia. Duct	Sec 1 - min	0.000	1	-0.029	1	-0.095	6	-1.218	9	0.058	1	0.002	1	-0.988	6	-0.924	8	-0.773	8	0.000	0.054	0.044	[redacted]	1.218	[redacted]
70	M7	4in Dia. Duct	Sec 5 - min	0.004	1	0.017	1	-0.075	9	-0.138	8	-0.037	1	-0.732	6	-2.002	9	-0.112	1	-0.247	1	0.000	0.008	0.089	[redacted]	2.002	[redacted]
28	M3	4in Dia. Duct	Sec 4 - min	0.000	6	0.036	1	0.002	6	-0.056	8	-0.302	1	-0.828	6	-1.038	9	-0.094	8	-0.206	8	0.000	0.019	0.082	[redacted]	1.838	[redacted]
243	M25	6in Dia. Duct	Sec 2 - max	0.037	8	0.351	6	0.000	1	-0.072	1	1.116	9	0.942	6	-0.002	1	0.009	1	0.008	1	0.003	0.050	0.042	[redacted]	1.116	[redacted]
268	M27	6in Dia. Duct	Sec 4 - min	0.000	9	-0.029	1	-0.088	7	-0.043	1	-0.093	9	+2.026	6	-0.022	1	-0.924	8	+0.773	8	0.000	0.004	0.090	[redacted]	2.026	[redacted]
198	M20	6in Dia. Duct	Sec 3 - min	0.000	1	0.002	1	0.000	1	-0.694	8	+0.088	1	0.004	1	-1.367	8	-0.367	8	-0.308	8	0.000	0.031	0.061	[redacted]	1.367	[redacted]
244	M25	6in Dia. Duct	Sec 2 - min	0.000	1	-0.030	1	-0.095	6	+1.115	9	0.072	1	0.002	1	+0.942	6	-0.924	6	-0.773	6	0.000	0.050	0.042	[redacted]	1.115	[redacted]
15	M2	4in Dia. Duct	Sec 3 - max	0.018	9	0.105	8	0.161	9	-0.612	1	1.104	8	0.049	1	0.879	8	-0.037	1	-0.082	1	0.002	0.049	0.039	[redacted]	1.104	[redacted]
77	M8	4in Dia. Duct	Sec 4 - max	0.065	7	-0.007	8	0.027	6	0.390	8	-0.292	1	0.537	8	1.477	7	-0.044	8	-0.096	8	0.008	0.017	0.066	[redacted]	1.477	[redacted]
16	M2	4in Dia. Duct	Sec 3 - min	0.004	1	0.096	1	-0.026	6	-1.104	8	0.612	1	-0.879	8	-0.049	1	-0.094	8	-0.206	8	0.000	0.049	0.039	[redacted]	1.104	[redacted]
245	M25	6in Dia. Duct	Sec 3 - max	0.037	6	0.350	6	0.000	1	-0.087	1	1.012	9	0.911	7	-0.002	1	0.009	1	0.008	1	0.003	0.045	0.040	[redacted]	1.012	[redacted]
265	M27	6in Dia. Duct	Sec 3 - max	0.051	6	0.008	8	0.000	1	0.087	9	-0.037	1	0.020	1	1.806	8	0.009	1	0.008	1	0.004	0.004	0.080	[redacted]	1.806	[redacted]
246	M25	6in Dia. Duct	Sec 3 - min	0.000	1	-0.031	1	-0.094	6	-1.012	9	0.087	1	0.002	1	-0.911	7	-0.924	6	-0.773	6	0.000	0.045	0.040	[redacted]	1.012	[redacted]
266	M27	6in Dia. Duct	Sec 3 - min	0.000	1	-0.018	1	-0.084	7	0.037	1	-0.087	9	-1.806	6	-0.020	1	-0.924	6	-0.773	6	0.000	0.004	0.080	[redacted]	1.806	[redacted]
78	M8	4in Dia. Duct	Sec 4 - min	0.002	8	-0.016	1	-0.092	9	0.252	1	-0.390	6	+1.477	7	-0.537	8	-0.112	1	-0.247	1	0.000	0.017	0.066	[redacted]	1.477	[redacted]
247	M25	6in Dia. Duct	Sec 4 - max	0.038	6	0.349	6	0.009	1	-0.102	1	0.909	9	0.883	7	-0.003	1	0.009	1	0.008	1	0.003	0.040	0.039	[redacted]	0.909	[redacted]
248	M25	6in Dia. Duct	Sec 4 - min	0.000	1	-0.032	1	-0.094	6	-0.909	9	0.102	1	0.003	1	-0.883	7	-0.924	6	+0.773	6	0.000	0.040	0.039	[redacted]	0.909	[redacted]
269	M27	6in Dia. Duct	Sec 2 - max	0.049	6	0.014	9	0.000	1	0.086	1	-0.052	9	0.018	1	1.571	8	0.009	1	0.008	1	0.004	0.004	0.070	[redacted]	1.571	[redacted]
249	M25	6in Dia. Duct	Sec 5 - max	0.038	6	0.348	6	0.000	1	-0.117	1	0.807	9	0.854	7	-0.003	1	0.009	1	0.008	1	0.003	0.036	0.038	[redacted]	0.854	[redacted]
251	M26	6in Dia. Duct	Sec 1 - max	0.038	6	0.058	9	0.000	1	-0.117	1	0.807	9	0.854	7	-0.003	1	0.009	1	0.008	1	0.003	0.038	0.038	[redacted]	0.854	[redacted]
290	M29	6in Dia. Duct	Sec 5 - min	-0.034	7	+0.027	1	0.000	1	-1.381	7	-1.229	8	+0.104	9	-0.277	6	0.000	1	0.000	1	0.003	0.061	0.012	[redacted]	1.381	[redacted]
289	M29	6in Dia. Duct	Sec 5 - max	0.029	8	0.029	8	0.024	8	1.229	8	1.381	7	0.277	6	0.104	9	0.107	8	0.090	8	0.002	0.061	0.012	[redacted]	1.381	[redacted]
25	M3	4in Dia. Duct	Sec 3 - max	0.032	9	0.050	8	0.133	9	0.179	1	0.207	8	1.418	9	0.829	6	-0.037	1	-0.082	1	0.003	0.009	0.083	[redacted]	1.418	[redacted]
250	M25	6in Dia. Duct	Sec 5 - min	0.000	1	-0.033	1	-0.093	6	-0.807	9	0.117	1	0.003	1	-0.854	7	-0.924	6	-0.773	6	0.000	0.036	0.038	[redacted]	0.854	[redacted]
252	M26	6in Dia. Duct	Sec 1 - min	0.000	1	0.033	1	-0.093	6	+0.807	9	0.117	1	0.003	1	-0.854	7	-0.924	6	+0.773	6	0.000	0.036	0.038	[redacted]	0.854	[redacted]
284	M27	6in Dia. Duct	Sec 2 - min	0.000	1	-0.010	1	-0.061	7	0.052	9	-0.089	1	-1.571	6	-0.016	1	-0.924	6	-0.773	6	0.000	0.004	0.070	[redacted]	1.571	[redacted]
288	M29	6in Dia. Duct	Sec 4 - min	-0.033	7	-0.024	1	0.000	1	-1.349	7	-1.192	8	-0.106	9	-0.244	6	0.000	1	0.000	1	0.003	0.060	0.011	[redacted]	1.349	[redacted]
287	M29	6in Dia. Duct	Sec 4 - max	0.029	8	0.029	8	0.026	8	1.192	8	1.349	7	0.244	6	0.106	9	0.107	8	0.090	8	0.002	0.060	0.011	[redacted]	1.349	[redacted]
26	M3	4in Dia. Duct	Sec 3 - min	0.000	6	0.041	1	0.000	6	-0.207	8	-0.179	1	-0.829	6	-1.418	6	-0.094	8	-0.206	8	0.000	0.009	0.083	[redacted]	1.418	[redacted]
17	M2	4in Dia. Duct	Sec 4 - max	0.019	9	0.101	8	0.159	9	+0.356	1	0.823	8	0.122	9	0.743	6	-0.037	1	-0.082	1	0.002	0.037	0.033	[redacted]	0.823	[redacted]
286	M29	6in Dia. Duct	Sec 3 - min	-0.031	7	-0.023	7	0.000	9	-1.318	7	-1.152	8	-0.107	9	+0.209	6	0.000	1	0.000	1	0.003	0.059	0.009	[redacted]	1.318	[redacted]
285	M29	6in Dia. Duct	Sec 3 - max	0.029	8	0.032	8	0.027	8	1.152	8	1.318	7	0.209	6	0.107	9	0.107	8	0.090	8	0.002	0.059	0.009	[redacted]	1.318	[redacted]
18	M2	4in Dia. Duct	Sec 4 - min	0.004	1	0.092	1	-0.026	8	-0.823	8	0.356	1	-0.743	6	-0.122	9	-0.094	8	-0.206	8	0.000	0.037	0.033	[redacted]	0.823	[redacted]
261	M27	6in Dia. Duct	Sec 1 - max	0.047	6	0.021	9	0.000	1	0.112	1	0.012	9	0.016	1	1.322	8	0.009	1	0.008	1	0.004	0.005	0.058	[redacted]	1.322	[redacted]
283	M29	6in Dia. Duct	Sec 2 - max	0.030	8	0.035	8	0.029	6	1.106	8	1.289	7	0.172	6	0.106	9	0.107	8	0.090	8	0.002	0.057	0.008	[redacted]	1.289	[redacted]
264	M29	6in Dia. Duct	Sec 2 - min	-0.030	7	-0.021	7	-0.002	9	-1.289	7	-1.106	8	-0.106	9	-0.172	6	0.000	1	0.000	1	0.002	0.057	0.008	[redacted]	1.289	[redacted]
71	M8	4in Dia. Duct	Sec 1 - max	0.061	8	0.026	6	0.011	6	0.237	1	-0.171	8	1.111	9	0.600	6	-0.044	8	-0.096	8	0.006	0.011	0.049	[redacted]	1.111	[redacted]
115	M12	4in Dia. Duct	Sec 3 - max	0.059	8	-0.049	8	0.150	7	-0.288	1	0.426	6	0.926	8	0.084	8	0.055	8	0.120	8	0.005	0.019	0.041	[redacted]	0.926	[redacted]
279	M28	6in Dia. Duct	Sec 5 - max	0.030	8	0.037	8	0.030	6	1.059	8	1.262	7	0.134	6	0.103	9	0.107	8	0.090	8	0.002	0.056	0.006	[redacted]	1.262	[redacted]
281	M29	6in Dia. Duct	Sec 1 - max	0.030	8	0.036	8	0.030	6	1.059	8	1.262	7	0.134	6	0.103	9	0.107	8	0.090	8	0.002	0.056	0.006	[redacted]	1.262	[redacted]
280	M28	6in Dia. Duct	Sec 6 - min	-0.029	7	-0.021	7	-0.003	9	-1.262	7	-1.059	8	-0.103	9	-0.134	6	0.000	1	0.000	1	0.002	0.056	0.006	[redacted]	1.262	[redacted]
282	M29	6in Dia. Duct	Sec 1 - min	-0.028	7	-0.020	7	-0.003	9	-1.262	7	-1.059	8	-0.103	9	-0.134	6	0.000	1	0.000	1	0.002	0.056	0.006	[redacted]	1.262	[redacted]
262	M27	6in Dia. Duct	Sec 1 - min	0.000	1	-0.002	1	-0.077	7	-0.012	9	-0.112	1	+1.322	6	-0.016	1	-0.924	6	+0.773	6	0.000	0.005	0.059	[redacted]	1.322	[redacted]
20	M3	4in Dia. Duct	Sec 2 - max	0.031	9	0.054	8	0.139	9	0.042	1	0.372	8	0.990	9	0.824	6	-0.037	1	-0.082	1	0.003	0.017	0.044	[redacted]	0.990	[redacted]
21	M3	4in Dia. Duct	Sec 1 - max	0.029	9	0.059	8	0.138	9	-0.109	1	0.552	8	0.555	9	0.811	6	-0.037	1	-0.082	1	0.003	0.025	0.036	[redacted]	0.811	[redacted]
19	M2	4in Dia. Duct	Sec 5 - max	0.020	9	0.097	8	0.157	9	-0.109	1	0.552	8	0.555	9	0.811	6	-0.037	1	-0.082	1	0.002	0.025	0.036	[redacted]	0.811	[redacted]
116	M12	4in Dia. Duct	Sec 3 - min	-0.024	6	-0.055	1	-0.017	8	-0.425	6	0.288	1	-0.904	9	+0.926	6	0.002	1	0.005	1	0.002	0.019	0.041	[redacted]	0.926	[redacted]
142	M16	6in Dia. Duct	Sec 1 - min	-0.004	9	-0.014	7	-0.023	9	-0.772	7	-0.119	1	-0.611	6	-0.277	9	0.000	1	0.000	1	0.000	0.034	0.027	[redacted]	0.772	[redacted]
277	M28	6in Dia. Duct	Sec 4 - max	0.030	8	0.040	8	0.032	8	1.008	8	1.236	7	0.093	6	0.096	9	0.107	8	0.090	8	0.002	0.055	0.004	[redacted]	1.236	[redacted]
141	M16	6in Dia. Duct	Sec 1 - max	0.000	6	0.108	6	0.051	6	0.119	1	0.772	7	0.277	9	0.611	6	0.110	8	0.092	8	0.000	0.034	0.027	[redacted]	0.772	[redacted]
276	M28	6in Dia. Duct	Sec 4 - min	-0.027	7	-0.020	7	-0.004	9	-1.235	7	-1.008	8	-0.096	9	-0.093	6	0.000	1	0.000	1	0.002	0.055	0.004	[redacted]	1.235	[redacted]
30	M2	4in Dia. Duct	Sec 5 - min	0.004	1	0.088	1	-0.024	8	-0.552	8	0.109	1	-0.811	6	+0.555	9	-0.094	8	+0.206	8	0.000	0.025	0.036	[redacted]	0.811	[redacted]
22	M3	4in Dia. Duct	Sec 1 - min	0.003	6	0.050	1	-0.005	6	-0.552	8	0.109	1	+0.811	6	-0.555	9	-0.094	8	+0.206	8	0.000	0.025	0.036	[redacted]	0.811	[redacted]
24	M3	4in Dia. Duct	Sec 2 - min	0.002	6	0.045	1	-0.003	6	-0.372	8	-0.042	1	-0.824	6	-0.990	9	-0.094	8	-0.206	8	0.000	0.017	0.044	[redacted]	0.990	[redacted]
275	M28	6in Dia. Duct	Sec 3 - max	0.031	8	0.043	8	0.033	8	0.954	8	1.209	7	0.051	6	0.092	9	0.107	8	0.090	8	0.003	0.054	0.004	[redacted]	1.209	[redacted]
72	M8	4in Dia. Duct	Sec 1 - min	0.004	1	0.017	1	-0.075	9	0.171	6	-0.237	1	-0.600	6	+1.111	9	-0.112	1	-0.247	1	0.000	0.011	0.049	[redacted]	1.111	[redacted]
276	M28	6in Dia. Duct	Sec 3 - min	-0.026	7	-0.019	7	-0.008	9	-1.209	7	-0.954	8	-0.092	9	-0.051	6	0.000	1	0.000	1	0.002	0.054	0.004	[redacted]	1.209	[redacted]
76	M8	4in Dia. Duct	Sec 3 - max	0.082	7	0.004	8	0.027	8	0.400	8	-0.329	1	0.351	8	0.808	7	-0.044	8	-0.096	8	0.008	0.018	0.035	[redacted]	0.808	[redacted]
273	M28	6in Dia. Duct	Sec 2 - max	0.031	8	0.046	8	0.034	8	0.895	8	1.186	7	0.007	7	0.084	8	0.107	8	0.090	8	0.003	0.053	0.004	[redacted]	1.186	[redacted]
274	M28	6in Dia. Duct	Sec 2 - min	-0.024	7	-0.018	7	-0.007	9	-1.186	7	-0.895	8	-0.084	8	-0.007	7	0.000	1	0.000	1	0.002	0.053	0.004	[redacted]	1.186	[redacted]
271	M28	6in Dia. Duct	Sec 1 - max	0.031	8	0.049	8	0.036	8	0.832	8	1.162	7	0.000	1	0.075	8	0.107	8	0.090	8	0.003	0.052	0.003	[redacted]	1.162	[redacted]
144	M15	6in Dia. Duct	Sec 2 - min	-0.006	9	-0.021	7	-0.020	9	-0.832	7	-0.155	1	-0.444	8	-0.204	9	0.000	1	0.000	1	0.000	0.037	0.020	[redacted]	0.832	[redacted]
272	M28	6in Dia. Duct	Sec 1 - min	-0.023	7	-0.017	7	-0.009	9	-1.162	7	-0.832	8	-0.075	8	0.000	1	0.000	1	0.000	1	0.002	0.052	0.003	[redacted]	1.162	[redacted]
143	M16	6in Dia. Duct	Sec 2 - max	0.001	6	0.101	8	0.047	6	0.155	1	0.832	7	0.204	9	0.444	6	0.110	8	0.092	8	0.000	0.037	0.020	[redacted]	0.832	[redacted]
253	M26	6in Dia. Duct	Sec 2 - max	0.040	6	0.048	9	0.000	1	-0.002	1	0.596	9	0.606	7	-0.005	1	0.009	1	0.008	1	0.003	0.026	0.027	[redacted]	0.606	[redacted]
150	M15	6in Dia. Duct	Sec 5 - min	-0.012	9	-0.043	7	-0.009	9	-1.162	7	-0.832	8	-0.020	7	-0.065	8	0.000	1	0.000	1	0.001	0.052	0.003	[redacted]	1.162	[redacted]
149	M15	6in Dia. Duct	Sec 5 - max	0.007	6	0.079	8	0.039	8	0.832	8	1.162	7	0.065	8	0.028	7	0.110	8	0.092	8	0.001	0.052	0.003	[redacted]	1.162	[redacted]
148	M16	6in Dia. Duct	Sec 3 - min	-0.008	9	-0.028	7	-0.016	9	-0.917	7	-0.242	8	-0.280	6	-0.143	9	0.000	1	0.000	1	0.001	0.041	0.013	[redacted]	0.917	[redacted]
76	M8	4in Dia. Duct	Sec 3 - min	0.004	1	-0.005	1	-0.086	9	0.329	1	-0.400	6	-0.606	7	-0.351	8	-0.112	1	-0.247	1	0.000	0.018	0.036	[redacted]	0.606	[redacted]
145	M15	6in Dia. Duct	Sec 3 - max	0.003	6	0.094	8	0.043	8	0.242	8	0.917	7	0.143	9	0.290	6	0.110	8	0.092	8	0.000	0.041	0.013	[redacted]	0.917	[redacted]
254	M26	6in Dia. Duct	Sec 2 - min	0.000	1	0.024	1	-0.089	6	-0.596	9	0.002	1	0.605	1	-0.606	7	-0.924	6	-0.773	6	0.000	0.026	0.027	[redacted]	0.606	[redacted]
146	M15	6in Dia. Duct	Sec 4 - min	-0.010	9	-0.036	7	-0.012	9	-1.027	7	-0.550	8	-0.151	7	-0.097	8	0.000	1	0.000	1	0.001	0.046	0.007	[redacted]	1.027	[redacted]
147	M15	6in Dia. Duct	Sec 4 - max	0.005	6	0.085	8	0.039	8	0.550	8	1.027	7	0.097	8	0.151	7	0.110	8	0.092	8	0.000	0.046	0.007	[redacted]	1.027	[redacted]

D-2250

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_a	f_{sy}/σ_a	f_{sz}/σ_a		f_c (ksi)	
113	M12	4in Dia. Duct	Sec 2 - max	0.053	9	-0.035	8	0.144	7	0.103	1	0.103	8	0.784	8	0.965	7	0.055	8	0.120	8	0.005	0.005	0.043		0.965	
114	M12	4in Dia. Duct	Sec 2 - min	-0.021	6	-0.044	1	-0.011	8	-0.103	8	-0.103	1	-0.965	7	-0.784	8	0.002	1	0.005	1	0.002	0.005	0.043		0.785	
259	M26	6in Dia. Duct	Sec 5 - max	0.047	8	0.021	9	0.000	1	0.129	1	0.176	9	0.012	1	0.785	8	0.009	1	0.009	1	0.004	0.008	0.035		0.523	
73	M8	4in Dia. Duct	Sec 2 - max	0.059	7	0.015	8	0.017	6	0.328	6	-0.320	9	0.523	9	0.495	6	-0.044	8	-0.096	8	0.006	0.015	0.023		0.785	
260	M26	6in Dia. Duct	Sec 5 - min	0.000	1	-0.002	1	-0.077	7	-0.176	9	-0.129	1	-0.785	8	-0.012	1	-0.924	6	-0.773	6	0.000	0.008	0.035		0.523	
74	M8	4in Dia. Duct	Sec 2 - min	0.004	1	0.006	1	-0.061	9	0.320	6	-0.328	6	-0.495	6	-0.523	6	-0.112	1	-0.247	1	0.000	0.015	0.023		0.493	
257	M26	6in Dia. Duct	Sec 4 - max	0.044	8	0.030	9	0.000	1	0.121	1	0.281	9	0.055	7	0.493	8	0.009	1	0.008	1	0.004	0.012	0.022		0.421	
255	M26	6in Dia. Duct	Sec 3 - max	0.042	8	0.036	9	0.000	1	0.077	1	0.421	9	0.339	7	0.192	8	0.009	1	0.006	1	0.003	0.019	0.015		0.493	
256	M26	6in Dia. Duct	Sec 4 - min	0.000	1	0.006	1	-0.080	6	-0.281	9	-0.121	1	-0.493	6	-0.055	7	-0.924	6	-0.773	6	0.000	0.012	0.022		0.421	
258	M26	6in Dia. Duct	Sec 3 - min	0.000	1	0.015	1	-0.084	6	-0.421	6	-0.077	1	-0.192	6	-0.339	7	-0.924	6	-0.773	6	0.000	0.019	0.015		0.001	
181	M19	6in Dia. Duct	Sec 1 - max	0.001	6	0.002	9	0.001	8	0.000	6	0.000	7	0.000	7	0.000	6	0.000	1	0.000	1	0.000	0.000	0.000		0.000	
182	M19	6in Dia. Duct	Sec 1 - min	0.000	7	0.000	6	-0.001	8	0.000	7	0.000	6	0.000	8	0.000	7	0.000	1	0.000	1	0.000	0.000	0.000		0.000	
183	M19	6in Dia. Duct	Sec 2 - max	0.000	6	0.002	9	0.000	8	0.000	6	0.000	7	0.000	7	0.000	8	0.000	1	0.000	1	0.000	0.000	0.000		0.000	
184	M19	6in Dia. Duct	Sec 2 - min	0.000	7	0.000	8	0.000	6	0.000	7	0.000	6	0.000	8	0.000	7	0.000	1	0.000	1	0.000	0.000	0.000		0.000	
185	M19	6in Dia. Duct	Sec 3 - max	0.000	6	0.001	9	0.000	8	0.000	6	0.000	7	0.000	7	0.000	8	0.000	1	0.000	1	0.000	0.000	0.000		0.000	
186	M19	6in Dia. Duct	Sec 3 - min	0.000	7	0.000	8	0.000	6	0.000	7	0.000	6	0.000	8	0.000	7	0.000	1	0.000	1	0.000	0.000	0.000		0.000	
187	M19	6in Dia. Duct	Sec 4 - max	0.000	6	0.000	9	0.000	8	0.000	6	0.000	7	0.000	7	0.000	9	0.000	1	0.000	1	0.000	0.000	0.000		0.000	
188	M19	6in Dia. Duct	Sec 4 - min	0.000	7	0.000	8	0.000	6	0.000	7	0.000	6	0.000	9	0.000	7	0.000	1	0.000	1	0.000	0.000	0.000		0.000	
189	M19	6in Dia. Duct	Sec 5 - max	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000		0.000	
190	M19	6in Dia. Duct	Sec 5 - min	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000		0.000	

amec

CALCULATION SHEET

CALC. NO.:	145579-V-CA-005	REV:	1	DATE:	March 26, 2006
CALC. TITLE:	Off-Gas Treatment System Pipe Stress Analysis				
PROJECT NO.:	145579	PROJECT TITLE:	Final DBVS Design		

Attachment 12: Excel Spreadsheet – Model 4 AG-1 Analysis and Unity Checks

NOTE: This cover sheet represents the approval signatures of the originator and checker for all pages of this attachment

ORIGINATOR:	DATE:	CHECKER:	DATE:
Kevin M. Jones KMJ	3/26/06	J. Van Corbach JVC	3/26/06

Duct Size	σ_b (ksi) Eq. 10	σ_s (ksi) Eq. 6 or 7	σ_c (ksi) Eq. 5	σ_c (ksi) Eq. 9	τ_t (ksi) Eq. 9	σ_t (ksi) Eq. 10	Temp	Material
2in Dia. Duct	4.5	27.0	22.5	32.3	15.6	15.6	100	CS
3in Dia. Duct	9.5	27.0	22.5	36.9	15.6	15.6	100	CS
4in Dia. Duct	11.9	27.0	22.5	34.3	15.6	15.6	100	CS
6in Dia. Duct	12.2	22.6	18.8	30.6	13.0	13.0	100	SS

Model 4

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_c	f_b/σ_b	f_s/σ_s		f_t (ksi)	
																									D-2250		
511	M52	RIGID	Sec 1 - max	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	NC	NC	NC		0.000	
512	M52	RIGID	Sec 1 - min	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	NC	NC	NC		0.000	
513	M52	RIGID	Sec 2 - max	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	NC	NC	NC		0.000	
514	M52	RIGID	Sec 2 - min	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	NC	NC	NC		0.000	
515	M52	RIGID	Sec 3 - max	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	NC	NC	NC		0.000	
516	M52	RIGID	Sec 3 - min	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	NC	NC	NC		0.000	
517	M52	RIGID	Sec 4 - max	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	NC	NC	NC		0.000	
518	M52	RIGID	Sec 4 - min	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	NC	NC	NC		0.000	
519	M52	RIGID	Sec 6 - max	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	NC	NC	NC		0.000	
520	M52	RIGID	Sec 6 - min	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	NC	NC	NC		0.000	
579	M58	6in Dia. Duct	Sec 5 - max	0.556	6	-0.033	1	0.565	7	1.479	9	3.455	6	6.844	7	-0.153	1	0.938	7	0.766	7	0.046	0.154	0.304		6.844	
580	M68	6in Dia. Duct	Sec 5 - min	0.047	1	-0.439	6	-0.306	6	-3.455	6	-1.479	9	0.153	1	-6.844	7	0.061	1	0.051	1	0.004	0.154	0.304		6.844	
589	M60	4in Dia. Duct	Sec 5 - max	0.473	7	0.114	8	-0.001	1	0.050	1	4.117	7	-0.081	1	6.689	7	0.381	7	0.870	7	0.040	0.152	0.248		6.689	
597	M60	4in Dia. Duct	Sec 4 - max	0.474	7	0.115	6	-0.001	1	0.060	1	4.194	7	-0.080	1	6.515	7	0.381	7	0.870	7	0.040	0.155	0.241		6.515	
598	M59	4in Dia. Duct	Sec 5 - max	0.472	7	-0.017	1	-0.001	1	0.086	1	4.427	7	-0.058	1	6.238	7	0.010	6	0.022	6	0.040	0.164	0.231		6.238	
1179	M118	2in Dia. Duct	Sec 5 - max	0.065	6	0.098	3	-0.000	1	-0.016	1	4.211	2	-0.018	1	7.121	6	0.004	3	0.055	3	0.014	0.155	0.264		7.121	
595	M60	4in Dia. Duct	Sec 3 - max	0.474	7	0.116	6	-0.001	1	0.009	1	4.271	7	-0.079	1	6.340	7	0.381	7	0.870	7	0.040	0.158	0.235		6.340	
449	M46	6in Dia. Duct	Sec 5 - max	0.298	6	0.241	6	-0.005	1	5.200	6	3.681	9	-0.183	1	3.984	7	0.613	6	0.514	6	0.024	0.231	0.177		5.200	
593	M60	4in Dia. Duct	Sec 2 - max	0.475	7	0.118	6	-0.001	1	0.078	1	4.349	7	-0.078	1	6.166	7	0.381	7	0.870	7	0.040	0.161	0.229		6.166	
1180	M118	2in Dia. Duct	Sec 5 - min	0.032	1	-0.074	2	-0.182	4	-4.211	2	0.018	1	-7.121	6	0.018	1	-0.010	2	-0.141	2	0.007	0.166	0.264		7.121	
447	M46	6in Dia. Duct	Sec 4 - max	0.298	6	0.241	6	-0.005	1	5.131	6	3.605	9	-0.181	1	3.922	7	0.613	6	0.514	6	0.024	0.228	0.174		5.131	
591	M60	4in Dia. Duct	Sec 1 - max	0.475	7	0.117	6	-0.001	1	0.088	1	4.427	7	-0.077	1	5.990	7	0.381	7	0.870	7	0.040	0.164	0.222		5.990	
1129	M113	2in Dia. Duct	Sec 5 - max	0.058	6	0.000	1	0.000	1	0.018	1	4.730	2	0.005	1	6.302	4	0.001	3	0.017	3	0.013	0.175	0.233		6.302	
421	M43	6in Dia. Duct	Sec 1 - max	0.154	8	0.065	9	0.317	9	5.398	6	1.606	9	3.792	8	2.762	9	1.015	9	0.850	9	0.013	0.240	0.169		5.398	
445	M45	6in Dia. Duct	Sec 3 - max	0.298	6	0.241	6	-0.005	1	5.063	6	3.530	9	-0.180	1	3.860	7	0.613	6	0.514	6	0.024	0.225	0.172		5.063	
459	M46	6in Dia. Duct	Sec 5 - max	0.321	6	-0.005	6	-0.003	6	5.194	6	3.893	9	-0.148	1	3.854	7	0.525	6	0.440	6	0.026	0.231	0.162		5.194	
457	M46	6in Dia. Duct	Sec 4 - max	0.321	6	-0.005	6	-0.004	6	5.199	6	3.840	9	-0.145	1	3.591	7	0.525	6	0.440	6	0.026	0.231	0.160		5.198	
1130	M113	2in Dia. Duct	Sec 6 - min	0.033	1	-0.091	2	-0.183	4	-4.730	2	-0.018	1	-6.302	4	-0.005	1	-0.013	2	-0.171	2	0.007	0.175	0.233		6.302	
443	M45	6in Dia. Dict	Sec 2 - max	0.295	6	0.241	6	-0.005	1	4.994	6	3.466	9	-0.178	1	3.798	7	0.613	6	0.514	6	0.024	0.222	0.169		4.994	
460	M46	6in Dia. Duct	Sec 6 - min	-0.077	9	-0.265	9	-0.219	7	-3.681	9	-5.200	6	-3.984	7	0.183	1	-0.432	7	-0.362	7	0.006	0.231	0.177		5.200	
455	M46	6in Dia. Duct	Sec 3 - max	0.321	6	-0.005	6	-0.004	6	5.197	6	3.786	9	-0.143	1	3.529	7	0.525	6	0.440	6	0.026	0.231	0.157		5.197	
453	M46	6in Dia. Duct	Sec 2 - max	0.320	6	-0.004	6	-0.004	6	5.199	6	3.733	9	-0.142	1	3.467	7	0.525	6	0.440	6	0.026	0.231	0.154		5.199	
971	M98	2in Dia. Duct	Sec 1 - max	0.136	7	0.038	5	0.114	6	0.431	8	0.192	1	0.025	1	9.840	6	0.017	2	0.225	2	0.030	0.010	0.384		9.840	
422	M43	6in Dia. Duct	Sec 1 - min	-0.016	9	-0.381	6	-0.317	8	-1.608	9	-5.398	6	-2.762	9	-3.792	6	0.021	1	0.018	1	0.001	0.240	0.169		5.398	
479	M48	6in Dia. Duct	Sec 5 - max	0.274	6	-0.048	9	0.014	8	1.159	6	4.342	9	-0.102	1	4.366	7	0.246	6	0.208	8	0.022	0.193	0.184		4.366	
441	M45	6in Dia. Duct	Sec 1 - max	0.298	6	0.241	6	-0.005	1	4.926	6	3.381	9	-0.177	1	3.735	7	0.613	6	0.514	6	0.024	0.219	0.166		4.926	
451	M46	6in Dia. Duct	Sec 1 - max	0.320	6	-0.004	6	-0.005	6	5.200	6	3.680	9	-0.140	1	3.414	9	0.625	6	0.440	6	0.026	0.231	0.152		5.200	
448	M45	6in Dia. Duct	Sec 4 - min	-0.077	9	-0.265	9	-0.218	7	-3.605	9	-5.131	6	-3.922	7	0.181	1	-0.432	7	-0.362	7	0.006	0.228	0.174		5.131	
577	M68	6in Dia. Duct	Sec 4 - max	0.653	6	-0.033	1	0.562	7	1.666	9	2.499	6	5.613	7	-0.151	1	0.938	7	0.765	7	0.045	0.111	0.249		5.613	
439	M44	6in Dia. Duct	Sec 6 - max	0.298	6	0.448	6	-0.005	1	4.926	6	3.377	9	0.234	8	3.732	7	0.645	9	0.540	9	0.019	0.219	0.166		4.926	
469	M46	6in Dia. Duct	Sec 5 - min	-0.122	9	-0.169	9	-0.221	7	-3.893	9	-5.194	6	-3.854	7	0.146	1	-1.310	7	-1.097	7	0.010	0.231	0.162		5.194	
446	M45	6in Dia. Duct	Sec 3 - min	-0.077	9	-0.284	9	-0.216	7	-3.530	9	-5.063	6	-3.860	7	0.180	1	-0.432	7	-0.362	7	0.006	0.225	0.172		5.063	
600	M60	4in Dia. Duct	Sec 5 - min	0.011	1	-0.014	1	-0.263	6	-4.117	7	-0.050	1	-6.689	7	0.081	1	-0.013	1	-0.029	1	0.001	0.152	0.248		6.689	
458	M46	6in Dia. Duct	Sec 4 - min	-0.122	9	-0.169	9	-0.220	7	-3.840	9	-5.198	6	-3.591	7	0.146	1	-1.310	7	-1.097	7	0.010	0.231	0.160		5.198	
873	M98	2in Dia. Duct	Sec 2 - max	0.135	7	0.034	5	0.112	6	0.657	8	0.050	1	0.024	1	9.446	6	0.017	2	0.225	2	0.030	0.021	0.350		9.446	
460	M48	6in Dia. Duct	Sec 5 - min	-0.162	9	-0.395	6	-0.238	7	-4.342	9	-1.159	6	-4.366	7	0.102	1	-2.332	7	-1.952	7	0.013	0.193	0.184		4.366	
456	M46	6in Dia. Duct	Sec 3 - min	-0.122	9	-0.168	9	-0.220	7	-3.786	9	-5.197	6	-3.529	7	0.143	1	-1.310	7	-1.097	7	0.010	0.231	0.157		5.197	
596	M60	4in Dia. Duct	Sec 4 - min	0.011	1	-0.013	1	-0.262	6	-4.194	7	-0.060	1	-6.515	7	0.080	1	-0.013	1	-0.029	1	0.001	0.155	0.241		6.515	
444	M45	6in Dia. Duct	Sec 2 - min	-0.077	9	-0.263	9	-0.217	7	-3.465	9	-4.994	6	-3.798	7	0.178	1	-0.432	7	-0.362	7	0.006	0.222	0.169		4.994	
590	M59	4in Dia. Duct	Sec 5 - min	0.010	1	-0.163	9	-0.261	6	-4.427	7	-0.088	1	-6.238	7	0.058	1	-0.022	9	-0.050	9	0.001	0.164	0.231		6.238	
464	M46	6in Dia. Duct	Sec 2 - min	-0.122	9	-0.167	9	-0.219	7	-3.733	9	-5.199	6	-3.467	7	0.142	1	-1.310	7	-1.097	7	0.010	0.231	0.154		5.199	
437	M44	6in Dia. Duct	Sec 4 - max	0.226	6	0.448	6	-0.005	1	4.798	6	3.291	9	0.235	8	3.670	7	0.645	9	0.540	9	0.019	0.213	0.163		4.798	
399	M39	6in Dia. Duct	Sec 5 - max	0.269	6	-0.014	9	-0.005	1	3.744	9	7.276	6	-0.037	1	1.099	9	0.895	7	0.833	7	0.022	0.323	0.049		7.276	
598	M60	4in Dia. Duct	Sec 3 - min	0.012	1	-0.012	1	-0.262	6	-4.271	7	-0.069	1	-6.340	7	0.079	1	-0.013	1	-0.029	1	0.001	0.156	0.235		6.340	
1001	M101	2in Dia. Duct	Sec 1 - max	0.129	7	0.047	7	0.105	6	0.319	8	0.561	7	0.018	1	9.279	6	0.023	7	0.315	7	0.029	0.021	0.344		9.279	
452	M46	6in Dia. Duct	Sec 1 - min	-0.122	9	-0.166	9	-0.219	7	-3.680	9	-5.200	6	-3.414	9	0.140	1	-1.310	7	-1.097	7	0.010	0.231	0.152		5.200	
621	M63	4in Dia. Duct	Sec 1 - max	0.363	7	0.596	7	0.377	9	0.010	1	3.605	7	-0.096	1	6.175	7	0.647	7	1.477	7	0.030	0.154	0.229		6.175	
11	M2	6in Dia. Duct	Sec 1 - max	0.166	6	-0.077	1	0.000	6	7.358	7	-0.133	1	0.094	1	1.168	8	0.244	1	0.204	1	0.013	0.327	0.052		7.358	
581	M59	4in Dia. Duct	Sec 1 - max	0.512	7	0.035	1	-0.001	1	2.723	7	0.365	1	6.681	7	-0.010	1	0.010	6	0.022	6	0.043	0.101	0.247		6.681	
442	M45	6in Dia. Duct	Sec 1 - min	-0.077	9	-0.263	9	-0.217	7	-3.381	9	-4.926	6	-3.730	7	0.177	1	-0.432	7	-0.362	7	0.006	0.219	0.166		4.926	
594	M60	4in Dia. Duct	Sec 2 - min	0.012	1	-0.011	1	-0.261	6	-4.346	7	-0.076	1	-6.166	7	0.076	1	-0.013	1	-0.029	1	0.001	0.161	0.229		6.166	
975	M98	2in Dia. Duct	Sec 3 - max	0.133	7	0.031	5	0.110	6	0.669	8	-0.078	1	0.022	1	9.051	6	0.017	2	0.225	2	0.030	0.025	0.335		9.051	
397	M39	6in Dia. Duct	Sec 4 - max	0.269	6	-0.013	9	-0.005	1	3.748	9	7.219	6	-0.036	1	1.046	9	0.895	7	0.833	7	0.022	0.321	0.047		7.219	
1079	M106	2in Dia. Duct	Sec 6 - max	0.060	7	0.000	1	0.000	1	0.003	1	4.189	2	-0.008	1	5.934	4	0.002	3	0.029	3	0.013	0.155	0.220		5.934	
592	M60	4in Dia. Duct	Sec 1 - min	0.012	1	-0.010	1	-0.261	6	-4.427	7	-0.088	1	-5.990	7	0.077	1	-0.013	1	-0.029	1	0.001	0.164	0.222		5.990	
436	M44	6in Dia. Duct	Sec 3 - max	0.226	6	0.448	6	-0.005	1	4.671	6	3.205	9	0.237	8	3.609	7	0.645	9	0.540	9	0.019	0.208	0.160		4.671	
440	M44	6in Dia. Duct	Sec 5 - min	-0.021	9	-0.392	9	-0.217	7	-3.377	9	-4.926	6	-3.732	7	-0.234	8	0.000	1	0.000	1	0.002	0.219	0.166		4.926	

D-3250

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_a	f_b/σ_a	f_s/σ_a		f_a (ksi)	
379	M38	6in Dia. Duct	Sec 5 - max	0.245	9	0.041	9	-0.005	1	3.756	9	7.050	6	-0.021	1	1.179	9	0.907	7	0.759	7	0.020	0.313	0.052		7.050	
385	M39	6in Dia. Duct	Sec 3 - max	0.268	6	-0.012	9	-0.005	1	3.751	9	7.162	6	-0.034	1	0.997	9	0.995	7	0.833	7	0.022	0.318	0.044		7.162	
390	M39	6in Dia. Duct	Sec 5 - min	-0.134	9	-0.200	6	-0.179	9	-7.276	6	-3.744	9	-1.099	9	0.037	1	-0.031	1	-0.026	1	0.011	0.323	0.049		7.276	
1080	M105	2in Dia. Duct	Sec 5 - min	0.035	1	-0.079	2	-0.166	4	-4.189	2	-0.003	1	-5.934	4	0.006	1	-0.012	2	-0.165	2	0.007	0.165	0.220		6.934	
972	M96	2in Dia. Duct	Sec 1 - min	0.000	1	0.033	4	0.000	1	-0.192	1	-0.431	6	-9.640	8	-0.025	1	-0.007	1	-0.095	1	0.000	0.016	0.364		9.640	
383	M39	6in Dia. Duct	Sec 2 - max	0.268	6	-0.012	9	-0.005	1	3.756	9	7.106	6	-0.033	1	0.947	9	0.995	7	0.833	7	0.022	0.316	0.042		7.106	
12	M2	6in Dia. Duct	Sec 1 - min	0.008	1	-1.535	6	-0.005	6	0.133	1	-7.358	7	-1.168	8	-0.094	1	-0.419	9	-0.350	9	0.001	0.327	0.052		7.358	
623	M63	4in Dia. Duct	Sec 2 - max	0.362	7	0.655	7	0.378	9	0.008	1	3.396	7	-0.092	1	6.035	7	0.647	7	1.477	7	0.030	0.126	0.224		6.035	
109	M11	6in Dia. Duct	Sec 5 - max	0.011	9	-0.111	1	0.022	9	-0.762	1	7.439	6	0.013	1	1.063	6	0.250	1	0.209	1	0.001	0.331	0.047		7.439	
110	M11	6in Dia. Duct	Sec 5 - min	-0.011	7	-1.599	6	-0.022	7	-7.439	6	0.762	1	-1.063	6	-0.013	1	-0.498	6	-0.414	6	0.001	0.331	0.047		7.439	
1211	M122	6in Dia. Duct	Sec 1 - max	0.011	9	0.443	6	0.126	6	-0.762	1	7.439	6	0.013	1	1.063	6	0.250	1	0.209	1	0.001	0.331	0.047		7.439	
1212	M122	6in Dia. Duct	Sec 1 - min	-0.011	7	0.066	1	-0.090	1	-7.439	6	0.762	1	-1.063	6	-0.013	1	-0.498	6	-0.414	6	0.001	0.331	0.047		7.439	
477	M46	6in Dia. Duct	Sec 4 - max	0.272	9	-0.041	9	0.010	8	2.116	6	4.233	9	-0.090	1	3.776	7	0.248	6	0.208	6	0.022	0.189	0.168		4.233	
977	M98	2in Dia. Duct	Sec 4 - max	0.132	7	0.028	5	0.108	6	0.769	8	-0.193	1	0.021	1	8.654	9	0.017	2	0.225	2	0.029	0.028	0.321		8.654	
388	M39	6in Dia. Duct	Sec 4 - min	-0.133	9	-0.199	6	-0.179	9	-7.219	6	-3.748	9	-1.048	9	0.038	1	-0.031	1	-0.026	1	0.011	0.321	0.047		7.219	
438	M44	6in Dia. Duct	Sec 4 - min	-0.021	9	-0.301	9	-0.217	7	-3.291	9	-4.798	6	-3.670	7	-0.235	8	0.000	1	0.000	1	0.002	0.213	0.163		4.798	
433	M44	6in Dia. Duct	Sec 2 - max	0.225	8	0.447	6	-0.005	1	4.544	8	3.120	9	0.239	8	3.547	7	0.646	9	0.540	9	0.018	0.202	0.158		4.544	
380	M38	6in Dia. Duct	Sec 5 - min	-0.133	7	-0.298	9	-0.179	9	-7.050	6	-3.758	9	-1.179	9	0.021	1	-0.034	1	-0.028	1	0.011	0.313	0.052		7.050	
979	M96	2in Dia. Duct	Sec 5 - max	0.131	7	0.025	5	0.106	6	0.854	8	-0.295	1	0.020	1	8.502	9	0.017	2	0.225	2	0.029	0.032	0.315		8.502	
1003	M101	2in Dia. Duct	Sec 2 - max	0.128	7	0.044	7	0.103	6	0.462	8	0.377	7	0.014	1	8.913	8	0.023	7	0.315	7	0.028	0.017	0.330		8.913	
381	M39	6in Dia. Duct	Sec 1 - max	0.268	6	-0.011	9	-0.005	1	3.758	9	7.050	6	-0.031	1	0.898	9	0.995	7	0.833	7	0.022	0.313	0.040		7.050	
1	M1	6in Dia. Duct	Sec 1 - max	0.000	1	0.000	1	0.000	1	7.390	7	-0.164	1	0.013	1	1.027	8	0.250	1	0.209	1	0.000	0.328	0.046		7.390	
2	M1	6in Dia. Duct	Sec 1 - min	0.000	1	0.000	1	0.000	1	0.164	1	-7.390	7	-1.027	8	-0.013	1	-0.536	8	-0.448	8	0.000	0.328	0.046		7.390	
3	M1	6in Dia. Duct	Sec 2 - max	0.000	8	-0.002	1	0.000	8	7.389	7	-0.164	1	0.013	1	1.026	8	0.250	1	0.209	1	0.000	0.328	0.046		7.389	
4	M1	6in Dia. Duct	Sec 2 - min	0.000	7	-0.002	1	0.000	8	0.164	1	-7.389	7	-1.026	8	-0.013	1	-0.536	8	-0.448	8	0.000	0.328	0.046		7.389	
5	M1	6in Dia. Duct	Sec 3 - max	0.000	8	-0.003	1	0.002	8	7.387	7	-0.162	1	0.013	1	1.025	8	0.250	1	0.209	1	0.000	0.328	0.046		7.387	
6	M1	6in Dia. Duct	Sec 3 - min	0.000	7	-0.003	1	-0.002	8	0.162	1	-7.387	7	-1.025	8	-0.013	1	-0.536	8	-0.448	8	0.000	0.328	0.046		7.387	
369	M40	6in Dia. Duct	Sec 5 - max	0.288	8	0.032	8	-0.005	1	3.611	9	7.252	6	0.150	6	0.628	9	1.103	9	0.923	9	0.024	0.322	0.028		7.252	
7	M1	6in Dia. Duct	Sec 4 - max	0.001	8	-0.005	1	0.003	8	7.383	7	-0.158	1	0.013	1	1.023	8	0.250	1	0.209	1	0.000	0.328	0.045		7.383	
8	M1	6in Dia. Duct	Sec 4 - min	-0.001	7	-0.005	1	-0.003	8	0.158	1	-7.383	7	-1.023	8	-0.013	1	-0.536	8	-0.448	8	0.000	0.328	0.045		7.383	
366	M39	6in Dia. Duct	Sec 3 - min	-0.133	9	-0.199	6	-0.179	9	-7.162	6	-3.751	9	-0.997	9	0.034	1	-0.031	1	-0.026	1	0.011	0.318	0.044		7.162	
9	M1	6in Dia. Duct	Sec 5 - max	0.002	8	-0.007	1	0.003	8	7.378	7	-0.153	1	0.013	1	1.021	8	0.250	1	0.209	1	0.000	0.328	0.045		7.378	
10	M1	6in Dia. Duct	Sec 5 - min	-0.002	7	-0.007	1	-0.003	8	0.153	1	-7.378	7	-1.021	8	-0.013	1	-0.536	8	-0.448	8	0.000	0.328	0.045		7.378	
1181	M119	6in Dia. Duct	Sec 1 - max	0.002	8	-0.007	8	0.003	8	7.378	7	-0.153	1	0.013	1	1.021	8	0.250	1	0.209	1	0.000	0.328	0.045		7.378	
1182	M119	6in Dia. Duct	Sec 1 - min	-0.002	7	-0.007	2	-0.003	8	0.153	1	-7.378	7	-1.021	8	-0.013	1	-0.536	8	-0.448	8	0.000	0.328	0.045		7.378	
401	M41	6in Dia. Duct	Sec 1 - max	0.282	8	0.247	8	-0.005	1	3.612	9	7.251	6	0.668	6	0.068	1	1.161	9	0.972	9	0.021	0.322	0.030		7.251	
461	M47	6in Dia. Duct	Sec 1 - max	0.288	9	-0.082	9	-0.003	8	5.194	6	3.693	9	-0.082	1	2.662	9	0.356	8	0.298	8	0.024	0.231	0.118		5.194	
1183	M119	6in Dia. Duct	Sec 2 - max	0.002	8	-0.008	8	0.004	8	7.374	7	-0.149	1	0.013	1	1.019	8	0.250	1	0.209	1	0.000	0.328	0.045		7.374	
1184	M119	6in Dia. Duct	Sec 2 - min	-0.002	7	-0.008	2	-0.004	8	0.149	1	-7.374	7	-1.019	8	-0.013	1	-0.536	8	-0.448	8	0.000	0.328	0.045		7.374	
1185	M119	6in Dia. Duct	Sec 3 - max	0.002	8	-0.009	8	0.005	8	7.370	7	-0.144	1	0.013	1	1.017	8	0.250	1	0.209	1	0.000	0.328	0.045		7.370	
1186	M119	6in Dia. Duct	Sec 3 - min	-0.002	7	-0.009	2	-0.005	8	0.144	1	-7.370	7	-1.017	8	-0.013	1	-0.536	8	-0.448	8	0.000	0.328	0.045		7.370	
1187	M119	6in Dia. Duct	Sec 4 - max	0.003	8	-0.010	8	0.005	8	7.364	7	-0.139	1	0.013	1	1.014	8	0.250	1	0.209	1	0.000	0.327	0.046		7.364	
1188	M119	6in Dia. Duct	Sec 4 - min	-0.003	7	-0.010	2	-0.005	8	0.139	1	-7.364	7	-1.014	8	-0.013	1	-0.536	8	-0.448	8	0.000	0.327	0.045		7.364	
463	M47	6in Dia. Duct	Sec 2 - max	0.288	9	-0.082	9	-0.003	8	5.123	6	3.816	9	-0.084	1	2.713	9	0.356	8	0.298	8	0.024	0.228	0.121		5.123	
13	M2	6in Dia. Duct	Sec 2 - max	0.156	8	-0.078	1	0.006	8	6.927	7	-0.111	1	0.094	1	1.165	8	0.244	1	0.204	1	0.013	0.308	0.052		6.927	
1189	M119	6in Dia. Duct	Sec 5 - max	0.003	8	-0.012	8	0.006	8	7.358	7	-0.133	1	0.013	1	1.011	8	0.250	1	0.209	1	0.000	0.327	0.045		7.358	
1190	M119	6in Dia. Duct	Sec 5 - min	-0.003	7	-0.012	2	-0.006	8	0.133	1	-7.358	7	-1.011	8	-0.013	1	-0.536	8	-0.448	8	0.000	0.327	0.045		7.358	
411	M42	6in Dia. Duct	Sec 1 - max	0.198	9	0.423	8	-0.005	1	3.360	9	6.881	6	1.027	8	0.071	1	1.091	9	0.913	9	0.016	0.310	0.046		6.881	
397	M40	6in Dia. Duct	Sec 4 - max	0.288	9	0.033	8	-0.005	1	3.645	9	7.258	6	0.163	6	0.677	9	1.103	9	0.923	9	0.024	0.323	0.028		7.258	
465	M47	6in Dia. Duct	Sec 3 - max	0.296	8	-0.083	9	-0.002	8	5.052	6	3.940	9	-0.085	1	2.764	9	0.356	8	0.298	8	0.024	0.225	0.123		5.052	
467	M47	6in Dia. Duct	Sec 4 - max	0.297	6	-0.084	9	-0.002	8	4.990	6	3.993	9	-0.087	1	2.814	9	0.356	8	0.298	8	0.024	0.221	0.125		4.990	
974	M98	2in Dia. Duct	Sec 2 - min	0.000	1	0.030	4	0.000	1	-0.050	1	-0.567	6	-9.446	6	-0.024	1	-0.007	1	-0.095	1	0.000	0.021	0.350		9.446	
631	M64	4in Dia. Duct	Sec 1 - max	0.223	6	0.554	7	0.674	7	-0.009	1	3.878	7	-0.072	1	5.817	7	0.257	7	0.580	7	0.019	0.144	0.208		5.817	
403	M41	6in Dia. Duct	Sec 2 - max	0.203	6	0.246	8	-0.005	1	3.555	9	7.163	6	0.555	6	0.089	1	1.161	9	0.972	9	0.022	0.318	0.029		7.163	
489	M47	6in Dia. Duct	Sec 5 - max	0.297	6	-0.084	9	-0.001	8	4.908	6	3.987	9	-0.088	1	2.865	9	0.356	8	0.298	8	0.024	0.218	0.127		4.908	
438	M44	6in Dia. Duct	Sec 3 - min	-0.022	9	-0.301	9	-0.218	7	-3.208	9	-4.671	6	-3.609	7	-0.237	8	0.000	1	0.000	1	0.002	0.208	0.160		4.671	
395	M40	6in Dia. Duct	Sec 3 - max	0.287	6	0.033	8	-0.005	1	3.678	9	7.264	6	0.176	6	0.526	9	1.103	9	0.923	9	0.024	0.323	0.023		7.264	
431	M44	6in Dia. Duct	Sec 1 - max	0.225	6	0.447	6	-0.005	1	4.417	6	3.035	9	0.242	8	3.466	7	0.645	9	0.540	9	0.018	0.196	0.155		4.417	
476	M46	6in Dia. Duct	Sec 4 - min	-0.160	9	-0.360	6	-0.234	7	-4.233	9	-2.116	6	-3.776	7	0.090	1	-2.352	7	-1.952	7	0.013	0.188	0.166		4.233	
384	M39	6in Dia. Dict	Sec 2 - min	-0.133	9	-0.198	6	-0.179	9	-7.106	6	-3.755	9	-0.947	9	0.033	1	-0.031	1	-0.026	1	0.011	0.316	0.042		7.106	
393	M40	6in Dia. Duct	Sec 2 - max	0.287	6	0.034	8	-0.005	1	3.711	9	7.270	6	0.189	6	0.475	9	1.103	9	0.923	9	0.024	0.323	0.021		7.270	
601	M61	4in Dia. Duct	Sec 1 - max	0.363	7	0.568	7	-0.031	1	0.050	1	4.117	7	-0.099	1	4.920	7	1.063	7	2.427	7	0.032	0.152	0.182		4.920	
405	M41	6in Dia. Duct	Sec 3 - max	0.263	6	0.246	8	-0.005	1	3.497	9	7.115	6	0.643	6	0.071	1	1.161	9	0.972	9	0.022	0.316	0.029		7.115	
419	M42	6in Dia. Duct	Sec 2 - max	0.198	6	0.423	8	-0.005	1	3.307	9	6.861	6	1.015	6	0.072	1	1.091	9	0.913	9	0.016	0.305	0.045		6.861	
625	M63	4in Dia. Duct	Sec 3 - max	0.352	7	0.655	7	0.378	9	0.001	1	3.186	7	-0.085	1	5.896	7	0.647	7	1.477	7	0.030	0.118	0.218		5.896	
1005	M101	2in Dia. Duct	Sec 3 - max	0.127	7	0.041	7	0.100	6	0.571	8	0.206	7	0.012	1	8.546	6	0.023	7	0.315	7	0.028	0.021	0.317		8.546	
391	M40	6in Dia. Duct	Sec 1 - max	0.287	6	0.034	8	-0.005	1	3.744	9	7.276	6	0.202	6	0.425	9	1.103	9	0.923	9	0.024	0.323	0.019		7.276	
1002	M101	2in Dia. Duct	Sec 1 - min	0.000	1	0.035	8	0.000	1	-0.661	7	-0.318	8	-9.279	8	-0.016	1	-0.008	1	-0.077	1	0.000	0.021	0.344		9.279	
578	M58	6in Dia. Duct	Sec 4 - min	0.045	1	-0.437	6	-0.305	8	-2.499	6	-1.668	9	0.151	1	-5.613	7	0.061	1	0.061	1	0.004	0.111	0.249		5.613	
382	M39	6in Dia. Duct	Sec 1 - min	-0.133	9	-0.197	6	-0.179	9	-7.050	6	-3.758	9	-0.896	9	0.031	1	-0.031	1	-0.026	1	0.011	0.313	0.040		7.050	
622	M63	4in Dia. Duct	Sec 1 - min	0.010	1	-0.011	1	0.017	1	-3.605	7	-0.010	1	-6.175	7	0.098	1	0.000	1	0.002	1	0.001	0.134	0.229		6.175	
407	M41	6in Dia. Duct	Sec 4 - max	0.283	6	0.246	8	-0.005	1	3.439	9	7.047	6	0.630	6	0.072	1	1.161	9	0.972	9	0.022	0.313	0.028		7.047	
434	M44	6in Dia. Duct	Sec 2 - min	-0.022	9	-0.300	9	-0.216	7	-3.120	9	-4.544	6	-3.547	7	-0.239	8	0.000	1	0.000	1	0.002	0.202	0.158		4.544	
482	M47	6in Dia. Duct	Sec 1 - min	-0.149	9	-0.251	6	-0.221	7	-3.893	9	-5.194	6	-2.662	9	0.092	1	-2.046	7	-1.713	7	0.012	0.231	0.118		5.194	
484	M47	6in Dia. Duct	Sec 2 - min	-0.149	9	-0.251	6	-0.221	7	-3.916	9	-5.123	6	-2.713	9	0.084	1	-2.046	7	-1.713	7	0.012	0.228	0.121		5.123	

D-2250

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_a	f_{sy}/σ_a	f_{sz}/σ_a		f_c (ksi)	
415	M42	6in Dia. Duct	Sec 3 - max	0.196	6	0.424	6	-0.005	1	3.234	9	6.740	6	1.002	6	0.074	1	1.081	6	0.913	6	0.016	0.300	0.045		6.740	
14	M2	6in Dia. Duct	Sec 2 - max	0.008	1	-1.536	6	-0.006	6	0.111	1	-8.927	7	-1.165	9	-0.094	1	-0.419	9	-0.350	9	0.001	0.308	0.052		8.927	
400	M40	6in Dia. Duct	Sec 5 - min	-0.121	9	-0.130	7	-0.179	7	-7.252	6	-3.611	9	-0.628	9	-0.150	6	-0.020	1	-0.017	1	0.010	0.322	0.026		7.252	
976	M99	2in Dia. Duct	Sec 3 - min	0.000	1	0.026	4	0.000	1	0.076	1	-0.669	6	-9.051	6	-0.022	1	-0.007	1	-0.095	1	0.000	0.025	0.335		9.051	
466	M47	6in Dia. Duct	Sec 3 - min	-0.149	9	-0.252	6	-0.221	7	-3.940	9	-5.052	6	-2.754	9	0.085	1	-2.046	7	-1.713	7	0.012	0.228	0.123		5.052	
981	M99	2in Dia. Duct	Sec 1 - max	0.102	7	0.025	5	0.178	2	0.593	6	-0.294	7	0.020	1	6.502	9	0.028	2	0.384	2	0.023	0.022	0.315		6.502	
412	M42	6in Dia. Duct	Sec 1 - min	-0.043	9	-0.257	7	-0.181	7	-6.881	6	-3.360	9	-0.071	1	-1.027	6	0.013	1	0.011	1	0.004	0.310	0.046		6.881	
402	M41	6in Dia. Duct	Sec 1 - min	-0.059	9	-0.209	7	-0.179	7	-7.251	6	-3.612	9	-0.066	1	-0.669	6	-0.005	1	-0.004	1	0.007	0.322	0.030		7.251	
409	M41	6in Dia. Duct	Sec 5 - max	0.284	6	0.246	6	-0.005	1	3.381	9	6.979	6	0.617	6	0.078	9	1.161	9	0.872	9	0.022	0.310	0.027		6.979	
468	M47	6in Dia. Duct	Sec 4 - min	-0.149	9	-0.252	6	-0.222	7	-3.963	9	-4.980	6	-2.814	9	0.087	1	-2.046	7	-1.713	7	0.012	0.221	0.125		4.980	
398	M40	6in Dia. Duct	Sec 4 - min	-0.121	9	-0.129	7	-0.179	7	-7.258	6	-3.645	9	-0.577	9	-0.153	6	-0.020	1	-0.017	1	0.010	0.323	0.026		7.258	
470	M47	6in Dia. Duct	Sec 5 - min	-0.149	9	-0.253	6	-0.222	7	-3.987	9	-4.908	6	-2.865	9	0.088	1	-2.046	7	-1.713	7	0.012	0.216	0.127		4.908	
399	M40	6in Dia. Duct	Sec 3 - min	-0.121	9	-0.129	7	-0.179	9	-7.264	6	-3.675	9	-0.526	9	-0.178	6	-0.020	1	-0.017	1	0.010	0.323	0.023		7.264	
1007	M101	2in Dia. Duct	Sec 4 - max	0.126	7	0.037	7	0.098	6	0.676	8	0.049	7	0.011	1	8.176	8	0.023	7	0.316	7	0.026	0.025	0.303		8.176	
404	M41	6in Dia. Duct	Sec 2 - min	-0.059	9	-0.209	7	-0.190	7	-7.163	6	-3.555	9	-0.069	1	-0.655	6	-0.005	1	-0.004	1	0.007	0.319	0.029		7.163	
417	M42	6in Dia. Duct	Sec 4 - max	0.199	6	0.424	6	-0.005	1	3.161	9	6.620	6	0.989	6	0.075	1	1.091	9	0.813	9	0.016	0.294	0.044		6.620	
394	M40	6in Dia. Duct	Sec 2 - min	-0.121	9	-0.128	7	-0.179	9	-7.270	6	-3.711	9	-0.475	9	-0.189	6	-0.020	1	-0.017	1	0.010	0.323	0.021		7.270	
633	M64	4in Dia. Duct	Sec 2 - max	0.224	6	0.553	7	0.674	7	-0.014	1	3.871	7	-0.069	1	5.374	6	0.257	7	0.586	7	0.019	0.136	0.199		5.374	
414	M42	6in Dia. Duct	Sec 2 - min	-0.042	9	-0.257	7	-0.182	7	-6.881	6	-3.307	9	-0.072	1	-1.015	6	0.013	1	0.011	1	0.003	0.305	0.046		6.881	
15	M2	6in Dia. Duct	Sec 3 - max	0.168	6	-0.078	1	0.006	6	6.496	7	-0.089	1	0.094	1	1.163	6	0.244	1	0.204	1	0.013	0.289	0.052		6.496	
627	M63	4in Dia. Duct	Sec 4 - max	0.352	7	0.554	7	0.378	9	-0.003	1	2.980	7	-0.079	1	5.756	7	0.647	7	1.477	7	0.030	0.110	0.213		5.756	
432	M44	6in Dia. Duct	Sec 1 - min	-0.022	9	-0.299	9	-0.216	7	-3.035	9	-4.417	6	-3.488	7	-0.242	6	0.000	1	0.000	1	0.002	0.196	0.155		4.417	
611	M62	4in Dia. Duct	Sec 1 - max	0.399	7	0.558	7	0.005	1	0.025	1	2.480	7	-0.108	1	6.129	7	0.955	7	2.160	7	0.034	0.092	0.227		6.129	
392	M40	6in Dia. Duct	Sec 1 - min	-0.121	9	-0.128	7	-0.179	9	-7.276	6	-3.744	9	-0.425	9	-0.202	6	-0.020	1	-0.017	1	0.010	0.323	0.019		7.276	
406	M41	6in Dia. Duct	Sec 3 - min	-0.059	9	-0.210	7	-0.180	7	-7.115	6	-3.497	9	-0.071	1	-0.643	6	-0.005	1	-0.004	1	0.007	0.316	0.029		7.115	
632	M64	4in Dia. Duct	Sec 1 - min	0.004	1	-0.013	1	0.025	1	-3.878	7	0.009	1	-5.617	7	0.072	1	0.000	1	0.000	1	0.000	0.144	0.208		5.617	
503	M61	4in Dia. Duct	Sec 2 - max	0.383	7	0.564	7	-0.001	1	0.047	1	3.401	7	-0.101	1	5.224	7	1.063	7	2.427	7	0.032	0.126	0.193		5.224	
562	M59	4in Dia. Duct	Sec 1 - min	0.037	1	-0.132	7	-0.280	7	-0.366	1	-2.723	7	0.015	1	-6.681	7	-0.022	9	-0.050	9	0.003	0.101	0.247		6.681	
624	M63	4in Dia. Duct	Sec 2 - min	0.010	1	-0.012	1	0.017	1	-3.398	7	-0.008	1	-6.035	7	0.092	1	0.000	1	0.002	1	0.001	0.126	0.224		6.035	
329	M30	6in Dia. Duct	Sec 5 - max	0.136	8	0.140	6	0.258	9	2.993	6	0.334	1	4.623	9	-0.161	1	0.049	7	0.041	7	0.011	0.133	0.205		4.623	
330	M33	6in Dia. Duct	Sec 5 - min	-0.136	9	-0.039	1	0.010	1	-0.334	1	-2.993	6	0.161	1	-4.623	6	-0.151	8	-0.126	8	0.011	0.133	0.205		4.623	
351	M36	6in Dia. Duct	Sec 1 - max	0.136	8	0.121	9	0.104	7	2.993	6	0.334	1	4.623	9	-0.161	1	0.049	7	0.041	7	0.011	0.133	0.205		4.623	
352	M36	6in Dia. Duct	Sec 1 - min	-0.136	7	-0.219	6	-0.420	6	-0.334	1	-2.993	6	0.161	1	-4.623	6	-0.151	8	-0.126	8	0.011	0.133	0.205		4.623	
976	M99	2in Dia. Duct	Sec 4 - min	0.000	1	0.023	4	0.000	1	0.193	1	-0.769	6	-8.654	6	-0.021	1	-0.007	1	-0.095	1	0.000	0.028	0.321		8.654	
419	M42	6in Dia. Duct	Sec 5 - max	0.199	6	0.424	6	-0.005	1	3.068	9	6.499	6	0.976	6	0.077	1	1.091	9	0.813	9	0.016	0.289	0.043		6.499	
408	M41	6in Dia. Duct	Sec 4 - min	-0.059	9	-0.210	7	-0.181	7	-7.047	6	-3.439	9	-0.072	1	-0.630	6	-0.005	1	-0.004	1	0.007	0.313	0.028		7.047	
475	M46	6in Dia. Duct	Sec 3 - max	0.270	6	-0.035	9	0.005	6	3.060	6	4.136	9	-0.077	1	3.196	7	0.246	6	0.208	6	0.022	0.164	0.142		4.136	
416	M42	6in Dia. Duct	Sec 3 - min	-0.042	9	-0.257	9	-0.182	7	-6.740	6	-3.234	9	-0.074	1	-1.002	6	0.013	1	0.011	1	0.003	0.300	0.045		6.740	
1004	M101	2in Dia. Duct	Sec 2 - min	0.000	1	0.031	6	0.000	1	-0.377	7	-0.452	6	-8.913	6	-0.014	1	-0.006	1	-0.077	1	0.000	0.017	0.330		8.913	
980	M98	2in Dia. Duct	Sec 5 - min	0.000	1	0.020	4	0.000	1	0.295	1	-0.854	6	-8.502	9	-0.020	1	-0.007	1	-0.095	1	0.000	0.032	0.315		8.502	
21	M3	6in Dia. Duct	Sec 1 - max	0.439	6	-0.087	1	0.007	8	6.633	7	-0.044	1	0.243	1	1.332	8	0.203	1	0.170	1	0.036	0.250	0.059		5.633	
1009	M101	2in Dia. Duct	Sec 5 - max	0.125	7	0.034	7	0.098	6	0.769	8	-0.095	7	0.009	1	7.804	8	0.023	7	0.315	7	0.028	0.028	0.289		7.804	
613	M62	4in Dia. Duct	Sec 2 - max	0.399	7	0.557	7	0.005	1	0.022	1	2.271	7	-0.104	1	6.141	7	0.955	7	2.160	7	0.034	0.094	0.227		6.141	
410	M41	6in Dia. Duct	Sec 5 - min	-0.059	9	-0.210	7	-0.181	7	-6.979	6	-3.381	9	-0.078	9	-0.617	6	-0.005	1	-0.004	1	0.007	0.310	0.027		6.979	
429	M43	6in Dia. Duct	Sec 5 - max	0.177	6	0.089	9	0.340	9	0.023	9	3.004	6	4.395	7	3.365	6	1.015	9	0.850	9	0.015	0.134	0.195		4.395	
418	M42	6in Dia. Duct	Sec 4 - min	-0.042	9	-0.258	9	-0.183	7	-6.820	6	-3.161	9	-0.075	1	-0.989	6	0.013	1	0.011	1	0.003	0.294	0.044		6.620	
16	M2	6in Dia. Duct	Sec 3 - min	0.008	1	-1.538	6	-0.006	6	0.069	1	-6.496	7	-1.163	6	-0.094	1	-0.419	9	-0.350	9	0.001	0.289	0.052		6.496	
629	M63	4in Dia. Duct	Sec 5 - max	0.352	7	0.554	7	0.379	9	-0.006	1	2.773	7	-0.072	1	5.617	7	0.647	7	1.477	7	0.030	0.103	0.208		5.617	
353	M36	6in Dia. Duct	Sec 2 - max	0.137	6	0.118	9	0.103	7	2.759	6	0.274	1	4.645	9	-0.174	1	0.049	7	0.041	7	0.011	0.123	0.205		4.645	
354	M36	6in Dia. Duct	Sec 2 - min	-0.137	7	-0.220	8	-0.419	6	-0.274	1	-2.759	6	0.174	1	-4.645	9	-0.151	8	-0.126	6	0.011	0.123	0.205		4.645	
478	M48	6in Dia. Duct	Sec 3 - min	-0.159	9	-0.375	6	-0.230	7	-4.138	9	-3.080	6	-3.196	7	0.077	1	-2.332	7	-1.952	7	0.013	0.184	0.142		4.138	
471	M48	6in Dia. Duct	Sec 1 - max	0.207	6	-0.025	9	-0.001	6	4.906	6	3.988	9	-0.051	1	2.220	9	0.248	8	0.208	8	0.022	0.218	0.099		4.906	
615	M62	4in Dia. Duct	Sec 3 - max	0.399	7	0.557	7	0.005	1	0.018	1	2.062	7	-0.102	1	6.152	7	0.955	7	2.160	7	0.034	0.076	0.226		6.152	
1006	M101	2in Dia. Duct	Sec 3 - min	0.000	1	0.026	6	0.000	1	-0.206	7	-0.571	6	-8.546	6	-0.012	1	-0.006	1	-0.077	1	0.000	0.021	0.317		8.546	
635	M64	4in Dia. Duct	Sec 3 - max	0.224	6	0.552	7	0.674	7	-0.019	1	3.463	7	-0.054	1	5.139	6	0.257	7	0.586	7	0.019	0.126	0.190		5.139	
628	M63	4in Dia. Duct	Sec 3 - min	0.010	1	-0.012	1	0.017	1	-3.188	7	-0.001	1	-5.896	7	0.085	1	0.000	1	0.002	1	0.001	0.116	0.216		5.896	
982	M99	2in Dia. Duct	Sec 1 - min	0.000	1	0.020	4	0.000	1	0.294	7	-0.593	6	-8.502	9	-0.020	1	0.000	1	-0.002	1	0.000	0.022	0.315		8.502	
605	M61	4in Dia. Duct	Sec 3 - max	0.382	7	0.562	7	-0.001	1	0.042	1	2.687	7	-0.102	1	5.527	7	1.063	7	2.427	7	0.032	0.100	0.205		5.527	
602	M61	4in Dia. Duct	Sec 1 - min	0.013	1	-0.001	1	-0.263	6	-4.117	7	-0.050	1	-4.920	7	0.089	1	-0.002	1	-0.004	1	0.001	0.152	0.162		4.920	
420	M42	6in Dia. Duct	Sec 5 - min	-0.042	9	-0.258	9	-0.183	7	-6.499	6	-3.088	9	-0.077	1	-0.975	6	0.013	1	0.011	1	0.003	0.289	0.043		6.499	
634	M64	4in Dia. Duct	Sec 2 - min	0.004	1	-0.014	1	0.025	1	-3.871	7	0.014	1	-5.374	6	0.083	1	0.000	1	0.000	1	0.000	0.136	0.199		5.374	
481	M48	6in Dia. Duct	Sec 1 - max	0.019	6	0.376	6	0.419	6	4.778	7	0.050	6	-0.104	1	2.726	7	0.006	1	0.006	1	0.002	0.212	0.121		4.778	
482	M48	6in Dia. Duct	Sec 1 - min	-0.019	7	-0.281	7	-0.012	1	-0.050	6	-4.776	7	-2.726	7	0.104	1	0.000	1	0.000	1	0.002	0.212	0.121		4.776	
17	M2	6in Dia. Duct	Sec 4 - max	0.156	6	-0.079	1	0.007	8	6.065	7	-0.087	1	0.094	1	1.161	6	0.244	1	0.204	1	0.013	0.270	0.052		6.065	
1011	M102	2in Dia. Duct	Sec 1 - max	0.100	7	0.034	7	0.191	2	0.553	8	0.252	7	0.009	1	7.804	8	0.023	2	0.316	2	0.022	0.020	0.289		7.804	
355	M36	6in Dia. Duct	Sec 3 - max	0.137	6	0.117	9	0.101	7	2.522	6	0.217	1	4.688	9	-0.166	1	0.049	7	0.041	7	0.011	0.112	0.207		4.688	
356	M36	6in Dia. Duct	Sec 3 - min	-0.137	7	-0.222	6	-0.416	8	-0.217	1	-2.522	6	0.166	1	-4.688	9	-0.151	8	-0.126	8	0.011	0.112	0.207		4.688	
617	M62	4in Dia. Duct	Sec 4 - max	0.399	7	0.556	7	0.005	1	0.014	1	1.854	7	-0.100	1	8.164	7	0.955	7	2.160	7	0.034	0.069	0.228		8.164	
472	M46	6in Dia. Duct	Sec 1 - min	-0.165	9	-0.364	6	-0.222	7	-3.988	9	-4.908	6	-2.229	9	0.051	1	-2.332	7	-1.952	7	0.013	0.218	0.099		4.908	
430	M43	6in Dia. Duct	Sec 5 - min	0.007	9	-0.404	6	-0.340	6	-3.004	6	-0.023	9	-3.365	6	-4.395	7	0.021	1	0.016	1	0.001	0.134	0.195		4.395	
23	M3	6in Dia. Duct	Sec 2 - max	0.439	6	-0.088	1	-0.007	6	5.266	7	-0.025	1	0.243	1	1.330	6	0.203	1	0.170	1	0.036	0.234	0.059		5.266	
1008	M101	2in Dia. Duct	Sec 4 - min	0.000	1	0.025	6	0.000	1	-0.049	7	-0.676	6	-6.176	6	-0.011	1	-0.006	1	-0.077	1	0.000	0.025	0.303		6.176	
628	M63	4in Dia. Duct	Sec 4 - min	0.010	1	-0.013	1	0.017	1	-2.880	7	0.003	1	-5.756	7	0.079	1	0.000	1	0.002	1	0.001	0.110	0.213		5.756	
849	M65	4in Dia. Duct	Sec 5 - max	0.140	6	0.533	7	0.750	7	3.446	6	0.331	1	4.992	9	-0.282	1	0.079	6	0.180	6	0.012	0.126	0.185		4.992	
1221	M123	4in Dia. Duct	Sec 1 - max	0.14	6	0.034	1	-0.009	1	3.446	6	0.331	1	4.992	6	-0.282	1	0.079	6	0.180	6	0.012	0.126	0.185		4.992	

	Member	Duct,Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_a	f_b/σ_a	f_{sh}/σ_a		f_c (ksi)	
																									O-2250		
499	M50	6in Dia. Duct	Sec 5 - max	0.004	8	0.317	8	0.448	9	4.126	8	0.854	1	3.138	6	0.327	9	0.000	1	0.000	1	0.000	0.183	0.139		4.126	
500	M50	6in Dia. Duct	Sec 5 - min	-0.004	7	-0.339	7	-0.012	1	-0.854	1	-4.129	8	-0.327	9	-3.138	8	0.000	1	0.000	1	0.000	0.183	0.139		4.126	
619	M62	4in Dia. Duct	Sec 5 - max	0.398	7	0.556	7	0.005	1	0.010	1	1.645	7	-0.098	1	6.175	7	0.955	7	2.160	7	0.033	0.061	0.228		6.176	
919	M92	2in Dia. Duct	Sec 5 - max	0.065	7	0.044	3	-0.002	1	0.076	1	1.715	2	0.022	1	6.584	4	0.007	3	0.053	3	0.014	0.064	0.244		6.584	
16	M2	6in Dia. Duct	Sec 4 - min	0.008	1	-1.637	6	-0.007	8	0.087	1	-6.065	7	-1.161	6	-0.094	1	-0.419	9	-0.350	9	0.001	0.270	0.052		6.065	
357	M36	6in Dia. Duct	Sec 4 - max	0.138	8	0.115	9	0.100	7	2.283	8	0.162	1	4.692	9	-0.158	1	0.049	7	0.041	7	0.011	0.101	0.209		4.692	
358	M36	6in Dia. Duct	Sec 4 - min	-0.139	7	-0.226	6	-0.417	8	-0.162	1	-2.283	6	0.158	1	-4.692	9	-0.151	8	-0.126	8	0.011	0.101	0.209		4.692	
607	M61	4in Dia. Duct	Sec 4 - max	0.392	7	0.560	7	-0.001	1	0.034	1	1.976	7	-0.104	1	5.829	7	1.063	7	2.427	7	0.032	0.073	0.216		5.829	
637	M64	4in Dia. Duct	Sec 4 - max	0.224	6	0.552	7	0.074	7	-0.026	1	3.266	7	-0.044	1	4.903	6	0.257	7	0.586	7	0.019	0.121	0.182		4.903	
473	M48	6in Dia. Duct	Sec 2 - max	0.269	8	-0.020	9	0.002	8	3.931	8	4.058	9	-0.064	1	2.067	9	0.246	8	0.206	8	0.022	0.150	0.119		4.056	
604	M61	4in Dia. Duct	Sec 2 - min	0.013	1	-0.003	1	-0.264	6	-3.401	7	-0.047	1	-5.224	7	0.101	1	-0.002	1	-0.004	1	0.001	0.126	0.183		5.224	
612	M62	4in Dia. Duct	Sec 1 - min	0.013	1	-0.009	1	-0.070	6	-2.460	7	-0.025	1	-6.129	7	0.106	1	0.000	1	-0.001	1	0.001	0.092	0.227		6.129	
636	M64	4in Dia. Duct	Sec 3 - min	0.004	1	-0.015	1	0.025	1	-3.463	7	0.019	1	-5.139	6	0.054	1	0.000	1	0.000	1	0.000	0.128	0.190		5.139	
1010	M101	2in Dia. Duct	Sec 5 - min	0.090	1	0.021	6	0.000	1	0.096	7	-0.769	8	-7.604	8	-0.009	1	-0.006	1	-0.077	1	0.000	0.028	0.289		7.604	
387	M99	2in Dia. Duct	Sec 4 - max	0.085	5	-0.049	6	0.206	3	-0.663	5	0.895	4	7.153	3	0.097	1	0.026	2	0.384	2	0.019	0.033	0.265		7.153	
920	M92	2in Dia. Duct	Sec 5 - min	0.034	1	-0.030	2	-0.173	4	-1.715	2	-0.078	1	-6.584	4	-0.022	1	-0.005	2	-0.067	2	0.008	0.064	0.244		6.584	
107	M11	6in Dia. Duct	Sec 4 - max	0.011	6	-0.110	1	0.021	9	-0.693	1	5.020	7	0.013	1	1.044	6	0.259	1	0.205	1	0.001	0.268	0.046		6.020	
108	M11	6in Dia. Duct	Sec 4 - min	-0.011	7	-1.598	6	-0.021	7	-5.020	7	0.693	1	-1.044	6	-0.013	1	-0.495	8	-0.414	6	0.001	0.288	0.046		6.020	
19	M2	6in Dia. Duct	Sec 5 - max	0.150	6	-0.060	1	0.007	8	5.633	7	-0.044	1	0.094	1	1.159	8	0.244	1	0.204	1	0.013	0.250	0.052		5.633	
25	M3	6in Dia. Duct	Sec 3 - max	0.439	8	-0.088	1	0.006	8	4.899	7	-0.005	1	0.243	1	1.328	8	0.203	1	0.170	1	0.036	0.218	0.059		4.899	
359	M36	6in Dia. Duct	Sec 5 - min	0.138	6	0.112	9	0.099	7	2.084	7	0.110	1	4.717	9	-0.150	1	0.049	7	0.041	7	0.011	0.092	0.210		4.717	
360	M36	6in Dia. Duct	Sec 5 - min	-0.138	7	-0.227	6	-0.416	8	-0.110	1	-2.084	7	0.150	1	-4.717	9	-0.151	8	-0.126	8	0.011	0.092	0.210		4.717	
614	M62	4in Dia. Duct	Sec 2 - min	0.013	1	-0.010	1	-0.071	6	-2.271	7	-0.022	1	-6.141	7	0.104	1	0.000	1	-0.001	1	0.001	0.084	0.227		6.141	
650	M65	4in Dia. Duct	Sec 5 - min	0.000	1	-0.034	1	0.028	1	-0.331	1	-3.446	6	0.282	1	-4.992	9	-0.002	1	-0.005	1	0.000	0.128	0.185		4.992	
1222	M123	4in Dia. Duct	Sec 1 - min	0	1	-0.083	6	-0.164	9	-0.331	1	-3.446	6	0.282	1	-4.992	9	-0.002	1	-0.005	1	0.000	0.128	0.185		4.992	
474	M48	6in Dia. Duct	Sec 2 - min	-0.157	9	-0.369	6	-0.226	7	-4.056	9	-3.991	6	-2.867	9	0.064	1	-2.332	7	-1.952	7	0.013	0.150	0.119		4.056	
630	M63	4in Dia. Duct	Sec 5 - min	0.010	1	-0.013	1	0.017	1	-2.773	7	0.006	1	-5.617	7	0.072	1	0.000	1	0.002	1	0.001	0.103	0.208		5.617	
22	M3	6in Dia. Duct	Sec 1 - min	0.023	1	-1.301	6	-0.007	6	0.044	1	-5.633	7	-1.332	8	-0.243	1	-0.148	9	-0.125	9	0.002	0.250	0.059		5.633	
1012	M102	2in Dia. Duct	Sec 1 - min	0.000	1	0.021	8	0.000	1	-0.262	7	-0.553	8	-7.604	8	-0.009	1	-0.001	1	-0.020	1	0.000	0.020	0.289		7.604	
609	M61	4in Dia. Duct	Sec 5 - max	0.381	7	0.558	7	-0.001	1	0.024	1	1.267	7	-0.108	1	6.129	7	1.063	7	2.427	7	0.032	0.047	0.227		6.129	
606	M61	4in Dia. Duct	Sec 3 - min	0.013	1	-0.005	1	-0.266	6	-2.587	7	-0.042	1	-5.527	7	0.102	1	-0.002	1	-0.004	1	0.001	0.100	0.205		5.527	
618	M62	4in Dia. Duct	Sec 3 - min	0.013	1	-0.010	1	-0.071	6	-2.062	7	-0.016	1	-6.152	7	0.102	1	0.000	1	-0.001	1	0.001	0.076	0.228		6.152	
639	M64	4in Dia. Duct	Sec 5 - max	0.224	6	0.551	7	0.073	7	-0.031	1	3.049	7	-0.035	1	4.666	6	0.257	7	0.586	7	0.019	0.113	0.173		4.666	
641	M65	4in Dia. Duct	Sec 1 - max	0.135	6	0.851	7	0.760	7	-0.029	1	3.249	7	-0.035	1	4.666	6	0.079	6	0.180	6	0.011	0.120	0.173		4.666	
20	M2	6in Dia. Duct	Sec 5 - min	0.008	1	-1.639	6	-0.007	8	0.044	1	-5.633	7	-1.159	8	-0.094	1	-0.419	9	-0.350	9	0.001	0.250	0.052		5.633	
638	M64	4in Dia. Duct	Sec 4 - min	0.004	1	-0.015	1	0.025	1	-3.256	7	0.025	1	-4.903	9	0.044	1	0.000	1	0.000	1	0.000	0.121	0.182		4.903	
361	M37	6in Dia. Duct	Sec 1 - max	0.245	8	0.112	9	-0.005	1	1.620	8	0.099	1	4.717	9	-0.150	1	0.906	7	0.759	7	0.020	0.072	0.210		4.717	
1177	M118	2in Dia. Duct	Sec 4 - max	0.059	5	0.001	1	0.000	1	-0.039	1	3.174	2	-0.020	1	4.544	2	0.004	3	0.055	3	0.013	0.118	0.169		4.544	
363	M37	6in Dia. Duct	Sec 2 - max	0.245	8	0.112	9	-0.005	1	1.576	8	0.090	1	4.682	9	-0.149	1	0.906	7	0.759	7	0.020	0.070	0.208		4.682	
988	M99	2in Dia. Duct	Sec 4 - min	0.000	1	-0.053	4	0.000	1	-0.895	4	0.663	5	-0.097	1	-7.153	3	0.000	1	-0.002	1	0.000	0.033	0.265		7.153	
618	M62	4in Dia. Duct	Sec 4 - min	0.013	1	-0.011	1	-0.071	6	-1.854	7	-0.014	1	-6.164	7	0.100	1	0.000	1	-0.001	1	0.001	0.069	0.228		6.164	
849	M65	2in Dia. Duct	Sec 5 - max	0.119	7	0.039	7	0.033	6	0.830	8	-0.102	1	0.024	1	6.501	9	0.026	7	0.386	7	0.028	0.031	0.241		6.501	
31	M4	6in Dia. Duct	Sec 1 - max	0.656	6	-0.046	1	0.008	9	4.167	9	0.034	1	0.355	1	1.294	8	0.221	6	0.185	6	0.054	0.185	0.055		4.167	
27	M3	6in Dia. Duct	Sec 4 - max	0.440	8	-0.089	1	0.008	8	4.633	8	0.014	1	0.243	1	1.326	8	0.203	1	0.170	1	0.036	0.201	0.059		4.633	
24	M3	6in Dia. Duct	Sec 2 - min	0.023	1	-1.301	6	-0.007	8	0.025	1	-5.266	7	-1.330	6	-0.243	1	-0.148	9	-0.125	9	0.002	0.234	0.059		5.266	
365	M37	6in Dia. Duct	Sec 3 - max	0.245	8	0.111	9	-0.005	1	1.532	8	0.081	1	4.646	9	-0.148	1	0.906	7	0.759	7	0.020	0.066	0.207		4.646	
1213	M122	6in Dia. Duct	Sec 2 - max	0.013	8	0.436	6	0.122	6	-0.554	1	5.621	8	0.010	1	0.770	7	0.250	1	0.209	1	0.001	0.269	0.034		5.621	
1214	M122	6in Dia. Duct	Sec 2 - min	-0.013	7	0.058	1	0.000	1	-5.621	8	0.554	1	-0.770	7	-0.010	1	-0.495	6	-0.414	6	0.001	0.269	0.034		5.621	
642	M65	4in Dia. Duct	Sec 1 - min	0.000	1	-0.016	1	0.028	1	-3.249	7	0.029	1	-4.666	8	0.035	1	-0.002	1	-0.005	1	0.000	0.120	0.173		4.666	
362	M37	6in Dia. Duct	Sec 1 - min	-0.133	7	-0.227	6	-0.179	9	-0.099	1	-1.620	6	0.150	1	-4.717	9	-0.034	1	-0.029	1	0.011	0.072	0.210		4.717	
483	M49	6in Dia. Duct	Sec 2 - max	0.016	8	0.372	8	0.421	8	4.282	7	-0.006	8	-0.125	1	2.256	7	0.000	1	0.000	1	0.001	0.190	0.100		4.282	
484	M49	6in Dia. Duct	Sec 2 - min	-0.016	7	-0.265	7	-0.012	1	0.006	8	-4.282	7	-2.256	7	0.125	1	0.000	1	0.000	1	0.001	0.190	0.100		4.282	
1178	M119	2in Dia. Duct	Sec 4 - min	0.026	1	-0.063	2	-0.171	4	-3.174	2	0.039	1	-4.544	2	0.020	1	-0.010	2	-0.141	2	0.006	0.118	0.169		4.544	
367	M37	6in Dia. Duct	Sec 4 - max	0.245	8	0.111	9	-0.005	1	1.488	8	0.072	1	4.614	9	-0.147	1	0.906	7	0.759	7	0.020	0.066	0.205		4.614	
620	M62	4in Dia. Duct	Sec 5 - min	0.013	1	-0.011	1	-0.072	6	-1.645	7	-0.010	1	-6.175	7	0.098	1	0.000	1	-0.001	1	0.001	0.061	0.228		6.175	
606	M61	4in Dia. Duct	Sec 4 - min	0.013	1	-0.007	1	-0.268	6	-1.978	7	-0.034	1	-5.829	7	0.104	1	-0.002	1	-0.004	1	0.001	0.073	0.216		5.829	
369	M37	6in Dia. Duct	Sec 6 - max	0.245	8	0.111	9	-0.005	1	1.475	7	0.063	1	4.679	9	-0.146	1	0.906	7	0.759	7	0.020	0.068	0.204		4.679	
371	M38	6in Dia. Duct	Sec 1 - max	0.245	8	0.111	9	-0.005	1	1.475	7	0.063	1	4.679	9	-0.146	1	0.907	7	0.759	7	0.020	0.068	0.204		4.679	
364	M37	6in Dia. Duct	Sec 2 - min	-0.133	7	-0.227	6	-0.179	9	-0.090	1	-1.576	6	0.149	1	-4.682	9	-0.034	1	-0.029	1	0.011	0.070	0.208		4.682	
851	M65	2in Dia. Duct	Sec 1 - max	0.104	7	0.035	7	0.137	2	0.859	8	0.423	7	0.024	1	6.501	9	0.026	2	0.359	2	0.023	0.024	0.241		6.501	
640	M64	4in Dia. Duct	Sec 5 - min	0.004	1	-0.016	1	0.025	1	-3.049	7	0.031	1	-4.666	6	0.035	1	0.000	1	0.000	1	0.000	0.113	0.173		4.666	
1127	M113	2in Dia. Duct	Sec 4 - max	0.051	5	0.000	1	0.000	1	0.016	1	3.434	2	0.006	1	3.983	2	0.001	3	0.017	3	0.011	0.127	0.146		3.983	
368	M37	6in Dia. Duct	Sec 3 - min	-0.133	7	-0.228	6	-0.179	9	-0.081	1	-1.532	6	0.148	1	-4.648	9	-0.034	1	-0.028	1	0.011	0.068	0.207		4.648	
33	M4	6in Dia. Duct	Sec 2 - max	0.656	6	-0.047	1	0.009	9	3.921	9	0.047	1	0.355	1	1.292	8	0.221	6	0.185	6	0.054	0.174	0.057		3.921	
1017	M102	2in Dia. Duct	Sec 4 - max	0.083	5	-0.035	7	0.193	3	-0.419	5	0.762	4	6.437	3	0.026	1	0.023	2	0.318	2	0.016	0.026	0.238		6.437	
847	M65	2in Dia. Duct	Sec 4 - max	0.120	7	0.042	7	0.035	8	0.729	8	0.030	1	0.029	1	6.224	9	0.026	7	0.386	7	0.027	0.027	0.231		6.224	
849	M65	2in Dia. Duct	Sec 6 - max	0.091	7	0.036	8	0.000	1	0.476	2	0.143	1	0.016	1	6.625	4	0.004	7	0.060	7	0.020	0.016	0.246		6.625	
841	M65	2in Dia. Duct	Sec 1 - max	0.124	7	0.052	7	0.042	6	0.339	8	0.576	7	0.043	1	6.314	8	0.026	7	0.386	7	0.028	0.021	0.234		6.314	
366	M37	6in Dia. Duct	Sec 4 - min	-0.133	7	-0.228	6	-0.179	9	-0.072	1	-1.488	6	0.147	1	-4.614	9	-0.034	1	-0.028	1	0.011	0.066	0.205		4.614	
497	M50	6in Dia. Duct	Sec 4 - max	0.005	8	0.320	8	0.447	6	3.733	9	0.467	1	2.586	6	0.503	9	0.000	1	0.000	1	0.000	0.166	0.116		3.733	
498	M50	6in Dia. Duct	Sec 4 - min	-0.005	7	-0.337	7	-0.012	1	-0.467	1	-3.733	9	-0.503	9	-2.586	6	0.000	1	0.000	1	0.000	0.166	0.116		3.733	
1128	M113	2in Dia. Duct	Sec 4 - min	0.026	1	-0.060	2	-0.163	4	-3.434	2	-0.016	1	-3.983	2	-0.006	1	-0.013	2	-0.171	2	0.006	0.127	0.146		3.983	
29	M3	6in Dia. Duct	Sec 5 - max	0.440	8	-0.089	1	0.008	8	4.167	9	0.034	1	0.243	1	1.323	8	0.203	1	0.170	1	0.036	0.165	0.059		4.167	
370	M37	6in Dia. Duct	Sec 5 - min	-0.133	7	-0.228	6	-0.179	9	-0.063	1	-1.475	7	0.146	1	-4.579	9	-0.034	1	-0.028	1	0.011	0.066	0.204		4.579	
372	M38	6in Dia. Duct	Sec 1 - min	-0.133	7	-0.229	6	-0.179	9	-0.063	1	-1.475	7	0.146	1	-4.579	9	-0.034	1	-0.028	1	0.011	0.066	0.204		4.579	

D-2250

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_t/σ_c	f_{sy}/σ_c	f_{sz}/σ_c		f_t (ksi)
26	M3	6in Dia. Duct	Sec 3 - min	0.023	1	-1.301	6	-0.008	6	0.006	1	-4.899	7	-1.326	6	-0.243	1	-0.149	9	-0.125	9	0.002	0.218	0.059		4.899
845	M85	2in Dia. Duct	Sec 3 - max	0.121	7	0.046	7	0.036	6	0.613	8	0.177	1	0.034	1	6.116	8	0.028	7	0.368	7	0.027	0.023	0.227		6.116
843	M85	2in Dia. Duct	Sec 2 - max	0.123	7	0.049	7	0.040	6	0.483	8	0.367	7	0.038	1	6.216	8	0.028	7	0.368	7	0.027	0.018	0.230		6.216
957	M96	2in Dia. Duct	Sec 4 - max	0.098	5	-0.043	5	0.164	3	-0.377	5	0.597	1	6.251	3	0.052	1	0.016	2	0.245	2	0.022	0.022	0.232		6.251
610	M61	4in Dia. Duct	Sec 5 - min	0.013	1	-0.009	1	-0.267	6	-1.267	7	-0.024	1	-8.129	7	0.106	1	-0.002	1	-0.004	1	0.001	0.047	0.227		8.129
35	M4	6in Dia. Duct	Sec 3 - max	0.655	6	-0.047	1	0.009	9	3.875	9	0.000	1	0.355	1	1.289	8	0.221	6	0.185	6	0.054	0.162	0.057		3.875
951	M96	2in Dia. Duct	Sec 1 - max	0.115	7	0.036	5	0.146	2	0.042	6	0.066	1	0.018	1	6.625	4	0.018	2	0.245	2	0.026	0.002	0.245		6.625
959	M96	2in Dia. Duct	Sec 5 - min	0.098	5	0.016	1	0.091	1	0.000	1	1.681	2	5.069	5	0.015	1	-0.016	2	0.245	2	0.022	0.002	0.188		5.069
850	M85	2in Dia. Duct	Sec 5 - min	0.000	1	0.023	6	-0.065	9	0.102	1	-0.030	9	-8.501	9	-0.024	1	-0.005	1	-0.069	1	0.000	0.031	0.241		8.501
575	M58	6in Dia. Duct	Sec 3 - max	0.366	6	0.258	9	0.407	7	2.646	9	0.867	6	2.707	9	-0.126	1	0.071	1	0.032	1	0.032	0.118	0.120		2.707
1016	M102	2in Dia. Duct	Sec 4 - min	0.000	1	-0.061	6	0.000	1	-0.762	4	0.419	5	-0.025	1	-6.437	3	-0.001	1	-0.020	1	0.000	0.028	0.236		6.437
1077	M108	2in Dia. Duct	Sec 4 - max	0.054	7	0.000	1	0.000	1	-0.006	1	3.079	2	-0.004	1	3.782	2	0.002	3	0.029	3	0.012	0.114	0.140		3.782
852	M86	2in Dia. Duct	Sec 1 - min	0.000	1	0.023	6	0.000	1	-0.423	7	-0.659	8	-8.501	9	-0.024	1	0.000	1	-0.013	1	0.000	0.024	0.241		8.501
37	M4	6in Dia. Duct	Sec 4 - max	0.657	6	-0.047	1	0.009	9	3.429	9	0.074	1	0.355	1	1.267	8	0.221	6	0.185	6	0.054	0.162	0.057		3.429
950	M95	2in Dia. Duct	Sec 5 - min	0.000	1	0.033	4	-0.195	9	-0.143	1	-0.478	2	-6.625	4	-0.018	1	0.001	1	0.017	1	0.000	0.018	0.245		6.625
20	M3	6in Dia. Duct	Sec 4 - min	0.023	1	-1.302	8	-0.008	6	-0.014	1	-4.533	9	-1.326	8	-0.243	1	-0.149	9	-0.125	9	0.002	0.201	0.059		4.533
969	M99	2in Dia. Duct	Sec 5 - max	0.086	5	0.015	1	0.000	1	-0.027	1	1.501	2	5.043	5	0.005	1	0.028	2	0.384	2	0.019	0.056	0.187		5.043
1078	M108	2in Dia. Duct	Sec 4 - min	0.027	1	-0.066	2	-0.145	4	-3.076	2	0.006	1	-3.782	2	0.004	1	-0.012	2	-0.165	2	0.008	0.114	0.140		3.782
859	M86	2in Dia. Duct	Sec 6 - max	0.091	6	0.025	1	0.062	2	-0.278	1	1.136	4	5.296	9	-0.045	1	0.026	2	0.359	2	0.020	0.002	0.195		5.296
846	M85	2in Dia. Duct	Sec 4 - min	0.000	1	0.028	6	-0.066	9	-0.030	1	-0.729	8	-6.224	9	-0.029	1	-0.005	1	-0.069	1	0.000	0.027	0.231		6.224
587	M59	4in Dia. Duct	Sec 4 - max	0.462	7	-0.004	1	-0.001	1	0.212	1	2.668	6	-0.040	1	3.180	7	0.010	6	0.022	6	0.041	0.099	0.118		3.180
373	M38	6in Dia. Duct	Sec 2 - max	0.245	8	0.093	9	-0.005	1	2.178	7	0.514	8	3.140	9	-0.104	1	0.007	7	0.759	7	0.020	0.097	0.140		3.140
842	M85	2in Dia. Duct	Sec 1 - min	0.000	1	0.037	8	-0.076	9	-0.576	7	-0.339	8	-6.314	8	-0.043	1	-0.005	1	-0.069	1	0.000	0.021	0.234		6.314
423	M43	6in Dia. Duct	Sec 2 - max	0.180	6	0.070	9	0.323	9	3.344	6	1.245	8	2.080	6	1.046	9	1.016	9	0.850	9	0.013	0.149	0.092		3.344
959	M96	2in Dia. Duct	Sec 4 - min	0.000	1	-0.046	4	0.000	1	-0.597	1	0.377	5	-0.052	1	-6.251	3	-0.005	1	-0.068	1	0.000	0.022	0.232		6.251
39	M4	6in Dia. Duct	Sec 5 - max	0.657	6	-0.046	1	0.009	9	3.182	9	0.067	1	0.355	1	1.284	8	0.221	6	0.185	6	0.054	0.141	0.057		3.182
41	M5	6in Dia. Duct	Sec 1 - max	0.773	6	-0.017	1	0.009	9	3.182	9	0.087	1	0.413	1	1.058	8	0.478	8	0.400	8	0.063	0.141	0.047		4.616
105	M11	6in Dia. Duct	Sec 3 - max	0.010	9	-0.108	1	0.020	9	-0.587	1	4.616	7	0.013	1	1.026	6	0.260	1	0.209	1	0.001	0.205	0.046		4.616
106	M11	6in Dia. Duct	Sec 3 - min	-0.010	7	-1.596	6	-0.020	7	-4.616	7	0.597	1	-1.026	6	-0.013	1	-0.495	6	-0.414	6	0.001	0.205	0.046		4.716
377	M38	6in Dia. Duct	Sec 4 - max	0.245	8	0.058	9	-0.005	1	3.356	9	4.716	6	0.462	7	0.384	8	0.907	7	0.759	7	0.020	0.210	0.021		5.069
960	M96	2in Dia. Duct	Sec 5 - min	0.000	1	-0.049	5	-0.083	3	-1.681	2	0.000	1	-0.015	1	-5.069	5	-0.005	1	-0.066	1	0.000	0.002	0.188		6.116
848	M85	2in Dia. Duct	Sec 3 - min	0.000	1	0.030	8	-0.071	9	-0.177	1	-0.613	8	-6.116	8	-0.034	1	-0.005	1	-0.069	1	0.000	0.023	0.227		3.779
485	M49	6in Dia. Duct	Sec 3 - max	0.017	8	0.356	8	0.423	6	3.778	7	-0.444	1	-0.148	1	1.763	7	0.000	1	0.000	1	0.001	0.188	0.079		3.778
486	M49	6in Dia. Duct	Sec 3 - min	-0.017	7	-0.288	7	-0.012	1	0.444	1	-3.779	7	-1.763	7	0.146	1	0.000	1	0.000	1	0.000	0.166	0.079		6.216
844	M85	2in Dia. Duct	Sec 2 - min	0.000	1	0.033	8	-0.073	9	-0.367	7	-0.483	8	-6.216	8	-0.038	1	-0.005	1	-0.069	1	0.000	0.019	0.230		6.625
952	M96	2in Dia. Duct	Sec 1 - min	0.000	1	0.033	4	0.000	1	-0.008	1	-0.042	8	-6.625	4	-0.018	1	-0.005	1	-0.066	1	0.000	0.002	0.245		3.094
43	M5	6in Dia. Duct	Sec 2 - max	0.773	6	-0.017	1	0.010	9	3.094	9	0.092	1	0.413	1	1.056	8	0.478	8	0.400	8	0.063	0.138	0.047		3.140
374	M38	6in Dia. Duct	Sec 2 - min	-0.133	7	-0.246	6	-0.179	9	-0.514	8	-2.178	7	0.104	1	-3.140	9	-0.034	1	-0.026	1	0.011	0.097	0.140		4.167
30	M3	6in Dia. Duct	Sec 5 - min	0.023	1	-1.302	6	-0.008	6	-0.034	1	-4.167	9	-1.323	6	-0.243	1	-0.149	9	-0.125	9	0.002	0.185	0.059		2.707
578	M58	6in Dia. Duct	Sec 3 - min	-0.097	7	-0.018	1	-0.407	6	-0.867	6	-2.646	9	0.126	1	-2.707	9	-0.441	6	-0.369	6	0.008	0.118	0.120		4.167
32	M4	6in Dia. Duct	Sec 1 - min	0.035	1	-0.656	7	-0.008	7	-0.034	1	-4.167	9	-1.294	8	-0.355	1	0.132	1	0.111	1	0.003	0.185	0.056		3.134
327	M33	6in Dia. Duct	Sec 4 - max	0.133	8	0.152	6	0.252	9	2.142	9	0.144	1	3.134	9	-0.125	1	0.049	7	0.041	7	0.011	0.095	0.139		3.134
326	M33	6in Dia. Duct	Sec 4 - min	-0.133	9	-0.026	1	0.010	1	-0.144	1	-2.142	6	0.125	1	-3.134	9	-0.151	8	-0.126	8	0.011	0.095	0.139		3.006
45	M5	6in Dia. Duct	Sec 3 - max	0.773	6	-0.017	1	0.010	9	3.006	9	0.097	1	0.413	1	1.053	8	0.478	8	0.400	8	0.063	0.134	0.047		5.043
990	M99	2in Dia. Duct	Sec 5 - min	0.000	1	-0.035	5	-0.080	3	-1.501	2	0.027	1	-0.005	1	-5.043	5	0.000	1	-0.002	1	0.000	0.056	0.187		3.344
424	M43	6in Dia. Duct	Sec 2 - min	-0.010	9	-0.387	6	-0.323	8	-1.245	9	-3.344	6	-1.046	9	-2.080	6	0.021	1	0.018	1	0.001	0.149	0.092		4.716
376	M38	6in Dia. Duct	Sec 4 - min	-0.133	7	-0.281	8	-0.179	9	-4.716	8	-3.356	9	-0.384	8	-0.462	7	-0.034	1	-0.028	1	0.011	0.210	0.021		2.916
47	M5	6in Dia. Duct	Sec 4 - max	0.774	6	-0.017	1	0.010	9	2.916	9	0.102	1	0.413	1	1.050	8	0.478	8	0.400	8	0.063	0.130	0.047		3.337
495	M50	6in Dia. Duct	Sec 3 - max	0.006	8	0.322	6	0.449	6	3.337	8	0.284	1	2.036	6	0.681	9	0.000	1	0.000	1	0.000	0.148	0.090		3.337
496	M50	6in Dia. Duct	Sec 3 - min	-0.006	7	-0.334	7	-0.012	1	-0.284	1	-3.337	8	-0.681	9	-2.036	9	0.000	1	0.000	1	0.000	0.148	0.090		4.590
1019	M102	2in Dia. Duct	Sec 5 - max	0.083	5	0.015	1	0.000	1	-0.005	1	1.358	6	4.590	5	0.007	1	0.023	2	0.318	2	0.018	0.050	0.170		4.013
941	M95	2in Dia. Duct	Sec 1 - max	0.134	2	0.087	4	0.000	1	-1.306	1	1.624	8	4.013	5	0.005	1	0.004	7	0.060	7	0.030	0.060	0.149		5.296
860	M89	2in Dia. Duct	Sec 5 - min	0.000	1	-0.037	7	-0.038	3	-1.136	4	0.276	1	0.046	1	-5.296	9	0.000	1	-0.013	1	0.000	0.042	0.196		2.828
49	M8	6in Dia. Duct	Sec 6 - max	0.774	6	-0.017	1	0.011	9	2.828	9	0.105	1	0.413	1	1.047	8	0.478	8	0.400	8	0.063	0.126	0.047		2.831
61	M7	6in Dia. Duct	Sec 1 - max	0.777	6	-0.018	1	0.013	9	2.831	8	0.108	1	0.413	1	1.016	8	0.481	8	0.403	8	0.064	0.126	0.045		3.921
34	M4	6in Dia. Duct	Sec 2 - min	0.035	1	-0.669	7	-0.009	7	-0.047	1	-3.921	9	-1.292	8	-0.355	1	0.132	1	0.111	1	0.003	0.174	0.057		5.069
991	M97	2in Dia. Duct	Sec 1 - max	0.061	5	0.016	1	0.001	1	-0.084	1	0.855	5	5.069	5	0.015	1	0.056	2	0.767	2	0.014	0.032	0.188		2.747
63	M7	6in Dia. Duct	Sec 2 - max	0.777	6	-0.018	1	0.014	9	2.747	8	0.112	1	0.413	1	1.012	8	0.481	8	0.403	8	0.064	0.122	0.045		3.385
1223	M123	4in Dia. Duct	Sec 2 - max	0.143	8	0.019	1	-0.009	1	2.525	6	0.059	1	3.385	9	-0.193	1	0.079	6	0.160	6	0.012	0.094	0.125		2.828
51	M8	6in Dia. Duct	Sec 1 - max	0.788	8	0.011	9	0.011	8	0.418	1	0.871	8	0.106	1	2.820	9	0.591	8	0.494	8	0.065	0.039	0.126		2.820
63	M6	6in Dia. Duct	Sec 2 - max	0.789	8	0.011	9	0.011	9	0.418	1	0.864	8	0.106	1	2.831	8	0.591	8	0.494	8	0.065	0.038	0.125		2.831
59	M8	6in Dia. Duct	Sec 5 - max	0.791	8	0.013	9	0.013	9	0.418	1	0.839	8	0.106	1	2.814	8	0.591	8	0.494	8	0.065	0.037	0.126		2.814
56	M8	6in Dia. Duct	Sec 3 - max	0.790	8	0.012	9	0.012	9	0.418	1	0.856	8	0.106	1	2.822	8	0.591	8	0.494	8	0.065	0.038	0.125		2.822
67	M6	6in Dia. Duct	Sec 4 - max	0.790	8	0.013	9	0.013	9	0.418	1	0.846	8	0.106	1	2.828	8	0.591	8	0.494	8	0.065	0.038	0.125		5.296
861	M87	2in Dia. Duct	Sec 1 - max	0.073	7	0.025	1	-0.002	1	-0.091	7	0.403	6	5.296	9	-0.045	1	0.046	6	0.622	6	0.016	0.015	0.196		2.964
65	M7	6in Dia. Duct	Sec 3 - max	0.778	8	-0.019	1	0.014	9	2.964	8	0.117	1	0.413	1	1.008	8	0.481	8	0.403	8	0.064	0.118	0.045		3.875
36	M4	6in Dia. Duct	Sec 3 - min	0.035	1	-0.669	7	-0.009	7	-0.060	1	-3.875	9	-1.269	8	-0.355	1	0.132	1	0.111	1	0.003	0.163	0.057		2.860
67	M7	6in Dia. Duct	Sec 4 - max	0.778	8	-0.018	1	0.014	9	2.580	8	0.122	1	0.413	1	1.004	8	0.481	8	0.403	8	0.064	0.115	0.045		2.815
378	M38	6in Dia. Duct	Sec 3 - max	0.245	8	0.076	9	-0.005	1	2.815	9	2.623	6	1.731	7	-0.063	1	0.907	7	0.759	7	0.020	0.125	0.077		4.590
1020	M102	2in Dia. Duct	Sec 5 - min	0.000	1	-0.040	7	-0.070	3	-1.358	8	0.005	1	-0.007	1	-4.590	5	-0.001	1	-0.020	1	0.000	0.050	0.170		2.497
71	M8	6in Dia. Duct	Sec 1 - max	0.883	8	-0.054	1	0.015	9	2.497	8	0.128	1	0.366	1	1.232	8	0.216	8	0.181	8	0.054	0.111	0.055		5.069
962	M97	2in Dia. Duct	Sec 1 - min	0.000	1	-0.049	5	-0.155	9	-0.855	5	0.094	1	-0.015	1	-5.069	5	-0.003	1	-0.046	1	0.000	0.032	0.188		2.497
69	M7	6in Dia. Duct	Sec 6 - max	0.778	8	-0.018	1	0.016	9	2.497	8	0.128	1	0.413	1	1.000	8	0.481	8	0.403	8	0.064	0.111	0.044		3.385
1224	M123	4in Dia. Duct	Sec 2 - min	0	1	-0.098	6	-0.158	9	-0.059	1	-2.525	6	0.193	1	-3.385	9	-0.002	1	-0.005	1	0.000	0.094	0.125		3.180
586	M59	4in Dia. Duct	Sec 4 - min	0.017	1	-0.151	7	-0.252	7	-2.668	6	-0.212	1	-3.180	7	0.040	1	-0.022	9	-0.050	9	0.001	0.099	0.118		

D-2250

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_a	f_b/σ_a	f_s/σ_a		f_a (ksi)	
991	M100	2in Dia. Duct	Sec 1 - max	0.046	7	0.015	1	0.000	1	-0.023	1	0.536	8	5.043	5	0.005	1	0.059	2	0.801	2	0.010	0.020	0.187		5.043	
1215	M122	6in Dia. Duct	Sec 3 - max	0.015	6	0.428	6	0.118	6	-0.356	1	4.232	8	0.007	1	0.612	7	0.250	1	0.209	1	0.001	0.168	0.027		4.232	
1218	M122	6in Dia. Duct	Sec 3 - min	-0.015	7	0.05	1	0.000	1	-4.232	6	0.356	1	-0.612	7	-0.007	1	-0.485	6	-0.414	6	0.001	0.168	0.027		4.232	
917	M92	2in Dia. Duct	Sec 4 - max	0.059	7	0.033	3	-0.002	1	0.084	1	1.346	2	0.050	1	4.056	4	0.007	3	0.093	3	0.013	0.050	0.150		4.056	
376	M38	6in Dia. Duct	Sec 3 - min	-0.133	7	-0.283	8	-0.179	9	-2.523	6	-2.815	9	0.083	1	-1.731	7	-0.034	1	-0.028	1	0.011	0.125	0.077		2.815	
38	M4	6in Dia. Duct	Sec 4 - min	0.035	1	-0.870	7	-0.009	7	-0.074	1	-3.429	9	-1.287	8	-0.355	1	0.132	1	0.111	1	0.003	0.152	0.057		3.429	
862	M87	2in Dia. Duct	Sec 1 - min	0.000	1	-0.037	7	-0.122	9	-0.403	8	0.091	7	0.045	1	-5.298	9	0.009	1	0.089	1	0.000	0.015	0.199		5.298	
73	M8	6in Dia. Duct	Sec 2 - max	0.663	6	-0.054	1	0.015	9	2.251	8	0.143	1	0.355	1	1.228	8	0.216	8	0.181	8	0.054	0.100	0.055		2.251	
942	M95	2in Dia. Duct	Sec 1 - min	0.000	1	0.060	1	-0.108	5	-1.624	8	1.306	1	-0.005	1	-4.013	5	0.001	1	0.017	1	0.000	0.060	0.149		4.013	
992	M100	2in Dia. Duct	Sec 1 - min	0.000	1	-0.035	5	-0.152	9	-0.538	8	0.023	1	-0.005	1	-5.043	5	0.000	1	0.008	1	0.000	0.020	0.187		5.043	
569	M57	6in Dia. Duct	Sec 5 - max	0.414	8	0.249	8	0.263	9	-0.126	1	2.521	8	1.364	9	0.659	6	0.184	9	0.154	9	0.034	0.112	0.061		2.621	
593	M59	4in Dia. Duct	Sec 2 - max	0.502	7	0.022	1	-0.001	1	1.051	7	0.014	1	3.383	6	0.003	1	0.010	6	0.022	6	0.042	0.039	0.125		3.383	
816	M82	2in Dia. Duct	Sec 4 - min	0.028	1	-0.010	2	-0.182	4	-1.346	2	-0.084	1	-4.056	4	-0.050	1	-0.005	2	-0.087	2	0.008	0.050	0.150		4.056	
567	M67	6in Dia. Duct	Sec 4 - max	0.413	8	0.249	8	0.283	9	-0.124	1	2.590	8	1.283	9	0.653	6	0.184	9	0.154	9	0.034	0.115	0.057		2.590	
467	M49	6in Dia. Duct	Sec 4 - max	0.016	8	0.364	8	0.425	8	3.269	7	-0.262	1	0.193	8	1.332	9	-0.193	8	0.000	1	0.001	0.145	0.059		3.269	
468	M49	6in Dia. Duct	Sec 4 - min	-0.016	7	-0.292	7	-0.012	1	0.262	1	-3.269	7	-1.332	9	-0.193	8	0.000	1	0.000	1	0.001	0.145	0.059		3.269	
565	M57	6in Dia. Duct	Sec 3 - max	0.413	8	0.246	8	0.283	9	-0.122	1	2.680	8	1.203	9	0.651	6	0.184	9	0.154	9	0.034	0.118	0.063		2.680	
671	M56	6in Dia. Duct	Sec 1 - max	0.382	8	0.283	8	0.402	7	1.398	9	0.815	6	2.521	8	-0.126	1	0.071	1	0.059	1	0.031	0.062	0.112		2.521	
563	M57	6in Dia. Duct	Sec 2 - max	0.413	8	0.248	8	0.282	9	-0.121	1	2.730	8	1.123	9	0.646	6	0.184	9	0.154	9	0.034	0.121	0.050		2.730	
561	M57	6in Dia. Duct	Sec 1 - max	0.412	8	0.249	8	0.282	9	-0.119	1	2.799	8	1.042	9	0.646	6	0.184	9	0.154	9	0.034	0.124	0.046		2.799	
963	M97	2in Dia. Duct	Sec 2 - max	0.089	6	0.009	1	0.001	1	0.006	1	1.284	6	3.829	5	0.007	1	0.056	2	0.767	2	0.013	0.046	0.142		3.829	
573	M58	6in Dia. Duct	Sec 2 - max	0.384	8	0.286	9	0.405	7	2.019	9	0.839	6	1.820	9	-0.126	1	0.071	1	0.059	1	0.031	0.090	0.081		2.019	
40	M4	6in Dia. Duct	Sec 5 - min	0.036	1	-0.870	7	-0.008	7	-0.087	1	-3.182	9	-1.284	8	-0.355	1	0.132	1	0.111	1	0.003	0.141	0.057		3.182	
1021	M103	2in Dia. Duct	Sec 1 - max	0.048	7	0.015	1	0.000	1	-0.032	1	0.535	8	4.590	5	0.007	1	0.052	2	0.704	2	0.011	0.020	0.170		4.590	
75	M8	6in Dia. Duct	Sec 3 - max	0.663	6	-0.054	1	0.015	9	2.005	8	0.166	1	0.355	1	1.224	8	0.216	8	0.181	8	0.054	0.089	0.054		2.005	
493	M50	6in Dia. Duct	Sec 2 - max	0.000	8	0.325	8	0.444	6	2.937	8	0.103	1	1.467	6	0.851	9	0.000	1	0.000	1	0.000	0.131	0.066		2.937	
494	M50	6in Dia. Duct	Sec 2 - min	-0.009	7	-0.331	7	-0.012	1	-0.103	1	-2.937	8	-0.851	9	-1.467	8	0.000	1	0.000	1	0.000	0.131	0.066		2.937	
559	M56	6in Dia. Duct	Sec 5 - max	0.428	8	-0.017	1	0.282	9	-0.119	1	2.799	8	0.645	9	0.259	6	0.408	9	0.342	9	0.035	0.124	0.035		2.799	
557	M56	6in Dia. Duct	Sec 4 - max	0.427	8	-0.017	1	0.282	9	-0.114	1	2.774	8	0.765	9	0.256	6	0.408	9	0.342	9	0.035	0.123	0.034		2.774	
42	M5	6in Dia. Duct	Sec 1 - min	0.042	1	-0.312	7	-0.009	8	-0.087	1	-3.182	9	-1.056	8	-0.413	1	0.041	1	0.034	1	0.003	0.141	0.047		3.182	
947	M95	2in Dia. Duct	Sec 4 - max	0.090	2	-0.022	4	0.000	1	0.653	2	-0.365	1	0.014	1	3.728	8	0.004	7	0.080	7	0.021	0.032	0.138		3.728	
983	M99	2in Dia. Duct	Sec 2 - max	0.090	7	0.000	5	0.169	9	0.815	5	-0.057	7	0.011	1	3.738	3	0.028	2	0.384	2	0.021	0.030	0.138		3.738	
1022	M103	2in Dia. Duct	Sec 1 - min	0.000	1	-0.040	7	-0.140	9	-0.535	8	0.032	1	-0.007	1	-4.590	5	0.000	1	-0.012	1	0.000	0.020	0.170		4.590	
984	M97	2in Dia. Duct	Sec 2 - min	0.000	1	-0.056	5	-0.151	9	-1.284	5	-0.006	1	-0.007	1	-3.829	5	-0.003	1	-0.046	1	0.000	0.046	0.142		3.829	
103	M11	6in Dia. Duct	Sec 2 - max	0.010	6	-0.108	1	0.019	9	-0.492	1	3.218	7	0.013	1	1.008	6	0.250	1	0.209	1	0.001	0.143	0.045		3.218	
104	M11	6in Dia. Duct	Sec 2 - min	-0.010	7	-1.594	8	-0.019	7	-3.218	7	0.492	1	-1.008	8	-0.013	1	-0.485	6	-0.414	6	0.001	0.143	0.045		3.218	
853	M86	2in Dia. Duct	Sec 2 - max	0.099	7	0.017	7	0.120	5	0.960	6	-0.313	7	0.032	1	3.501	9	0.026	2	0.359	2	0.022	0.038	0.130		3.501	
44	M5	6in Dia. Duct	Sec 2 - min	0.042	1	-0.313	7	-0.010	6	-0.092	1	-3.094	9	-1.056	8	-0.413	1	0.041	1	0.034	1	0.003	0.138	0.047		3.094	
583	M57	2in Dia. Duct	Sec 2 - max	0.089	7	0.015	1	-0.002	1	0.027	1	0.793	8	3.863	9	-0.025	1	0.048	6	0.822	6	0.015	0.029	0.143		3.863	
555	M56	6in Dia. Duct	Sec 3 - max	0.427	8	-0.017	1	0.282	9	-0.109	1	2.748	8	0.685	9	0.254	6	0.408	9	0.342	9	0.035	0.122	0.030		2.748	
77	M8	6in Dia. Duct	Sec 4 - max	0.664	6	-0.055	1	0.016	9	1.759	8	0.174	1	0.355	1	1.220	8	0.216	8	0.181	8	0.054	0.078	0.054		1.759	
709	M71	4in Dia. Duct	Sec 5 - max	0.318	7	-0.010	1	-0.001	1	0.138	7	-0.016	1	1.049	7	4.120	6	0.016	8	0.037	8	0.027	0.005	0.153		4.120	
711	M72	4in Dia. Duct	Sec 1 - max	0.318	7	0.010	1	0.124	8	0.138	7	-0.016	1	1.049	7	4.120	6	0.016	8	0.037	8	0.027	0.005	0.153		4.120	
891	M70	4in Dia. Duct	Sec 1 - max	0.359	6	0.011	1	0.044	7	0.332	7	0.000	1	3.828	6	0.488	9	0.033	6	0.076	6	0.030	0.012	0.142		3.828	
570	M57	6in Dia. Duct	Sec 5 - min	-0.139	7	-0.358	9	-0.019	1	-2.521	8	0.128	1	-0.658	6	-1.364	9	-0.527	6	-0.441	6	0.011	0.112	0.061		2.621	
46	M5	6in Dia. Duct	Sec 3 - min	0.043	1	-0.313	7	-0.010	8	-0.087	1	-3.005	9	-1.053	8	-0.413	1	0.041	1	0.034	1	0.004	0.134	0.047		3.005	
1013	M102	2in Dia. Duct	Sec 2 - max	0.084	7	0.010	7	0.153	6	0.622	8	-0.382	7	-0.002	1	3.578	3	0.023	2	0.318	2	0.021	0.030	0.133		3.578	
568	M57	6in Dia. Duct	Sec 4 - min	-0.139	7	-0.358	9	-0.019	1	-2.590	8	0.124	1	-0.653	6	-1.283	9	-0.527	6	-0.441	6	0.011	0.115	0.057		2.590	
566	M57	6in Dia. Duct	Sec 3 - min	-0.139	7	-0.357	9	-0.019	1	-2.660	8	0.122	1	-0.651	6	-1.203	9	-0.527	6	-0.441	6	0.011	0.116	0.053		2.660	
553	M56	6in Dia. Duct	Sec 2 - max	0.427	8	-0.016	1	0.281	9	-0.104	1	2.723	8	0.605	9	0.252	8	0.408	9	0.342	9	0.035	0.121	0.027		2.723	
564	M57	6in Dia. Duct	Sec 2 - min	-0.140	7	-0.357	9	-0.019	1	-2.730	8	0.121	1	-0.648	6	-1.123	9	-0.527	6	-0.441	6	0.011	0.121	0.050		2.730	
572	M58	6in Dia. Duct	Sec 1 - min	-0.101	7	-0.019	1	-0.402	8	-0.615	6	-1.398	9	0.128	1	-2.521	8	-0.441	6	-0.369	6	0.008	0.062	0.112		2.521	
562	M57	6in Dia. Duct	Sec 1 - min	-0.140	7	-0.358	9	-0.019	1	-2.799	8	0.119	1	-0.646	6	-1.042	9	-0.527	6	-0.441	6	0.011	0.124	0.046		2.799	
993	M100	2in Dia. Duct	Sec 2 - max	0.043	7	0.009	1	0.000	1	0.076	1	0.922	5	3.830	5	0.005	1	0.059	2	0.801	2	0.010	0.030	0.142		3.830	
693	M70	4in Dia. Duct	Sec 2 - max	0.358	6	0.011	1	0.044	7	0.330	7	-0.004	1	3.754	6	0.551	9	0.033	6	0.078	6	0.030	0.012	0.139		3.754	
689	M69	4in Dia. Duct	Sec 5 - max	0.360	6	0.011	1	0.367	7	0.251	7	0.019	1	3.828	6	0.488	9	0.061	6	0.140	6	0.030	0.009	0.142		3.828	
647	M65	4in Dia. Duct	Sec 4 - max	0.139	6	0.536	7	0.753	7	1.656	6	0.235	1	2.724	9	-0.203	1	0.079	6	0.180	6	0.012	0.069	0.101		2.724	
650	M66	4in Dia. Duct	Sec 5 - max	0.184	8	-0.030	7	0.143	8	-0.022	7	0.218	1	4.249	8	3.543	7	0.079	6	0.180	6	0.015	0.008	0.157		4.249	
651	M67	4in Dia. Duct	Sec 1 - max	0.184	8	0.028	1	0.654	7	-0.022	7	0.218	1	4.249	8	3.543	7	0.079	6	0.180	6	0.015	0.008	0.157		4.249	
48	M5	6in Dia. Duct	Sec 4 - min	0.043	1	-0.313	7	-0.010	8	-0.102	1	-2.916	9	-1.050	8	-0.413	1	0.041	1	0.034	1	0.004	0.130	0.047		2.916	
965	M97	2in Dia. Duct	Sec 3 - max	0.057	5	0.002	1	0.001	1	0.052	1	1.767	5	2.743	2	-0.002	1	0.056	2	0.767	2	0.013	0.085	0.102		2.743	
574	M58	6in Dia. Duct	Sec 2 - min	-0.099	7	-0.019	1	-0.405	8	-0.839	6	-2.019	9	0.126	1	-1.820	9	-0.441	6	-0.369	6	0.008	0.080	0.081		2.019	
687	M69	4in Dia. Duct	Sec 4 - max	0.360	8	0.012	1	0.367	7	0.252	7	0.023	1	3.787	8	0.385	9	0.061	6	0.140	6	0.030	0.009	0.136		3.787	
686	M70	4in Dia. Duct	Sec 3 - max	0.358	6	0.010	1	0.045	7	0.329	7	-0.005	1	3.680	6	0.613	9	0.033	6	0.076	6	0.030	0.012	0.136		3.680	
551	M56	6in Dia. Duct	Sec 1 - max	0.426	8	-0.016	1	0.281	9	-0.100	1	2.698	8	0.525	9	0.250	8	0.408	9	0.342	9	0.035	0.120	0.023		2.698	
560	M58	6in Dia. Duct	Sec 5 - min	-0.197	7	-0.226	9	-0.019	1	-2.799	8	0.119	1	-0.258	6	-0.845	9	-0.635	6	-0.531	6	0.016	0.124	0.038		2.799	
1175	M116	2in Dia. Duct	Sec 3 - max	0.082	5	0.001	1	0.000	1	-0.060	1	2.343	4	-0.022	1	2.129	2	0.004	3	0.055	3	0.012	0.087	0.079		2.343	
685	M69	4in Dia. Duct	Sec 3 - max	0.360	8	0.012	1	0.367	7	0.254	7	0.028	1	3.888	6	0.281	9	0.061	6	0.140	6	0.030	0.009	0.137		3.888	
697	M70	4in Dia. Duct	Sec 4 - max	0.358	6	0.009	1	0.045	7	0.327	7	-0.011	1	3.606	6	0.676	9	0.033	6	0.076	6	0.030	0.012	0.134		3.606	
60	M5	6in Dia. Duct	Sec 5 - min	0.043	1	-0.314	7	-0.011	6	-0.100	1	-2.828	9	-1.047	8	-0.413	1	0.041	1	0.034	1	0.004	0.126	0.047		2.828	
79	M8	6in Dia. Duct	Sec 5 - max	0.664	6	-0.055	1	0.016	9	1.513	8	0.189	1	0.355	1	1.215	8	0.216	8	0.181	8	0.054	0.067	0.054		1.513	
1151	M110	2in Dia. Duct	Sec 1 - max	0.081	5	0.043	5	0.001	1	-0.049	1	2.965	5	1.404	2	0.065	1	0.025	3	0.347	3	0.014	0.110	0.052		2.965	
62	M7	6in Dia. Duct	Sec 1 - min	0.046	1	-0.318	7	-0.013	7	-0.109	1	-2.831	8	-1.018	8	-0.413	1	0.041	1	0.034	1	0.004	0.126	0.046		2.831	
1153	M116	2in Dia. Duct	Sec 2 - max	0.081	5	0.043	5	0.001	1	-0.047	1	2.953	5	1.386	2	0.064	1	0.025	3	0.347	3	0.014	0.109	0.051		2.953	
683	M69	4in Dia. Duct	Sec 2 - max	0.360	8	0.013	1	0.367	7	0.254	7	0.032	1	3.615	6	0.177	9	0.061	6	0.140	6	0.030	0.009	0.134		3.615	

D-2250

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_a	f_{sy}/σ_s	f_{sz}/σ_s	f_c (ksi)
558	M56	6in Dia. Duct	Sec 4 - min	-0.197	7	-0.228	9	-0.019	1	-2.774	8	0.114	1	-0.256	6	+0.765	9	-0.635	6	-0.531	6	0.016	0.123	0.034	2.774
699	M70	4in Dia. Duct	Sec 5 - max	0.358	6	0.009	1	0.045	7	0.324	7	-0.015	1	3.531	6	0.738	9	0.033	6	0.076	8	0.030	0.012	0.131	3.531
864	M87	2in Dia. Duct	Sec 2 - min	0.000	1	-0.047	7	-0.115	9	-0.793	8	-0.027	1	0.025	1	-3.893	9	0.006	1	0.089	1	0.000	0.029	0.143	3.893
984	M100	2in Dia. Duct	Sec 2 - min	0.000	1	-0.041	5	-0.147	8	-0.822	6	-0.075	1	-0.005	1	-3.830	6	0.000	1	0.008	1	0.000	0.030	0.142	3.830
1155	M116	2in Dia. Duct	Sec 3 - max	0.061	5	0.043	5	0.001	1	-0.049	1	2.941	5	1.302	2	0.064	1	0.025	3	0.347	3	0.014	0.109	0.049	2.941
681	M69	4in Dia. Duct	Sec 1 - max	0.360	6	0.013	1	0.367	7	0.255	7	0.037	1	3.544	6	0.074	9	0.061	6	0.140	6	0.030	0.009	0.131	3.544
64	M7	6in Dia. Duct	Sec 2 - min	0.046	1	-0.316	7	-0.014	7	-0.112	1	-2.747	8	-1.012	8	-0.413	1	0.041	1	0.034	1	0.004	0.122	0.045	2.747
1141	M115	2in Dia. Duct	Sec 1 - max	0.085	5	-0.008	5	0.001	1	-0.035	1	2.958	5	1.263	2	0.034	1	0.039	5	0.532	5	0.014	0.110	0.047	2.958
701	M71	4in Dia. Duct	Sec 1 - max	0.520	7	0.009	1	-0.001	1	0.341	6	-0.024	1	3.531	6	0.738	9	0.016	9	0.037	8	0.027	0.013	0.131	3.531
1023	M105	2in Dia. Duct	Sec 2 - max	0.047	7	0.006	1	0.000	1	0.081	1	0.846	5	3.476	5	0.004	1	0.052	2	0.704	2	0.010	0.031	0.129	3.476
1167	M116	2in Dia. Duct	Sec 4 - max	0.061	5	0.043	5	0.001	1	-0.051	1	2.930	5	1.296	2	0.064	1	0.025	3	0.347	3	0.014	0.109	0.049	2.930
1178	M118	2in Dia. Duct	Sec 3 - min	0.020	1	+0.032	2	-0.163	6	-2.343	4	0.000	1	-2.129	2	0.022	1	-0.010	2	-0.141	2	0.004	0.087	0.079	2.343
489	M49	6in Dia. Duct	Sec 5 - max	0.015	8	0.301	8	0.420	6	2.753	7	-0.073	1	0.939	6	1.042	9	0.000	1	0.000	1	0.001	0.122	0.046	2.753
490	M48	6in Dia. Duct	Sec 5 - min	-0.016	7	-0.298	7	-0.012	1	0.073	1	-2.753	7	-1.042	9	-0.939	6	0.000	1	0.000	1	0.001	0.122	0.046	2.753
710	M71	4in Dia. Duct	Sec 5 - min	-0.145	8	-0.027	6	-0.386	6	0.016	1	-0.138	7	-4.120	6	-1.049	7	-0.003	7	-0.007	7	0.012	0.005	0.153	4.120
712	M72	4in Dia. Duct	Sec 1 - min	-0.145	8	0.006	7	-0.035	7	0.018	1	-0.138	7	-4.120	6	-1.049	7	-0.003	7	-0.007	7	0.012	0.005	0.153	4.120
948	M95	4in Dia. Duct	Sec 4 - min	0.000	1	-0.029	1	-0.088	4	0.385	1	-0.853	2	-3.726	6	-0.014	1	0.001	1	0.017	1	0.000	0.032	0.138	3.726
849	M85	4in Dia. Duct	Sec 4 - min	0.000	1	-0.029	1	0.026	1	-0.235	1	-1.866	6	0.203	1	-2.724	9	-0.002	1	-0.005	1	0.000	0.089	0.101	2.724
1143	M115	2in Dia. Duct	Sec 2 - max	0.085	5	-0.008	5	0.001	1	-0.037	1	2.959	5	1.227	2	0.034	1	0.039	5	0.532	5	0.014	0.110	0.045	2.959
491	M50	6in Dia. Duct	Sec 1 - max	0.007	8	0.328	6	0.443	6	2.753	7	-0.073	1	0.939	6	1.042	9	0.000	1	0.000	1	0.001	0.122	0.046	2.753
492	M50	6in Dia. Duct	Sec 1 - min	-0.007	7	-0.329	7	-0.012	1	0.073	1	-2.753	7	-1.042	9	-0.939	6	0.000	1	0.000	1	0.001	0.122	0.046	2.753
72	M8	6in Dia. Duct	Sec 1 - min	0.040	1	-0.881	7	+0.015	7	-0.128	1	-2.497	8	+1.232	6	-0.355	1	0.132	1	0.111	1	0.003	0.111	0.055	2.497
556	M56	6in Dia. Duct	Sec 3 - min	-0.197	7	-0.227	9	-0.019	1	-2.748	8	0.109	1	-0.254	6	-0.685	9	-0.635	6	-0.531	6	0.016	0.122	0.030	2.748
1161	M117	2in Dia. Duct	Sec 1 - max	0.049	5	0.086	5	0.001	1	-0.053	1	2.918	5	1.342	2	0.085	1	0.011	3	0.150	3	0.011	0.108	0.050	2.918
984	M98	2in Dia. Duct	Sec 2 - min	0.000	1	-0.004	4	0.000	1	0.857	7	-0.815	8	-3.738	3	-0.011	1	0.000	1	-0.002	1	0.000	0.030	0.138	3.738
1159	M116	2in Dia. Duct	Sec 5 - max	0.062	5	0.042	5	0.001	1	-0.063	1	2.916	5	1.258	2	0.063	1	0.025	3	0.347	3	0.014	0.108	0.047	2.916
1145	M115	2in Dia. Duct	Sec 3 - max	0.085	5	-0.008	5	0.001	1	-0.040	1	2.901	5	1.191	2	0.034	1	0.039	5	0.532	5	0.014	0.110	0.044	2.901
52	M8	6in Dia. Duct	Sec 1 - min	0.044	1	-0.011	6	-0.011	6	-0.871	8	-0.418	1	-2.828	8	-0.106	1	-0.008	1	-0.008	1	0.004	0.039	0.123	2.828
54	M8	6in Dia. Duct	Sec 2 - min	0.045	1	-0.011	6	-0.011	6	-0.854	8	-0.418	1	-2.820	8	-0.106	1	-0.008	1	-0.008	1	0.004	0.039	0.125	2.820
427	M43	6in Dia. Duct	Sec 4 - max	0.171	6	0.092	9	0.334	8	-0.337	1	0.857	6	2.590	7	1.560	8	1.016	9	0.650	9	0.014	0.038	0.115	2.590
66	M7	6in Dia. Duct	Sec 3 - min	0.047	1	-0.316	7	-0.014	7	-0.117	1	-2.684	8	-1.008	8	-0.413	1	0.041	1	0.034	1	0.004	0.118	0.045	2.684
988	M97	2in Dia. Duct	Sec 3 - min	0.000	1	-0.063	5	-0.146	5	-1.767	5	-0.052	1	0.002	1	-2.743	2	-0.003	1	+0.046	1	0.000	0.065	0.102	2.743
60	M6	6in Dia. Duct	Sec 5 - min	0.047	1	-0.013	6	-0.013	6	-0.839	8	-0.418	1	-2.631	8	-0.106	1	-0.008	1	-0.008	1	0.004	0.037	0.123	2.631
1147	M115	2in Dia. Duct	Sec 4 - max	0.086	5	-0.007	5	0.001	1	-0.043	1	2.983	5	1.155	2	0.034	1	0.039	5	0.532	5	0.014	0.110	0.043	2.983
56	M8	6in Dia. Duct	Sec 3 - min	0.046	1	-0.012	6	-0.012	6	-0.856	8	-0.418	1	-2.814	8	-0.106	1	-0.008	1	-0.008	1	0.004	0.038	0.125	2.814
58	M8	6in Dia. Duct	Sec 4 - min	0.048	1	+0.013	6	+0.013	6	-0.848	8	-0.418	1	+2.822	8	-0.106	1	-0.008	1	-0.008	1	0.004	0.038	0.125	2.822
584	M58	4in Dia. Duct	Sec 2 - min	0.030	1	-0.135	7	+0.270	7	-0.014	1	-1.051	7	-0.003	1	-3.383	6	-0.022	9	+0.050	9	0.003	0.038	0.125	3.383
1163	M117	2in Dia. Duct	Sec 2 - max	0.049	5	0.086	5	0.001	1	-0.053	1	2.895	5	1.308	2	0.085	1	0.011	3	0.150	3	0.011	0.107	0.048	2.895
954	M86	2in Dia. Duct	Sec 2 - min	0.000	1	0.001	3	0.000	1	0.313	7	-0.090	8	-3.501	9	-0.032	1	0.000	1	-0.013	1	0.000	0.036	0.130	3.501
1149	M115	2in Dia. Duct	Sec 5 - max	0.085	5	+0.007	5	0.001	1	+0.046	1	2.965	5	1.119	2	0.033	1	0.039	5	0.532	5	0.014	0.110	0.041	2.965
660	M66	4in Dia. Duct	Sec 6 - min	0.000	1	-0.032	8	-0.135	7	-0.216	1	0.022	7	-3.543	7	-4.249	8	-0.002	1	-0.005	1	0.000	0.008	0.157	4.249
662	M67	4in Dia. Duct	Sec 1 - min	0.000	1	0.008	6	-0.308	8	-0.216	1	0.022	7	+3.543	7	-4.249	8	-0.002	1	-0.005	1	0.000	0.008	0.157	4.249
1195	M113	2in Dia. Duct	Sec 3 - max	0.045	5	0.000	1	0.000	1	0.015	1	2.304	4	0.007	1	1.891	2	0.001	3	0.017	3	0.010	0.085	0.070	2.304
692	M70	4in Dia. Duct	Sec 1 - min	-0.131	8	-0.006	6	-0.406	8	0.000	1	-0.332	7	-0.468	9	-3.828	6	0.008	1	0.019	1	0.011	0.012	0.142	3.828
1165	M117	2in Dia. Duct	Sec 3 - max	0.049	5	0.086	5	0.001	1	-0.054	1	2.871	5	1.269	2	0.084	1	0.011	3	0.150	3	0.011	0.108	0.047	2.871
554	M56	6in Dia. Duct	Sec 2 - min	-0.197	7	-0.227	9	-0.019	1	-2.723	8	0.104	1	-0.252	6	-0.605	9	-0.635	6	+0.531	6	0.016	0.121	0.027	2.723
1152	M116	2in Dia. Duct	Sec 1 - min	0.000	1	-0.006	1	+0.136	5	-2.965	5	0.048	1	-0.065	1	+1.404	2	-0.003	1	-0.034	1	0.001	0.110	0.052	2.965
66	M7	6in Dia. Duct	Sec 4 - min	0.047	1	-0.316	7	+0.014	7	-0.122	1	-2.580	8	-1.004	8	-0.413	1	0.041	1	0.034	1	0.004	0.115	0.045	2.580
1014	M102	2in Dia. Duct	Sec 2 - min	0.000	1	-0.003	8	0.000	1	0.392	7	-0.822	6	-3.678	3	0.002	1	-0.001	1	-0.020	1	0.000	0.030	0.133	3.678
691	M90	2in Dia. Duct	Sec 1 - max	0.065	7	0.053	7	-0.002	1	+0.006	1	2.891	5	1.086	6	-0.124	1	0.021	3	0.291	3	0.014	0.107	0.049	2.901
694	M70	4in Dia. Duct	Sec 2 - min	-0.130	9	-0.007	6	-0.409	8	0.004	1	-0.330	7	-0.551	9	-3.754	6	0.008	1	0.019	1	0.011	0.012	0.139	3.754
1187	M117	2in Dia. Duct	Sec 4 - max	0.049	5	0.088	5	0.001	1	-0.054	1	2.848	5	1.233	2	0.084	1	0.011	3	0.150	3	0.011	0.105	0.046	2.848
643	M65	4in Dia. Duct	Sec 2 - max	0.136	6	0.547	7	0.757	7	-0.084	1	1.579	7	0.044	1	2.478	6	0.079	6	0.180	6	0.011	0.056	0.092	2.478
549	M55	6in Dia. Duct	Sec 5 - max	0.377	6	-0.024	1	0.281	9	-0.100	1	2.698	8	0.241	4	-0.156	6	0.497	9	0.416	9	0.031	0.120	0.011	2.698
1154	M116	2in Dia. Duct	Sec 2 - min	0.000	1	-0.007	1	-0.136	5	-2.953	5	0.047	1	-0.064	1	+1.368	2	-0.003	1	-0.034	1	0.001	0.109	0.051	2.953
997	M97	2in Dia. Duct	Sec 4 - max	0.055	5	+0.005	1	0.001	1	0.042	1	2.305	5	1.715	2	-0.011	1	0.066	2	0.767	2	0.012	0.085	0.064	2.305
893	M90	2in Dia. Duct	Sec 2 - max	0.065	7	0.053	7	-0.002	1	-0.008	1	2.886	5	1.083	6	-0.123	1	0.021	3	0.291	3	0.014	0.107	0.039	2.886
1024	M103	2in Dia. Duct	Sec 2 - min	0.000	1	-0.047	7	-0.135	9	-0.846	6	-0.061	1	-0.004	1	-3.476	5	0.000	1	-0.012	1	0.000	0.031	0.129	3.476
81	M9	6in Dia. Duct	Sec 1 - max	0.447	6	+0.082	1	0.016	8	1.613	8	0.189	1	0.240	1	1.261	8	0.203	1	0.170	1	0.037	0.067	0.066	1.613
1169	M117	2in Dia. Duct	Sec 5 - max	0.049	5	0.088	5	0.001	1	-0.055	1	2.825	5	1.196	2	0.084	1	0.011	3	0.150	3	0.011	0.105	0.044	2.825
1126	M113	2in Dia. Duct	Sec 3 - min	0.020	1	-0.069	2	-0.142	4	-2.304	4	-0.015	1	-1.891	2	-0.007	1	-0.013	2	-0.171	2	0.004	0.085	0.070	2.304
1156	M116	2in Dia. Duct	Sec 3 - min	0.006	1	+0.007	1	-0.138	5	-2.941	5	0.049	1	-0.064	1	-1.332	2	+0.003	1	-0.034	1	0.001	0.109	0.049	2.941
696	M70	4in Dia. Duct	Sec 3 - min	-0.130	9	-0.008	6	-0.409	8	0.008	1	-0.328	7	-0.613	9	-3.680	6	0.008	1	0.019	1	0.011	0.012	0.139	3.680
552	M56	6in Dia. Duct	Sec 1 - min	-0.197	7	-0.226	9	-0.019	1	-2.658	8	0.100	1	-0.250	6	-0.525	9	-0.635	6	-0.531	6	0.016	0.120	0.023	2.658
1162	M117	2in Dia. Duct	Sec 1 - min	0.007	1	-0.002	1	-0.136	5	-2.918	5	0.053	1	-0.085	1	-1.342	2	-0.002	2	-0.025	2	0.002	0.108	0.050	2.918
895	M90	2in Dia. Duct	Sec 3 - max	0.065	7	0.052	7	+0.002	1	-0.011	1	2.872	5	1.039	6	-0.123	1	0.021	3	0.291	3	0.014	0.106	0.038	2.872
70	M7	6in Dia. Duct	Sec 6 - min	0.047	1	-0.319	7	-0.015	7	-0.128	1	-2.497	8	-1.000	8	-0.413	1	0.041	1	0.034	1	0.004	0.111	0.044	2.497
663	M67	4in Dia. Duct	Sec 2 - max	0.186	6	0.024	1	0.653	7	-0.005	7	0.174	1	3.706	8	2.389	7	0.079	6	0.180	6	0.016	0.006	0.137	3.706
611	M92	2in Dia. Duct	Sec 1 - max	0.040	7	0.019	7	-0.002	1	0.109	1	1.451	5	2.600	6	-0.135	1	0.007	3	0.093	3	0.009	0.054	0.096	2.600
74	M6	6in Dia. Duct	Sec 2 - min	0.040	1	-0.881	7	-0.015	7	-0.143	1	-2.251	8	-1.228	6	-0.355	1	0.132	1	0.111	1	0.003	0.100	0.055	2.251
897	M90	2in Dia. Duct	Sec 4 - max	0.065	7	0.052	7	-0.002	1	-0.013	1	2.856	5	1.014	6	-0.122	1	0.021	3	0.291	3	0.014	0.106	0.038	2.856
1158	M116	2in Dia. Duct	Sec 4 - min	0.006	1	-0.007	1	-0.136	5	-2.930	5	0.051	1	-0.064	1	-1.296	2	-0.003	1	-0.034	1	0.001	0.109	0.048	2.930
679	M68	4in Dia. Duct	Sec 5 - max	0.284	6	0.013	1	0.593	7	0.108	7	0.048	1	3.544	6	0.074	9	0.076	6	0.170	6	0.022	0.004	0.131	3.544
1142	M115	2in Dia. Duct	Sec 1 - min	0.004	1	-0.021	4	-0.137	5	-2.958	5	0.035	1	-0.034	1	-1.253	2	-0.003	1	-0.044	1	0.001	0.110	0.047	2.958
1164	M117	2in Dia. Duct	Sec 2 - min	0.007	1	-0.002	1	-0.136	5	-2.895	5	0.053	1	-0.085	1	-1.306	2	-0.002	2	-0.025	2	0.002	0.107	0.049	2.895

AS-124

D-2250

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_a	f_b/σ_a	f_s/σ_a	f_c (ksi)
901	M91	2in Dia. Duct	Sec 1 - max	0.050	7	0.099	7	-0.002	1	-0.016	1	2.844	5	1.098	6	-0.163	1	0.012	3	0.159	3	0.011	0.105	0.041	2.844
890	M89	4in Dia. Duct	Sec 5 - min	-0.071	9	-0.006	6	-0.455	8	-0.019	1	-0.251	7	-0.488	9	-3.828	8	0.007	1	0.016	1	0.000	0.009	0.142	3.828
881	M80	2in Dia. Duct	Sec 1 - max	0.070	7	0.091	2	-0.002	1	0.008	1	2.901	5	0.919	6	-0.066	1	0.032	6	0.430	6	0.016	0.107	0.034	2.901
1171	M118	2in Dia. Duct	Sec 1 - max	0.040	5	0.001	1	0.000	1	-0.102	1	1.290	5	2.735	6	0.025	1	0.004	3	0.055	3	0.009	0.047	0.101	2.735
805	M87	2in Dia. Duct	Sec 3 - max	0.095	7	0.005	1	-0.002	1	0.147	1	1.304	5	2.529	6	-0.004	1	0.046	6	0.622	6	0.015	0.048	0.094	2.529
698	M70	4in Dia. Duct	Sec 4 - min	-0.130	9	-0.008	6	-0.409	8	0.011	1	-0.327	7	-0.676	9	-3.606	6	0.006	1	0.019	1	0.011	0.012	0.134	3.606
698	M90	2in Dia. Duct	Sec 5 - max	0.065	7	0.052	7	-0.002	1	-0.016	1	2.844	5	0.989	6	-0.122	1	0.021	3	0.291	3	0.014	0.105	0.037	2.844
883	M89	2in Dia. Duct	Sec 2 - max	0.070	7	0.000	2	-0.002	1	0.005	1	2.900	5	0.894	6	-0.065	1	0.032	6	0.430	6	0.016	0.107	0.033	2.900
1160	M116	2in Dia. Duct	Sec 5 - min	0.005	1	-0.007	1	-0.136	5	-2.818	5	0.055	1	-0.063	1	-1.259	2	-0.003	1	-0.054	1	0.001	0.106	0.047	2.918
702	M71	4in Dia. Duct	Sec 1 - min	-0.150	9	-0.009	6	-0.377	8	0.024	1	-0.341	6	-0.736	9	-3.531	6	-0.003	7	-0.007	7	0.013	0.013	0.131	3.531
1144	M115	2in Dia. Duct	Sec 2 - min	0.004	1	-0.021	4	-0.137	5	-2.869	5	0.037	1	-0.034	1	-1.227	2	-0.003	1	-0.044	1	0.001	0.110	0.045	2.869
1131	M114	2in Dia. Duct	Sec 1 - max	0.059	5	-0.011	1	0.001	1	-0.022	1	2.899	5	0.940	2	0.000	1	0.050	2	0.688	2	0.013	0.107	0.035	2.816
903	M91	2in Dia. Duct	Sec 2 - max	0.050	7	0.097	7	-0.002	1	-0.016	1	2.818	5	1.074	6	-0.162	1	0.012	3	0.159	3	0.011	0.104	0.040	2.901
885	M89	2in Dia. Duct	Sec 3 - max	0.070	7	0.000	2	-0.002	1	0.001	1	2.901	5	0.870	6	-0.065	1	0.032	6	0.430	6	0.016	0.107	0.032	2.133
1075	M106	2in Dia. Duct	Sec 3 - max	0.048	7	0.000	1	0.000	1	-0.016	1	2.133	2	-0.002	1	1.766	2	0.002	3	0.029	3	0.011	0.070	0.065	2.901
963	M96	2in Dia. Duct	Sec 2 - max	0.108	7	0.010	5	0.123	9	0.738	3	-0.609	1	-0.006	1	2.601	3	0.018	2	0.245	2	0.024	0.027	0.104	2.692
547	M55	6in Dia. Duct	Sec 4 - max	0.377	6	-0.023	1	0.261	7	-0.093	1	2.592	5	0.210	4	-0.111	5	0.497	9	0.416	9	0.031	0.115	0.009	2.871
1166	M117	2in Dia. Duct	Sec 3 - min	0.007	1	-0.002	1	-0.135	5	-2.671	5	0.054	1	-0.064	1	-1.269	2	-0.002	2	-0.025	2	0.002	0.106	0.047	2.746
995	M100	2in Dia. Duct	Sec 3 - max	0.041	7	0.002	1	0.000	1	0.117	1	1.188	5	2.748	2	0.005	1	0.039	2	0.601	2	0.009	0.044	0.102	2.981
1146	M115	2in Dia. Duct	Sec 3 - min	0.004	1	-0.021	4	-0.137	5	-2.961	5	0.040	1	-0.034	1	-1.191	2	-0.003	1	-0.044	1	0.001	0.110	0.044	2.913
1133	M114	2in Dia. Duct	Sec 2 - max	0.059	5	-0.011	1	0.001	1	-0.025	1	2.913	5	0.904	2	-0.001	1	0.050	2	0.669	2	0.013	0.108	0.033	2.935
259	M26	6in Dia. Duct	Sec 5 - max	0.145	8	-0.025	7	0.235	9	-0.089	7	0.273	8	0.000	1	2.936	7	0.049	7	0.041	7	0.012	0.012	0.130	2.757
888	M89	4in Dia. Duct	Sec 4 - min	-0.071	9	-0.008	6	-0.455	8	-0.023	1	-0.252	7	-0.386	9	-3.767	8	0.007	1	0.016	1	0.000	0.009	0.139	2.901
887	M89	2in Dia. Duct	Sec 4 - max	0.070	7	0.000	2	-0.002	1	-0.002	1	2.901	5	0.845	6	-0.064	1	0.032	6	0.430	6	0.016	0.107	0.031	2.926
1135	M114	2in Dia. Duct	Sec 3 - max	0.059	5	-0.011	1	0.001	1	-0.029	1	2.926	5	0.868	2	-0.001	1	0.050	2	0.688	2	0.013	0.108	0.032	3.531
700	M70	4in Dia. Duct	Sec 6 - min	-0.130	9	-0.009	6	-0.409	8	0.015	1	-0.324	7	-0.738	9	-3.531	6	0.006	1	0.019	1	0.011	0.012	0.131	2.901
889	M89	2in Dia. Duct	Sec 5 - max	0.070	7	0.000	2	-0.002	1	-0.006	1	2.901	5	0.821	6	-0.064	1	0.032	6	0.430	6	0.016	0.107	0.030	2.863
1148	M115	2in Dia. Duct	Sec 4 - min	0.004	1	-0.021	4	-0.137	5	-2.893	5	0.043	1	-0.034	1	-1.155	2	-0.003	1	-0.044	1	0.001	0.110	0.043	2.580
429	M43	6in Dia. Duct	Sec 4 - min	0.002	8	-0.398	8	-0.394	8	-0.857	6	0.337	1	-1.580	8	-2.698	7	0.021	1	0.016	1	0.000	0.036	0.115	2.791
905	M91	2in Dia. Duct	Sec 3 - max	0.050	7	0.097	7	-0.002	1	-0.017	1	2.791	5	1.049	6	-0.162	1	0.012	3	0.159	3	0.011	0.103	0.039	2.951
228	M23	6in Dia. Duct	Sec 5 - max	0.170	8	0.000	7	0.000	1	0.093	7	0.178	8	0.000	1	2.951	9	0.008	7	0.007	7	0.014	0.008	0.131	2.943
1137	M114	2in Dia. Duct	Sec 4 - max	0.059	5	-0.012	1	0.001	1	-0.032	1	2.943	5	0.832	2	-0.002	1	0.050	2	0.688	2	0.013	0.109	0.031	2.848
1168	M117	2in Dia. Duct	Sec 4 - min	0.007	1	-0.002	1	-0.135	5	-2.848	5	0.054	1	-0.064	1	-1.233	2	-0.002	2	-0.025	2	0.002	0.105	0.046	2.938
1139	M114	2in Dia. Duct	Sec 6 - max	0.059	5	-0.012	1	0.001	1	-0.035	1	2.938	5	0.785	2	-0.002	1	0.050	2	0.688	2	0.013	0.110	0.029	2.905
1150	M115	2in Dia. Duct	Sec 5 - min	0.004	1	-0.021	4	-0.136	5	-2.986	5	0.046	1	-0.033	1	-1.119	2	-0.003	1	-0.044	1	0.001	0.110	0.041	2.800
912	M92	2in Dia. Duct	Sec 1 - min	0.009	1	-0.005	5	-0.145	2	-1.451	5	-0.109	1	0.135	1	-2.600	6	-0.005	2	-0.067	2	0.002	0.054	0.096	3.686
688	M69	4in Dia. Duct	Sec 3 - min	-0.071	9	-0.005	6	-0.455	8	-0.028	1	-0.254	7	-0.281	9	-3.686	6	0.007	1	0.016	1	0.000	0.009	0.137	2.922
227	M23	6in Dia. Duct	Sec 4 - max	0.170	8	0.000	7	0.000	1	0.093	7	0.174	8	0.000	1	2.922	9	0.008	7	0.007	7	0.014	0.008	0.130	2.765
907	M91	2in Dia. Duct	Sec 4 - max	0.050	7	0.097	7	-0.002	1	-0.016	1	2.765	5	1.024	6	-0.162	1	0.012	3	0.159	3	0.011	0.102	0.039	3.371
657	M66	2in Dia. Duct	Sec 4 - max	0.091	5	-0.027	7	0.147	3	0.111	5	0.161	4	3.371	3	-0.047	1	0.028	2	0.359	2	0.020	0.006	0.125	2.825
1170	M117	2in Dia. Duct	Sec 5 - min	0.007	1	-0.002	1	-0.135	5	-2.825	5	0.055	1	-0.064	1	-1.198	2	-0.002	2	-0.025	2	0.002	0.105	0.044	2.951
231	M24	6in Dia. Duct	Sec 1 - max	0.178	8	0.000	7	0.036	9	0.081	7	0.104	8	0.000	1	2.951	9	0.029	7	0.024	7	0.015	0.005	0.131	2.478
644	M65	4in Dia. Duct	Sec 2 - min	0.000	1	-0.020	1	0.026	1	-1.979	7	0.084	1	-2.479	6	-0.044	1	-0.002	1	-0.006	1	0.000	0.068	0.092	3.348
677	M68	4in Dia. Duct	Sec 4 - max	0.264	8	0.014	1	0.593	7	0.107	7	0.054	1	3.348	6	-0.006	1	0.078	6	0.178	6	0.022	0.004	0.124	2.894
225	M23	6in Dia. Duct	Sec 3 - max	0.170	8	0.000	7	0.000	1	0.093	7	0.170	8	0.000	1	2.894	9	0.008	7	0.007	7	0.014	0.008	0.129	2.941
233	M24	6in Dia. Duct	Sec 2 - max	0.178	8	-0.001	7	0.036	9	0.080	7	0.108	8	0.000	1	2.941	9	0.029	7	0.024	7	0.015	0.005	0.131	2.930
235	M24	6in Dia. Duct	Sec 3 - max	0.178	8	-0.002	7	0.037	9	0.080	7	0.113	8	0.000	1	2.930	9	0.029	7	0.024	7	0.015	0.005	0.130	2.920
237	M24	6in Dia. Duct	Sec 4 - max	0.178	8	-0.003	7	0.037	9	0.079	7	0.118	8	0.000	1	2.920	9	0.029	7	0.024	7	0.015	0.005	0.130	2.739
909	M91	2in Dia. Duct	Sec 6 - max	0.050	7	0.097	7	-0.002	1	-0.019	1	2.739	5	0.999	6	-0.161	1	0.012	3	0.159	3	0.011	0.101	0.037	2.735
1172	M116	2in Dia. Duct	Sec 1 - min	0.007	1	-0.043	4	-0.169	5	-1.290	5	0.102	1	-0.025	1	-2.736	5	-0.010	2	-0.141	2	0.002	0.047	0.101	2.909
239	M24	6in Dia. Duct	Sec 5 - max	0.178	8	-0.003	7	0.038	9	0.078	7	0.124	8	0.000	1	2.909	9	0.029	7	0.024	7	0.015	0.006	0.129	2.901
892	M90	2in Dia. Duct	Sec 1 - min	0.007	1	-0.008	1	-0.095	8	-2.901	5	0.086	1	0.124	1	-1.058	6	0.005	1	0.066	1	0.002	0.107	0.040	3.615
684	M69	4in Dia. Duct	Sec 2 - min	-0.071	9	-0.005	6	-0.455	8	-0.032	1	-0.254	7	-0.177	9	-3.615	6	0.007	1	0.016	1	0.000	0.009	0.134	2.698
550	M55	6in Dia. Duct	Sec 5 - min	-0.224	7	-0.409	8	-0.019	1	-2.698	8	0.100	1	0.158	5	-0.241	4	-0.644	6	-0.539	6	0.018	0.120	0.011	2.305
968	M97	2in Dia. Duct	Sec 4 - min	0.000	1	-0.069	5	-0.142	5	-2.305	5	-0.042	1	0.011	1	-1.715	2	-0.003	1	-0.046	1	0.000	0.085	0.084	2.501
1025	M103	2in Dia. Duct	Sec 3 - max	0.044	7	0.001	1	0.000	1	0.099	1	1.254	7	2.501	2	0.001	1	0.052	2	0.704	2	0.010	0.046	0.093	2.133
1076	M106	2in Dia. Duct	Sec 3 - min	0.020	1	-0.057	2	-0.135	6	-2.133	2	0.018	1	-1.766	2	0.002	1	-0.012	2	-0.169	2	0.004	0.079	0.065	2.468
545	M55	6in Dia. Duct	Sec 3 - max	0.376	8	-0.023	1	0.281	7	-0.087	1	2.468	8	0.167	8	-0.057	7	0.497	9	0.416	9	0.031	0.110	0.008	2.865
223	M23	6in Dia. Duct	Sec 2 - max	0.170	8	0.001	7	0.000	1	0.093	7	0.165	8	0.000	1	2.865	9	0.008	7	0.007	7	0.014	0.007	0.127	2.844
902	M91	2in Dia. Duct	Sec 1 - min	0.009	1	-0.003	1	-0.095	8	-2.844	5	0.016	1	0.163	1	-1.098	6	0.002	2	0.028	2	0.002	0.106	0.041	2.886
694	M90	2in Dia. Duct	Sec 2 - min	0.007	1	-0.009	1	-0.095	8	-2.886	5	0.008	1	0.123	1	-1.083	6	0.005	1	0.066	1	0.002	0.107	0.039	2.234
539	M64	6in Dia. Duct	Sec 5 - max	0.269	8	0.128	7	0.282	7	-0.074	1	2.234	8	0.591	6	0.406	9	0.438	9	0.386	9	0.022	0.099	0.028	2.836
221	M23	6in Dia. Duct	Sec 1 - max	0.168	8	0.002	7	0.000	1	0.093	7	0.161	8	0.000	1	2.836	9	0.008	7	0.007	7	0.014	0.007	0.128	2.005
76	M6	6in Dia. Duct	Sec 3 - min	0.041	1	-0.592	7	-0.015	7	-0.158	1	-2.005	8	-1.224	8	-0.355	1	0.132	1	0.111	1	0.003	0.059	0.054	3.544
682	M68	4in Dia. Duct	Sec 1 - min	-0.071	9	-0.004	6	-0.455	8	-0.037	1	-0.255	7	-0.074	9	-3.544	6	0.007	1	0.016	1	0.000	0.009	0.131	2.836
219	M22	6in Dia. Duct	Sec 5 - max	0.136	8	0.002	7	0.000	1	0.091	7	0.210	8	0.000	1	2.836	9	-0.013	9	-0.011	9	0.011	0.009	0.136	3.023
707	M71	4in Dia. Duct	Sec 4 - max	0.319	7	-0.005	1	-0.001	1	0.209	7	-0.041	1	1.416	7	3.023	8	0.016	8	0.037	8	0.027	0.008	0.112	2.672
896	M90	2in Dia. Duct	Sec 3 - min	0.007	1	-0.008	1	-0.095	8	-2.872	5	0.011	1	0.123	1	-1.039	6	0.005	1	0.066	1	0.002	0.106	0.038	2.816
904	M91	2in Dia. Duct	Sec 2 - min	0.009	1	-0.003	1	-0.095	8	-2.816	5	0.016	1	0.162	1	-1.074	6	0.002	2	0.028	2	0.002	0.104	0.040	2.312
1051	M106	2in Dia. Duct	Sec 1 - max	0.050	7	0.027	5	0.000	1	-0.015	1	2.312	7	1.330	2	0.017	1	0.022	3	0.302	3	0.011	0.056	0.049	2.745
996	M100	2in Dia. Duct	Sec 3 - min	0.000	1	-0.048	5	-0.142	9	-1.186	5	-0.117	1	-0.005	1	-2.745	2	0.009	1	0.008	1	0.000	0.044	0.102	2.858
698	M90	2in Dia. Duct	Sec 4 - min	0.009	1	-0.009	1	-0.095	8	-2.858	5	0.013	1	0.122	1	-1.014	6	0.005	1	0.066	1	0.002	0.105	0.038	2.149
1101	M111	2in Dia. Duct	Sec 1 - max	0.046	5	0.024	7	0.000	1	0.014	1	2.148	5	1.486	2	-0.010	1	0.024	3	0.323	3	0.010	0.080	0.055	2.909
241	M25	6in Dia. Duct	Sec 1 - max	0.159	8	-0.003	7	0.169	9	0.054	7	0.032	8	0.000	1	2.909	9	0.045	7	0.037	7	0.013	0.002	0.129	1.819
99	M10	6in Dia. Duct	Sec 5 - max	0.164	8	-0.102	1	0.016	8	-0.398	1	1.819	7	0.094	1	1.133	8	0.244	1	0.204	1	0.013	0.061	0.060	

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_a	f_b/σ_a	f_s/σ_a		f_e (ksi)	
																								0.2250			
1053	M108	2in Dia. Duct	Sec 2 - max	0.050	7	0.028	6	0.000	1	-0.017	1	2.304	7	1.299	2	0.017	1	0.022	3	0.302	3	0.011	0.085	0.048		2.304	
230	M23	6in Dia. Duct	Sec 5 - min	-0.066	7	-0.016	8	-0.215	6	-0.178	8	-0.093	7	-2.951	9	0.000	1	-0.095	8	-0.080	8	0.005	0.008	0.131		2.951	
906	M91	2in Dia. Duct	Sec 3 - min	0.005	1	-0.003	1	-0.095	8	-2.791	5	0.017	1	0.162	1	-1.049	6	0.002	2	0.028	2	0.002	0.103	0.039		2.791	
543	M55	6in Dia. Duct	Sec 2 - max	0.376	8	-0.022	1	0.281	7	-0.080	1	2.350	8	0.192	1	0.023	7	0.497	9	0.416	9	0.031	0.104	0.009		2.350	
900	M90	2in Dia. Duct	Sec 5 - min	0.006	1	-0.009	1	-0.096	8	-2.844	5	0.016	1	0.122	1	-0.868	6	0.005	1	0.068	1	0.002	0.105	0.037		2.844	
654	M67	4in Dia. Duct	Sec 2 - min	0.000	1	0.006	6	-0.307	8	-0.174	1	0.005	7	-2.359	7	-3.706	8	-0.002	1	-0.006	1	0.000	0.006	0.137		3.706	
1103	M111	2in Dia. Duct	Sec 2 - max	0.046	5	0.024	7	0.000	1	0.012	1	2.142	5	1.460	2	-0.010	1	0.024	3	0.323	3	0.010	0.079	0.054		2.142	
217	M22	6in Dia. Duct	Sec 4 - max	0.136	8	0.002	7	0.000	1	0.090	7	0.206	8	0.000	1	2.773	9	-0.013	9	-0.011	9	0.011	0.009	0.123		2.773	
220	M22	6in Dia. Duct	Sec 5 - min	-0.089	7	-0.014	8	-0.229	6	-0.210	6	-0.091	7	-2.835	9	0.000	1	-0.052	6	-0.043	6	0.009	0.009	0.125		2.836	
969	M97	2in Dia. Duct	Sec 5 - max	0.053	6	-0.011	1	0.001	1	-0.022	1	2.889	5	0.853	2	-0.019	1	0.056	2	0.767	2	0.012	0.107	0.024		2.899	
63	M9	6in Dia. Duct	Sec 2 - max	0.448	6	-0.093	1	0.016	6	1.142	8	0.213	1	0.243	1	1.256	8	0.203	1	0.170	1	0.037	0.051	0.059		1.256	
1059	M108	2in Dia. Duct	Sec 3 - max	0.060	7	0.026	6	0.000	1	-0.019	1	2.297	7	1.266	2	0.017	1	0.022	3	0.302	3	0.011	0.085	0.047		2.297	
228	M23	6in Dia. Duct	Sec 4 - min	-0.085	7	-0.016	8	-0.215	6	-0.174	8	-0.093	7	-2.922	9	0.000	1	-0.095	8	-0.080	8	0.005	0.008	0.130		2.922	
675	M68	4in Dia. Duct	Sec 3 - max	0.284	6	0.015	1	0.693	7	0.107	7	0.059	1	3.151	6	-0.006	1	0.076	8	0.176	6	0.022	0.004	0.117		3.151	
540	M54	6in Dia. Duct	Sec 5 - min	-0.216	7	-0.684	6	-0.019	1	-2.234	8	0.074	1	-0.406	9	-0.581	6	-0.553	6	-0.463	8	0.016	0.059	0.026		2.234	
871	M88	2in Dia. Duct	Sec 1 - max	0.065	7	-0.015	1	-0.002	1	0.024	1	2.844	5	0.616	2	0.002	1	0.042	6	0.573	6	0.014	0.105	0.023		2.844	
261	M27	6in Dia. Duct	Sec 1 - max	0.001	7	0.016	8	0.119	7	-0.099	7	0.273	8	0.000	1	2.935	7	0.049	7	0.041	7	0.000	0.012	0.130		2.935	
262	M27	6in Dia. Duct	Sec 1 - min	-0.001	8	0.009	7	0.000	1	-0.273	8	0.099	7	-2.935	7	0.000	1	-0.151	8	-0.126	8	0.000	0.012	0.130		2.935	
1132	M114	2in Dia. Duct	Sec 1 - min	0.002	1	-0.057	3	-0.138	5	-2.889	6	0.022	1	0.000	1	-0.940	2	-0.003	1	-0.047	1	0.000	0.107	0.038		2.889	
662	M69	2in Dia. Dict	Sec 1 - min	0.005	1	-0.013	1	-0.095	8	-2.901	5	-0.008	1	0.066	1	-0.819	6	0.006	1	0.084	1	0.001	0.107	0.034		2.901	
260	M26	6in Dia. Duct	Sec 5 - min	0.000	1	-0.040	6	-0.235	7	-0.273	8	0.099	7	-2.935	7	0.000	1	-0.151	8	-0.126	8	0.000	0.012	0.130		2.935	
243	M25	6in Dia. Duct	Sec 2 - max	0.159	6	-0.004	7	0.166	9	0.053	7	0.037	8	0.000	1	2.861	9	0.045	7	0.037	7	0.013	0.002	0.127		2.861	
548	M56	6in Dia. Duct	Sec 4 - min	-0.224	7	-0.408	8	-0.019	1	-2.592	8	0.093	1	0.111	5	-0.210	4	-0.644	8	-0.539	6	0.018	0.115	0.009		2.592	
908	M91	2in Dia. Duct	Sec 4 - min	0.009	1	-0.003	1	-0.095	8	-2.765	5	0.016	1	0.162	1	-1.024	6	0.002	2	0.028	2	0.002	0.102	0.038		2.765	
521	M53	6in Dia. Duct	Sec 1 - max	0.197	8	0.220	7	0.267	7	1.052	8	1.041	7	0.766	6	1.767	9	0.345	9	0.299	9	0.016	0.047	0.079		1.787	
522	M53	6in Dia. Duct	Sec 1 - min	-0.197	7	-0.746	8	-0.019	1	-1.041	7	-1.052	8	-1.767	9	-0.766	6	-0.474	6	-0.397	6	0.016	0.047	0.079		1.787	
673	M68	2in Dia. Duct	Sec 2 - max	0.065	7	-0.015	1	-0.002	1	0.020	1	2.858	5	0.593	2	0.003	1	0.042	6	0.573	6	0.014	0.106	0.022		2.858	
1106	M111	2in Dia. Duct	Sec 3 - max	0.046	5	0.023	7	0.000	1	0.010	1	2.135	5	1.425	2	-0.010	1	0.024	3	0.323	3	0.010	0.079	0.053		2.135	
869	M87	2in Dia. Duct	Sec 3 - min	0.000	1	-0.057	7	-0.108	9	-1.304	8	-0.147	1	0.004	1	-2.529	8	0.000	1	0.089	1	0.000	0.048	0.034		2.529	
975	M88	2in Dia. Duct	Sec 3 - max	0.065	7	-0.015	1	-0.002	1	0.018	1	2.872	5	0.569	2	0.003	1	0.042	6	0.573	6	0.014	0.108	0.021		2.872	
1057	M108	2in Dia. Duct	Sec 4 - max	0.051	7	0.026	6	0.000	1	-0.021	1	2.290	7	1.234	2	0.017	1	0.022	3	0.302	3	0.011	0.085	0.046		2.290	
1134	M114	2in Dia. Duct	Sec 2 - min	0.002	1	-0.057	3	-0.137	5	-2.913	5	0.025	1	0.001	1	-0.904	2	-0.003	1	-0.047	1	0.000	0.108	0.033		2.913	
884	M89	2in Dia. Duct	Sec 2 - min	0.005	1	-0.013	1	-0.095	8	-2.800	5	-0.005	1	0.065	1	-0.894	6	0.006	1	0.084	1	0.001	0.107	0.033		2.800	
1041	M105	2in Dia. Duct	Sec 1 - max	0.052	7	-0.011	1	0.000	1	-0.003	1	2.297	7	1.214	2	0.009	1	0.034	9	0.468	9	0.012	0.085	0.045		2.297	
677	M68	2in Dia. Duct	Sec 4 - max	0.065	7	-0.015	1	-0.002	1	0.012	1	2.886	5	0.544	2	0.004	1	0.042	6	0.573	6	0.014	0.107	0.020		2.886	
199	M20	6in Dia. Duct	Sec 5 - max	0.100	9	-0.047	1	0.089	9	-0.344	1	0.366	8	2.632	9	0.000	1	-0.022	9	-0.019	9	0.008	0.016	0.117		2.632	
200	M20	6in Dia. Duct	Sec 5 - min	-0.100	6	-0.049	8	0.000	1	-0.366	8	0.344	1	0.000	1	-2.632	9	-0.028	6	-0.024	6	0.008	0.016	0.117		2.632	
201	M21	6in Dia. Duct	Sec 1 - max	0.100	9	0.044	7	0.000	1	-0.344	1	0.366	8	2.632	9	0.000	1	-0.022	9	-0.019	9	0.008	0.016	0.117		2.632	
202	M21	6in Dia. Duct	Sec 1 - min	-0.100	7	0.028	9	-0.292	9	-0.366	8	0.344	1	0.000	1	-2.632	9	-0.028	6	-0.024	6	0.005	0.018	0.117		2.632	
1217	M122	6in Dia. Duct	Sec 4 - max	0.017	6	0.42	6	0.114	6	-0.187	1	2.672	6	0.258	9	0.479	9	0.260	1	0.209	1	0.001	0.119	0.021		2.672	
1218	M122	6in Dia. Duct	Sec 4 - min	-0.017	7	0.042	1	0.000	1	-2.672	8	0.187	1	-0.479	9	-0.258	6	-0.495	6	-0.414	6	0.001	0.119	0.021		2.672	
226	M23	6in Dia. Duct	Sec 3 - min	-0.084	7	-0.015	8	-0.214	6	-0.170	8	-0.093	7	-2.894	9	0.000	1	-0.095	8	-0.080	8	0.005	0.009	0.129		2.894	
879	M88	2in Dia. Duct	Sec 5 - max	0.065	7	-0.015	1	-0.002	1	0.009	1	2.901	5	0.519	2	0.004	1	0.042	6	0.573	6	0.014	0.107	0.019		2.901	
1136	M114	2in Dia. Duct	Sec 3 - min	0.002	1	-0.057	3	-0.137	5	-2.928	5	0.026	1	0.001	1	-0.868	2	-0.003	1	-0.047	1	0.000	0.108	0.032		2.928	
867	M87	2in Dia. Duct	Sec 4 - max	0.062	7	-0.005	1	-0.002	1	0.146	1	1.983	5	1.446	2	0.017	1	0.046	6	0.622	6	0.014	0.073	0.054		1.983	
868	M89	2in Dia. Duct	Sec 3 - min	0.005	1	-0.013	1	-0.095	8	-2.901	5	-0.001	1	0.065	1	-0.870	6	0.006	1	0.084	1	0.001	0.107	0.032		2.901	
215	M22	6in Dia. Duct	Sec 3 - max	0.136	8	0.003	7	0.000	1	0.090	7	0.203	8	0.000	1	2.709	9	-0.013	9	-0.011	9	0.011	0.009	0.120		2.709	
1107	M111	2in Dia. Duct	Sec 4 - max	0.046	5	0.023	7	0.000	1	0.008	1	2.129	5	1.390	2	-0.010	1	0.024	3	0.323	3	0.010	0.079	0.051		2.129	
1043	M105	2in Dia. Duct	Sec 2 - max	0.052	7	-0.011	1	0.000	1	-0.006	1	2.300	7	1.162	2	0.009	1	0.034	9	0.468	9	0.012	0.085	0.044		2.300	
218	M22	6in Dia. Duct	Sec 4 - min	-0.099	7	-0.013	8	-0.229	6	-0.206	6	-0.090	7	-2.773	9	0.000	1	-0.052	6	-0.043	6	0.006	0.009	0.123		2.773	
245	M25	6in Dia. Duct	Sec 3 - max	0.160	8	-0.004	7	0.169	9	0.052	7	0.043	8	0.000	1	2.614	9	0.045	7	0.037	7	0.013	0.002	0.125		2.614	
910	M91	2in Dia. Duct	Sec 5 - min	0.009	1	-0.003	1	-0.095	8	-2.739	5	0.019	1	0.161	1	-0.999	6	0.002	2	0.028	2	0.002	0.101	0.037		2.739	
1059	M108	2in Dia. Duct	Sec 5 - max	0.051	7	0.026	5	0.000	1	-0.024	1	2.283	7	1.292	2	0.017	1	0.022	3	0.302	3	0.011	0.085	0.045		2.283	
1061	M107	2in Dia. Duct	Sec 1 - max	0.042	7	0.062	7	0.000	1	-0.024	1	2.283	7	1.254	2	0.022	1	0.008	3	0.118	3	0.009	0.085	0.046		2.283	
1138	M114	2in Dia. Duct	Sec 4 - min	0.002	1	-0.057	3	-0.137	5	-2.943	5	0.032	1	0.002	1	-0.832	2	-0.003	1	-0.047	1	0.000	0.109	0.031		2.943	
1111	M112	2in Dia. Duct	Sec 1 - max	0.038	5	0.057	5	0.000	1	0.000	1	2.123	5	1.427	2	-0.015	1	0.008	3	0.116	3	0.008	0.079	0.053		2.123	
224	M23	6in Dia. Duct	Sec 2 - min	-0.084	7	-0.014	8	-0.214	6	-0.165	8	-0.093	7	-2.865	9	0.000	1	-0.095	8	-0.080	8	0.005	0.007	0.127		2.865	
888	M89	2in Dia. Duct	Sec 4 - min	0.005	1	-0.013	1	-0.095	8	-2.901	5	0.002	1	0.064	1	-0.845	6	0.006	1	0.084	1	0.001	0.107	0.031		2.901	
263	M27	6in Dia. Duct	Sec 2 - max	0.000	7	0.015	8	0.119	7	-0.095	7	0.265	8	0.000	1	2.877	7	0.049	7	0.041	7	0.000	0.012	0.128		2.877	
264	M27	6in Dia. Duct	Sec 2 - min	0.000	8	0.008	7	0.000	1	-0.265	8	0.095	7	-2.877	7	0.000	1	-0.151	8	-0.126	8	0.000	0.012	0.128		2.877	
325	M33	6in Dia. Duct	Sec 3 - max	0.130	8	0.165	6	0.246	9	1.218	6	0.027	1	1.661	9	-0.068	1	0.049	7	0.041	7	0.011	0.054	0.075		1.661	
326	M33	6in Dia. Duct	Sec 3 - min	-0.130	9	-0.014	1	0.010	1	-0.027	1	-1.218	6	0.068	1	-1.661	9	-0.151	8	-0.126	8	0.011	0.054	0.075		1.661	
1045	M105	2in Dia. Duct	Sec 3 - max	0.052	7	-0.011	1	0.000	1	-0.009	1	2.304	7	1.150	2	0.009	1	0.034	9	0.468	9	0.012	0.085	0.043		2.304	
1140	M114	2in Dia. Duct	Sec 5 - min	0.002	1	-0.057	3	-0.137	5	-2.958	5	0.035	1	0.002	1	-0.796	2	-0.003	1	-0.047	1	0.000	0.110	0.029		2.958	
1091	M110	2in Dia. Duct	Sec 1 - max	0.047	5	-0.010	1	0.000	1	0.025	1	2.134	5	1.347	2	-0.005	1	0.036	5	0.515	5	0.010	0.079	0.050		2.134	
945	M95	2in Dia. Duct	Sec 3 - max	0.109	2	0.008	4	0.000	1	1.133	2	-0.900	1	0.008	1	1.975	5	0.004	7	0.060	7	0.024	0.042	0.073		1.975	
1028	M103	2in Dia. Duct	Sec 3 - min	0.000	1	-0.054	7	-0.131	9	-1.254	7	-0.099	1	-0.001	1	-2.501	2	0.000	1	-0.012	1	0.000	0.046	0.093		2.501	
1109	M111	2in Dia. Duct	Sec 5 - max	0.046	5	0.023	7	0.000	1	0.006	1	2.123	5	1.354	2	-0.010	1	0.024	3	0.323	3	0.010	0.079	0.050		2.123	
890	M89	2in Dia. Duct	Sec 5 - min	0.005	1	-0.013	1	-0.095	8	-2.901	5	0.006	1	0.064	1	-0.921	6	0.006	1	0.084	1	0.001	0.107	0.030		2.901	
541	M55	6in Dia. Duct	Sec 1 - max	0.376	8	-0.022	1	0.282	7	-0.074	1	2.234	8	0.198	1	0.193	7	0.497	9	0.416	9	0.031	0.099	0.009		2.234	
537	M54	6in Dia. Duct	Sec 4 - max	0.289	8	0.129	7	0.282	7	-0.067	1	2.045	8	0.583	6	0.486	9	0.438	9	0.368	9	0.022	0.091	0.028		2.045	
713	M72	4in Dia. Duct	Sec 2 - max	0.314	7	-0.005	1	0.116	8	0.122	7	-0.040	1	0.730	7	2.806	8	0.016	8	0.037	8	0.025	0.095	0.108		2.806	
1063	M107	2in Dia. Duct	Sec 2 - max	0.042	7	0.062	7	0.000	1	-0.024	1	2.266	7	1.221	2	0.022	1	0.009	3	0.118	3	0.009	0.084	0.045		2.266	
222	M23	6in Dia. Duct	Sec 1 - min	-0.084	7	-0.014	8	-0.214	6	-0.161	8	-0.093	7	-2.836	9	0.000	1	-0.095	8	-0.080	8	0.005	0.007	0.126		2.836	
1047	M105	2in Dia. Duct	Sec 4 - max	0.052	7	-0.011	1	0.000	1	-0.012	1	2.308	7	1.118	2	0.009	1	0.034	9	0.468	9	0.012	0.085	0.041		2.308	

D-2250

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_a	f_{sy}/σ_s	f_{sz}/σ_s		f_t (ksi)	
247	M26	6in Dia. Duct	Sec 4 - max	0.160	8	-0.005	7	0.169	9	0.050	7	0.048	8	0.000	1	2.766	9	0.045	7	0.037	7	0.013	0.002	0.123		2.766	
1113	M112	2in Dia. Duct	Sec 2 - max	0.039	5	0.057	5	0.000	1	0.005	1	2.107	5	1.391	2	-0.015	1	0.008	3	0.116	3	0.009	0.078	0.052		2.107	
1093	M110	2in Dia. Duct	Sec 2 - max	0.047	5	-0.011	1	0.000	1	0.023	1	2.139	5	1.312	2	-0.005	1	0.038	5	0.515	5	0.010	0.079	0.049		2.139	
665	M87	4in Dia. Duct	Sec 3 - max	0.195	6	0.021	1	0.652	7	0.008	7	0.135	1	3.165	6	1.236	7	0.079	6	0.180	6	0.016	0.005	0.117		3.165	
216	M22	6in Dia. Duct	Sec 3 - min	-0.099	7	-0.013	8	-0.228	8	-0.203	8	-0.090	7	-2.709	9	0.000	1	-0.052	6	-0.043	6	0.008	0.009	0.120		2.709	
213	M22	6in Dia. Duct	Sec 2 - max	0.135	6	0.003	7	0.000	1	0.089	7	0.199	8	0.005	6	2.646	9	-0.013	9	-0.011	9	0.011	0.009	0.118		2.646	
232	M24	6in Dia. Duct	Sec 1 - min	-0.020	7	-0.018	8	-0.247	6	-0.104	8	-0.091	7	-2.951	9	0.000	1	-0.129	8	-0.108	8	0.002	0.005	0.131		2.951	
1049	M105	2in Dia. Duct	Sec 5 - max	0.052	7	-0.011	1	0.000	1	-0.015	1	2.312	7	1.086	2	0.009	1	0.034	9	0.468	9	0.012	0.058	0.040		2.312	
234	M24	6in Dia. Duct	Sec 2 - min	-0.020	7	-0.017	8	-0.247	6	-0.108	8	-0.090	7	-2.941	9	0.000	1	-0.129	8	-0.108	8	0.002	0.005	0.131		2.941	
1095	M110	2in Dia. Duct	Sec 3 - max	0.047	5	-0.011	1	0.000	1	0.020	1	2.141	5	1.277	2	-0.005	1	0.038	5	0.515	5	0.010	0.079	0.047		2.141	
236	M24	6in Dia. Duct	Sec 3 - min	-0.021	7	-0.018	8	-0.247	6	-0.113	8	-0.089	7	-2.930	9	0.000	1	-0.129	8	-0.109	8	0.002	0.005	0.130		2.930	
265	M27	6in Dia. Duct	Sec 3 - max	0.000	7	0.014	8	0.118	7	-0.091	7	0.258	8	0.000	1	2.619	7	0.049	7	0.041	7	0.000	0.011	0.125		2.619	
269	M27	6in Dia. Duct	Sec 3 - min	0.000	8	0.007	7	0.009	1	-0.258	8	0.091	7	-2.619	7	0.000	1	-0.151	8	-0.126	8	0.000	0.011	0.125		2.619	
235	M24	6in Dia. Duct	Sec 4 - min	-0.021	7	-0.016	8	-0.248	6	-0.118	8	-0.079	7	-2.920	9	0.000	1	-0.129	8	-0.108	8	0.002	0.005	0.130		2.920	
1065	M107	2in Dia. Duct	Sec 3 - max	0.042	7	0.062	7	0.000	1	-0.025	1	2.250	7	1.189	2	0.022	1	0.009	3	0.118	3	0.009	0.083	0.044		2.250	
240	M24	6in Dia. Duct	Sec 5 - min	-0.021	7	-0.019	8	-0.248	6	-0.124	8	-0.078	7	-2.909	9	0.000	1	-0.129	8	-0.108	8	0.002	0.006	0.129		2.909	
1115	M112	2in Dia. Duct	Sec 3 - max	0.039	5	0.055	5	0.000	1	0.004	1	2.092	5	1.356	2	-0.015	1	0.008	3	0.116	3	0.009	0.077	0.050		2.092	
248	M26	6in Dia. Duct	Sec 5 - max	0.160	8	-0.005	7	0.169	9	0.049	7	-0.054	8	0.000	1	2.718	9	0.045	7	0.037	7	0.013	0.002	0.121		2.718	
1102	M111	2in Dia. Duct	Sec 1 - min	0.009	1	-0.007	1	-0.133	5	-2.148	5	-0.014	1	0.010	1	-1.486	2	0.000	1	0.007	1	0.001	0.080	0.055		2.148	
548	M55	6in Dia. Duct	Sec 3 - min	-0.224	7	-0.408	8	-0.019	1	-2.466	6	0.087	1	0.057	7	-0.187	8	-0.644	6	-0.539	6	0.018	0.110	0.008		2.466	
1052	M106	2in Dia. Duct	Sec 1 - min	0.006	1	-0.007	1	-0.121	5	-2.312	7	0.015	1	-0.017	1	-1.330	2	0.000	1	-0.009	1	0.001	0.086	0.049		2.312	
1097	M110	2in Dia. Duct	Sec 4 - max	0.047	5	-0.011	1	0.000	1	0.017	1	2.145	5	1.242	2	-0.006	1	0.038	5	0.515	5	0.010	0.079	0.046		2.145	
78	M8	6in Dia. Duct	Sec 4 - min	0.041	1	-0.882	7	-0.016	7	-0.174	1	-1.759	8	-1.220	8	-0.355	1	0.132	1	0.111	1	0.003	0.078	0.054		1.759	
673	M88	4in Dia. Duct	Sec 2 - max	0.264	6	0.015	1	0.593	7	0.107	7	0.084	1	2.954	6	-0.007	1	0.078	6	0.178	6	0.022	0.004	0.109		2.954	
686	M88	4in Dia. Duct	Sec 5 - min	0.000	1	-0.004	8	-0.380	8	-0.048	1	-0.108	7	-0.074	8	-3.544	6	0.002	1	0.005	1	0.000	0.004	0.131		3.544	
1067	M107	2in Dia. Duct	Sec 4 - max	0.042	7	0.062	7	0.000	1	-0.026	1	2.233	7	1.157	2	0.022	1	0.009	3	0.118	3	0.009	0.083	0.043		2.233	
1054	M106	2in Dia. Duct	Sec 2 - min	0.006	1	-0.007	1	-0.121	5	-2.304	7	0.017	1	-0.017	1	-1.298	2	0.000	1	-0.009	1	0.001	0.085	0.048		2.304	
1104	M111	2in Dia. Duct	Sec 2 - min	0.009	1	-0.007	1	-0.133	5	-2.142	5	-0.012	1	0.010	1	-1.460	2	0.000	1	0.007	1	0.001	0.079	0.054		2.142	
1089	M110	2in Dia. Duct	Sec 5 - max	0.047	5	-0.011	1	0.000	1	0.014	1	2.148	5	1.206	2	-0.005	1	0.038	5	0.515	5	0.010	0.080	0.045		2.148	
211	M22	6in Dia. Duct	Sec 1 - max	0.135	6	0.004	7	0.000	1	0.088	7	0.198	8	0.050	6	2.583	9	-0.013	9	-0.011	9	0.011	0.009	0.115		2.583	
536	M54	6in Dia. Duct	Sec 4 - min	-0.216	7	-0.683	8	-0.019	1	-2.045	6	0.067	1	-0.488	8	-0.683	6	-0.553	6	-0.463	6	0.018	0.091	0.028		2.045	
1117	M112	2in Dia. Duct	Sec 4 - max	0.039	5	0.058	5	0.000	1	0.003	1	2.077	5	1.320	2	-0.015	1	0.008	3	0.116	3	0.009	0.077	0.049		2.077	
214	M22	6in Dia. Duct	Sec 2 - min	-0.099	7	-0.012	8	-0.228	8	-0.199	8	-0.089	7	-2.646	9	-0.008	6	-0.052	6	-0.043	6	0.008	0.009	0.118		2.646	
267	M27	6in Dia. Duct	Sec 4 - max	0.000	7	0.013	8	0.116	7	-0.086	7	0.252	8	0.000	1	2.762	7	0.049	7	0.041	7	0.000	0.011	0.123		2.762	
268	M27	6in Dia. Duct	Sec 4 - min	0.000	8	0.006	7	0.000	1	-0.252	8	0.086	7	-2.762	7	0.000	1	-0.151	8	-0.126	8	0.000	0.011	0.123		2.762	
261	M26	6in Dia. Duct	Sec 1 - max	0.141	8	-0.006	7	0.228	9	0.003	7	0.005	8	0.000	1	2.719	9	0.049	7	0.041	7	0.012	0.001	0.121		2.719	
1058	M106	2in Dia. Duct	Sec 3 - min	0.006	1	-0.008	1	-0.121	5	-2.297	7	0.019	1	-0.017	1	-1.266	2	0.000	1	-0.009	1	0.001	0.085	0.047		2.297	
1229	M123	4in Dia. Duct	Sec 3 - max	0.147	8	0.004	1	-0.005	1	1.449	6	-0.059	1	1.815	9	-0.104	1	0.079	6	0.180	6	0.012	0.054	0.067		1.815	
1103	M111	2in Dia. Duct	Sec 3 - min	0.009	1	-0.006	1	-0.133	5	-2.135	5	-0.010	1	0.010	1	-1.425	2	0.000	1	0.007	1	0.001	0.079	0.055		2.135	
209	M21	6in Dia. Duct	Sec 5 - max	0.110	9	0.004	7	0.000	1	0.062	7	0.209	8	0.050	6	2.583	9	-0.022	9	-0.019	9	0.009	0.009	0.115		2.583	
210	M21	6in Dia. Duct	Sec 5 - min	-0.110	7	-0.011	8	-0.278	8	-0.209	8	-0.062	7	-2.583	9	-0.050	6	-0.026	6	-0.024	6	0.009	0.009	0.115		2.583	
1069	M107	2in Dia. Duct	Sec 5 - max	0.042	7	0.062	7	0.000	1	-0.026	1	2.216	7	1.124	2	0.022	1	0.009	3	0.118	3	0.009	0.082	0.042		2.216	
1112	M112	2in Dia. Duct	Sec 1 - min	0.007	1	-0.003	1	-0.132	5	-2.123	5	-0.006	1	0.015	1	-1.427	2	-0.003	2	-0.047	2	0.002	0.079	0.053		2.123	
669	M87	4in Dia. Duct	Sec 6 - max	0.059	7	-0.016	1	-0.002	1	0.024	1	2.844	5	0.389	2	0.037	1	0.046	6	0.622	6	0.013	0.106	0.014		2.844	
997	M100	2in Dia. Duct	Sec 4 - max	0.039	7	-0.005	1	0.000	1	0.106	1	1.606	5	1.742	2	0.005	1	0.059	2	0.801	2	0.009	0.080	0.065		1.742	
1119	M112	2in Dia. Duct	Sec 5 - max	0.039	5	0.058	5	0.000	1	0.003	1	2.082	5	1.284	2	-0.015	1	0.008	3	0.116	3	0.009	0.076	0.048		2.082	
1062	M107	2in Dia. Duct	Sec 1 - min	0.007	1	-0.002	1	-0.120	5	-2.283	7	0.024	1	-0.022	1	-1.254	2	-0.004	2	-0.057	2	0.002	0.085	0.048		2.283	
1027	M103	2in Dia. Duct	Sec 4 - max	0.042	7	-0.005	1	0.000	1	0.082	1	1.721	7	1.697	2	-0.002	1	0.052	2	0.704	2	0.009	0.064	0.059		1.721	
100	M10	6in Dia. Duct	Sec 6 - min	0.010	1	-1.558	8	-0.018	7	-1.818	7	0.398	1	-1.133	6	-0.094	1	-0.381	7	-0.318	7	0.001	0.081	0.050		1.818	
708	M71	4in Dia. Duct	Sec 4 - min	-0.146	8	-0.023	8	-0.384	6	0.041	1	-0.209	7	-3.023	8	-1.418	7	-0.005	7	-0.007	7	0.012	0.008	0.112		3.023	
1058	M106	2in Dia. Duct	Sec 4 - min	0.006	1	-0.008	1	-0.121	5	-2.280	7	0.021	1	-0.017	1	-1.234	2	0.000	1	-0.009	1	0.001	0.085	0.048		2.280	
242	M25	6in Dia. Duct	Sec 1 - min	0.000	1	-0.019	8	-0.242	6	-0.032	8	-0.054	7	-2.609	9	0.000	1	-0.147	8	-0.123	8	0.000	0.002	0.129		2.609	
1106	M111	2in Dia. Duct	Sec 4 - min	0.008	1	-0.008	1	-0.133	5	-2.129	5	-0.006	1	0.010	1	-1.390	2	0.000	1	0.007	1	0.001	0.079	0.051		2.129	
670	M87	4in Dia. Duct	Sec 6 - min	0.000	1	-0.076	5	-0.136	6	-2.899	5	0.022	1	0.019	1	-0.653	2	-0.003	1	-0.046	1	0.000	0.107	0.024		2.899	
212	M22	6in Dia. Duct	Sec 1 - min	-0.099	7	-0.011	8	-0.228	8	-0.196	8	-0.086	7	-2.583	9	-0.050	6	-0.052	6	-0.043	6	0.008	0.009	0.115		2.583	
544	M55	6in Dia. Duct	Sec 2 - min	-0.224	7	-0.408	8	-0.019	1	-2.350	6	0.080	1	-0.023	7	-0.192	1	-0.644	6	-0.539	6	0.018	0.104	0.009		2.350	
268	M27	6in Dia. Duct	Sec 5 - max	0.000	1	0.012	8	0.117	7	-0.086	7	0.249	8	0.000	1	2.705	7	0.049	7	0.041	7	0.000	0.011	0.120		2.705	
270	M27	6in Dia. Duct	Sec 5 - min	0.000	1	0.005	7	0.000	1	-0.249	8	0.086	7	-2.705	7	0.000	1	-0.151	8	-0.126	8	0.000	0.011	0.120		2.705	
761	M79	6in Dia. Duct	Sec 1 - max	0.000	1	0.012	8	0.117	7	-0.086	7	0.249	8	0.000	1	2.705	7	0.049	7	0.041	7	0.000	0.011	0.120		2.705	
762	M79	6in Dia. Duct	Sec 1 - min	0.000	1	0.005	7	0.000	1	-0.249	8	0.086	7	-2.705	7	0.000	1	-0.151	8	-0.126	8	0.000	0.011	0.120		2.705	
1114	M112	2in Dia. Duct	Sec 2 - min	0.007	1	-0.003	1	-0.132	5	-2.107	5	-0.005	1	0.015	1	-1.391	2	-0.003	2	-0.047	2	0.002	0.078	0.052		2.107	
954	M90	2in Dia. Duct	Sec 2 - min	0.000	1	0.007	4	0.000	1	0.609	1	-0.738	3	-2.801	3	0.006	1	-0.005	1	-0.088	1	0.000	0.027	0.104		2.801	
1042	M105	2in Dia. Duct	Sec 1 - min	0.004	1	-0.024	4	-0.121	5	-2.297	7	0.003	1	-0.009	1	-1.214	2	0.000	1	-0.011	1	0.001	0.085	0.045		2.297	
655	M86	4in Dia. Duct	Sec 4 - min	0.000	1	-0.042	8	0.000	1	-0.161	4	-0.111	5	0.047	1	-3.371	3	0.000	1	-0.013	1	0.000	0.006	0.126		3.371	
1064	M107	2in Dia. Duct	Sec 2 - min	0.007	1	-0.002	1	-0.120	5	-2.268	7	0.024	1	-0.022	1	-1.221	2	-0.004	2	-0.057	2	0.002	0.084	0.045		2.268	
535	M54	6in Dia. Duct	Sec 3 - max	0.269	8	0.130	7	0.282	7	-0.060	1	1.857	6	0.585	6	0.565	9	0.436	9	0.386	9	0.022	0.083	0.026		1.857	
1060	M106	2in Dia. Duct	Sec 5 - min	0.006	1	-0.008	1	-0.120	5	-2.283	7	0.024	1	-0.017	1	-1.202	2	0.000	1	-0.009	1	0.001	0.085	0.045		2.283	
1110	M111	2in Dia. Duct	Sec 5 - min	0.009	1	-0.008	1	-0.132	5	-2.123	5	-0.006	1	0.010	1	-1.364	2	0.000	1	0.007	1	0.001	0.079	0.050		2.123	
657	M86	4in Dia. Duct	Sec 4 - max	0.180	6	-0.015	7	0.138	8	0.193	7	0.002	1	2.909	6	2.275	7	0.079	6	0.180	6	0.015	0.067	0.108		2.909	
1044	M105	2in Dia. Duct	Sec 2 - min	0.004	1	-0.025	4	-0.121	5	-2.300	7	0.008	1	-0.009	1	-1.182	2	0.000	1	-0.011	1	0.001	0.085	0.044		2.300	
1092	M110	2in Dia. Duct	Sec 1 - min	0.004	1	-0.025	8	-0.134	5	-2.134	5	-0.025	1	0.005	1	-1.347	2	0.000	1	0.008	1	0.001	0.079	0.050		2.134	
244	M25	6in Dia. Duct	Sec 2 - min	0.000	1	-0.019	8	-0.242	6	-0.037	8	-0.053	7	-2.861	9	0.000	1	-0.147	8	-0.123	8	0.000	0.002	0.127		2.861	
1116	M112	2in Dia. Duct	Sec 3 - min	0.007	1	-0.003	1	-0.132	5	-2.092	5	-0.004	1	0.015	1	-1.356	2	-0.003	2	-0.047	2	0.002	0.077	0.050		2.092	
1066	M107	2in Dia. Duct	Sec 3 - min	0.006	1	-0.002	1	-0.120	5	-2.250	7	0.025	1	-0.022	1	-1.189	2	-0.004	2	-0.057	2	0.002	0.083	0.044		2.250	
1048	M105	2in Dia. Duct	Sec 3 - min	0.004	1	-0.025	4	-0.121	5	-2.304	7	0.009	1	-0.009	1	-1.150	2	0.000	1	-0.011	1	0.001	0.085	0.043		2.304	

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_c	f_y/σ_y	f_z/σ_y		f_c (ksi)	
672	M88	2in Dia. Duct	Sec 1 - min	0.002	1	-0.052	7	-0.095	8	-2.844	5	-0.024	1	-0.002	1	-0.918	2	0.007	1	0.091	1	0.000	0.105	0.023		2.844	
1094	M110	2in Dia. Duct	Sec 2 - min	0.004	1	-0.025	8	-0.133	5	-2.136	5	-0.023	1	0.005	1	-1.312	2	0.000	1	0.008	1	0.001	0.079	0.048		2.138	
674	M88	2in Dia. Duct	Sec 2 - min	0.002	1	-0.052	7	-0.095	8	-2.856	5	-0.020	1	-0.003	1	-0.593	2	0.007	1	0.091	1	0.000	0.108	0.022		2.858	
671	M88	4in Dia. Duct	Sec 1 - max	0.264	6	0.016	1	0.593	7	0.107	7	0.070	1	2.757	6	-0.007	1	0.078	6	0.176	6	0.022	0.004	0.102		2.757	
257	M26	6in Dia. Duct	Sec 4 - max	0.144	6	-0.020	7	0.233	9	-0.050	7	0.190	6	0.000	1	2.424	7	0.049	7	0.041	7	0.012	0.008	0.108		2.424	
678	M88	4in Dia. Duct	Sec 4 - min	0.000	1	-0.004	6	-0.380	8	-0.054	1	-0.107	7	0.006	1	-3.348	6	0.002	1	0.005	1	0.000	0.004	0.124		3.348	
676	M88	2in Dia. Duct	Sec 3 - min	0.002	1	-0.053	7	-0.095	8	-2.872	5	-0.016	1	-0.003	1	-0.589	2	0.007	1	0.091	1	0.000	0.106	0.021		2.872	
1048	M105	2in Dia. Duct	Sec 4 - min	0.004	1	-0.025	4	-0.121	5	-2.306	7	0.012	1	-0.009	1	-1.118	2	0.000	1	-0.011	1	0.001	0.085	0.041		2.306	
676	M88	2in Dia. Duct	Sec 4 - min	0.002	1	-0.053	7	-0.095	8	-2.889	5	-0.012	1	-0.004	1	-0.544	2	0.007	1	0.091	1	0.000	0.107	0.020		2.889	
1096	M110	2in Dia. Duct	Sec 3 - min	0.004	1	-0.025	8	-0.133	5	-2.141	5	-0.020	1	0.005	1	-1.277	2	0.000	1	0.008	1	0.001	0.079	0.047		2.141	
246	M25	6in Dia. Duct	Sec 3 - min	0.000	1	-0.020	6	-0.243	8	-0.043	8	-0.052	7	-2.814	9	0.000	1	-0.147	8	-0.123	8	0.000	0.002	0.125		2.814	
1118	M112	2in Dia. Duct	Sec 4 - min	0.007	1	-0.003	1	-0.132	5	-2.077	5	-0.003	1	0.015	1	-1.320	2	-0.003	2	-0.047	2	0.002	0.077	0.049		2.077	
1068	M107	2in Dia. Duct	Sec 4 - min	0.008	1	-0.003	1	-0.120	5	-2.233	7	0.026	1	-0.022	1	-1.157	2	-0.004	2	-0.057	2	0.002	0.083	0.043		2.233	
1031	M104	2in Dia. Duct	Sec 1 - max	0.046	7	-0.012	1	0.000	1	0.010	1	2.242	7	0.921	2	0.000	1	0.046	2	0.826	2	0.010	0.083	0.034		2.242	
550	M58	2in Dia. Duct	Sec 5 - min	0.002	1	-0.053	7	-0.095	8	-2.901	5	-0.008	1	-0.004	1	-0.518	2	0.007	1	0.091	1	0.000	0.107	0.019		2.901	
688	M87	6in Dia. Duct	Sec 4 - min	0.000	1	-0.087	7	-0.101	9	-1.983	5	-0.146	1	-0.017	1	-1.448	2	0.006	1	0.069	1	0.000	0.073	0.054		1.983	
55	M9	6in Dia. Duct	Sec 3 - max	0.448	6	-0.083	1	0.017	8	0.771	8	0.236	1	0.243	1	1.256	6	0.203	1	0.170	1	0.037	0.034	0.056		1.256	
1060	M105	2in Dia. Duct	Sec 5 - min	0.004	1	-0.025	4	-0.121	5	-2.312	7	0.016	1	-0.009	1	-1.066	2	0.000	1	-0.011	1	0.001	0.086	0.040		2.312	
1033	M104	2in Dia. Duct	Sec 2 - max	0.045	7	-0.012	1	0.000	1	0.007	1	2.255	7	0.890	2	0.000	1	0.046	2	0.826	2	0.010	0.084	0.033		2.255	
542	M55	6in Dia. Duct	Sec 1 - min	-0.224	7	-0.497	6	-0.019	1	-2.234	6	0.074	1	-0.103	7	-0.198	1	-0.844	6	-0.539	6	0.018	0.098	0.009		2.234	
1098	M110	2in Dia. Duct	Sec 4 - min	0.004	1	-0.025	8	-0.133	5	-2.145	5	-0.017	1	0.005	1	-1.242	2	0.000	1	0.008	1	0.001	0.079	0.048		2.145	
536	M54	6in Dia. Duct	Sec 3 - min	-0.216	7	-0.663	6	-0.019	1	-1.857	6	0.080	1	-0.565	9	-0.565	6	-0.553	6	-0.463	6	0.018	0.083	0.028		1.857	
783	M79	6in Dia. Duct	Sec 2 - max	0.000	6	0.010	6	0.116	7	-0.092	7	0.237	8	0.000	1	2.601	7	0.049	7	0.041	7	0.000	0.011	0.116		2.601	
784	M79	6in Dia. Duct	Sec 2 - min	0.000	7	0.003	7	0.000	1	-0.237	8	0.092	7	-2.601	7	0.000	1	-0.151	8	-0.126	8	0.000	0.011	0.116		2.601	
1035	M104	2in Dia. Duct	Sec 3 - max	0.045	7	-0.012	1	0.000	1	0.003	1	2.269	7	0.858	2	0.000	1	0.046	2	0.826	2	0.010	0.084	0.032		2.269	
916	M92	2in Dia. Duct	Sec 3 - max	0.053	7	0.022	3	-0.002	1	0.092	1	1.272	4	0.079	1	1.803	2	0.007	3	0.093	3	0.012	0.047	0.067		1.803	
101	M11	6in Dia. Duct	Sec 1 - max	0.009	6	-0.104	1	0.018	9	-0.398	1	1.819	7	0.013	1	0.991	6	0.250	1	0.209	1	0.001	0.081	0.044		1.819	
102	M11	6in Dia. Duct	Sec 1 - min	-0.009	7	-1.682	6	-0.018	7	-1.819	7	0.398	1	-0.991	6	-0.013	1	-0.495	6	-0.414	6	0.001	0.081	0.044		1.819	
703	M71	4in Dia. Duct	Sec 2 - max	0.322	7	0.004	1	-0.001	1	0.307	8	-0.044	1	2.352	6	1.024	6	0.016	6	0.037	6	0.027	0.011	0.067		2.352	
92	M9	6in Dia. Duct	Sec 1 - min	0.027	1	-1.311	6	-0.018	6	-0.189	1	-1.513	8	-1.261	8	-0.243	1	-0.125	7	-0.105	7	0.002	0.087	0.056		1.513	
1070	M107	2in Dia. Duct	Sec 5 - min	0.008	1	-0.003	1	-0.120	5	-2.216	7	0.026	1	-0.022	1	-1.124	2	-0.004	2	-0.057	2	0.002	0.082	0.042		2.216	
1120	M112	2in Dia. Duct	Sec 5 - min	0.007	1	-0.003	1	-0.132	5	-2.082	5	-0.003	1	0.015	1	-1.264	2	-0.003	2	-0.047	2	0.002	0.078	0.046		2.082	
248	M25	6in Dia. Duct	Sec 4 - min	0.000	1	-0.021	8	-0.243	6	-0.048	8	-0.050	7	-2.766	9	0.000	1	-0.147	8	-0.123	8	0.000	0.002	0.123		2.766	
1037	M104	2in Dia. Duct	Sec 4 - max	0.045	7	-0.012	1	0.000	1	0.000	1	2.283	7	0.826	2	0.000	1	0.046	2	0.826	2	0.010	0.085	0.031		2.283	
1100	M110	2in Dia. Duct	Sec 5 - min	0.004	1	-0.025	8	-0.133	5	-2.148	5	-0.014	1	0.005	1	-1.206	2	0.000	1	0.008	1	0.001	0.080	0.045		2.148	
97	M10	6in Dia. Duct	Sec 4 - max	0.164	6	-0.101	1	0.018	8	-0.369	1	1.381	7	0.094	1	1.129	6	0.244	1	0.204	1	0.013	0.061	0.050		1.381	
533	M54	6in Dia. Duct	Sec 2 - max	0.268	6	0.130	7	0.263	7	-0.063	1	1.669	6	0.588	6	0.045	9	0.436	9	0.365	9	0.022	0.074	0.029		1.669	
1071	M108	2in Dia. Duct	Sec 1 - max	0.035	7	0.000	1	0.000	1	-0.035	1	0.895	5	2.267	2	-0.002	1	0.002	3	0.029	3	0.008	0.033	0.084		2.267	
80	M8	6in Dia. Duct	Sec 5 - min	0.041	1	-0.603	7	-0.016	7	-0.189	1	-1.513	8	-1.215	8	-0.355	1	0.132	1	0.111	1	0.003	0.087	0.054		1.513	
1039	M104	2in Dia. Duct	Sec 5 - max	0.045	7	-0.013	1	0.000	1	-0.000	1	2.297	7	0.794	2	0.000	1	0.046	2	0.826	2	0.010	0.085	0.029		2.297	
998	M100	2in Dia. Duct	Sec 4 - min	0.000	1	-0.055	5	-0.138	5	-1.806	5	-0.105	1	-0.005	1	-1.742	2	0.000	1	0.006	1	0.000	0.060	0.065		1.742	
714	M72	4in Dia. Duct	Sec 2 - min	-0.141	6	-0.009	7	-0.026	7	0.040	1	-0.122	7	-2.906	8	-0.730	7	-0.003	7	-0.007	7	0.012	0.005	0.105		2.906	
1091	M109	2in Dia. Duct	Sec 1 - max	0.042	7	-0.011	1	0.000	1	0.038	1	2.064	5	1.004	2	0.002	1	0.053	2	0.717	2	0.009	0.077	0.037		2.064	
523	M53	6in Dia. Duct	Sec 2 - max	0.197	8	0.219	7	0.286	7	0.421	8	0.856	7	0.765	6	1.555	9	0.345	9	0.269	9	0.016	0.038	0.069		1.555	
524	M53	6in Dia. Duct	Sec 2 - min	-0.197	7	-0.748	6	-0.019	1	-0.856	7	-0.421	8	-1.555	9	-0.785	6	-0.474	6	-0.397	6	0.016	0.038	0.069		1.555	
250	M25	6in Dia. Duct	Sec 5 - min	0.000	1	-0.021	8	-0.243	6	-0.054	8	-0.049	7	-2.718	9	0.000	1	-0.147	8	-0.123	8	0.000	0.002	0.121		2.718	
1026	M103	2in Dia. Duct	Sec 4 - min	0.000	1	-0.061	7	-0.126	5	-1.721	7	-0.052	1	0.002	1	-1.597	2	0.000	1	-0.012	1	0.000	0.064	0.059		1.721	
1063	M109	2in Dia. Duct	Sec 2 - max	0.041	7	-0.012	1	0.000	1	0.035	1	2.096	5	0.968	2	0.002	1	0.053	2	0.717	2	0.009	0.078	0.036		2.096	
252	M26	6in Dia. Duct	Sec 1 - min	0.000	1	-0.021	8	-0.228	7	-0.005	8	-0.093	7	-2.718	9	0.000	1	-0.151	8	-0.126	8	0.000	0.001	0.121		2.718	
666	M87	4in Dia. Duct	Sec 3 - min	0.000	1	0.003	6	-0.306	8	-0.135	1	-0.006	7	-1.238	7	-3.165	8	-0.002	1	-0.005	1	0.000	0.005	0.117		3.165	
1095	M109	2in Dia. Duct	Sec 3 - max	0.041	7	-0.012	1	0.000	1	0.032	1	2.199	5	0.934	2	0.002	1	0.053	2	0.717	2	0.009	0.076	0.035		2.199	
785	M79	6in Dia. Duct	Sec 3 - max	0.000	6	0.008	6	0.115	7	-0.081	7	0.229	8	0.000	1	2.498	7	0.049	7	0.041	7	0.000	0.010	0.111		2.498	
786	M79	6in Dia. Duct	Sec 3 - min	0.000	7	0.000	7	0.000	1	-0.229	8	0.081	7	-2.498	7	0.000	1	-0.151	8	-0.126	8	0.000	0.010	0.111		2.498	
1097	M109	2in Dia. Duct	Sec 4 - max	0.041	7	-0.012	1	0.000	1	0.029	1	2.122	5	0.899	2	0.002	1	0.053	2	0.717	2	0.009	0.079	0.033		2.122	
1228	M123	4in Dia. Duct	Sec 3 - min	0	1	-0.114	8	-0.151	7	0.059	1	-1.449	6	0.104	1	-1.015	9	-0.002	1	-0.005	1	0.000	0.054	0.067		1.015	
676	M88	4in Dia. Duct	Sec 3 - min	0.000	1	-0.003	6	-0.380	8	-0.059	1	-0.107	7	0.006	1	-3.151	8	0.002	1	0.005	1	0.000	0.004	0.117		3.151	
534	M54	6in Dia. Duct	Sec 2 - min	-0.216	7	-0.662	6	-0.019	1	-1.669	6	0.053	1	-0.645	9	-0.586	6	-0.553	6	-0.463	6	0.018	0.074	0.029		1.669	
669	M87	4in Dia. Duct	Sec 5 - max	0.187	6	0.016	1	0.649	7	0.019	7	0.070	1	2.757	6	-0.007	1	0.078	6	0.180	6	0.016	0.003	0.102		2.757	
1089	M109	2in Dia. Duct	Sec 5 - max	0.041	7	-0.012	1	0.000	1	0.025	1	2.134	5	0.853	2	0.002	1	0.053	2	0.717	2	0.009	0.079	0.032		2.134	
529	M53	6in Dia. Duct	Sec 5 - max	0.199	8	0.213	7	0.283	7	-0.046	1	1.481	8	0.757	6	0.653	9	0.345	9	0.269	9	0.016	0.066	0.038		1.481	
530	M53	6in Dia. Duct	Sec 5 - min	-0.199	7	-0.754	6	-0.019	1	-1.481	8	0.046	1	-0.653	9	-0.757	6	-0.474	6	-0.397	6	0.016	0.066	0.038		1.481	
171	M18	6in Dia. Duct	Sec 1 - max	0.024	8	0.082	1	0.032	8	-0.644	8	1.587	1	1.066	7	0.339	8	-0.022	9	-0.019	9	0.002	0.071	0.047		1.587	
172	M18	6in Dia. Duct	Sec 1 - min	-0.024	8	0.057	8	-0.046	7	-1.587	1	0.644	8	-0.339	8	-1.066	7	-0.028	8	-0.024	8	0.002	0.071	0.047		1.587	
531	M54	6in Dia. Duct	Sec 1 - max	0.268	8	0.131	7	0.263	7	-0.046	1	1.481	8	0.587	6	0.724	9	0.436	9	0.365	9	0.022	0.065	0.032		1.481	
1209	M121	6in Dia. Duct	Sec 5 - max	0.024	8	-0.086	1	0.048	9	-0.644	8	1.587	1	1.069	7	0.339	8	-0.022	9	-0.019	9	0.002	0.071	0.047		1.587	
1210	M121	6in Dia. Duct	Sec 5 - min	-0.024	6	-0.098	4	-0.048	6	-1.587	1	0.644	8	-0.339	8	-1.069	7	-0.028	6	-0.024	6	0.002	0.071	0.047		1.587	
870	M67	2in Dia. Duct	Sec 5 - min	0.000	1	-0.076	7	-0.095	8	-2.844	5	-0.024	1	-0.037	1	-0.389	2	0.006	1	0.089	1	0.000	0.105	0.014		2.844	
1121	M113	2in Dia. Duct	Sec 1 - max	0.033	5	0.000	1	0.000	1	0.013	1	0.731	3	2.293	2	-0.009	1	0.001	3	0.017	3	0.007	0.027	0.085		2.293	
1072	M108	2in Dia. Duct	Sec 1 - min	0.008	1	-0.050	8	-0.139	5	-0.895	5	0.036	1	0.002	1	-2.267	2	-0.012	2	-0.165	2	0.002	0.033	0.084		2.267	
916	M92	2in Dia. Duct	Sec 3 - min	0.022	1	-0.008	2	-0.151	4	-1.272	4	-0.092	1	-1.803	2	-0.079	1	-0.005	2	-0.067	2	0.005	0.047	0.067		1.803	
1032	M104	2in Dia. Duct	Sec 1 - min	0.001	1	-0.050	7	-0.122	5	-2.242	7	-0.010	1	0.000	1	-0.921	2	0.000	1	-0.012	1	0.000	0.083	0.034		2.242	
1034	M104	2in Dia. Duct	Sec 2 - min	0.001	1	-0.051	7	-0.122	5	-2.255	7	-0.007	1	0.000	1	-0.890	2	0.000	1	-0.012	1	0.000	0.084	0.033		2.255	
667	M67	4in Dia. Duct	Sec 4 - max	0.186	6	0.016	1	0.650	7	0.016	7	0.100	1	2.026	6	0.086	7	0.079	6	0.180	6	0.016	0.004	0.097		2.026	
787	M79	6in Dia. Duct	Sec 4 - max	0.001	6	0.006	6	0.114	7	-0.081	7	0.223	8	0.000	1	2.398	7	0.049	7	0.041	7	0.000	0.010	0.108		2.398	
788	M79	6in Dia. Duct	Sec 4 - min	-0.001	7	-0.001	7	0.000	1	-0.223	8	0.081	7	-2.398	7	0.000	1	-0.151	8	-0.126	8	0.000	0.010	0.108		2.398	

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_a	f_{vy}/σ_a	f_{vz}/σ_a	f_c (ksi)
1029	M103	2in Dia. Duct	Sec 5 - max	0.040	7	-0.012	1	0.000	1	0.010	1	2.242	7	0.659	2	-0.005	1	0.052	2	0.704	2	0.009	0.053	0.024	2.242
258	M26	6in Dia. Duct	Sec 4 - min	0.000	1	-0.035	8	-0.233	7	-0.190	8	0.050	7	-2.424	7	0.000	1	-0.151	8	-0.126	8	0.000	0.008	0.108	2.424
931	M94	3in Dia. Duct	Sec 1 - max	0.144	2	0.058	2	0.000	8	-0.819	1	1.210	2	1.518	5	0.018	1	0.013	7	0.064	7	0.015	0.045	0.056	1.515
1036	M104	2in Dia. Duct	Sec 3 - min	0.001	1	-0.051	7	-0.122	5	-2.269	7	-0.003	1	0.000	1	-0.856	2	0.000	1	-0.012	1	0.000	0.084	0.032	2.269
532	M54	6in Dia. Duct	Sec 1 - min	-0.216	7	-0.652	8	-0.819	1	-1.481	8	0.046	1	-0.724	9	-0.587	6	-0.553	6	-0.463	8	0.018	0.066	0.032	1.491
1038	M104	2in Dia. Duct	Sec 4 - max	0.002	1	-0.051	7	-0.122	5	-2.293	7	0.000	1	0.000	1	-0.828	2	0.000	1	-0.012	1	0.000	0.085	0.031	2.293
946	M95	3in Dia. Duct	Sec 3 - min	0.000	1	0.000	1	-0.067	6	0.900	1	-1.133	2	-1.975	5	-0.006	1	0.001	1	0.017	1	0.000	0.042	0.073	1.975
1040	M104	2in Dia. Duct	Sec 5 - min	0.002	1	-0.051	7	-0.121	5	-2.297	7	0.003	1	0.000	1	-0.794	2	0.000	1	-0.012	1	0.000	0.085	0.029	2.297
656	M66	4in Dia. Duct	Sec 4 - min	0.000	1	-0.017	6	-0.126	7	-0.002	1	-0.193	7	-2.275	7	-2.909	8	-0.002	1	-0.005	1	0.000	0.007	0.108	2.909
1082	M109	2in Dia. Duct	Sec 1 - min	0.001	1	-0.049	3	-0.134	5	-2.084	5	-0.038	1	-0.002	1	-1.004	2	0.000	1	0.008	1	0.000	0.077	0.037	2.084
1226	M123	4in Dia. Duct	Sec 5 - max	0.155	6	-0.027	1	-0.009	1	-0.170	1	1.167	6	-0.075	1	1.566	7	0.079	6	0.180	6	0.013	0.043	0.058	1.566
1231	M124	4in Dia. Duct	Sec 1 - max	0.155	6	0.06	6	0.083	7	-0.170	1	1.167	6	-0.075	1	1.566	7	0.079	6	0.180	6	0.013	0.043	0.058	1.566
1122	M113	2in Dia. Duct	Sec 1 - min	0.008	1	-0.069	6	-0.143	5	-0.731	3	-0.013	1	0.009	1	-2.293	2	-0.013	2	-0.171	2	0.002	0.027	0.095	2.293
1084	M109	2in Dia. Duct	Sec 2 - min	0.001	1	-0.049	3	-0.134	5	-2.096	5	-0.036	1	-0.002	1	-0.989	2	0.000	1	0.008	1	0.000	0.078	0.036	2.096
674	M68	4in Dia. Duct	Sec 2 - min	0.000	1	-0.003	6	-0.380	8	-0.064	1	-0.107	7	0.007	1	-2.954	6	0.002	1	0.005	1	0.000	0.004	0.109	2.954
253	M26	6in Dia. Duct	Sec 2 - max	0.142	6	-0.010	7	0.226	9	0.016	7	0.057	8	0.000	1	2.222	9	0.049	7	0.041	7	0.012	0.003	0.099	2.222
1089	M109	2in Dia. Duct	Sec 3 - min	0.001	1	-0.049	3	-0.134	5	-2.109	5	-0.032	1	-0.002	1	-0.934	2	0.000	1	0.008	1	0.000	0.078	0.035	2.109
98	M10	6in Dia. Duct	Sec 4 - min	0.010	1	-1.667	6	-0.018	7	-1.361	7	0.369	1	-1.128	6	-0.094	1	-0.381	7	-0.319	7	0.001	0.061	0.050	1.361
1088	M109	2in Dia. Duct	Sec 4 - min	0.001	1	-0.050	3	-0.134	6	-2.122	5	-0.029	1	-0.002	1	-0.889	2	0.000	1	0.008	1	0.000	0.079	0.033	2.122
789	M79	6in Dia. Duct	Sec 5 - max	0.002	6	0.004	8	0.113	7	-0.083	7	0.218	8	0.000	1	2.294	7	0.049	7	0.041	7	0.000	0.010	0.102	2.294
790	M79	6in Dia. Duct	Sec 5 - min	-0.002	7	-0.003	7	0.000	1	-0.218	8	0.083	7	-2.294	7	0.000	1	-0.151	8	-0.126	8	0.000	0.010	0.102	2.294
791	M80	6in Dia. Duct	Sec 1 - max	0.002	6	0.004	8	0.113	7	-0.083	7	0.218	8	0.000	1	2.294	7	0.049	7	0.041	7	0.000	0.010	0.102	2.294
792	M80	6in Dia. Duct	Sec 1 - min	-0.002	8	-0.003	7	0.000	1	-0.218	8	0.083	7	-2.294	7	0.000	1	-0.151	8	-0.126	8	0.000	0.010	0.102	2.294
999	M100	2in Dia. Duct	Sec 5 - max	0.036	7	-0.012	1	0.000	1	0.036	1	2.084	5	0.704	2	0.005	1	0.059	2	0.801	2	0.008	0.077	0.026	2.084
1090	M109	2in Dia. Duct	Sec 6 - min	0.001	1	-0.050	3	-0.134	5	-2.134	5	-0.025	1	-0.002	1	-0.863	2	0.000	1	0.008	1	0.000	0.079	0.032	2.134
704	M71	4in Dia. Duct	Sec 2 - min	-0.149	8	-0.013	6	-0.379	6	0.044	1	-0.307	6	-1.024	9	-2.362	6	-0.003	7	-0.007	7	0.013	0.011	0.087	2.362
739	M74	4in Dia. Duct	Sec 5 - max	0.231	7	-0.077	1	0.044	5	-1.478	1	1.622	2	0.843	5	0.790	4	0.016	8	0.037	8	0.019	0.000	0.031	1.622
741	M75	4in Dia. Duct	Sec 1 - max	0.231	7	0.091	2	0.047	4	-1.478	1	1.622	2	0.843	5	0.790	4	0.016	8	0.037	8	0.019	0.000	0.031	1.622
87	M9	6in Dia. Duct	Sec 4 - max	0.448	6	-0.054	1	0.017	8	0.400	8	0.260	1	0.243	1	1.261	6	0.203	1	0.170	1	0.037	0.018	0.056	1.261
84	M9	6in Dia. Duct	Sec 2 - min	0.026	1	-1.311	7	-0.016	6	-0.213	1	-1.142	8	-1.256	8	-0.243	1	-0.125	7	-0.105	7	0.002	0.051	0.056	1.256
705	M71	4in Dia. Duct	Sec 3 - max	0.321	7	0.000	1	-0.001	1	0.264	7	-0.050	1	1.755	7	1.933	8	0.016	8	0.037	8	0.027	0.010	0.072	1.933
1030	M103	2in Dia. Duct	Sec 5 - min	0.000	1	-0.067	7	-0.122	5	-2.242	7	0.010	1	0.005	1	-0.659	2	0.000	1	-0.012	1	0.000	0.083	0.024	2.242
672	M68	4in Dia. Duct	Sec 1 - min	0.000	1	-0.002	6	-0.381	8	-0.070	1	-0.107	7	0.007	1	-2.757	6	0.002	1	0.005	1	0.000	0.004	0.102	2.757
425	M43	6in Dia. Duct	Sec 3 - max	0.166	6	0.078	9	0.329	9	1.259	9	0.853	9	0.818	7	0.118	1	1.015	9	0.850	9	0.014	0.056	0.036	1.259
89	M9	6in Dia. Duct	Sec 5 - max	0.449	6	-0.084	1	0.017	8	0.026	8	0.264	1	0.243	1	1.265	9	0.203	1	0.170	1	0.037	0.013	0.056	1.123
95	M10	6in Dia. Duct	Sec 3 - max	0.164	6	-0.101	1	0.018	6	-0.341	1	0.942	7	0.094	1	1.123	8	0.244	1	0.204	1	0.013	0.042	0.050	1.321
525	M53	6in Dia. Duct	Sec 3 - max	0.198	8	0.216	7	0.285	7	-0.009	1	0.673	7	0.763	6	1.321	9	0.345	9	0.289	9	0.016	0.030	0.059	1.321
526	M53	6in Dia. Duct	Sec 3 - min	-0.198	7	-0.750	8	-0.019	1	-0.673	7	0.009	1	-1.321	9	-0.763	6	-0.474	6	-0.397	8	0.016	0.030	0.059	1.321
670	M67	4in Dia. Duct	Sec 6 - min	0.000	1	-0.002	6	-0.303	8	-0.070	1	-0.016	7	0.007	1	-2.757	6	-0.002	1	-0.005	1	0.000	0.003	0.102	2.757
159	M16	6in Dia. Duct	Sec 5 - max	0.060	6	0.390	6	0.046	9	1.502	8	-0.559	1	0.739	6	0.009	9	-0.022	9	-0.019	9	0.005	0.067	0.033	1.502
1000	M100	2in Dia. Duct	Sec 5 - min	0.000	1	-0.002	6	-0.134	5	-2.084	5	-0.036	1	-0.005	1	-0.704	2	0.000	1	0.008	1	0.000	0.077	0.026	2.084
255	M26	6in Dia. Duct	Sec 3 - max	0.143	6	-0.015	7	0.230	9	-0.012	7	0.118	8	0.000	1	1.816	7	0.049	7	0.041	7	0.012	0.005	0.085	1.816
527	M53	6in Dia. Duct	Sec 4 - max	0.198	8	0.215	7	0.204	7	-0.026	1	0.645	8	0.780	6	1.087	9	0.345	9	0.289	9	0.016	0.035	0.048	1.087
528	M53	6in Dia. Duct	Sec 4 - min	-0.198	7	-0.752	6	-0.019	1	-0.645	8	0.026	1	-1.087	9	-0.760	6	-0.474	6	-0.397	6	0.016	0.038	0.048	1.087
793	M80	6in Dia. Duct	Sec 2 - max	0.003	6	0.000	6	0.111	7	-0.092	7	0.216	8	0.000	1	2.078	7	0.049	7	0.041	7	0.000	0.010	0.092	2.078
794	M80	6in Dia. Duct	Sec 2 - min	-0.003	9	-0.007	7	0.000	1	-0.215	8	0.092	7	-2.076	7	0.000	1	-0.151	8	-0.126	8	0.000	0.010	0.092	2.076
932	M94	3in Dia. Duct	Sec 1 - min	-0.005	3	0.052	1	-0.059	9	-1.210	2	0.818	1	-0.018	1	-1.515	5	-0.003	8	-0.011	8	0.001	0.045	0.056	1.515
254	M26	6in Dia. Duct	Sec 2 - min	0.000	1	-0.026	8	-0.228	7	-0.057	8	-0.016	7	-2.222	9	0.000	1	-0.151	8	-0.126	8	0.000	0.003	0.099	2.222
1230	M123	4in Dia. Duct	Sec 6 - min	0	1	-0.144	6	-0.166	7	-1.167	6	0.170	1	-1.566	7	0.075	1	-0.002	1	-0.005	1	0.000	0.043	0.058	1.566
1232	M124	4in Dia. Duct	Sec 1 - min	0	1	0.029	1	-0.012	8	-1.167	6	0.170	1	-1.566	7	0.075	1	-0.002	1	-0.005	1	0.000	0.043	0.058	1.566
919	M92	4in Dia. Duct	Sec 5 - max	0.197	2	-0.033	3	0.019	5	-0.181	3	2.081	2	0.221	7	0.199	8	0.016	8	0.037	8	0.016	0.077	0.008	2.081
668	M67	4in Dia. Duct	Sec 4 - min	0.000	1	0.000	6	-0.304	8	-0.100	1	-0.016	7	-0.086	7	-2.626	6	-0.002	1	-0.005	1	0.000	0.004	0.097	2.626
955	M95	2in Dia. Duct	Sec 3 - max	0.102	7	-0.017	6	0.141	3	0.602	3	-0.431	1	1.487	6	0.029	1	0.018	2	0.245	2	0.023	0.022	0.055	1.487
167	M17	6in Dia. Duct	Sec 4 - max	0.000	6	0.001	3	0.000	6	1.506	8	-0.563	1	0.740	6	0.011	9	-0.022	9	-0.019	9	0.000	0.067	0.033	1.506
168	M17	6in Dia. Duct	Sec 4 - min	0.000	8	0.001	1	0.000	7	0.563	1	-1.506	6	-0.011	9	-0.740	6	-0.028	6	-0.024	6	0.000	0.067	0.033	1.506
169	M17	6in Dia. Duct	Sec 6 - max	0.000	1	0.000	1	0.000	1	1.506	8	-0.563	1	0.740	6	0.011	9	-0.022	9	-0.019	9	0.000	0.067	0.033	1.506
170	M17	6in Dia. Duct	Sec 5 - min	0.000	1	0.000	1	0.000	1	0.563	1	-1.506	6	-0.011	9	-0.740	6	-0.028	6	-0.024	6	0.000	0.067	0.033	1.506
1191	M120	6in Dia. Duct	Sec 1 - max	0	1	0	1	0.000	1	1.506	8	-0.563	1	0.740	6	0.011	9	-0.022	9	-0.019	9	0.000	0.067	0.033	1.506
1192	M120	6in Dia. Duct	Sec 1 - min	0	1	0	1	0.000	1	0.563	1	-1.506	6	-0.011	9	-0.740	6	-0.028	6	-0.024	6	0.000	0.067	0.033	1.506
165	M17	6in Dia. Duct	Sec 3 - max	0.000	6	0.002	3	0.001	6	1.505	8	-0.562	1	0.739	6	0.010	9	-0.022	9	-0.019	9	0.000	0.067	0.033	1.505
166	M17	6in Dia. Duct	Sec 3 - min	0.000	8	0.002	1	-0.001	7	0.562	1	-1.505	8	-0.010	9	-0.739	6	-0.028	6	-0.024	6	0.000	0.067	0.033	1.505
1193	M120	6in Dia. Duct	Sec 2 - max	0	8	-0.002	1	0.000	7	1.505	8	-0.562	1	0.739	6	0.010	9	-0.022	9	-0.019	9	0.000	0.067	0.033	1.505
1194	M120	6in Dia. Duct	Sec 2 - min	0	9	-0.002	1	0.000	8	0.562	1	-1.505	8	-0.010	9	-0.739	6	-0.028	6	-0.024	6	0.000	0.067	0.033	1.505
163	M17	6in Dia. Duct	Sec 2 - max	0.000	8	0.003	3	0.002	6	1.504	8	-0.561	1	0.739	6	0.010	9	-0.022	9	-0.019	9	0.000	0.067	0.033	1.504
164	M17	6in Dia. Duct	Sec 2 - min	0.000	8	0.003	1	-0.002	7	0.561	1	-1.504	8	-0.010	9	-0.739	6	-0.028	6	-0.024	8	0.000	0.067	0.033	1.504
161	M17	6in Dia. Duct	Sec 1 - max	0.001	6	0.004	3	0.002	6	1.502	8	-0.559	1	0.736	6	0.009	9	-0.022	9	-0.019	9	0.000	0.067	0.033	1.502
162	M17	6in Dia. Duct	Sec 1 - min	-0.001	8	0.004	1	-0.002	7	0.559	1	-1.502	8	-0.009	9	-0.736	6	-0.028	8	-0.024	8	0.000	0.067	0.033	1.502
1195	M120	6in Dia. Duct	Sec 3 - max	0	8	-0.004	1	0.002	7	1.503	8	-0.560	1	0.738	6	0.009	9	-0.022	9	-0.019	9	0.000	0.067	0.033	1.503
1196	M120	6in Dia. Duct	Sec 3 - min	0	6	-0.004	1	-0.002	8	0.560	1	-1.503	8	-0.009	9	-0.736	6	-0.028	6	-0.024	6	0.000	0.067	0.033	1.503
160	M16	6in Dia. Duct	Sec 6 - min	0.000	1	0.018	1	-0.046	8	0.569	1	-1.502	8	-0.009	9	-0.736	8	-0.028	6	-0.024	6	0.000	0.067	0.033	1.502
1197	M120	6in Dia. Duct	Sec 4 - max	0.001	8	-0.006	1	0.003	7	1.498	8	-0.556	1	0.736	6	0.007	9	-0.022	9	-0.019	9	0.000	0.067	0.033	1.498
1198	M120	6in Dia. Duct	Sec 4 - min	-0.001	6	-0.008	1	-0.003	6	0.556	1	-1.498	8	-0.007	9	-0.736	6	-0.028	6	-0.024	8	0.000	0.067	0.033	1.499
1199	M120	6in Dia. Duct	Sec 5 - max	0.002	8	-0.008	1	0.004	7	1.492	8	-0.550	1	0.733	6	0.004	9	-0.022	9	-0.019	9	0.000	0.066	0.033	1.492
1200	M120	6in Dia. Duct	Sec 5 - min	-0.002	6	-0.008	1	-0.004	6	0.550	1	-1.492	8	-0.004	9	-0.733	6	-0.028	6	-0.024	6	0.000	0.066	0.033	1.492
1201	M121	6in Dia. Duct	Sec 1 - max	0.002	8	-0.008	2	0.004	9	1.492	6	-0.550	1	0.733	6	0.004	9	-0.022	9	-0.019	9	0.000	0.066	0.033	

D-2250

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_a	f_{sy}/σ_s	f_{sz}/σ_s		f_v (ksi)	
1202	M121	6in Dia. Duct	Sec 1- min	-0.002	6	-0.008	5	-0.004	6	0.550	1	-1.492	6	-0.004	6	-0.733	6	-0.020	6	-0.024	6	0.000	0.066	0.033		1.492	
585	M59	4in Dia. Duct	Sec 3 - max	0.492	7	0.009	1	-0.001	1	0.179	1	1.076	6	0.443	6	0.293	9	0.010	6	0.022	6	0.041	0.040	0.016		1.076	
319	M32	6in Dia. Duct	Sec 6 - max	0.123	8	-0.017	1	-0.002	1	-0.014	1	0.851	6	-0.046	1	1.115	9	0.049	7	0.041	7	0.010	0.038	0.050		1.115	
320	M32	6in Dia. Duct	Sec 5 - min	-0.123	9	-0.080	6	-0.058	7	-0.851	6	0.014	1	-1.115	9	0.046	1	-0.151	6	-0.126	9	0.010	0.038	0.050		1.115	
321	M33	6in Dia. Duct	Sec 1 - max	0.123	6	0.190	6	0.234	9	-0.014	1	0.851	6	-0.046	1	1.115	9	0.049	7	0.041	7	0.010	0.038	0.050		1.115	
322	M33	6in Dia. Duct	Sec 1- min	-0.123	8	0.011	1	0.010	1	-0.851	6	0.014	1	-1.115	9	0.046	1	-0.151	6	-0.126	8	0.010	0.038	0.050		1.115	
740	M74	4in Dia. Duct	Sec 5 - min	-0.058	8	-0.079	2	-0.042	4	-1.622	2	1.478	1	-0.790	4	-0.643	5	-0.003	7	-0.007	7	0.005	0.080	0.031		1.622	
742	M75	4in Dia. Duct	Sec 1- min	-0.058	8	0.096	1	-0.046	5	-1.622	2	1.478	1	-0.790	4	-0.643	5	-0.003	7	-0.007	7	0.005	0.080	0.031		1.622	
821	M83	4in Dia. Duct	Sec 1 - max	0.157	2	0.216	2	0.019	5	-0.191	3	2.081	2	0.148	7	0.086	8	0.042	8	0.097	8	0.013	0.077	0.005		2.081	
715	M72	4in Dia. Duct	Sec 3 - max	0.311	7	-0.021	1	0.106	8	-0.049	7	0.093	1	0.488	7	1.769	8	0.016	8	0.037	8	0.028	0.003	0.066		1.769	
706	M71	4in Dia. Duct	Sec 3 - min	-0.147	6	-0.016	6	-0.362	6	0.060	1	-0.264	7	-1.933	8	-1.795	7	-0.003	7	-0.007	7	0.012	0.010	0.072		1.933	
157	M16	6in Dia. Duct	Sec 4 - max	0.059	6	0.367	6	0.045	9	1.223	8	-0.546	1	0.770	6	0.041	9	-0.022	9	-0.019	9	0.005	0.054	0.034		1.223	
765	M60	6in Dia. Duct	Sec 3 - max	0.004	6	-0.004	6	0.109	7	-0.110	7	0.218	6	0.000	1	1.862	7	0.049	7	0.041	7	0.000	0.010	0.093		1.862	
766	M60	6in Dia. Duct	Sec 3 - min	-0.004	9	-0.011	7	0.000	1	-0.219	8	0.110	7	-1.862	7	0.000	1	-0.151	8	-0.126	8	0.000	0.010	0.093		1.862	
729	M73	4in Dia. Duct	Sec 6 - max	0.288	7	-0.072	2	0.039	7	-1.097	2	1.142	1	0.616	7	0.753	8	0.016	8	0.037	8	0.023	0.042	0.028		1.142	
731	M74	4in Dia. Duct	Sec 1 - max	0.288	7	0.071	1	0.041	4	-1.097	2	1.142	1	0.616	7	0.753	8	0.016	8	0.037	8	0.023	0.042	0.028		1.142	
98	M10	6in Dia. Duct	Sec 3 - min	0.010	1	-1.557	6	-0.016	7	-0.942	7	0.341	1	-1.123	6	-0.094	1	-0.381	7	-0.319	7	0.001	0.042	0.050		1.123	
426	M43	6in Dia. Duct	Sec 3 - min	-0.004	9	-0.393	9	-0.329	8	-0.853	9	-1.259	6	-0.118	1	-0.816	7	0.021	1	0.018	1	0.000	0.056	0.039		1.259	
86	M9	6in Dia. Duct	Sec 3 - min	0.026	1	-1.312	7	-0.017	6	-0.236	1	-0.771	8	-1.266	6	-0.243	1	-0.125	7	-0.105	7	0.002	0.034	0.056		1.918	
256	M25	6in Dia. Duct	Sec 3 - min	0.000	1	-0.031	8	-0.230	7	-0.118	8	0.012	7	-1.918	7	0.000	1	-0.151	8	-0.126	8	0.000	0.005	0.085		1.726	
1173	M116	2in Dia. Duct	Sec 2 - max	0.048	6	0.001	1	0.000	1	-0.061	1	1.726	8	0.436	8	0.023	1	0.004	3	0.055	3	0.010	0.004	0.016		1.264	
111	M12	6in Dia. Duct	Sec 1 - max	0.030	8	0.412	6	0.102	8	0.035	1	1.284	7	0.669	6	0.360	9	0.251	1	0.210	1	0.002	0.057	0.030		1.559	
203	M21	6in Dia. Duct	Sec 2 - max	0.103	9	0.034	7	0.000	1	-0.160	1	0.258	6	1.559	7	0.000	1	-0.022	9	-0.019	9	0.008	0.011	0.069		1.559	
204	M21	6in Dia. Duct	Sec 2 - min	-0.103	7	0.016	8	-0.287	9	-0.259	8	0.160	1	0.000	7	-1.559	7	-0.028	6	-0.024	6	0.008	0.011	0.069		1.775	
197	M20	6in Dia. Duct	Sec 4 - max	0.094	9	-0.022	1	0.077	9	0.058	7	-0.056	1	1.775	8	0.000	1	-0.022	9	-0.019	9	0.008	0.003	0.079		1.775	
196	M20	6in Dia. Duct	Sec 4 - min	-0.094	6	-0.024	8	0.000	1	0.056	7	-0.058	7	0.000	1	-1.775	8	-0.028	6	-0.024	6	0.008	0.003	0.079		1.775	
158	M16	6in Dia. Duct	Sec 4 - min	0.000	1	0.020	1	-0.045	8	0.546	1	-1.223	8	-0.041	9	-0.770	6	-0.028	6	-0.024	6	0.000	0.054	0.034		1.223	
749	M75	4in Dia. Duct	Sec 6 - max	0.180	7	-0.074	2	0.045	5	-0.666	2	1.190	1	0.676	5	0.756	4	0.016	8	0.037	8	0.016	0.044	0.028		1.190	
611	M62	4in Dia. Duct	Sec 1 - max	0.180	7	0.063	3	0.037	4	-0.666	2	1.190	1	0.676	5	0.756	4	0.016	8	0.037	8	0.016	0.044	0.028		1.190	
112	M12	6in Dia. Duct	Sec 1- min	-0.015	7	0.034	1	0.000	1	-1.284	7	-0.035	1	-0.360	9	-0.669	6	-0.352	6	-0.295	6	0.001	0.057	0.030		1.284	
985	M99	2in Dia. Duct	Sec 3 - max	0.050	7	-0.024	5	0.186	3	0.401	3	-0.250	2	1.414	8	-0.002	1	0.028	2	0.384	2	0.020	0.015	0.052		1.414	
1203	M121	6in Dia. Duct	Sec 2 - max	0.007	8	-0.03	2	0.015	9	1.300	8	-0.357	1	0.037	6	0.000	1	-0.022	9	-0.019	9	0.001	0.058	0.028		1.300	
1204	M121	6in Dia. Duct	Sec 2 - min	-0.007	6	-0.03	5	-0.015	9	0.357	1	-1.300	8	0.000	1	-0.037	6	-0.028	6	-0.024	6	0.001	0.058	0.028		1.300	
820	M82	4in Dia. Duct	Sec 5 - min	-0.014	3	-0.070	2	-0.017	4	-2.081	2	0.191	3	-0.189	6	-0.221	7	-0.003	7	-0.007	7	0.001	0.077	0.008		2.081	
655	M66	4in Dia. Duct	Sec 3 - max	0.177	6	0.000	7	0.128	8	0.270	7	-0.076	1	1.639	6	1.077	7	0.079	6	0.180	6	0.015	0.010	0.061		1.639	
93	M10	6in Dia. Duct	Sec 2 - max	0.164	0	-0.100	1	0.017	8	-0.312	1	0.504	7	0.094	1	1.118	6	0.244	1	0.204	1	0.013	0.022	0.060		1.118	
113	M12	6in Dia. Duct	Sec 2 - max	0.030	6	0.411	6	0.102	8	0.046	1	1.168	7	0.698	6	0.348	9	0.251	1	0.210	1	0.002	0.052	0.031		1.168	
943	M95	2in Dia. Duct	Sec 2 - max	0.121	2	0.037	4	0.000	1	0.336	1	-0.282	3	1.215	4	-0.001	1	0.004	7	0.080	7	0.027	0.012	0.045		1.215	
114	M12	6in Dia. Duct	Sec 2 - min	-0.016	7	0.033	1	0.000	1	-1.169	7	-0.045	1	-0.348	9	-0.688	6	-0.352	6	-0.295	6	0.001	0.052	0.031		1.168	
797	M80	6in Dia. Duct	Sec 4 - max	0.005	6	-0.009	8	0.107	7	-0.136	7	0.232	8	0.000	1	1.652	7	0.049	7	0.041	7	0.000	0.010	0.073		1.652	
798	M80	6in Dia. Duct	Sec 4 - min	-0.005	9	-0.016	7	0.000	1	-0.232	8	0.136	7	-1.652	7	0.000	1	-0.151	8	-0.126	8	0.000	0.010	0.073		1.652	
719	M72	4in Dia. Duct	Sec 5 - max	0.303	7	-0.051	1	0.093	8	-0.822	1	0.854	7	0.713	9	0.204	6	0.016	8	0.037	8	0.025	0.032	0.026		0.854	
721	M73	4in Dia. Duct	Sec 1 - max	0.303	7	0.067	2	0.033	4	-0.822	1	0.854	7	0.713	9	0.204	6	0.016	8	0.037	8	0.025	0.032	0.026		0.854	
1174	M116	2in Dia. Duct	Sec 2 - min	0.014	1	-0.043	4	-0.160	2	-1.726	8	0.061	1	-0.023	1	-0.436	6	-0.010	2	-0.141	2	0.003	0.064	0.016		1.726	
622	M63	4in Dia. Duct	Sec 1 - min	0.032	3	-0.042	3	-0.017	4	-2.081	2	0.191	3	-0.089	8	-0.146	7	-0.036	7	-0.083	7	0.000	0.077	0.005		2.081	
156	M16	6in Dia. Duct	Sec 3 - max	0.059	6	0.369	6	0.045	9	0.943	6	-0.531	1	0.802	6	0.073	9	-0.022	9	-0.019	9	0.005	0.042	0.036		0.980	
121	M13	6in Dia. Duct	Sec 1 - max	0.048	6	0.409	6	0.077	4	0.227	1	0.980	7	0.782	6	0.312	9	0.215	1	0.180	1	0.004	0.044	0.035		1.146	
1219	M122	6in Dia. Duct	Sec 5 - min	-0.019	8	0.412	6	0.111	9	-0.046	1	1.146	7	0.669	6	0.360	9	0.260	1	0.209	1	0.002	0.051	0.030		1.146	
1220	M122	6in Dia. Duct	Sec 5 - min	-0.019	7	0.034	1	0.000	1	-1.146	7	0.046	1	-0.360	9	-0.669	6	-0.465	6	-0.414	6	0.002	0.051	0.030		1.051	
115	M12	6in Dia. Duct	Sec 3 - max	0.030	8	0.411	6	0.102	8	0.054	1	1.051	7	0.729	6	0.336	9	0.251	1	0.210	1	0.002	0.047	0.032		1.769	
718	M72	4in Dia. Duct	Sec 3 - min	-0.137	8	-0.024	7	-0.020	7	-0.093	1	0.049	7	-1.769	8	-0.488	7	-0.003	7	-0.007	7	0.012	0.003	0.066		1.051	
118	M12	6in Dia. Duct	Sec 3 - min	-0.018	7	0.033	1	0.000	1	-1.051	7	-0.054	1	-0.336	9	-0.726	6	-0.352	6	-0.295	6	0.001	0.047	0.032		0.980	
122	M13	6in Dia. Duct	Sec 1- min	-0.008	7	0.032	1	0.000	1	-0.980	7	-0.227	1	-0.312	9	-0.782	6	-0.159	6	-0.117	6	0.001	0.044	0.035		1.123	
745	M75	4in Dia. Duct	Sec 3 - max	0.210	7	0.005	2	0.000	6	1.123	2	-0.942	1	0.509	4	0.622	5	0.016	8	0.037	8	0.016	0.042	0.019		1.142	
730	M73	4in Dia. Duct	Sec 5 - min	-0.095	8	-0.073	1	-0.046	8	-1.142	1	1.097	2	-0.753	8	-0.616	7	-0.003	7	-0.007	7	0.008	0.042	0.028		1.142	
732	M74	4in Dia. Duct	Sec 1- min	-0.095	8	0.069	2	-0.039	5	-1.142	1	1.097	2	-0.753	8	-0.616	7	-0.003	7	-0.007	7	0.008	0.042	0.028		0.995	
123	M13	6in Dia. Duct	Sec 2 - max	0.048	8	0.409	6	0.077	4	0.236	1	0.885	7	0.602	6	0.299	9	0.215	1	0.180	1	0.004	0.038	0.036		1.121	
1015	M102	2in Dia. Duct	Sec 3 - max	0.088	7	-0.014	7	0.171	3	0.452	3	-0.288	2	1.121	3	0.013	1	0.023	2	0.318	2	0.020	0.017	0.042		0.943	
156	M16	6in Dia. Duct	Sec 3 - min	0.000	1	0.021	1	-0.045	8	0.631	1	-0.045	8	-0.073	9	-0.602	6	-0.028	6	-0.024	6	0.000	0.042	0.036		0.935	
117	M12	6in Dia. Duct	Sec 4 - max	0.030	8	0.410	6	0.102	8	0.083	1	0.935	7	0.754	6	0.324	9	0.251	1	0.210	1	0.002	0.042	0.034		1.487	
958	M98	2in Dia. Duct	Sec 3 - min	0.000	1	-0.020	4	0.000	1	0.431	1	-0.602	3	-0.029	1	-1.487	5	-0.005	1	-0.066	1	0.000	0.022	0.055		1.294	
913	M92	2in Dia. Duct	Sec 2 - max	0.048	7	0.018	5	-0.002	1	0.101	1	1.294	3	0.508	4	-0.107	1	0.007	3	0.093	3	0.010	0.048	0.019		1.474	
1123	M113	2in Dia. Duct	Sec 2 - max	0.039	5	0.000	1	0.000	1	0.014	1	1.474	8	0.363	4	-0.008	1	0.001	3	0.017	3	0.009	0.055	0.013		0.935	
118	M12	6in Dia. Duct	Sec 4 - min	-0.018	7	0.032	1	0.000	1	-0.935	7	-0.053	1	-0.324	9	-0.754	6	-0.352	6	-0.295	6	0.001	0.042	0.034		1.412	
1073	M108	2in Dia. Duct	Sec 2 - max	0.042	7	0.000	1	0.000	1	-0.025	1	1.412	8	0.392	4	0.000	1	0.002	3	0.029	3	0.009	0.052	0.015		1.281	
68	M9	6in Dia. Duct	Sec 4 - min	0.028	1	-1.313	7	-0.017	6	-0.260	1	-0.400	8	-1.261	6	-0.243	1	-0.125	7	-0.105	7	0.002	0.018	0.056		1.449	
799	M80	6in Dia. Duct	Sec 5 - max	0.008	6	-0.013	8	0.105	7	-0.171	7	0.253	6	0.000	1	1.446	7	0.049	7	0.041	7	0.000	0.011	0.064		1.446	
800	M80	6in Dia. Duct	Sec 5 - min	-0.008	9	-0.020	7	0.000	1	-0.253	8	0.171	7	-1.446	7	0.000	1	-0.151	8	-0.126	8	0.000	0.011	0.064		1.446	
801	M81	6in Dia. Duct	Sec 1 - max	0.008	6	-0.013	8	0.105	7	-0.171	7	0.253	6	0.000	1	1.446	7	0.049	7	0.041	7	0.000	0.011	0.064		1.446	
802	M81	6in Dia. Duct	Sec 1- min	-0.008	9	-0.020	7	0.000	1	-0.253	8	0.171	7	-1.446	7	0.000	1	-0.151	8	-0.126	8	0.000	0.011	0.064		1.113	
81	M10	6in Dia. Duct	Sec 1 - max	0.183	8	-0.099	1	0.017	6	0.026	8	0.264	1	0.094	1	1.113	6	0.244	1	0.204	1	0.013	0.013	0.049		1.313	
207	M21	6in Dia. Duct	Sec 4 - max	0.106	9	0.014	7	0.000	1	0.040	7	0.178	8	0.535	6	1.313	9	-0.022	9	-0.019	9	0.009	0.009	0.058		1.313	
208	M21	6in Dia. Duct	Sec 4 - min	-0.106	7	-0.001	5	-0.277	8	-0.179	6	-0.040	7	-1.313	9	-0.535	6	-0.028	6	-0.024	6	0.009	0.009	0.058		0.855	
124	M13	6in Dia. Duct	Sec 2 - min	-0.008	7	0.031	1	0.000	1	-0.855	7	-0.336	1	-0.288	9	-0.802	6	-0.139	6	-0.117	6	0.001	0.039	0.036		0.821	
125	M13	6in Dia. Duct	Sec 3 - max	0.048	8	0.409	6	0.077	4	0.245	1	0.749	7	0.821	6	0.283	9	0.215	1	0.180	1	0.004	0.033	0.036			

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_b/σ_a	f_{bz}/σ_a	f_s/σ_a	f_s (ksi)
																						0.2250			
823	M83	4in Dia. Duct	Sec 2 - max	0.157	2	0.210	2	0.021	6	-0.323	3	1.429	2	0.205	7	0.141	8	0.042	6	0.097	6	0.013	0.053	0.008	1.429
119	M12	6in Dia. Duct	Sec 6 - max	0.030	6	0.409	6	0.102	6	0.072	1	0.819	7	0.782	6	0.312	9	0.251	1	0.210	1	0.002	0.036	0.035	0.819
750	M75	4in Dia. Duct	Sec 5 - min	-0.017	8	-0.080	1	-0.048	4	-1.190	1	0.686	2	-0.756	4	-0.676	5	-0.003	7	-0.007	7	0.001	0.044	0.028	1.190
812	M82	4in Dia. Duct	Sec 1 - min	-0.017	8	0.026	2	-0.035	5	-1.190	1	0.686	2	-0.756	4	-0.676	5	-0.003	7	-0.007	7	0.001	0.044	0.028	1.190
923	M93	4in Dia. Duct	Sec 2 - max	0.154	2	0.014	3	0.000	1	1.169	2	-0.665	3	0.465	8	0.349	7	0.044	7	0.100	7	0.013	0.043	0.017	1.169
94	M10	6in Dia. Duct	Sec 2 - min	0.010	1	-1.556	8	-0.017	7	-0.504	7	0.312	1	-1.118	6	-0.094	1	-0.381	7	-0.319	7	0.001	0.022	0.050	1.118
1233	M124	4in Dia. Duct	Sec 2 - max	0.159	8	0.045	6	0.076	7	0.042	1	0.654	6	-0.052	1	0.950	9	0.079	6	0.180	6	0.013	0.024	0.035	0.950
120	M12	6in Dia. Duct	Sec 6 - min	-0.016	7	0.032	1	0.000	1	-0.819	7	-0.072	1	-0.312	9	-0.782	6	-0.352	6	-0.299	6	0.001	0.030	0.035	0.819
939	M94	3in Dia. Duct	Sec 5 - max	0.062	2	0.031	4	0.000	1	-0.409	1	0.508	8	1.255	5	0.002	1	0.004	7	0.019	7	0.007	0.019	0.046	1.255
921	M93	4in Dia. Duct	Sec 1 - max	0.162	2	0.044	3	0.014	6	0.915	2	0.018	3	0.651	8	0.016	7	0.044	7	0.100	7	0.014	0.034	0.024	0.915
839	M84	4in Dia. Duct	Sec 5 - max	0.156	2	0.044	3	0.000	1	0.924	2	0.003	3	0.651	8	0.016	7	0.020	9	0.046	9	0.013	0.034	0.024	0.924
153	M16	6in Dia. Duct	Sec 2 - max	0.055	8	0.400	6	0.044	9	0.662	9	-0.516	1	0.833	6	0.104	9	-0.022	9	-0.019	9	0.006	0.029	0.037	0.833
1124	M113	2in Dia. Duct	Sec 2 - min	0.014	1	-0.058	2	-0.138	2	-1.474	9	-0.014	1	0.008	1	-0.363	4	-0.013	2	-0.171	2	0.003	0.058	0.013	1.474
90	M9	6in Dia. Duct	Sec 5 - min	0.029	1	-1.313	7	-0.017	6	-0.264	1	-0.028	6	-1.265	6	-0.243	1	-0.125	7	-0.106	7	0.002	0.013	0.056	1.265
656	M66	4in Dia. Duct	Sec 3 - min	0.000	1	-0.003	6	-0.121	7	0.078	1	-0.270	7	-1.077	7	-1.636	6	-0.002	1	-0.005	1	0.000	0.010	0.061	1.636
128	M13	6in Dia. Duct	Sec 3 - min	-0.008	7	0.030	1	0.000	1	-0.749	7	-0.245	1	-0.283	9	-0.821	6	-0.139	6	-0.117	6	0.001	0.033	0.038	0.821
914	M92	2in Dia. Duct	Sec 2 - min	0.016	1	-0.004	4	-0.145	2	-1.294	3	-0.101	1	0.107	1	-0.506	4	+0.005	2	-0.067	2	0.004	0.048	0.019	1.294
1074	M108	2in Dia. Duct	Sec 2 - min	0.014	1	-0.046	4	-0.133	2	-1.412	8	0.025	1	0.000	1	-0.392	4	+0.012	2	-0.165	2	0.003	0.052	0.015	1.412
317	M32	6in Dia. Duct	Sec 4 - max	0.120	6	-0.004	1	-0.002	1	0.047	1	0.539	6	-0.032	1	0.607	9	0.049	7	0.041	7	0.010	0.024	0.036	0.607
318	M32	6in Dia. Duct	Sec 4 - min	-0.120	9	-0.047	6	-0.056	9	-0.539	6	-0.047	1	-0.607	9	0.032	1	-0.151	8	-0.128	8	0.010	0.024	0.036	1.328
937	M94	3in Dia. Duct	Sec 4 - max	0.118	2	-0.030	2	0.000	1	-0.137	8	0.212	1	0.902	1	1.328	4	0.013	7	0.054	7	0.012	0.008	0.049	0.840
127	M13	6in Dia. Duct	Sec 4 - max	0.048	6	0.407	6	0.077	4	0.263	1	0.633	7	0.840	6	0.268	9	0.215	1	0.180	1	0.004	0.028	0.037	0.941
833	M84	4in Dia. Duct	Sec 2 - max	0.158	2	0.059	3	0.003	8	0.566	2	0.624	3	0.941	6	-0.049	1	0.020	9	0.046	9	0.013	0.031	0.035	0.854
720	M72	4in Dia. Duct	Sec 6 - min	-0.130	8	-0.066	7	-0.005	7	-0.854	7	0.822	1	-0.204	6	-0.713	9	-0.003	7	-0.007	7	0.011	0.032	0.026	0.854
722	M73	4in Dia. Duct	Sec 1 - min	-0.130	8	0.066	1	-0.040	5	-0.854	7	0.822	1	-0.204	9	-0.713	9	-0.003	7	-0.007	7	0.011	0.032	0.026	0.639
726	M73	4in Dia. Duct	Sec 3 - max	0.286	7	-0.003	2	0.004	7	0.839	2	-0.628	3	0.587	8	0.381	7	0.016	8	0.037	8	0.024	0.024	0.021	0.822
837	M84	4in Dia. Duct	Sec 4 - max	0.158	2	0.049	3	0.000	1	0.822	2	0.160	3	0.863	8	-0.044	1	0.020	9	0.046	9	0.013	0.030	0.025	0.859
131	M14	6in Dia. Duct	Sec 1 - max	0.059	8	0.407	6	0.054	9	0.380	1	0.566	7	0.859	8	0.253	9	0.139	1	0.116	1	0.005	0.025	0.038	0.878
191	M20	6in Dia. Duct	Sec 1 - max	0.075	9	0.054	1	0.095	8	-0.433	8	0.500	1	0.000	1	0.878	8	-0.022	9	-0.019	9	0.006	0.022	0.039	0.878
192	M20	6in Dia. Duct	Sec 1 - min	-0.075	8	0.052	8	0.000	1	+0.500	1	0.433	8	-0.878	8	0.000	1	-0.028	6	-0.024	6	0.006	0.022	0.039	0.878
779	M78	6in Dia. Duct	Sec 5 - max	0.075	9	-0.054	8	0.019	7	-0.433	8	0.500	1	0.000	1	0.878	8	-0.022	9	-0.019	9	0.006	0.022	0.039	0.878
780	M78	6in Dia. Duct	Sec 5 - min	-0.075	7	-0.061	1	-0.044	8	-0.500	1	0.433	8	-0.878	8	0.000	1	-0.028	6	-0.024	6	0.008	0.022	0.039	0.878
998	M99	2in Dia. Duct	Sec 3 - min	0.000	1	-0.029	4	0.000	1	-0.250	2	-0.401	3	0.002	1	-1.414	8	0.000	1	-0.002	1	0.000	0.016	0.052	1.414
154	M16	6in Dia. Duct	Sec 2 - min	0.000	1	0.023	1	-0.044	8	0.516	1	-0.662	9	-0.104	9	-0.833	6	-0.028	9	-0.024	6	0.009	0.029	0.037	0.833
717	M72	4in Dia. Duct	Sec 4 - max	0.307	7	+0.036	1	0.101	8	-0.370	9	0.389	1	0.323	7	0.709	8	0.016	8	0.037	8	0.026	0.014	0.026	0.709
126	M13	6in Dia. Duct	Sec 4 - min	-0.008	7	0.030	1	0.000	1	-0.833	7	-0.263	1	-0.206	9	-0.840	6	-0.139	6	-0.117	6	0.001	0.028	0.037	0.840
835	M84	4in Dia. Duct	Sec 3 - max	0.158	2	0.054	3	0.000	8	0.703	2	0.333	3	0.720	9	-0.047	1	0.020	9	0.046	9	0.013	0.026	0.027	0.720
149	M15	6in Dia. Duct	Sec 6 - max	0.061	8	0.402	6	0.050	9	0.488	1	-0.355	7	0.864	6	0.135	9	0.034	1	0.029	1	0.005	0.022	0.039	0.864
147	M15	6in Dia. Duct	Sec 4 - max	0.061	8	0.403	6	0.049	9	0.491	1	-0.241	6	0.870	6	0.149	9	0.034	1	0.029	1	0.005	0.022	0.039	0.870
145	M15	6in Dia. Duct	Sec 3 - max	0.061	8	0.403	6	0.049	9	0.484	1	-0.127	6	0.876	6	0.163	9	0.034	1	0.029	1	0.005	0.022	0.039	0.876
143	M15	6in Dia. Duct	Sec 2 - max	0.061	8	0.404	6	0.049	9	0.476	1	-0.012	6	0.882	6	0.177	9	0.034	1	0.029	1	0.005	0.021	0.039	0.882
161	M16	6in Dia. Duct	Sec 1 - max	0.059	8	0.402	6	0.043	9	0.499	1	-0.353	6	0.864	6	0.135	9	-0.022	9	-0.010	9	0.005	0.022	0.038	0.864
940	M94	3in Dia. Duct	Sec 5 - min	0.000	1	0.028	1	-0.050	5	-0.508	8	0.409	1	-0.002	1	-1.255	5	0.001	1	0.005	1	0.000	0.018	0.046	1.255
141	M15	6in Dia. Duct	Sec 1 - max	0.060	8	0.404	6	0.049	9	0.469	1	0.103	6	0.888	6	0.191	9	0.034	1	0.029	1	0.005	0.021	0.039	0.888
129	M13	6in Dia. Duct	Sec 5 - max	0.046	6	0.407	6	0.077	4	0.262	1	0.518	7	0.659	8	0.253	9	0.215	1	0.180	1	0.004	0.023	0.038	0.659
279	M28	6in Dia. Duct	Sec 5 - max	0.053	6	-0.078	7	0.037	8	-0.801	9	0.611	6	0.398	8	0.655	7	0.049	7	0.041	7	0.004	0.036	0.025	0.611
280	M28	6in Dia. Duct	Sec 5 - min	-0.053	9	-0.079	6	-0.046	7	-0.611	6	0.801	9	-0.655	7	-0.398	8	-0.151	8	-0.128	8	0.004	0.036	0.025	0.611
281	M28	6in Dia. Duct	Sec 1 - max	0.053	6	0.063	6	0.038	7	-0.801	9	0.611	6	0.398	8	0.655	7	0.049	7	0.041	7	0.004	0.036	0.025	0.611
282	M28	6in Dia. Duct	Sec 1 - min	-0.053	7	0.003	1	-0.030	8	-0.611	6	0.801	9	-0.655	7	-0.398	8	-0.151	8	-0.128	8	0.004	0.036	0.025	0.611
173	M16	6in Dia. Duct	Sec 2 - max	0.030	8	0.097	1	0.020	8	-0.130	6	0.775	1	0.613	9	0.041	6	+0.022	9	-0.019	9	0.002	0.034	0.027	0.775
174	M16	6in Dia. Duct	Sec 2 - min	-0.030	6	0.032	8	-0.033	7	-0.775	1	0.130	6	-0.041	6	-0.613	9	-0.028	6	-0.024	6	0.002	0.034	0.027	0.775
746	M75	4in Dia. Duct	Sec 3 - min	-0.037	6	0.003	1	-0.002	8	0.942	1	-1.123	2	-0.522	6	-0.509	4	-0.003	7	-0.007	7	0.003	0.042	0.019	1.123
271	M28	6in Dia. Duct	Sec 1 - max	0.015	8	0.077	7	0.031	2	-0.726	8	0.755	7	0.653	3	0.071	2	0.049	7	0.041	7	0.001	0.034	0.029	0.755
272	M28	6in Dia. Duct	Sec 1 - min	-0.015	9	0.076	6	-0.042	3	+0.755	7	0.726	8	-0.071	2	-0.653	3	-0.151	8	-0.128	8	0.001	0.034	0.029	0.755
809	M81	6in Dia. Duct	Sec 5 - max	0.015	8	-0.047	8	0.099	3	-0.726	8	0.755	7	0.653	3	0.071	2	0.049	7	0.041	7	0.001	0.034	0.029	0.755
810	M81	6in Dia. Duct	Sec 5 - min	-0.015	9	-0.054	7	0.000	1	-0.755	7	0.726	8	-0.071	2	-0.653	3	-0.151	8	-0.128	8	0.001	0.034	0.029	0.755
133	M14	6in Dia. Duct	Sec 2 - max	0.059	8	0.408	6	0.055	9	0.388	1	0.450	7	-0.867	6	0.238	9	0.139	1	0.116	1	0.005	0.020	0.039	0.867
132	M14	6in Dia. Duct	Sec 1 - min	0.000	1	0.029	1	0.000	1	-0.585	7	-0.380	1	-0.253	9	-0.859	6	-0.011	6	-0.009	6	0.000	0.025	0.038	0.859
92	M10	6in Dia. Duct	Sec 1 - min	0.010	1	-1.555	8	-0.017	7	-0.264	1	-0.028	6	-1.113	6	-0.094	1	-0.381	7	-0.319	7	0.001	0.013	0.049	1.113
205	M21	6in Dia. Duct	Sec 3 - max	0.105	9	0.024	7	0.000	1	-0.049	7	0.195	8	1.025	7	0.050	8	-0.022	9	-0.019	9	0.003	0.009	0.046	1.025
206	M21	6in Dia. Duct	Sec 3 - min	-0.105	7	0.009	8	-0.282	9	-0.196	8	0.049	7	-0.050	8	-1.025	7	-0.028	6	-0.024	6	0.009	0.009	0.046	0.888
139	M14	6in Dia. Duct	Sec 6 - max	0.059	8	0.404	6	0.056	9	0.411	1	0.105	7	0.888	6	0.191	9	0.139	1	0.116	1	0.005	0.018	0.039	0.810
929	M93	4in Dia. Duct	Sec 6 - max	0.100	2	0.040	2	0.000	6	-0.438	1	0.647	2	0.810	6	0.010	1	0.013	7	0.030	7	0.008	0.024	0.030	1.112
651	M66	4in Dia. Duct	Sec 1 - max	0.170	6	0.028	7	0.114	8	0.022	6	0.186	1	1.112	7	0.696	8	0.079	6	0.180	6	0.014	0.007	0.041	1.112
1239	M124	4in Dia. Duct	Sec 6 - max	0.17	6	0	6	0.054	7	0.022	6	0.186	1	1.112	7	0.696	8	0.079	6	0.180	6	0.014	0.007	0.041	0.881
137	M14	6in Dia. Duct	Sec 4 - max	0.059	8	0.405	6	0.055	9	0.404	1	0.220	7	0.881	6	0.207	9	0.139	1	0.116	1	0.005	0.016	0.039	0.659
130	M13	6in Dia. Duct	Sec 5 - min	-0.006	7	0.029	1	0.000	1	-0.818	7	-0.252	1	-0.253	9	-0.859	6	-0.139	6	-0.117	6	0.001	0.023	0.038	1.037
195	M20	6in Dia. Duct	Sec 3 - max	0.066	9	0.003	1	0.070	8	0.186	9	-0.163	1	1.037	9	0.000	1	-0.022	9	-0.019	9	0.007	0.008	0.046	1.037
196	M20	6in Dia. Duct	Sec 3 - min	-0.066	6	0.001	8	0.000	1	0.163	1	-0.186	9	0.000	1	-1.037	6	-0.028	6	-0.024	6	0.007	0.008	0.046	1.162
817	M82	4in Dia. Duct	Sec 4 - max	0.167	2	-0.009	3	0.005	7	0.136	3	1.162	2	0.697	6	0.071	9	0.016	8	0.037	8	0.016	0.043	0.003	1.169
924	M93	4in Dia. Duct	Sec 2 - min	-0.010	3	-0.002	2	-0.022	9	0.565	3	-1.169	2	-0.349	7	-0.465	6	-0.008	6	-0.013	8	0.001	0.043	0.017	0.674
135	M14	6in Dia. Duct	Sec 3 - max	0.059	8	0.406	6	0.055	9	0.396	1	0.335	7	0.874	6	0.222	9	0.139	1	0.116	1	0.005	0.018	0.039	0.711
1207	M121	6in Dia. Duct	Sec 4 - max	0.019	8	-0.074	2	0.037	9	0.232	8	0.711	1	0.836	7	0.000	1	-0.022	9	-0.019	9	0.002	0.032	0.028	0.711
1208	M121	6in Dia. Duct	Sec 4 - min	-0.019	6	-0.074	6	-0.037	8	-0.711	1	-0.232	8	0.000	1	-0.836	7	-0.028	6	-0.024	6	0.002	0.032	0.028	1.038
803	M81	6in Dia. Duct	Sec 2 - max	0.008	8	-0.021	8	0.101	7	-0.288	7	0.320	8	0.000	1	1.038	7	0.049	7	0.041	7	0.001	0.014	0.046	1.038

D-2250

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_a	f_{sy}/σ_s	f_{sz}/σ_s		I_s (ksi)
804	M81	6in Dia. Duct	Sec 2 - min	-0.008	9	-0.028	7	0.000	1	-0.320	8	0.269	7	-1.038	7	0.000	1	-0.151	8	-0.126	8	0.001	0.014	0.046		1.038
824	M93	4in Dia. Duct	Sec 2 - min	0.004	3	-0.044	3	-0.020	4	-1.428	2	0.323	3	-0.141	8	-0.205	7	-0.036	7	-0.083	7	0.000	0.053	0.008		1.428
825	M93	4in Dia. Duct	Sec 3 - max	0.145	2	-0.016	3	0.000	7	0.819	2	-0.536	3	0.002	4	0.492	5	0.044	7	0.100	7	0.012	0.030	0.016		0.819
152	M16	6in Dia. Duct	Sec 1 - min	0.000	1	0.024	1	-0.043	8	0.353	6	-0.499	1	-0.135	9	-0.864	6	-0.028	6	-0.024	6	0.000	0.022	0.038		0.864
150	M15	6in Dia. Duct	Sec 5 - min	0.000	1	0.024	1	-0.022	8	0.355	7	-0.498	1	-0.135	9	-0.864	6	0.013	6	0.011	6	0.000	0.022	0.036		0.870
146	M15	6in Dia. Duct	Sec 4 - min	0.000	1	0.025	1	-0.021	8	0.241	6	-0.491	1	-0.149	9	-0.870	6	0.013	6	0.011	6	0.000	0.022	0.039		0.876
148	M15	6in Dia. Duct	Sec 3 - min	0.000	1	0.025	1	-0.021	6	0.127	6	-0.494	1	-0.183	9	-0.876	6	0.013	6	0.011	6	0.000	0.022	0.039		0.882
144	M15	6in Dia. Duct	Sec 2 - min	0.000	1	0.026	1	-0.021	6	0.012	6	-0.476	1	-0.177	9	-0.882	6	0.013	6	0.011	6	0.000	0.021	0.039		0.888
142	M16	6in Dia. Duct	Sec 1 - min	0.000	1	0.027	1	-0.020	6	-0.103	6	-0.459	1	-0.191	9	-0.888	6	0.013	6	0.011	6	0.000	0.021	0.039		0.924
840	M84	4in Dia. Duct	Sec 5 - min	-0.021	3	0.028	2	-0.084	7	-0.003	3	-0.924	2	-0.016	7	-0.651	6	-0.027	6	-0.082	6	0.002	0.034	0.024		0.918
922	M93	4in Dia. Duct	Sec 1 - min	-0.019	3	0.028	2	-0.040	9	-0.010	3	-0.915	2	-0.018	7	-0.651	6	-0.008	8	-0.013	8	0.002	0.034	0.024		0.879
1205	M121	6in Dia. Duct	Sec 5 - max	0.013	8	-0.052	2	0.026	9	0.879	8	0.053	1	0.437	4	0.000	1	-0.022	9	-0.019	9	0.001	0.039	0.019		0.879
1206	M121	6in Dia. Duct	Sec 3 - min	-0.013	6	-0.052	6	-0.026	8	-0.063	1	-0.879	8	0.000	1	-0.437	4	-0.028	6	-0.024	6	0.001	0.039	0.018		0.950
1234	M124	4in Dia. Duct	Sec 2 - min	0	1	0.014	1	-0.005	8	-0.654	6	-0.042	1	-0.950	9	0.052	1	-0.002	1	-0.005	1	0.000	0.024	0.039		0.622
723	M73	4in Dia. Duct	Sec 2 - max	0.294	7	0.032	2	0.013	4	0.309	1	-0.295	7	0.622	9	0.274	7	0.016	8	0.037	8	0.025	0.011	0.023		0.867
134	M14	6in Dia. Duct	Sec 2 - min	0.000	1	0.028	1	0.000	1	-0.450	7	-0.388	1	-0.238	9	-0.867	8	-0.011	6	-0.009	6	0.000	0.020	0.039		1.076
596	M59	4in Dia. Duct	Sec 3 - min	0.024	1	-0.144	7	-0.281	7	-1.076	6	-0.179	1	-0.293	9	-0.443	6	-0.022	9	-0.050	9	0.002	0.040	0.016		1.121
1016	M102	2in Dia. Duct	Sec 3 - min	0.000	1	-0.027	6	0.000	1	0.288	2	-0.452	3	-0.013	1	-1.121	3	-0.001	1	-0.020	1	0.000	0.017	0.042		0.746
831	M84	4in Dia. Duct	Sec 1 - max	0.181	2	0.078	9	-0.001	1	0.433	2	0.746	3	0.416	7	0.381	8	0.045	5	0.103	5	0.015	0.028	0.016		0.888
840	M14	6in Dia. Duct	Sec 5 - min	0.000	1	0.027	1	0.000	1	-0.105	7	-0.411	1	-0.191	9	-0.888	6	-0.011	6	-0.009	8	0.000	0.018	0.039		0.941
834	M04	4in Dia. Duct	Sec 2 - min	-0.021	3	0.043	2	-0.092	7	-0.524	3	-0.566	2	0.049	1	-0.941	5	-0.027	6	-0.082	6	0.002	0.021	0.035		1.215
944	M95	2in Dia. Duct	Sec 2 - min	0.000	1	0.031	1	-0.083	5	0.262	3	-0.336	1	0.001	1	-1.215	4	0.001	1	0.017	1	0.000	0.012	0.045		0.893
1236	M124	4in Dia. Duct	Sec 3 - max	0.182	6	0.03	6	0.088	7	0.110	1	0.284	6	-0.029	1	0.893	8	0.079	6	0.160	6	0.014	0.011	0.033		0.881
138	M14	6in Dia. Duct	Sec 4 - min	0.000	1	0.027	1	0.000	1	-0.220	7	-0.404	1	-0.207	9	-0.881	8	-0.011	6	-0.009	6	0.000	0.018	0.039		1.328
938	M94	3in Dia. Duct	Sec 4 - min	0.000	1	-0.038	1	-0.053	4	-0.212	1	0.137	8	-1.328	4	-0.002	1	-0.003	8	-0.011	6	0.000	0.008	0.049		0.725
855	M88	2in Dia. Duct	Sec 3 - max	0.093	7	-0.005	7	0.130	9	0.725	8	-0.472	7	0.076	2	0.254	3	0.028	2	0.369	2	0.021	0.027	0.008		0.822
838	M84	4in Dia. Duct	Sec 4 - min	-0.021	3	0.033	2	-0.087	7	-0.160	3	-0.822	2	0.044	1	-0.683	8	-0.027	6	-0.062	6	0.002	0.030	0.026		0.746
829	M83	4in Dia. Duct	Sec 5 - max	0.159	2	0.194	2	0.029	5	0.433	2	0.746	3	0.423	7	0.345	8	0.042	8	0.097	8	0.013	0.028	0.016		0.874
136	M14	6in Dia. Duct	Sec 3 - min	0.000	1	0.026	1	0.000	1	-0.335	7	-0.396	1	-0.222	9	-0.874	6	-0.011	6	-0.009	6	0.000	0.018	0.039		0.767
747	M75	4in Dia. Duct	Sec 4 - max	0.200	7	-0.033	2	0.022	5	0.787	2	-0.445	1	0.197	4	0.244	5	0.016	8	0.037	8	0.002	0.028	0.009		0.720
838	M64	4in Dia. Duct	Sec 3 - min	-0.021	3	0.038	2	-0.089	7	-0.333	3	-0.703	2	0.047	1	-0.720	9	-0.027	6	-0.082	6	0.002	0.028	0.027		0.810
930	M93	4in Dia. Duct	Sec 5 - min	-0.003	3	0.036	1	-0.041	9	-0.647	2	0.436	1	-0.010	1	-0.810	5	-0.002	8	-0.005	8	0.000	0.024	0.030		0.839
726	M73	4in Dia. Duct	Sec 3 - min	-0.112	8	-0.003	1	-0.011	8	0.828	3	-0.839	2	-0.381	7	-0.587	8	-0.003	7	-0.007	7	0.009	0.024	0.021		0.806
828	M83	4in Dia. Duct	Sec 3 - max	0.158	2	0.204	2	0.024	5	-0.446	8	0.608	7	0.271	7	0.202	8	0.042	8	0.097	8	0.013	0.030	0.010		0.709
718	M72	4in Dia. Duct	Sec 4 - min	-0.134	8	-0.040	7	-0.012	7	-0.380	1	0.370	9	-0.709	8	-0.323	7	-0.003	7	-0.007	7	0.011	0.014	0.026		0.513
735	M74	4in Dia. Duct	Sec 3 - max	0.250	7	-0.003	1	0.003	9	0.513	1	-0.463	2	0.266	4	0.309	5	0.016	8	0.037	8	0.021	0.019	0.011		0.822
275	M28	8in Dia. Duct	Sec 3 - max	0.034	8	0.000	7	0.000	1	0.622	8	-0.813	7	0.460	6	0.267	9	0.049	7	0.041	7	0.003	0.028	0.020		0.622
276	M28	6in Dia. Duct	Sec 3 - min	-0.034	9	-0.001	8	-0.009	7	0.613	7	-0.622	8	-0.267	9	-0.460	8	-0.151	8	-0.126	8	0.003	0.028	0.020		0.604
856	M94	3in Dia. Duct	Sec 3 - max	0.126	2	0.000	2	0.000	1	0.359	3	-0.228	2	-0.005	1	0.604	9	0.013	7	0.054	7	0.013	0.013	0.022		0.819
926	M93	4in Dia. Duct	Sec 3 - min	-0.002	3	-0.032	2	-0.026	8	0.536	3	-0.819	2	-0.492	5	-0.092	4	-0.008	8	-0.013	8	0.000	0.030	0.018		0.603
827	M83	4in Dia. Duct	Sec 4 - max	0.199	2	0.199	2	0.026	5	-0.170	6	0.603	9	0.344	7	0.270	8	0.042	8	0.097	8	0.013	0.022	0.013		0.647
805	M81	6in Dia. Duct	Sec 3 - max	0.010	8	-0.030	6	0.096	7	-0.395	7	0.422	8	0.081	9	0.647	6	0.049	7	0.041	7	0.001	0.019	0.028		0.647
806	M81	6in Dia. Duct	Sec 3 - min	-0.010	9	-0.037	7	0.000	1	-0.422	8	0.395	7	-0.047	6	-0.081	9	-0.151	8	-0.126	8	0.001	0.019	0.028		1.112
852	M89	4in Dia. Duct	Sec 1 - min	0.000	1	0.026	8	-0.106	7	-0.186	1	-0.022	6	-0.695	8	-1.112	7	-0.002	1	-0.005	1	0.000	0.007	0.041		1.112
1240	M124	4in Dia. Duct	Sec 5 - min	0	1	-0.03	1	0.002	1	-0.186	1	-0.022	6	-0.695	8	-1.112	7	-0.002	1	-0.005	1	0.000	0.007	0.041		0.831
1237	M124	4in Dia. Duct	Sec 4 - max	0.166	8	0.010	6	0.081	7	0.034	1	0.064	7	0.551	7	0.831	8	0.079	6	0.160	8	0.014	0.002	0.031		1.162
818	M82	4in Dia. Duct	Sec 4 - min	-0.014	3	-0.046	2	-0.004	8	-1.162	2	-0.138	3	-0.071	9	-0.097	6	-0.003	7	-0.007	7	0.001	0.043	0.003		0.622
724	M73	4in Dia. Duct	Sec 2 - min	-0.121	8	0.031	1	-0.020	5	0.295	7	-0.309	1	-0.274	7	-0.622	8	-0.003	7	-0.007	7	0.010	0.011	0.023		0.746
830	M83	4in Dia. Duct	Sec 5 - min	0.012	3	-0.046	3	-0.027	4	-0.746	3	-0.433	2	-0.345	8	-0.423	7	-0.038	7	-0.083	7	0.001	0.028	0.016		0.746
832	M84	4in Dia. Duct	Sec 1 - min	-0.008	3	0.062	8	-0.163	7	-0.746	3	-0.433	2	-0.361	8	-0.416	7	-0.029	4	-0.066	4	0.001	0.028	0.015		0.893
1236	M124	4in Dia. Duct	Sec 3 - min	0	1	0	1	0.002	1	-0.284	6	-0.110	1	-0.893	8	0.029	1	-0.002	1	-0.005	1	0.000	0.011	0.033		0.462
315	M32	6in Dia. Duct	Sec 3 - max	0.117	8	0.009	1	-0.002	1	0.300	6	0.018	1	0.462	9	0.018	1	-0.151	8	-0.126	8	0.010	0.013	0.021		0.462
316	M32	6in Dia. Duct	Sec 3 - min	-0.117	9	-0.036	6	-0.062	9	-0.300	6	-0.033	1	-0.462	9	0.018	1	0.016	8	0.037	8	0.010	0.017	0.010		0.464
813	M82	4in Dia. Duct	Sec 2 - max	0.187	2	0.039	3	0.023	4	-0.346	3	0.464	2	0.223	5	0.278	4	0.016	8	0.037	8	0.016	0.023	0.002		0.623
815	M82	4in Dia. Duct	Sec 3 - max	0.197	2	0.015	3	0.010	4	0.087	3	0.623	2	0.031	7	0.060	6	0.016	8	0.037	8	0.016	0.012	0.017		0.464
645	M65	4in Dia. Duct	Sec 3 - max	0.137	8	0.542	7	0.795	7	0.320	8	0.153	1	0.464	9	0.295	6	0.079	6	0.160	6	0.012	0.012	0.017		0.806
826	M83	4in Dia. Duct	Sec 3 - min	0.007	3	-0.045	3	-0.022	4	-0.806	7	0.446	8	-0.202	8	-0.271	7	-0.036	7	-0.083	7	0.001	0.030	0.010		0.787
746	M76	4in Dia. Duct	Sec 4 - min	-0.027	8	-0.039	1	-0.023	4	0.445	1	-0.787	2	-0.244	5	-0.197	4	-0.003	7	-0.007	7	0.002	0.029	0.009		0.588
927	M93	4in Dia. Duct	Sec 4 - max	0.137	2	-0.047	3	0.015	5	-0.064	8	0.146	7	0.000	1	0.588	8	0.044	7	0.100	7	0.012	0.005	0.022		0.436
853	M66	4in Dia. Duct	Sec 2 - max	0.173	8	0.014	7	0.121	8	0.211	6	-0.014	1	0.436	8	-0.015	1	0.079	6	0.160	6	0.015	0.008	0.016		0.556
607	M61	6in Dia. Duct	Sec 4 - max	0.013	8	-0.038	8	0.095	3	-0.557	6	0.558	1	0.281	9	0.273	6	0.049	7	0.041	7	0.001	0.025	0.012		0.558
608	M61	6in Dia. Duct	Sec 4 - min	-0.013	9	-0.045	7	0.000	1	-0.558	1	0.557	6	-0.273	6	-0.281	9	-0.151	8	-0.126	8	0.001	0.025	0.012		0.394
773	M75	6in Dia. Duct	Sec 2 - max	0.081	9	0.005	8	0.000	1	0.351	1	-0.242	8	0.000	1	0.394	9	-0.022	9	-0.019	9	0.005	0.016	0.018		0.394
774	M76	6in Dia. Duct	Sec 2 - min	-0.081	7	-0.001	1	-0.015	8	0.242	8	-0.351	1	-0.394	9	0.000	1	-0.028	6	-0.024	6	0.005	0.016	0.018		0.475
775	M76	6in Dia. Duct	Sec 3 - max	0.065	9	-0.015	8	0.000	1	0.248	1	-0.197	9	0.000	1	0.475	9	-0.022	9	-0.019	9	0.005	0.011	0.021		0.475
776	M76	6in Dia. Duct	Sec 3 - min	-0.065	7	-0.021	1	-0.025	8	0.107	8	-0.246	1	-0.475	9	0.000	1	-0.028	6	-0.024	6	0.005	0.011	0.021		0.320
743	M75	4in Dia. Duct	Sec 2 - max	0.221	7	0.050	2	0.024	4	0.320	2	-0.301	1	0.160	4	0.160	5	0.016	8	0.037	8	0.019	0.012	0.007		0.513
738	M74	4in Dia. Duct	Sec 3 - min	-0.077	8	-0.005	2	0.000	6	0.463	2	-0.513	1	-0.309	5	-0.268	4	-0.003	7	-0.007	7	0.008	0.019	0.011		0.479
933	M94	3in Dia. Duct	Sec 2 - max	0.130	2	0.029	2	0.000	1	0.127	3	0.122	2	0.478	6	0.012	1	0.013	7	0.054	7	0.014	0.008	0.018		0.725
856	M66	2in Dia. Duct	Sec 3 - min	0.000	1	-0.021	8	0.000	1	0.472	7	-0.725	8	-0.264	3	-0.076	2	0.000	1	-0.013	1	0.000	0.027	0.009		0.603
828	M83	4in Dia. Duct	Sec 4 - min	0.010	3	-0.047	3	-0.025	4	-0.603	9	0.170	6	-0.270	8	-0.344	7	-0.036	7	-0.083	7	0.001	0.022	0.013		0.604
936	M94	3in Dia. Duct	Sec 3 - min	0.000	1	-0.007	1	-0.035	4	0.228	2	-0.359	3	-0.604	9	0.005	1	-0.003	8	-0.011	8	0.000	0.013	0.022		0.398
1227	M123	4in Dia. Duct	Sec 4 - max	0.151	8	-0.011	1	-0.009	1	0.218	6	-0.022	1	0.398	8	-0.015	1	0.079	6	0.160	6	0.013	0.006	0.015		0.446
273	M28	6in Dia. Duct	Sec 2 - max	0.024	8	0.038	7	0.013	2	0.265	8	-0.277	7	0.446	7	0.059	8	0.049	7	0.041	7	0.002	0.013	0.020		0.448
274	M28	6in Dia. Duct	Sec 2 - min	-0.024	9	0.038	8	-0.023	3	0.277	7	-0.265	8	-0.058	8	-0.446	7	-0.151	8	-0.126	8	0.002	0.013	0.020		

0.2250

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_a	f_b/σ_a	f_v/σ_a	f_e (ksi)
727	M73	4in Dia. Duct	Sec 4 - max	0.277	7	-0.037	2	0.022	7	0.175	2	-0.149	1	0.109	8	0.084	7	0.018	8	0.037	8	0.023	0.006	0.004	0.277
309	M31	6in Dia. Duct	Sec 5 - max	0.111	8	-0.034	6	0.028	9	-0.041	6	0.212	1	0.336	9	-0.009	1	0.049	7	0.041	7	0.009	0.009	0.015	0.336
310	M31	6in Dia. Duct	Sec 5 - min	-0.111	9	-0.040	1	-0.015	6	-0.212	1	0.041	6	0.009	1	-0.336	9	-0.151	8	-0.128	8	0.009	0.009	0.015	0.336
311	M32	6in Dia. Duct	Sec 1 - max	0.111	8	0.034	1	-0.002	1	-0.041	6	0.212	1	0.336	9	-0.009	1	0.049	7	0.041	7	0.009	0.009	0.015	0.336
312	M32	6in Dia. Duct	Sec 1 - min	-0.111	9	-0.010	6	-0.075	9	-0.212	1	0.041	6	0.009	1	-0.336	9	-0.151	8	-0.128	6	0.009	0.009	0.015	0.336
1238	M124	4in Dia. Duct	Sec 4 - min	0	1	-0.015	1	0.002	1	-0.064	7	-0.034	1	-0.831	8	-0.551	7	-0.002	1	-0.005	1	0.000	0.002	0.031	0.831
323	M33	6in Dia. Duct	Sec 2 - max	0.127	6	0.178	6	0.240	9	0.220	6	-0.016	1	0.285	9	-0.011	1	0.049	7	0.041	7	0.010	0.010	0.012	0.285
324	M33	6in Dia. Duct	Sec 2 - min	-0.127	9	-0.001	1	0.010	1	0.016	1	-0.220	6	0.011	1	-0.285	9	-0.151	8	-0.128	8	0.010	0.010	0.012	0.285
733	M74	4in Dia. Duct	Sec 2 - max	0.259	7	0.034	1	0.020	4	0.143	3	-0.139	2	0.035	6	0.124	9	0.016	6	0.037	8	0.022	0.005	0.005	0.259
777	M78	6in Dia. Duct	Sec 4 - max	0.070	9	-0.034	8	0.009	7	-0.026	6	0.036	1	0.000	1	0.518	8	-0.022	9	-0.019	9	0.006	0.002	0.023	0.518
778	M78	6in Dia. Duct	Sec 4 - min	-0.070	7	-0.041	1	-0.034	8	-0.038	1	0.026	6	-0.518	8	0.000	1	-0.026	6	-0.024	6	0.006	0.002	0.023	0.464
646	M65	4in Dia. Duct	Sec 3 - min	0.000	1	-0.025	1	0.026	1	-0.153	1	-0.320	8	-0.295	6	-0.464	9	-0.002	1	-0.005	1	0.000	0.012	0.017	0.464
814	M82	4in Dia. Duct	Sec 2 - min	-0.014	3	0.002	2	-0.022	6	-0.464	2	0.345	3	-0.278	4	-0.223	5	-0.003	7	-0.007	7	0.001	0.017	0.010	0.464
175	M18	6in Dia. Duct	Sec 3 - max	0.037	6	0.032	1	0.007	8	0.092	8	0.257	1	0.309	9	0.000	1	-0.022	9	-0.019	9	0.003	0.011	0.014	0.309
176	M18	6in Dia. Duct	Sec 3 - min	-0.037	6	0.005	8	-0.021	7	-0.257	1	-0.092	8	0.000	1	-0.309	9	-0.026	6	-0.024	6	0.003	0.011	0.014	0.588
928	M93	4in Dia. Duct	Sec 4 - min	0.000	1	-0.083	2	-0.041	4	-0.146	7	0.064	8	-0.566	8	0.000	1	-0.008	8	-0.013	6	0.000	0.005	0.022	0.285
299	M30	6in Dia. Duct	Sec 5 - max	0.091	6	-0.034	1	0.014	8	-0.214	1	0.265	6	0.055	8	0.175	7	0.049	7	0.041	7	0.007	0.012	0.008	0.285
300	M30	6in Dia. Duct	Sec 5 - min	-0.091	7	-0.038	6	-0.022	7	-0.265	6	0.214	1	-0.175	7	-0.055	8	-0.151	8	-0.128	8	0.007	0.012	0.008	0.285
301	M31	6in Dia. Duct	Sec 1 - max	0.091	8	0.046	6	0.027	7	-0.214	1	0.265	6	0.055	8	0.175	7	0.049	7	0.041	7	0.007	0.012	0.008	0.285
302	M31	6in Dia. Duct	Sec 1 - min	-0.091	9	0.040	1	-0.014	6	-0.265	6	0.214	1	-0.175	7	-0.055	8	-0.151	8	-0.128	8	0.007	0.012	0.008	0.275
769	M77	6in Dia. Duct	Sec 5 - max	0.056	8	0.025	6	0.000	1	0.275	1	-0.107	8	0.026	6	0.222	9	-0.022	9	-0.019	9	0.005	0.012	0.010	0.275
770	M77	6in Dia. Duct	Sec 5 - min	-0.056	6	0.018	1	-0.024	9	0.107	8	-0.275	1	-0.222	9	-0.026	6	-0.028	6	-0.024	6	0.005	0.012	0.010	0.275
771	M78	6in Dia. Duct	Sec 1 - max	0.056	9	0.025	8	0.000	1	0.275	1	-0.107	8	0.026	6	0.222	9	-0.022	9	-0.019	9	0.005	0.012	0.010	0.275
772	M78	6in Dia. Duct	Sec 1 - min	-0.056	7	0.018	1	-0.024	9	0.107	8	-0.275	1	-0.222	9	-0.026	6	-0.028	6	-0.024	6	0.005	0.012	0.010	0.260
283	M29	6in Dia. Duct	Sec 2 - max	0.059	6	0.040	6	0.025	7	-0.254	7	0.260	8	0.102	9	0.229	8	0.049	7	0.041	7	0.005	0.012	0.010	0.260
284	M29	6in Dia. Duct	Sec 2 - min	-0.059	7	0.040	1	-0.018	8	-0.260	8	0.254	7	-0.229	6	-0.102	9	-0.151	8	-0.126	8	0.005	0.012	0.010	0.623
616	M82	4in Dia. Duct	Sec 3 - min	-0.014	3	-0.022	2	-0.008	5	-0.623	2	-0.087	3	-0.080	8	-0.031	7	-0.003	7	-0.007	7	0.001	0.023	0.002	0.343
179	M18	6in Dia. Duct	Sec 5 - max	0.049	8	-0.018	1	0.005	9	-0.098	1	0.343	8	0.140	9	0.035	6	-0.022	9	-0.019	9	0.004	0.015	0.008	0.343
180	M18	6in Dia. Duct	Sec 5 - min	-0.049	6	-0.044	8	-0.019	6	-0.343	8	0.098	1	-0.035	6	-0.140	9	-0.028	8	-0.024	6	0.004	0.015	0.006	0.343
181	M19	6in Dia. Duct	Sec 1 - max	0.049	9	0.050	8	0.012	8	-0.098	1	0.343	8	0.140	9	0.035	8	-0.022	9	-0.019	9	0.004	0.015	0.006	0.343
182	M19	6in Dia. Duct	Sec 1 - min	-0.049	6	0.044	1	-0.037	9	-0.343	8	0.098	1	-0.035	6	-0.140	9	-0.028	6	-0.024	6	0.004	0.015	0.006	0.343
737	M74	4in Dia. Duct	Sec 4 - max	0.240	7	-0.040	1	0.023	5	-0.027	1	0.124	2	0.016	7	0.010	8	0.016	8	0.037	8	0.020	0.005	0.001	0.240
305	M31	6in Dia. Duct	Sec 3 - max	0.101	8	0.000	8	0.008	9	0.214	6	-0.154	1	0.142	7	0.020	8	0.049	7	0.041	7	0.008	0.010	0.008	0.214
306	M31	6in Dia. Dict	Sec 3 - min	-0.101	6	0.000	1	0.000	1	0.154	1	-0.214	6	-0.020	8	-0.142	7	-0.151	8	-0.126	8	0.008	0.010	0.008	0.436
654	M66	4in Dia. Duct	Sec 2 - min	0.000	1	0.012	6	-0.114	7	0.014	1	-0.211	8	0.015	1	-0.436	8	-0.002	1	-0.005	1	0.000	0.008	0.016	0.178
307	M31	6in Dia. Duct	Sec 4 - max	0.109	8	-0.014	8	0.018	9	0.178	8	-0.062	1	0.163	7	-0.006	1	0.049	7	0.041	7	0.009	0.008	0.007	0.178
308	M31	6in Dia. Duct	Sec 4 - min	-0.108	9	-0.020	1	-0.005	8	0.062	1	-0.178	8	0.000	1	-0.163	7	-0.151	8	-0.128	8	0.009	0.008	0.007	0.178
193	M19	6in Dia. Duct	Sec 2 - max	0.049	9	0.049	8	0.011	6	-0.077	1	0.319	8	0.122	9	0.030	6	-0.022	9	-0.019	9	0.004	0.014	0.005	0.319
194	M19	6in Dia. Duct	Sec 2 - min	-0.049	8	0.043	1	-0.035	9	-0.319	8	0.077	1	-0.030	6	-0.122	9	-0.028	6	-0.024	6	0.004	0.014	0.005	0.243
767	M77	6in Dia. Duct	Sec 4 - max	0.055	8	0.026	6	0.000	8	0.243	1	-0.064	8	0.027	6	0.182	9	-0.022	9	-0.019	9	0.005	0.011	0.008	0.243
768	M77	6in Dia. Duct	Sec 4 - min	-0.055	6	0.022	1	-0.025	9	0.064	8	-0.243	1	-0.192	9	-0.027	6	-0.028	6	-0.024	6	0.005	0.011	0.008	0.398
1228	M123	4in Dia. Duct	Sec 4 - min	0	1	-0.129	8	-0.159	7	0.022	1	-0.218	6	0.015	1	-0.398	8	-0.002	1	-0.005	1	0.000	0.008	0.015	0.320
744	M75	6in Dia. Duct	Sec 2 - min	-0.048	8	0.044	1	-0.025	5	0.301	1	-0.320	2	-0.160	5	-0.180	4	-0.003	7	-0.007	7	0.004	0.012	0.007	0.479
834	M94	6in Dia. Duct	Sec 2 - min	0.000	1	0.023	1	-0.042	9	-0.122	2	-0.127	3	-0.012	1	-0.479	6	-0.003	8	-0.011	8	0.000	0.005	0.018	0.295
165	M19	6in Dia. Duct	Sec 3 - max	0.050	9	0.048	8	0.011	6	-0.056	1	0.295	8	0.105	9	0.025	6	-0.022	9	-0.019	9	0.004	0.013	0.005	0.295
166	M19	6in Dia. Duct	Sec 3 - min	-0.050	6	0.042	1	-0.036	9	-0.295	8	0.056	1	-0.025	6	-0.105	9	-0.028	6	-0.024	6	0.004	0.013	0.005	0.254
277	M28	6in Dia. Duct	Sec 4 - max	0.044	8	-0.039	7	0.017	8	0.254	1	-0.253	6	0.127	6	0.129	9	0.049	7	0.041	7	0.004	0.011	0.006	0.254
278	M28	6in Dia. Duct	Sec 4 - min	-0.044	9	-0.040	8	-0.028	7	0.253	6	-0.254	1	-0.129	9	-0.127	6	-0.151	8	-0.128	8	0.004	0.011	0.006	0.134
313	M32	6in Dia. Duct	Sec 2 - max	0.114	8	0.021	1	-0.002	1	-0.053	1	0.134	6	-0.004	1	0.117	7	0.049	7	0.041	7	0.009	0.008	0.005	0.134
314	M32	6in Dia. Duct	Sec 2 - min	-0.114	9	-0.022	6	-0.069	9	-0.134	6	0.053	1	-0.117	7	0.004	1	-0.151	8	-0.126	8	0.009	0.008	0.005	0.272
187	M19	6in Dia. Duct	Sec 4 - max	0.050	8	0.047	8	0.010	6	-0.036	1	0.272	8	0.087	9	0.020	6	-0.022	9	-0.019	9	0.004	0.012	0.004	0.272
188	M19	6in Dia. Duct	Sec 4 - min	-0.050	6	0.041	1	-0.035	9	-0.272	8	0.036	1	-0.020	6	-0.087	9	-0.028	6	-0.024	6	0.004	0.012	0.004	0.205
765	M77	6in Dia. Duct	Sec 3 - max	0.054	8	0.032	8	0.002	6	0.205	1	-0.018	8	0.029	6	0.144	7	-0.022	9	-0.019	9	0.004	0.009	0.008	0.205
766	M77	6in Dia. Duct	Sec 3 - min	-0.054	6	0.025	1	-0.027	9	0.016	8	-0.205	1	-0.144	7	-0.029	6	-0.028	6	-0.024	6	0.004	0.009	0.008	0.175
728	M73	4in Dia. Duct	Sec 4 - min	-0.104	8	-0.038	1	-0.028	8	0.149	1	-0.175	2	-0.084	7	-0.109	8	-0.003	7	-0.007	7	0.009	0.008	0.004	0.249
189	M19	6in Dia. Duct	Sec 5 - max	0.050	9	0.049	8	0.009	6	-0.018	1	0.249	8	0.070	9	0.015	6	-0.022	9	-0.019	9	0.004	0.011	0.003	0.249
190	M19	6in Dia. Duct	Sec 5 - min	-0.050	8	0.040	1	-0.035	9	-0.249	8	0.018	1	-0.015	6	-0.070	9	-0.028	6	-0.024	6	0.004	0.011	0.003	0.249
751	M76	6in Dia. Duct	Sec 1 - max	0.050	8	0.046	8	0.009	6	-0.018	1	0.249	8	0.070	9	0.015	6	-0.022	9	-0.019	9	0.004	0.011	0.003	0.249
752	M76	6in Dia. Duct	Sec 1 - min	-0.050	8	0.040	1	-0.035	9	-0.249	8	0.018	1	-0.015	6	-0.070	9	-0.028	6	-0.024	6	0.004	0.011	0.003	0.143
704	M74	4in Dia. Duct	Sec 2 - min	-0.086	8	0.032	2	-0.018	5	0.139	2	-0.143	3	-0.124	9	-0.035	6	-0.003	7	-0.007	7	0.007	0.005	0.005	0.181
763	M77	6in Dia. Duct	Sec 2 - max	0.053	8	0.035	8	0.004	6	0.161	1	0.038	6	0.030	8	0.104	7	-0.022	9	-0.019	9	0.004	0.007	0.008	0.161
764	M77	6in Dia. Duct	Sec 2 - min	-0.053	6	0.029	1	-0.029	9	-0.038	6	-0.161	1	-0.104	7	-0.030	8	-0.028	6	-0.024	6	0.004	0.007	0.002	0.209
753	M78	6in Dia. Duct	Sec 2 - max	0.051	8	0.044	8	0.009	6	0.018	1	0.209	8	0.040	9	0.007	6	-0.022	9	-0.019	9	0.004	0.009	0.002	0.209
754	M78	6in Dia. Duct	Sec 2 - min	-0.051	6	0.038	1	-0.034	9	-0.209	8	-0.018	1	-0.007	6	-0.040	9	-0.028	6	-0.024	6	0.004	0.009	0.002	0.162
193	M20	6in Dia. Duct	Sec 2 - max	0.082	9	0.026	1	0.082	8	0.023	9	0.022	1	0.162	9	0.000	1	-0.022	9	-0.019	9	0.007	0.001	0.007	0.162
194	M20	6in Dia. Duct	Sec 2 - min	-0.082	8	0.027	8	0.000	1	-0.022	1	-0.023	9	0.000	1	-0.162	9	-0.028	6	-0.024	6	0.007	0.001	0.007	0.094
269	M29	6in Dia. Duct	Sec 5 - max	0.076	6	-0.029	6	0.017	3	-0.081	6	0.094	1	0.087	3	0.005	2	0.049	7	0.041	7	0.008	0.004	0.004	0.094
270	M29	6in Dia. Duct	Sec 5 - min	-0.076	7	-0.029	1	-0.011	2	-0.094	1	0.081	6	-0.005	2	-0.087	3	-0.151	8	-0.126	8	0.008	0.004	0.004	0.094
281	M30	6in Dia. Duct	Sec 1 - max	0.076	6	0.025	1	0.009	6	-0.081	6	0.094	1	0.087	3	0.005	2	0.049	7	0.041	7	0.008	0.004	0.004	0.094
282	M30	6in Dia. Duct	Sec 1 - min	-0.076	7	0.023	6	-0.016	9	-0.094	1	0.081	6	-0.005	2	-0.087	3	-0.151	8	-0.126	8	0.008	0.004	0.004	0.105
287	M29	6in Dia. Duct	Sec 4 - max	0.071	6	-0.006	6	0.006	3	0.105	8	-0.098	1	0.055	7	0.043	8	0.049	7	0.041	7	0.006	0.005	0.002	0.105
288	M29	6in Dia. Duct	Sec 4 - min	-0.071	7	-0.008	1	0.000	1	0.098	1	-0.105	6	-0.043	8	-0.055	7	-0.151	8	-0.126	8	0.006	0.005	0.002	0.170
755	M76	6in Dia. Duct	Sec 3 - max	0.051	8	0.042	8	0.008	6	0.051	1	0.170	8	0.022	8	0.011	7	-0.022	9	-0.019	9	0.004	0.008	0.001	0.170
756	M76	6in Dia. Duct	Sec 3 - min	-0.051	6	0.036	1	-0.033	9	-0.170	8	-0.051	1	-0.011	7	-0.022	8	-0.028	6	-0.024	6	0.004	0.008	0.001	0.087
297	M30	6in Dia. Duct	Sec 4 - max	0.087	8	-0.019	1	0.007	8	-0.035	1	0.070	6	-0.002	1	0.054	7	0.049	7	0.041	7	0.007	0.003	0.002	

C-2250

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_a	f_b/σ_b	f_s/σ_s		f_c (ksi)	
299	M30	6in Dia. Duct	Sec 4 - min	-0.087	7	-0.021	6	-0.014	7	-0.070	8	0.035	1	-0.054	7	0.002	1	-0.151	8	-0.126	6	0.007	0.003	0.002		0.097	
303	M31	6in Dia. Duct	Sec 2 - max	0.098	6	0.029	6	0.017	7	0.066	8	-0.061	1	0.029	2	0.028	3	0.049	7	0.041	7	0.008	0.003	0.001		0.096	
304	M31	6in Dia. Duct	Sec 2 - min	-0.096	9	0.020	1	-0.004	8	0.061	1	-0.068	6	-0.028	3	-0.029	2	-0.151	8	-0.120	6	0.008	0.002	0.001		0.096	
759	M76	6in Dia. Duct	Sec 6 - max	0.052	8	0.039	8	0.006	6	0.112	1	0.096	8	0.028	8	0.061	7	+0.022	9	-0.019	9	0.004	0.005	0.003		0.112	
760	M76	6in Dia. Duct	Sec 6 - min	-0.052	8	0.032	1	-0.031	9	-0.098	8	-0.112	1	-0.061	7	-0.028	8	+0.028	8	-0.024	8	0.004	0.005	0.003		0.112	
761	M77	6in Dia. Duct	Sec 1 - max	0.062	6	0.039	6	0.006	6	0.112	1	0.096	8	0.028	8	0.061	7	+0.022	9	-0.019	9	0.004	0.005	0.003		0.112	
762	M77	6in Dia. Duct	Sec 1 - min	-0.062	6	0.032	1	-0.031	9	-0.098	6	-0.112	1	-0.061	7	-0.028	8	-0.028	6	-0.024	6	0.004	0.005	0.002		0.133	
757	M76	6in Dia. Duct	Sec 4 - max	0.062	8	0.041	8	0.007	6	0.062	1	0.133	6	0.025	8	0.037	7	-0.022	9	-0.019	9	0.004	0.006	0.002		0.133	
756	M76	6in Dia. Duct	Sec 4 - min	-0.062	6	0.034	1	-0.032	9	-0.133	6	-0.062	1	-0.037	7	-0.025	8	-0.028	6	-0.024	6	0.004	0.006	0.002		0.151	
177	M18	6in Dia. Duct	Sec 4 - max	0.043	8	0.007	1	0.000	1	0.021	8	0.031	1	0.151	9	0.000	1	+0.022	9	-0.019	9	0.004	0.001	0.007		0.151	
176	M18	6in Dia. Duct	Sec 4 - min	-0.043	6	-0.019	8	-0.008	7	-0.031	1	-0.021	8	0.000	1	-0.151	9	-0.028	8	-0.024	6	0.004	0.001	0.007		0.084	
295	M30	6in Dia. Duct	Sec 3 - max	0.084	6	-0.004	1	0.000	1	0.045	1	-0.028	6	0.026	6	0.045	9	0.049	7	0.041	7	0.007	0.002	0.002		0.084	
296	M30	6in Dia. Duct	Sec 3 - min	-0.084	7	-0.007	8	-0.007	7	0.026	6	-0.045	1	-0.045	9	-0.028	6	-0.151	8	-0.126	8	0.007	0.002	0.002		0.124	
736	M74	6in Dia. Duct	Sec 4 - min	-0.067	6	-0.042	2	-0.021	4	-0.124	2	0.027	1	-0.010	8	-0.016	7	-0.003	7	-0.007	7	0.008	0.005	0.001		0.085	
285	M29	6in Dia. Duct	Sec 3 - max	0.065	6	0.017	6	0.013	7	0.047	7	-0.044	1	0.000	1	0.050	3	0.049	7	0.041	7	0.005	0.002	0.002		0.065	
286	M29	6in Dia. Duct	Sec 3 - min	-0.065	7	0.017	1	-0.007	6	0.044	1	-0.047	7	-0.050	3	0.000	1	+0.151	8	-0.126	8	0.005	0.002	0.002		0.080	
293	M30	6in Dia. Duct	Sec 2 - max	0.080	6	0.010	1	0.001	2	0.025	1	-0.022	6	0.042	6	0.010	9	0.049	7	0.041	7	0.007	0.001	0.002		0.080	
294	M30	6in Dia. Duct	Sec 2 - min	-0.080	7	0.008	6	-0.008	3	0.022	6	-0.025	1	-0.010	9	-0.042	6	-0.151	8	-0.126	6	0.007	0.001	0.002		0.066	
501	M51	6in Dia. Duct	Sec 1 - max	0.004	6	0.017	9	0.008	8	-0.066	3	0.066	1	0.033	7	0.033	8	0.000	1	0.000	1	0.000	0.003	0.001		0.066	
502	M51	6in Dia. Duct	Sec 1 - min	-0.004	9	0.017	6	-0.008	6	-0.066	1	0.066	3	-0.033	8	-0.033	7	0.000	1	0.000	1	0.000	0.003	0.001		0.037	
503	M51	6in Dia. Duct	Sec 2 - max	0.003	8	0.013	9	0.008	8	-0.037	3	0.037	9	0.019	7	0.019	8	0.000	1	0.000	1	0.000	0.002	0.001		0.037	
504	M51	6in Dia. Duct	Sec 2 - min	-0.003	9	0.013	6	-0.008	8	-0.037	9	0.037	3	-0.019	8	-0.019	7	0.000	1	0.000	1	0.000	0.001	0.000		0.017	
505	M51	6in Dia. Duct	Sec 3 - max	0.002	8	0.008	9	0.004	8	-0.017	3	0.017	1	0.008	7	0.008	8	0.000	1	0.000	1	0.000	0.001	0.000		0.017	
506	M51	6in Dia. Duct	Sec 3 - min	-0.002	9	0.008	6	-0.004	8	-0.017	1	0.017	3	-0.008	8	-0.008	7	0.000	1	-0.000	1	0.000	0.000	0.000		0.004	
507	M51	6in Dia. Duct	Sec 4 - max	0.001	8	0.004	9	0.002	8	-0.004	3	0.004	8	0.002	7	0.002	8	0.000	1	0.000	1	0.000	0.000	0.000		0.004	
508	M51	6in Dia. Duct	Sec 4 - min	-0.001	9	0.004	6	-0.002	8	-0.004	6	0.004	3	-0.002	8	-0.002	7	0.000	1	0.000	1	0.000	0.000	0.000		0.000	
509	M51	6in Dia. Duct	Sec 6 - max	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000		0.000	
510	M51	6in Dia. Duct	Sec 6 - min	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000		0.000	

amec

CALCULATION SHEET

CALC. NO.:	145579-V-CA-005	REV:	1	DATE:	March 26, 2006
CALC. TITLE:	Off-Gas Treatment System Pipe Stress Analysis				
PROJECT NO.:	145579	PROJECT TITLE:	Final DBVS Design		

Attachment 13: Excel Spreadsheet – Model 5 AG-1 Analysis and Unity Checks

NOTE: This cover sheet represents the approval signatures of the originator and checker for all pages of this attachment

ORIGINATOR:	DATE:	CHECKER:	DATE:
Kevin M. Jones KMJ	3/26/06	J. Van Corbach JVC	3/26/06

Duct Size	σ_c (ksi) Eq. 1b	σ_t (ksi) Eq. 6 or 7	τ_c (ksi) Eq. 5	τ_t (ksi) Eq. 9	τ_f (ksi) Eq. 8	σ_y (ksi) Eq. 10	Temp	Material
12in Dia. Duct	13.7	22.5	18.8	10.6	13.0	13.0	100	SS
14in Dia. Duct	13.9	22.5	18.8	10.6	13.0	13.0	100	SS
16in Dia. Duct	14.0	22.5	18.5	9.6	13.0	13.0	100	SS
20in Dia. Duct	14.2	22.5	18.2	9.6	13.0	13.0	100	SS
20in Dia. CS Duct	17.0	27.0	21.8	12.0	15.6	15.6	100	CS
24in Dia. CS Duct	17.2	27.0	21.1	10.4	13.6	15.6	100	CS

Model 5

D-2250

	Member	Duct Size		Axial (kal)	Load Case	y Shear (kal)	Load Case	z Shear (kal)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_c	f_{sy}/σ_c	f_{sz}/σ_c		f_t (ksi)	
271	M41	RIGID	Sec 1 - max	0.000	7	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	530.767	3	0.000	1	0.000	0.000	0.000		0.000	
272	M41	RIGID	Sec 1 - min	0.000	6	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	-530.444	2	0.000	1	0.000	0.000	0.000		0.000	
273	M41	RIGID	Sec 2 - max	0.000	7	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	530.767	3	0.000	1	0.000	0.000	0.000		0.000	
274	M41	RIGID	Sec 2 - min	0.000	6	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	-530.444	2	0.000	1	0.000	0.000	0.000		0.000	
275	M41	RIGID	Sec 3 - max	0.000	7	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	530.767	3	0.000	1	0.000	0.000	0.000		0.000	
276	M41	RIGID	Sec 3 - min	0.000	6	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	-530.444	2	0.000	1	0.000	0.000	0.000		0.000	
277	M41	RIGID	Sec 4 - max	0.000	7	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	530.767	3	0.000	1	0.000	0.000	0.000		0.000	
278	M41	RIGID	Sec 4 - min	0.000	6	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	-530.444	2	0.000	1	0.000	0.000	0.000		0.000	
279	M41	RIGID	Sec 5 - max	0.000	7	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	530.767	3	0.000	1	0.000	0.000	0.000		0.000	
280	M41	RIGID	Sec 5 - min	0.000	6	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	-530.444	2	0.000	1	0.000	0.000	0.000		0.000	
700	M83	24in Dia. CS Duct	Sec 6 - min	-0.905	8	-1.008	2	-0.126	4	-13.762	2	-0.063	1	-0.772	4	-0.772	5	-3675.459	4	-0.251	4	0.053	0.510	0.029		13.762	
698	M83	24in Dia. CS Duct	Sec 4 - min	-0.903	8	-1.003	2	-0.123	4	-12.619	2	-0.050	1	-0.630	4	-0.630	5	-3675.459	4	-0.251	4	0.053	0.467	0.023		12.619	
699	M83	24in Dia. CS Duct	Sec 5 - max	0.047	1	0.003	1	0.126	5	0.063	1	13.762	2	0.772	5	0.772	4	3675.459	5	0.251	5	0.003	0.510	0.029		13.762	
696	M83	24in Dia. CS Duct	Sec 3 - min	-0.914	8	-0.998	2	-0.118	4	-11.482	2	-0.057	1	-0.494	4	-0.494	5	-3675.459	4	-0.251	4	0.053	0.425	0.016		11.482	
697	M83	24in Dia. CS Duct	Sec 4 - max	0.043	1	0.003	1	0.123	5	0.060	1	12.619	2	0.630	5	0.630	4	3675.459	5	0.251	5	0.003	0.467	0.023		12.619	
611	M75	24in Dia. CS Duct	Sec 1 - max	1.070	9	0.319	3	0.055	4	-0.012	1	10.780	8	0.192	5	0.192	4	1599.134	9	0.109	9	0.062	0.399	0.007		10.780	
613	M75	24in Dia. CS Duct	Sec 2 - max	1.069	9	0.319	3	0.054	4	-0.004	1	10.689	8	0.177	5	0.177	4	1599.134	9	0.109	9	0.062	0.396	0.007		10.689	
609	M74	24in Dia. CS Duct	Sec 6 - max	1.047	8	0.012	1	0.053	4	-0.012	1	10.780	9	0.098	5	0.098	4	1976.337	9	0.135	9	0.061	0.399	0.004		10.780	
615	M75	24in Dia. CS Duct	Sec 3 - max	1.068	9	0.318	3	0.055	4	0.004	1	10.599	8	0.160	5	0.160	4	1599.134	9	0.109	9	0.062	0.393	0.006		10.599	
607	M74	24in Dia. CS Duct	Sec 4 - max	1.048	8	0.012	1	0.052	4	-0.015	1	10.619	8	0.113	5	0.113	4	1976.337	9	0.135	9	0.061	0.393	0.004		10.619	
617	M75	24in Dia. CS Duct	Sec 4 - max	1.066	9	0.318	3	0.057	4	0.011	1	10.509	8	0.144	5	0.144	4	1599.134	9	0.109	9	0.062	0.389	0.005		10.509	
605	M74	24in Dia. CS Duct	Sec 3 - max	1.050	8	0.013	1	0.050	4	-0.019	1	10.459	8	0.128	5	0.128	4	1976.337	9	0.135	9	0.061	0.387	0.005		10.459	
619	M75	24in Dia. CS Duct	Sec 5 - max	1.065	9	0.318	3	0.058	4	0.016	1	10.419	8	0.127	5	0.127	4	1599.134	9	0.109	9	0.062	0.386	0.005		10.419	
694	M83	24in Dia. CS Duct	Sec 2 - min	-0.919	8	-0.994	2	-0.113	4	-10.351	2	-0.053	1	-0.363	4	-0.363	5	-3675.459	4	-0.251	4	0.053	0.383	0.013		10.351	
603	M74	24in Dia. CS Duct	Sec 2 - max	1.051	8	0.013	1	0.049	4	-0.023	1	10.299	8	0.143	5	0.143	4	1976.337	9	0.135	9	0.061	0.381	0.006		10.299	
621	M76	24in Dia. CS Duct	Sec 1 - max	0.930	2	1.102	3	0.058	4	0.016	1	10.419	8	0.197	5	0.197	4	1150.530	9	0.079	9	0.054	0.386	0.007		10.419	
695	M83	24in Dia. CS Duct	Sec 3 - max	0.038	1	0.003	1	0.118	5	0.057	1	11.482	2	0.494	5	0.494	4	3675.459	5	0.251	5	0.002	0.425	0.016		11.482	
601	M74	24in Dia. CS Duct	Sec 1 - max	1.052	8	0.013	1	0.048	4	-0.026	1	10.139	8	0.157	5	0.157	4	1976.337	9	0.135	9	0.061	0.375	0.006		10.139	
39	M5	24in Dia. CS Duct	Sec 6 - max	0.976	9	0.003	1	0.046	4	-0.026	1	10.139	8	0.102	5	0.102	4	2141.320	5	0.146	6	0.057	0.375	0.004		10.139	
623	M76	24in Dia. CS Duct	Sec 2 - max	0.928	2	1.100	3	0.059	4	0.027	1	10.093	8	0.180	5	0.180	4	1150.530	9	0.079	9	0.054	0.374	0.007		10.093	
628	M76	24in Dia. CS Duct	Sec 3 - max	0.928	2	1.099	3	0.061	4	0.036	1	9.768	8	0.162	5	0.162	4	1150.530	9	0.079	9	0.054	0.362	0.006		9.768	
627	M76	24in Dia. CS Duct	Sec 4 - max	0.929	2	1.098	3	0.062	4	0.042	1	9.444	8	0.144	5	0.144	4	1150.530	9	0.079	9	0.054	0.350	0.005		9.444	
612	M75	24in Dia. CS Duct	Sec 1 - min	0.016	1	0.027	1	-0.053	5	-10.780	8	0.012	1	-0.192	4	-0.192	5	-1599.134	6	-0.109	6	0.001	0.399	0.007		10.780	
692	M83	24in Dia. CS Duct	Sec 1 - min	-0.924	8	-0.989	2	-0.108	4	-9.254	8	-0.050	1	-0.238	4	-0.238	5	-3675.459	4	-0.251	4	0.054	0.343	0.009		9.254	
610	M74	24in Dia. CS Duct	Sec 5 - min	0.022	1	-0.585	2	-0.053	5	-10.780	8	0.012	1	-0.098	4	-0.098	5	-1976.337	6	-0.135	6	0.001	0.399	0.004		10.780	
614	M75	24in Dia. CS Duct	Sec 2 - min	0.017	1	0.026	1	-0.054	5	-10.689	8	0.004	1	-0.177	4	-0.177	5	-1599.134	6	-0.109	6	0.001	0.396	0.007		10.689	
690	M82	24in Dia. CS Duct	Sec 5 - min	-0.917	8	-0.014	1	-0.108	5	-9.254	8	-0.050	1	-0.331	4	-0.331	5	-3265.402	4	-0.223	4	0.046	0.343	0.012		9.254	
618	M75	24in Dia. CS Duct	Sec 3 - min	0.016	1	0.025	1	-0.055	5	-10.599	8	-0.004	1	-0.160	4	-0.160	5	-1599.134	6	-0.109	6	0.001	0.393	0.006		10.599	
606	M74	24in Dia. CS Duct	Sec 4 - min	0.020	1	-0.563	2	-0.052	5	-10.619	8	0.015	1	-0.113	4	-0.113	5	-1976.337	6	-0.135	6	0.001	0.393	0.004		10.619	
693	M83	24in Dia. CS Duct	Sec 2 - max	0.033	1	0.003	1	0.113	5	0.053	1	10.351	2	0.363	5	0.363	4	3675.459	5	0.251	5	0.002	0.383	0.013		10.351	
629	M76	24in Dia. CS Duct	Sec 5 - max	0.928	2	1.098	3	0.063	4	0.048	1	9.120	8	0.125	5	0.125	4	1150.530	9	0.079	9	0.054	0.336	0.005		9.120	
616	M75	24in Dia. CS Duct	Sec 4 - min	0.015	1	0.023	1	-0.057	5	-10.509	8	-0.011	1	-0.144	4	-0.144	5	-1599.134	6	-0.109	6	0.001	0.389	0.005		10.509	
622	M76	24in Dia. CS Duct	Sec 1 - min	0.009	1	0.031	1	-0.058	5	-10.419	8	-0.016	1	-0.197	4	-0.197	5	-1150.530	6	-0.079	6	0.001	0.386	0.007		10.419	
606	M74	24in Dia. CS Duct	Sec 3 - min	0.024	1	-0.581	2	-0.050	5	-10.459	8	0.019	1	-0.128	4	-0.128	5	-1976.337	6	-0.135	6	0.001	0.387	0.006		10.459	
620	M75	24in Dia. CS Duct	Sec 5 - min	0.014	1	0.022	1	-0.058	5	-10.419	8	-0.018	1	-0.127	4	-0.127	5	-1599.134	6	-0.109	6	0.001	0.386	0.005		10.419	
604	M74	24in Dia. CS Duct	Sec 2 - min	0.025	1	-0.560	2	-0.049	5	-10.299	8	0.023	1	-0.143	4	-0.143	5	-1976.337	6	-0.135	6	0.001	0.381	0.005		10.299	
688	M82	24in Dia. CS Duct	Sec 4 - min	-0.915	8	-0.014	1	-0.106	5	-9.886	8	-0.300	5	-0.300	4	-0.300	5	-3265.402	4	-0.223	4	0.046	0.329	0.011		9.886	
602	M74	24in Dia. CS Duct	Sec 1 - min	0.027	1	-0.558	2	-0.048	5	-10.139	8	0.026	1	-0.157	4	-0.157	5	-1976.337	6	-0.135	6	0.002	0.375	0.006		10.139	
631	M77	24in Dia. CS Duct	Sec 1 - max	0.660	2	1.711	6	0.063	4	0.049	1	9.120	8	0.176	9	0.176	6	712.022	9	0.049	9	0.038	0.336	0.007		9.120	
624	M76	24in Dia. CS Duct	Sec 2 - min	0.008	1	0.029	1	-0.059	5	-10.093	8	-0.027	1	-0.180	4	-0.180	5	-1150.530	6	-0.079	6	0.000	0.374	0.007		10.093	
40	M5	24in Dia. CS Duct	Sec 6 - min	0.025	1	-0.952	2	-0.048	5	-10.139	8	0.026	1	-0.102	4	-0.102	5	-2141.320	4	-0.146	4	0.002	0.375	0.004		10.139	
689	M82	24in Dia. CS Duct	Sec 3 - min	-0.919	9	-0.013	1	-0.105	5	-0.042	1	-8.517	8	-0.268	4	-0.268	5	-3265.402	4	-0.223	4	0.046	0.315	0.010		8.517	
626	M76	24in Dia. CS Duct	Sec 3 - min	0.007	1	0.027	1	-0.061	5	-9.768	8	-0.035	1	-0.162	4	-0.162	5	-1150.530	6	-0.079	6	0.000	0.362	0.006		9.768	
633	M77	24in Dia. CS Duct	Sec 2 - max	0.658	2	1.709	8	0.065	4	0.050	1	8.612	2	0.159	9	0.159	6	712.022	9	0.049	9	0.038	0.319	0.006		8.612	
684	M82	24in Dia. CS Duct	Sec 2 - min	-0.921	9	-0.013	1	-0.104	5	-0.038	1	-8.146	8	-0.237	5	-0.237	4	-3265.402	4	-0.223	4	0.046	0.302	0.009		8.146	
629	M82	24in Dia. CS Duct	Sec 5 - max	0.026	1	1.323	2	0.108	4	0.254	8	0.050	1	0.331	4	0.331	5	3265.402	5	0.223	5	0.002	0.343	0.012		9.254	
628	M76	24in Dia. CS Duct	Sec 4 - min	0.006	1	0.024	1	-0.062	5	-9.444	8	-0.042	1	-0.144	4	-0.144	5	-1150.530	6	-0.079	6	0.000	0.350	0.005		9.444	
691	M83	24in Dia. CS Duct	Sec 1 - max	0.028	1	0.003	1	0.108	5	0.050	1	9.254	8	0.238	5	0.238	4	3675.459	5	0.251	5	0.002	0.343	0.009		9.254	
632	M77	24in Dia. CS Duct	Sec 1 - min	0.001	1	0.025	1	-0.063	5	-9.120	8	-0.049	1	-0.176	5	-0.176	9	-712.022	6	-0.049	6	0.000	0.336	0.007		9.120	
635	M77	24in Dia. CS Duct	Sec 3 - max	0.658	2	1.706	8	0.066	4	0.063	1	8.116	2	0.141	9	0.141	6	712.022	9	0.049	9	0.038	0.301	0.005		8.116	
682	M82	24in Dia. CS Duct	Sec 1 - min	-0.822	9	-0.012	1	-0.102	5	-0.034	1	-7.782	3	-0.206	5	-0.206	4	-3265.402	4	-0.223	4	0.046	0.288	0.005		7.782	
630	M76	24in Dia. CS Duct	Sec 6 - min	0.006	1	0.022	1	-0.063	5	-9.120	8	-0.049	1	-0.125	5	-0.125	9	-1150.530	6	-0.079	6	0.000	0.336	0.005		9.120	
687	M82	24in Dia. CS Duct	Sec 4 - max	0.026	1	1.322	2	0.106	4	0.886	8	0.046	1	0.300	4	0.300	5	3265.402	5	0.223	5	0.002	0.329	0.011		8.886	
680	M81	24in Dia. CS Duct	Sec 5 - min	-0.521	3	-0.030	1	-0.102	5	-0.034	1	-7.782	3	-0.362	5	-0.362	4	-2439.280	4	-0.167	4	0.030	0.288	0.013		7.782	
685	M82	24in Dia. CS Duct	Sec 3 - max	0.027	1	1.321	2	0.106	4	0.517	8	0.042	1	0.268	4	0.268	5	3265.402	5	0.223	5	0.002	0.315	0.010		8.517	
637	M77	24in Dia. CS Duct	Sec 4 - max	0.659	2	1.704	8	0.067	4	0.068	1	7.621	2	0.123	9	0.123	6	712.022	9	0.049	9	0.038	0.282	0.005		7.621	

D-2250

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_t/σ_a	f_{sy}/σ_a	f_{sz}/σ_a		f_t (ksi)	
634	M77	24in Dia. CS Duct	Sec 2 - min	0.000	1	0.023	1	-0.065	5	-8.612	2	-0.056	1	-0.159	6	-0.159	9	-712.022	6	-0.049	6	0.000	0.319	0.008		8.612	
663	M82	24in Dia. CS Duct	Sec 2 - max	0.025	1	1.321	2	0.104	4	8.146	6	0.038	1	0.237	4	0.237	5	3265.402	5	0.223	5	0.001	0.302	0.009		8.146	
676	M81	24in Dia. CS Duct	Sec 4 - min	-0.522	9	-0.029	1	-0.101	5	-0.029	1	-7.256	3	-0.331	5	-0.331	4	-2439.283	4	-0.167	4	0.030	0.269	0.012		7.256	
639	M77	24in Dia. CS Duct	Sec 5 - max	0.889	2	1.702	8	0.068	4	0.073	1	7.126	2	0.105	7	0.105	6	712.022	9	0.049	9	0.038	0.264	0.004		7.126	
638	M77	24in Dia. CS Duct	Sec 3 - min	0.000	1	0.020	1	-0.069	5	-8.116	2	-0.063	1	-0.141	6	-0.141	9	-712.022	6	-0.049	6	0.000	0.301	0.005		8.116	
679	M81	24in Dia. CS Duct	Sec 5 - max	0.020	1	1.630	2	0.102	4	7.792	3	0.034	1	0.362	4	0.362	5	2439.283	5	0.167	5	0.001	0.288	0.013		7.792	
37	M5	24in Dia. CS Duct	Sec 4 - max	0.895	9	0.003	1	0.032	6	-0.038	1	6.340	3	0.259	5	0.259	4	2141.320	5	0.146	5	0.058	0.235	0.010		6.340	
681	M82	24in Dia. CS Duct	Sec 1 - max	0.024	1	1.320	2	0.102	4	7.782	3	0.034	1	0.206	4	0.206	5	3265.402	5	0.223	5	0.001	0.288	0.008		7.782	
641	M78	24in Dia. CS Duct	Sec 1 - max	0.462	2	1.919	8	0.068	4	0.073	1	7.126	2	0.122	9	0.122	6	548.338	9	0.038	9	0.028	0.264	0.005		7.126	
678	M81	24in Dia. CS Duct	Sec 3 - min	-0.523	9	-0.027	1	-0.100	5	-0.017	1	-6.730	3	-0.302	5	-0.302	4	-2439.283	4	-0.167	4	0.030	0.249	0.011		6.730	
638	M77	24in Dia. CS Duct	Sec 4 - min	0.000	1	0.018	1	-0.067	5	-7.621	2	-0.066	1	-0.123	6	-0.123	9	-712.022	6	-0.049	6	0.000	0.282	0.005		7.621	
71	M5	24in Dia. CS Duct	Sec 1 - max	1.046	9	0.003	1	0.024	5	5.611	6	0.072	1	0.381	9	0.381	6	2141.320	5	0.146	5	0.061	0.208	0.014		5.611	
677	M81	24in Dia. CS Duct	Sec 4 - max	0.019	1	1.630	2	0.101	4	7.256	3	0.026	1	0.331	4	0.331	5	2439.283	5	0.167	5	0.001	0.269	0.012		7.256	
674	M81	24in Dia. CS Duct	Sec 2 - min	-0.524	9	-0.026	1	-0.098	5	-0.009	1	-6.203	3	-0.272	5	-0.272	4	-2439.283	4	-0.167	4	0.030	0.230	0.010		6.203	
642	M78	24in Dia. CS Duct	Sec 1 - min	-0.003	1	0.015	1	-0.068	6	-7.126	2	-0.073	1	-0.122	6	-0.122	9	-548.338	6	-0.038	6	0.000	0.264	0.005		7.126	
640	M77	24in Dia. CS Duct	Sec 5 - min	0.000	1	0.015	1	-0.069	5	-7.126	2	-0.073	1	-0.105	6	-0.105	7	-712.022	6	-0.049	6	0.000	0.264	0.004		7.126	
675	M81	24in Dia. CS Duct	Sec 3 - max	0.018	1	1.630	2	0.100	4	6.730	3	0.017	1	0.302	4	0.302	5	2439.283	5	0.167	5	0.001	0.249	0.011		6.730	
672	M81	24in Dia. CS Duct	Sec 1 - min	-0.524	9	-0.024	1	-0.097	5	-0.002	1	-5.676	3	-0.243	5	-0.243	4	-2439.283	4	-0.167	4	0.030	0.210	0.009		5.676	
36	M5	24in Dia. CS Duct	Sec 4 - min	0.043	1	-0.954	8	-0.032	9	-6.340	3	0.036	1	-0.259	4	-0.259	6	-2141.320	4	-0.146	4	0.003	0.235	0.010		6.340	
673	M81	24in Dia. CS Duct	Sec 2 - max	0.017	1	1.630	2	0.098	4	6.203	3	0.009	1	0.272	4	0.272	5	2439.283	5	0.167	5	0.001	0.230	0.010		6.203	
599	M73	24in Dia. CS Duct	Sec 5 - max	0.223	7	0.354	8	0.155	9	5.611	6	0.072	1	0.431	9	0.431	6	1679.632	5	0.115	5	0.013	0.208	0.016		5.611	
670	M80	24in Dia. CS Duct	Sec 6 - min	-0.145	3	-0.035	1	-0.097	5	-0.002	1	-5.676	3	-0.352	5	-0.352	4	-1574.144	4	-0.108	4	0.008	0.210	0.013		5.676	
597	M73	24in Dia. CS Duct	Sec 4 - max	0.224	7	0.384	8	0.156	9	5.505	6	0.067	1	0.385	9	0.385	6	1679.632	5	0.115	5	0.013	0.204	0.014		5.505	
32	M5	24in Dia. CS Duct	Sec 1 - min	0.084	1	-0.995	8	-0.024	4	-0.072	1	-5.611	6	-0.381	6	-0.381	9	-2141.320	4	-0.146	4	0.005	0.208	0.016		5.611	
600	M73	24in Dia. CS Duct	Sec 6 - min	-0.038	1	-0.219	7	-0.155	6	-0.072	1	-5.611	6	-0.431	6	-0.431	6	-1679.632	4	-0.115	4	0.002	0.208	0.016		5.611	
595	M73	24in Dia. CS Duct	Sec 3 - max	0.226	7	0.353	8	0.157	9	5.400	6	0.062	1	0.338	9	0.338	6	1679.632	5	0.115	5	0.013	0.200	0.013		5.400	
669	M80	24in Dia. CS Duct	Sec 5 - max	0.010	1	2.066	2	0.097	4	5.676	3	0.002	1	0.352	4	0.352	5	1574.144	5	0.108	5	0.001	0.210	0.013		5.676	
643	M78	24in Dia. CS Duct	Sec 2 - max	0.462	2	1.910	8	0.073	4	0.085	1	5.173	2	0.056	9	0.056	6	548.338	9	0.038	9	0.028	0.192	0.002		5.173	
596	M73	24in Dia. CS Duct	Sec 4 - min	-0.036	1	-0.215	7	-0.156	6	-0.067	1	-5.505	6	-0.385	6	-0.385	9	-1679.632	4	-0.115	4	0.002	0.204	0.014		5.505	
671	M81	24in Dia. CS Duct	Sec 1 - max	0.016	1	1.631	2	0.097	4	5.676	3	0.002	1	0.243	4	0.243	5	2439.283	5	0.167	5	0.001	0.210	0.009		5.676	
593	M73	24in Dia. CS Duct	Sec 2 - max	0.227	7	0.353	8	0.158	9	5.295	6	0.057	1	0.291	9	0.291	6	1679.632	5	0.115	5	0.013	0.196	0.011		5.197	
589	M72	24in Dia. CS Duct	Sec 6 - max	0.252	7	0.432	8	0.159	9	5.197	3	0.052	1	0.307	9	0.307	6	1011.873	5	0.069	5	0.015	0.192	0.011		5.197	
591	M73	24in Dia. CS Duct	Sec 1 - max	0.228	7	0.352	8	0.159	9	5.197	3	0.052	1	0.244	9	0.244	6	1679.632	5	0.115	5	0.013	0.192	0.009		5.197	
666	M73	24in Dia. CS Duct	Sec 3 - min	-0.036	1	-0.216	7	-0.157	6	-0.062	1	-5.400	6	-0.338	6	-0.338	9	-1679.632	4	-0.115	4	0.002	0.200	0.013		5.400	
667	M72	24in Dia. CS Duct	Sec 4 - max	0.253	7	0.433	8	0.160	9	5.106	3	0.041	1	0.259	9	0.259	6	1011.873	5	0.069	5	0.016	0.169	0.010		5.106	
594	M73	24in Dia. CS Duct	Sec 2 - min	-0.034	1	-0.215	7	-0.158	6	-0.057	1	-5.295	6	-0.291	6	-0.291	9	-1679.632	4	-0.115	4	0.002	0.196	0.011		5.295	
585	M72	24in Dia. CS Duct	Sec 3 - max	0.264	7	0.433	8	0.161	9	5.015	3	0.030	1	0.212	9	0.212	6	1011.873	5	0.069	5	0.015	0.186	0.008		5.015	
668	M80	24in Dia. CS Duct	Sec 4 - min	-0.145	3	-0.032	1	-0.096	5	0.009	1	-5.068	3	-0.323	5	-0.323	4	-1574.144	4	-0.108	4	0.008	0.189	0.012		5.068	
583	M72	24in Dia. CS Duct	Sec 2 - max	0.265	7	0.434	8	0.162	9	5.007	7	0.020	1	0.163	9	0.163	6	1011.873	5	0.069	5	0.015	0.185	0.006		5.007	
590	M72	24in Dia. CS Duct	Sec 5 - min	-0.026	1	-0.039	1	-0.159	6	-0.052	1	-5.197	3	-0.307	6	-0.307	9	-1011.873	4	-0.069	4	0.002	0.192	0.011		5.197	
579	M71	24in Dia. CS Duct	Sec 5 - max	0.235	7	0.452	8	0.163	9	5.011	7	0.010	1	0.151	5	0.151	4	636.828	5	0.044	5	0.014	0.186	0.006		5.011	
581	M72	24in Dia. CS Duct	Sec 1 - max	0.255	7	0.435	8	0.163	9	5.011	7	0.010	1	0.115	9	0.115	6	1011.873	5	0.069	5	0.015	0.186	0.004		5.197	
592	M73	24in Dia. CS Duct	Sec 1 - min	-0.033	1	-0.213	7	-0.159	6	-0.052	1	-5.197	3	-0.244	6	-0.244	9	-1679.632	4	-0.115	4	0.002	0.192	0.009		5.068	
577	M71	24in Dia. CS Duct	Sec 4 - max	0.239	7	0.453	8	0.164	9	4.956	7	-0.004	1	0.111	5	0.111	4	636.828	5	0.044	5	0.014	0.184	0.004		4.956	
667	M80	24in Dia. CS Duct	Sec 4 - max	0.009	1	2.066	2	0.096	4	5.068	3	-0.008	1	0.323	4	0.323	5	1574.144	5	0.108	5	0.001	0.188	0.012		5.068	
588	M72	24in Dia. CS Duct	Sec 4 - min	-0.025	1	-0.037	1	-0.160	5	-0.041	1	-5.106	3	-0.259	6	-0.259	9	-1011.873	4	-0.069	4	0.001	0.169	0.010		5.106	
575	M71	24in Dia. CS Duct	Sec 3 - max	0.239	7	0.455	8	0.165	9	4.900	7	-0.017	1	0.069	5	0.069	4	636.828	5	0.044	5	0.014	0.181	0.003		4.900	
586	M72	24in Dia. CS Duct	Sec 3 - min	-0.024	1	-0.035	1	-0.161	5	-0.030	1	-5.015	3	-0.212	6	-0.212	9	-1011.873	4	-0.069	4	0.001	0.186	0.008		5.015	
573	M71	24in Dia. CS Duct	Sec 2 - max	0.239	7	0.457	8	0.166	9	4.843	7	-0.029	1	0.028	5	0.028	4	636.828	5	0.044	5	0.014	0.179	0.001		4.843	
19	M2	24in Dia. CS Duct	Sec 5 - max	0.119	7	-0.069	1	0.235	6	-0.205	1	2.259	7	2.798	6	2.798	9	833.704	5	0.057	5	0.007	0.084	0.104		2.798	
20	M2	24in Dia. CS Duct	Sec 5 - min	-0.119	6	-0.172	7	-0.235	9	-2.259	7	0.205	1	-2.798	9	-2.798	6	-833.704	4	-0.057	4	0.007	0.084	0.104		2.798	
591	M53	24in Dia. CS Duct	Sec 1 - max	0.119	7	0.550	7	0.216	9	-0.205	1	2.259	7	2.798	6	2.798	9	833.704	5	0.057	5	0.007	0.084	0.104		2.798	
592	M53	24in Dia. CS Duct	Sec 1 - min	-0.119	6	0.076	1	-0.216	6	-2.259	7	0.205	1	-2.798	9	-2.798	6	-833.704	4	-0.057	4	0.007	0.084	0.104		2.798	
644	M78	24in Dia. CS Duct	Sec 2 - min	-0.003	1	0.006	1	-0.073	5	-5.173	2	-0.085	1	-0.056	6	-0.056	9	-548.338	6	-0.038	6	0.000	0.192	0.002		5.173	
571	M71	24in Dia. CS Duct	Sec 1 - max	0.240	7	0.458	8	0.167	9	4.785	7	-0.041	1	0.051	5	0.051	4	636.828	5	0.044	5	0.014	0.177	0.002		4.785	
584	M72	24in Dia. CS Duct	Sec 2 - min	-0.023	1	-0.034	1	-0.162	6	-0.020	1	-5.007	7	-0.163	6	-0.163	9	-1011.873	4	-0.069	4	0.001	0.165	0.006		5.007	
580	M71	24in Dia. CS Duct	Sec 5 - min	-0.022	8	-0.047	1	-0.163	6	-0.010	1	-5.011	7	-0.151	5	-0.151	5	-636.828	4	-0.044	4	0.001	0.186	0.006		5.011	
582	M72	24in Dia. CS Duct	Sec 1 - min	-0.022	1	-0.033	1	-0.163	6	-0.010	1	-5.011	7	-0.115	6	-0.115	9	-1011.873	4	-0.069	4	0.001	0.186	0.004		5.011	
569	M70	24in Dia. CS Duct	Sec 6 - max	0.184	7	0.410	8	0.167	9	4.785	7	-0.041	1	0.028	5	0.028	9	628.842	5	0.043	5	0.011	0.177	0.001		4.785	
578	M71	24in Dia. CS Duct	Sec 4 - min	-0.021	8	-0.045	1	-0.164	6	0.004	1	-4.956	7	-0.111	4	-0.111	5	-636.828	4	-0.044	4	0.001	0.184	0.004		4.956	
567	M70	24in Dia. CS Duct	Sec 4 - max	0.184	7	0.412	8	0.168	9	4.677	7	-0.053	1	0.077	5	0.077	9	628.842	5	0.043	5	0.011	0.173	0.003		4.677	
576	M71	24in Dia. CS Duct	Sec 3 - min	-0.020	8	-0.043	1	-0.165	6	0.017	1	-4.900	7	-0.069	4	-0.069	5	-636.828	4	-0.044	4	0.001	0.161	0.003		4.900	
565	M70	24in Dia. CS Duct	Sec 3 - max	0.184	7	0.414	8	0.169	9	4.568	7	-0.065	1	0.128	6	0.128	9	628.842	5	0.043	5	0.011	0.169	0.005		4.568	
568	M80	24in Dia. CS Duct	Sec 3 - min	-0.145	3	-0.030	1	-0.095	6	0.017	1	-4.460	3	-0.295	5	-0.295	4	-1574.144	4	-0.108	4	0.008	0.165	0.011		4.460	
570	M70	24in Dia. CS Duct	Sec 5 - min	-0.104	8	-0.044	1	-0.167	6	0.041	1	-4.785	7	-0.028	9	-0.028	6	-628.842	4	-0.043	4	0.006	0.177	0.001		4.785	
553	M70	24in Dia. CS Duct	Sec 2 - max	0.183	7	0.416	8	0.170	9	4.456	7	-0.077	1	0.178	6	0.178	9	628.842	5	0.043	5	0.011	0.165	0.007		4.456	
568	M70	24in Dia. CS Duct	Sec 4 - min	-0.103	8	-0.041	1	-0.168	6	-0.053	1	-4.677	7	-0.077	7	-0.077	6	-628.842	4	-0.043	4	0.006	0.173	0.003		4.677	
574	M71	24in Dia. CS Duct	Sec 2 - min	-0.019	8	-0.041	1	-0.166	6	0.029	1	-4.843	7	-0.028	4	-0.028	5	-636.828	4	-0.044	4	0.001	0.179	0.001		4.843	
572	M71	24in Dia. CS Duct	Sec 1 - min	-0.018	8	-0.038	1	-0.167	6	0.041	1	-4.785	7	-0.051	9	-0.051	6	-636.828	4	-0.044	4	0.001	0.177	0.002		4.785	
561	M70	24in Dia. CS Duct	Sec 1 - max	0.183	7	0.419	8	0.171	9	4.347	7	-0.087	1	0.229	6	0.229	9	628.842	5	0.043	5	0.011	0.161	0.009		4.347	
566	M70	24in Dia. CS Duct	Sec 3 - min	-0.103	8	-0.039	1	-0.169	6	0.056	1	-4.568	7	-0.128	9	-0.128	6	-628.842	4	-0.043	4	0.006	0.169	0.005		4.568	
564	M70	24in Dia. CS Duct	Sec 2 - min	-0.102	8	-0.037	1	-0.170	6	0.077	1	-4.456	7	-0.178	9	-0.178	6	-628.842	4	-0.043	4	0.006	0.165	0.007		4.456	
29	M4	24in Dia. CS Duct	Sec 6 - max	0.142	7	0.438	7	0.171	9	4.347	7	-0.087	1	0.211	6	0.211	9	833.704	5	0.057	5	0.008	0.161	0.008		4.347	
30	M4	24in Dia. CS Duct	Sec 5 - min	-0.142	8	-0.034	1	-0.171	6	0.087	1	-4.347	7	-0.211	9	-0.211	6	-833.704	4	-0.057	4	0.008	0.161	0.008		4.347	
565	M80	24in Dia. CS Duct	Sec 3 - max	0.008	1	2.066	2	0.096	4	4.460	3	-0.017	1	0.295	4	0.295	5	1574.144	5	0.108	5	0.000	0.165	0.011		4.460	
562	M70	24in Dia. CS Duct	Sec 1 - min	-0.101	8	-0.034	1	-0.171	6	0.087	1	-4.347	7	-0.229	9	-0.229	6	-628.842	4	-0.043	4	0.006	0.161	0.008		4.347	
35	M5	24in Dia. CS Duct	Sec 3 - max	1.012	9	0.003	1	0.018	6	-0.049	1	2.511	7	0.344	5	0.344	4	2141.320	5	0.146	5	0.059	0.093	0.013		2.511	

D-2250

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_c	f_{by}/σ_y	f_{bz}/σ_z		f_t (ksi)	
664	M80	24in Dia. CS Duct	Sec 2 - min	-0.145	3	-0.028	1	-0.093	5	0.026	1	-3.851	3	-0.267	5	-0.267	4	-1574.144	4	-0.108	4	0.008	0.143	0.010		3.851	
27	M4	24in Dia. CS Duct	Sec 4 - max	0.139	7	0.453	7	0.177	9	3.570	7	-0.134	1	0.615	6	0.615	9	833.704	5	0.057	5	0.008	0.132	0.019		3.570	
28	M4	24in Dia. CS Duct	Sec 4 - min	-0.139	8	-0.020	1	-0.177	6	0.134	1	-3.570	7	-0.515	9	-0.515	6	-833.704	4	-0.057	4	0.008	0.132	0.019		3.570	
663	M80	24in Dia. CS Duct	Sec 2 - max	0.008	1	2.070	2	0.093	4	3.851	3	-0.028	1	0.267	4	0.267	5	1574.144	5	0.108	5	0.000	0.143	0.010		3.851	
393	M53	24in Dia. CS Duct	Sec 2 - max	0.122	7	0.537	7	0.210	9	-0.091	1	1.391	7	2.457	6	2.457	9	833.704	5	0.057	5	0.007	0.052	0.091		2.457	
394	M53	24in Dia. CS Duct	Sec 2 - min	-0.122	8	0.065	1	-0.210	6	-1.391	7	0.091	1	-2.457	9	-2.457	6	-833.704	4	-0.057	4	0.007	0.052	0.091		2.457	
645	M78	24in Dia. CS Duct	Sec 5 - max	0.482	2	1.992	8	0.078	4	0.087	1	3.229	2	0.044	4	0.044	5	548.338	9	0.038	9	0.028	0.120	0.002		3.229	
659	M79	24in Dia. CS Duct	Sec 6 - max	0.297	2	2.015	8	0.092	4	3.241	3	-0.034	1	0.304	4	0.304	5	784.068	5	0.054	5	0.017	0.120	0.011		3.241	
25	M4	24in Dia. CS Duct	Sec 3 - max	0.138	7	0.457	7	0.153	9	2.767	7	-0.156	1	0.829	6	0.829	9	833.704	5	0.057	5	0.008	0.102	0.031		2.767	
26	M4	24in Dia. CS Duct	Sec 3 - min	-0.136	8	-0.005	1	-0.153	6	0.156	1	-2.767	7	-0.829	9	-0.829	6	-833.704	4	-0.057	4	0.008	0.102	0.031		2.767	
662	M80	24in Dia. CS Duct	Sec 1 - min	-0.145	3	-0.028	1	-0.092	5	0.034	1	-3.241	3	-0.240	5	-0.240	4	-1574.144	4	-0.108	4	0.008	0.120	0.009		3.241	
39	M6	24in Dia. CS Duct	Sec 2 - max	1.029	9	0.003	1	0.006	5	1.590	8	0.061	1	0.390	8	0.390	8	2141.320	5	0.146	5	0.060	0.059	0.014		1.590	
660	M79	24in Dia. CS Duct	Sec 5 - min	0.002	1	-0.030	1	-0.092	6	0.034	1	-3.241	3	-0.304	5	-0.304	4	-784.068	4	-0.054	4	0.000	0.120	0.011		3.241	
661	M80	24in Dia. CS Duct	Sec 1 - max	0.007	1	2.072	2	0.092	4	3.241	3	-0.034	1	0.240	4	0.240	5	1574.144	5	0.108	5	0.000	0.120	0.009		3.241	
657	M79	24in Dia. CS Duct	Sec 4 - max	0.297	2	2.018	8	0.091	4	2.643	3	-0.043	1	0.277	4	0.277	5	784.068	5	0.054	5	0.017	0.096	0.010		2.643	
23	M4	24in Dia. CS Duct	Sec 2 - max	0.133	7	0.482	7	0.189	9	1.939	7	-0.151	1	1.153	6	1.153	9	833.704	5	0.057	5	0.008	0.072	0.043		1.939	
24	M4	24in Dia. CS Duct	Sec 2 - min	-0.133	8	0.010	1	-0.189	6	0.151	1	-1.939	7	-1.153	9	-1.153	6	-833.704	4	-0.057	4	0.008	0.072	0.043		1.939	
646	M78	24in Dia. CS Duct	Sec 3 - min	-0.003	1	-0.002	1	-0.076	5	-3.229	2	-0.087	1	-0.044	5	-0.044	4	-548.338	6	-0.038	6	0.000	0.120	0.002		3.229	
9	M1	24in Dia. CS Duct	Sec 5 - max	0.078	6	-0.392	1	0.157	6	-0.649	7	1.007	1	1.998	9	1.998	8	833.704	5	0.057	5	0.005	0.037	0.074		1.998	
10	M1	24in Dia. CS Duct	Sec 5 - min	-0.078	8	-0.392	5	-0.157	7	-1.007	1	0.649	7	-1.998	8	-1.998	8	-833.704	4	-0.057	4	0.005	0.037	0.074		1.998	
11	M2	24in Dia. CS Duct	Sec 1 - max	0.078	7	0.135	1	0.157	6	-0.543	7	1.007	1	1.998	9	1.998	6	833.704	5	0.057	5	0.005	0.037	0.074		1.998	
12	M2	24in Dia. CS Duct	Sec 1 - min	-0.078	8	0.031	7	-0.157	9	-1.007	1	0.543	7	-1.998	8	-1.998	9	-833.704	4	-0.057	4	0.005	0.037	0.074		1.998	
7	M1	24in Dia. CS Duct	Sec 4 - max	0.078	6	-0.388	1	0.155	6	-0.361	7	0.825	1	2.071	9	2.071	6	833.704	5	0.057	5	0.005	0.031	0.077		2.071	
8	M1	24in Dia. CS Duct	Sec 4 - min	-0.078	8	-0.388	5	-0.155	7	-0.825	1	0.361	7	-2.071	8	-2.071	9	-833.704	4	-0.057	4	0.005	0.031	0.077		2.071	
17	M2	24in Dia. CS Duct	Sec 4 - max	0.109	7	-0.016	1	0.218	6	0.055	1	1.366	7	1.414	6	1.414	9	833.704	5	0.057	5	0.006	0.051	0.052		1.414	
18	M2	24in Dia. CS Duct	Sec 4 - min	-0.109	8	-0.122	7	-0.218	9	-1.366	7	-0.066	1	-1.414	9	-1.414	6	-833.704	4	-0.057	4	0.006	0.051	0.052		1.414	
38	M5	24in Dia. CS Duct	Sec 3 - min	0.060	1	-0.067	8	-0.016	9	-2.511	7	0.049	1	-0.344	4	-0.344	5	-2141.320	4	-0.146	4	0.003	0.093	0.013		2.511	
656	M79	24in Dia. CS Duct	Sec 4 - min	0.001	1	-0.027	1	-0.091	5	0.043	1	-2.643	3	-0.277	5	-0.277	4	-784.068	4	-0.054	4	0.000	0.096	0.010		2.643	
5	M1	24in Dia. CS Duct	Sec 3 - max	0.077	6	-0.384	1	0.154	6	-0.181	7	0.646	1	2.143	9	2.143	6	833.704	5	0.057	5	0.004	0.024	0.079		2.143	
6	M1	24in Dia. CS Duct	Sec 3 - min	-0.077	8	-0.384	5	-0.154	7	-0.646	1	0.181	7	-2.143	8	-2.143	9	-833.704	4	-0.057	4	0.004	0.024	0.079		2.143	
395	M53	24in Dia. CS Duct	Sec 3 - max	0.124	7	0.523	7	0.205	9	0.001	1	0.571	6	2.125	9	2.125	9	833.704	5	0.057	5	0.007	0.021	0.079		2.125	
396	M53	24in Dia. CS Duct	Sec 3 - min	-0.124	8	0.051	1	-0.205	6	-0.571	6	-0.001	1	-2.125	9	-2.125	6	-833.704	4	-0.057	4	0.007	0.021	0.079		2.125	
3	M1	24in Dia. CS Duct	Sec 2 - max	0.078	6	-0.380	1	0.152	6	-0.003	7	0.466	1	2.214	9	2.214	6	833.704	5	0.057	5	0.004	0.017	0.082		2.214	
4	M1	24in Dia. CS Duct	Sec 2 - min	-0.078	8	-0.380	5	-0.152	7	-0.466	1	0.003	7	-2.214	6	-2.214	9	-833.704	4	-0.057	4	0.004	0.017	0.082		2.214	
21	M4	24in Dia. CS Duct	Sec 1 - max	0.130	7	0.496	7	0.194	9	1.085	7	-0.122	1	1.487	6	1.487	9	833.704	5	0.057	5	0.008	0.040	0.055		1.487	
22	M4	24in Dia. CS Duct	Sec 1 - min	-0.130	8	0.024	1	-0.194	6	0.122	1	-1.085	7	-1.487	9	-1.487	6	-833.704	4	-0.057	4	0.008	0.040	0.055		1.487	
399	M53	24in Dia. CS Duct	Sec 6 - max	0.130	7	0.496	7	0.194	9	1.085	7	-0.122	1	1.487	6	1.487	9	833.704	5	0.057	5	0.008	0.040	0.055		1.487	
400	M53	24in Dia. CS Duct	Sec 6 - min	-0.130	8	0.024	1	-0.194	6	0.122	1	-1.085	7	-1.487	9	-1.487	6	-833.704	4	-0.057	4	0.008	0.040	0.055		2.045	
655	M79	24in Dia. CS Duct	Sec 3 - max	0.286	2	2.020	8	0.089	4	2.045	3	-0.050	1	0.250	4	0.250	5	784.068	5	0.054	5	0.017	0.076	0.009		2.205	
1	M1	24in Dia. CS Duct	Sec 1 - max	0.075	8	-0.376	1	0.150	6	0.173	7	0.292	1	2.285	9	2.285	6	833.704	5	0.057	5	0.004	0.011	0.085		2.285	
2	M1	24in Dia. CS Duct	Sec 1 - min	-0.075	8	-0.376	5	-0.150	7	-0.292	1	-0.173	7	-2.285	6	-2.285	9	-833.704	4	-0.057	4	0.004	0.011	0.085		2.285	
481	M62	24in Dia. CS Duct	Sec 1 - max	0.000	1	0.000	1	0.000	1	0.846	6	-0.617	1	1.529	9	1.529	6	3060.703	7	0.209	7	0.000	0.031	0.057		1.529	
482	M62	24in Dia. CS Duct	Sec 1 - min	0.000	1	0.000	1	0.000	1	0.617	1	-0.846	6	-1.529	6	-1.529	9	1769.815	1	0.121	1	0.000	0.031	0.057		1.529	
511	M65	24in Dia. CS Duct	Sec 1 - max	0.000	1	0.000	1	0.000	1	0.846	7	-0.617	1	1.529	7	1.529	8	-1769.815	1	-0.121	1	0.000	0.031	0.057		1.529	
512	M65	24in Dia. CS Duct	Sec 1 - min	0.000	1	0.000	1	0.000	1	0.617	1	-0.846	7	-1.529	8	-1.529	7	-3060.703	6	-0.209	6	0.000	0.031	0.056		1.522	
483	M62	24in Dia. CS Duct	Sec 2 - max	0.004	7	-0.015	1	0.008	6	0.934	6	-0.604	1	1.522	9	1.522	6	3060.703	7	0.209	7	0.000	0.031	0.056		1.522	
484	M62	24in Dia. CS Duct	Sec 2 - min	-0.004	8	-0.015	1	-0.008	9	0.604	1	-0.934	6	-1.522	6	-1.522	9	1769.815	1	0.121	1	0.000	0.031	0.056		1.522	
513	M65	24in Dia. CS Duct	Sec 2 - max	0.004	6	-0.015	1	0.008	8	0.934	7	-0.604	1	1.522	8	1.522	8	-1769.815	1	-0.121	1	0.000	0.031	0.056		1.522	
514	M65	24in Dia. CS Duct	Sec 2 - min	-0.004	9	-0.015	1	-0.008	7	0.604	1	-0.934	7	-1.522	8	-1.522	7	-3060.703	6	-0.209	6	0.000	0.031	0.056		1.522	
485	M62	24in Dia. CS Duct	Sec 3 - max	0.008	7	-0.029	1	0.016	6	0.795	6	-0.568	1	1.500	9	1.500	6	3060.703	7	0.209	7	0.000	0.029	0.056		1.500	
486	M62	24in Dia. CS Duct	Sec 3 - min	-0.008	8	-0.029	1	-0.016	9	0.568	1	-0.795	6	-1.500	9	-1.500	9	1769.815	1	0.121	1	0.000	0.029	0.056		1.500	
515	M65	24in Dia. CS Duct	Sec 3 - max	0.008	6	-0.029	1	0.016	8	0.795	7	-0.568	1	1.500	7	1.500	8	-1769.815	1	-0.121	1	0.000	0.029	0.056		1.500	
516	M65	24in Dia. CS Duct	Sec 3 - min	-0.008	9	-0.029	1	-0.016	7	0.568	1	-0.795	7	-1.500	8	-1.500	7	-3060.703	6	-0.209	6	0.000	0.029	0.056		1.500	
658	M79	24in Dia. CS Duct	Sec 3 - min	0.001	1	-0.025	1	-0.069	5	0.050	1	-2.045	3	-0.250	5	-0.250	4	-784.068	4	-0.054	4	0.000	0.076	0.009		2.045	
397	M53	24in Dia. CS Duct	Sec 4 - max	0.127	7	0.510	7	0.200	9	0.281	7	-0.072	1	1.802	9	1.802	6	833.704	5	0.057	5	0.007	0.010	0.067		1.802	
398	M53	24in Dia. CS Duct	Sec 4 - min	-0.127	8	0.036	1	-0.200	6	0.072	1	-0.281	7	-1.802	9	-1.802	6	-833.704	4	-0.057	4	0.007	0.010	0.067		1.802	
487	M62	24in Dia. CS Duct	Sec 4 - max	0.012	7	-0.044	1	0.025	6	0.733	6	-0.503	1	1.465	9	1.465	6	3060.703	7	0.209	7	0.001	0.027	0.054		1.465	
488	M62	24in Dia. CS Duct	Sec 4 - min	-0.012	8	-0.044	1	-0.025	9	0.503	1	-0.733	6	-1.465	6	-1.465	9	1769.815	1	0.121	1	0.001	0.027	0.054		1.465	
517	M65	24in Dia. CS Duct	Sec 4 - max	0.012	6	-0.044	1	0.025	8	0.733	7	-0.503	1	1.465	7	1.465	8	-1769.815	1	-0.121	1	0.001	0.027	0.054		1.465	
518	M65	24in Dia. CS Duct	Sec 4 - min	-0.012	9	-0.044	1	-0.025	7	0.503	1	-0.733	7	-1.465	8	-1.465	7	-3060.703	6	-0.209	6	0.001	0.027	0.054		1.465	
647	M78	24in Dia. CS Duct	Sec 4 - max	0.462	2	1.893	8	0.082	4	0.080	1	1.294	2	0.127	4	0.127	5	548.338	9	0.038	9	0.028	0.048	0.005		1.294	
653	M79	24in Dia. CS Duct	Sec 2 - max	0.295	2	2.023	8	0.088	4	1.448	3	-0.058	1	0.223	4	0.223	5	784.068	5	0.054	5	0.017	0.054	0.009		1.448	
491	M63	24in Dia. CS Duct	Sec 1 - max	0.025	7	-0.099	4	0.056	8	0.645	6	-0.415	1	1.415	9	1.415	6	3060.703	7	0.209	7	0.002	0.024	0.052		1.415	
492	M63	24in Dia. CS Duct	Sec 1 - min	-0.025	8	-0.099	2	-0.056	9	0.415	1	-0.645	6	-1.415	6	-1.415	9	1769.815	1	0.121	1	0.002	0.024	0.052		1.415	
521	M66	24in Dia. CS Duct	Sec 1 - max	0.025	5	-0.099	6	0.056	6	0.645	7	-0.415	1	1.415	7	1.415	8	-1769.815	1	-0.121	1	0.002	0.024	0.052		1.415	
522	M66	24in Dia. CS Duct	Sec 1 - min	-0.025	9	-0.099	2	-0.056	7	0.415	1	-0.645	7	-1.415	8	-1.415	7	-3060.703	6	-0.209	6	0.002	0.024	0.052		1.415	
34	M5	24in Dia. CS Duct	Sec 2 - min	0.077	1	-0.081	6	-0.006	4	-0.061	1	-1.590	6	-0.390	6	-0.390	9	-2141.320	4	-0.146	4	0.004	0.059	0.014		1.590	
489	M62	24in Dia. CS Duct	Sec 6 - max	0.016	7	-0.058	1	0.033	6	0.645	6	-0.415	1	1.415	9	1.415	6	3060.703	7	0.209	7	0.001	0.024	0.052		1.415	
490	M62	24in Dia. CS Duct	Sec 6 - min	-0.016	8	-0.058	1	-0.033	9	0.415	1	-0.645	6	-1.415	6	-1.415	9	1769.815	1	0.121	1	0.001	0.024	0.052		1.415	
518	M65	24in Dia. CS Duct	Sec 5 - max	0.016	6	-0.058	1	0.033	8	0.645	7	-0.415	1	1.415	7	1.415	8	-1769.815	1	-0.121	1	0.001	0.024	0.052		1.415	
520	M65	24in Dia. CS Duct	Sec 5 - min	-0.016	9	-0.058	1	-0.033	7	0.415	1	-0.645	7	-1.415	8	-1.415	7	-3060.703	6	-0.209	6	0.001	0.024	0.052		1.415	
493	M63	24in Dia. CS Duct	Sec 2 - max	0.029	7	-0.103	4	0.058	6	0.590	6	-0.361	1	1.384	9	1.384	6	3060.703	7	0.209	7	0.002	0.022	0.051		1.384	
494	M63	24in Dia. CS Duct	Sec 2 - min	-0.029	8	-0.103	2	-0.058	9	0.361	1	-0.590	6	-1.384	6	-1.384	9	1769.815	1	0.121	1	0.002	0.022	0.051		1.384	
523	M66	24in Dia. CS Duct	Sec 2 - max	0.029	6	-0.103	6	0.058	6	0.590	7	-0.361	1	1.384	7	1.384	8	-1769.815	1	-0.121	1	0.002	0.022	0.051		1.384	
524	M66	24in Dia. CS Duct	Sec 2 - min	-0.029	9	-0.103	2	-0.058	7	0.361	1	-0.590	7	-1.384	8	-1.384	7	-3060.703	6	-0.209	6	0.002	0.022	0.051		1.384	
495	M63	24in Dia. CS Duct	Sec 3 - max	0.031	7	-0.108	4	0.061	6	0.533	6	-0.303	1	1.358	9	1.358	6	3060.703	7	0.209	7	0.002	0.020	0.050		1.358	
496	M63	24in Dia. CS Duct	Sec 3 - min	-0.031	8	-0.108	2	-0.061	9	0.303	1	-0.533	6	-1.358	6	-1.358	7	1769.815	1	0.121	1	0.002	0.020	0.050		1.358	

D-2250

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_a	f_b/σ_a	f_s/σ_a		f_c (ksi)	
525	M66	24in Dia. CS Duct	Sec 3 - max	0.031	6	-0.108	6	0.061	6	0.533	7	-0.303	1	1.358	9	1.358	6	-1769.815	1	-0.121	1	0.002	0.020	0.050		1.358	
526	M66	24in Dia. CS Duct	Sec 3 - min	-0.031	9	-0.108	2	-0.061	7	0.303	1	-0.533	7	-1.358	6	-1.358	9	-3060.703	6	-0.209	6	0.002	0.020	0.050		1.358	
169	M18	16in Dia. Duct	Sec 5 - max	0.091	7	-0.093	1	0.052	2	-0.505	1	1.256	9	0.192	2	0.194	3	741.516	2	0.147	2	0.007	0.056	0.009		1.256	
170	M18	16in Dia. Duct	Sec 5 - min	-0.089	6	-0.147	9	-0.053	3	-1.258	9	0.505	1	-0.194	3	-0.192	2	-567.887	3	-0.132	3	0.005	0.056	0.009		1.258	
509	M64	24in Dia. CS Duct	Sec 5 - max	0.053	7	-0.188	1	0.106	6	-0.219	6	0.448	1	1.358	7	1.358	8	3060.703	7	0.209	7	0.003	0.017	0.050		1.358	
510	M64	24in Dia. CS Duct	Sec 5 - min	-0.053	6	-0.188	4	-0.106	9	-0.448	1	0.219	6	-1.358	8	-1.358	7	1769.815	1	0.121	1	0.003	0.017	0.050		1.358	
539	M67	24in Dia. CS Duct	Sec 5 - max	0.053	8	-0.188	1	0.106	8	-0.219	7	0.448	1	1.358	9	1.358	6	-1769.815	1	-0.121	1	0.003	0.017	0.050		1.358	
540	M67	24in Dia. CS Duct	Sec 5 - min	-0.053	9	-0.188	3	-0.106	7	-0.448	1	0.219	7	+1.358	6	-1.358	9	-3060.703	6	-0.209	6	0.003	0.017	0.050		1.358	
497	M63	24in Dia. CS Duct	Sec 4 - max	0.032	7	-0.112	4	0.064	6	0.473	6	-0.243	1	1.358	7	1.358	6	3060.703	7	0.209	7	0.002	0.016	0.050		1.358	
498	M63	24in Dia. CS Duct	Sec 4 - min	-0.032	9	-0.112	2	-0.064	9	0.243	1	-0.473	6	-1.358	6	-1.358	7	1769.815	1	0.121	1	0.002	0.016	0.050		1.358	
527	M66	24in Dia. CS Duct	Sec 4 - max	0.032	8	-0.112	6	0.064	8	0.473	7	-0.243	1	1.358	9	1.358	6	-1769.815	1	-0.121	1	0.002	0.016	0.050		1.358	
528	M66	24in Dia. CS Duct	Sec 4 - min	-0.032	9	-0.112	2	-0.064	7	0.243	1	-0.473	7	+1.358	6	-1.358	9	-3060.703	6	-0.209	6	0.002	0.016	0.050		1.358	
501	M64	24in Dia. CS Duct	Sec 1 - max	0.045	7	-0.158	1	0.089	6	0.411	6	-0.181	1	1.358	7	1.358	8	3060.703	7	0.209	7	0.003	0.015	0.050		1.358	
502	M64	24in Dia. CS Duct	Sec 1 - min	-0.045	8	-0.158	4	-0.089	9	0.181	1	-0.411	6	-1.358	6	-1.358	7	1769.815	1	0.121	1	0.003	0.015	0.050		1.358	
531	M67	24in Dia. CS Duct	Sec 1 - max	0.045	6	-0.158	1	0.089	8	0.411	7	-0.181	1	1.358	9	1.358	6	-1769.815	1	-0.121	1	0.003	0.015	0.050		1.358	
532	M67	24in Dia. CS Duct	Sec 1 - min	-0.045	9	-0.158	3	-0.089	7	0.181	1	-0.411	7	-1.358	6	-1.358	9	-3060.703	6	-0.209	6	0.003	0.015	0.050		1.358	
499	M63	24in Dia. CS Duct	Sec 5 - max	0.033	7	-0.117	4	0.066	6	0.411	6	-0.181	1	1.358	7	1.358	6	3060.703	7	0.209	7	0.002	0.015	0.050		1.358	
500	M63	24in Dia. CS Duct	Sec 5 - min	-0.033	8	-0.117	2	-0.066	9	0.181	1	-0.411	6	-1.358	8	-1.358	7	1769.815	1	0.121	1	0.002	0.015	0.050		1.358	
529	M65	24in Dia. CS Duct	Sec 5 - max	0.033	6	-0.117	8	0.066	8	0.411	7	-0.181	1	1.358	9	1.358	6	-1769.815	1	-0.121	1	0.002	0.015	0.050		1.358	
530	M65	24in Dia. CS Duct	Sec 5 - min	-0.033	9	-0.117	2	-0.066	7	0.181	1	-0.411	7	-1.358	6	-1.358	9	-3060.703	6	-0.209	6	0.002	0.015	0.050		1.358	
649	M78	24in Dia. CS Duct	Sec 6 - max	0.482	2	1.684	8	0.087	4	0.846	3	-0.084	1	0.215	4	0.215	6	548.338	9	0.038	9	0.028	0.031	0.005		0.646	
507	M64	24in Dia. CS Duct	Sec 4 - max	0.051	7	-0.180	1	0.102	6	-0.051	6	0.261	1	1.358	7	1.358	8	3060.703	7	0.209	7	0.003	0.010	0.050		1.358	
508	M64	24in Dia. CS Duct	Sec 4 - min	-0.051	8	-0.180	4	-0.102	9	-0.261	1	0.051	6	-1.358	8	-1.358	7	1769.815	1	0.121	1	0.003	0.010	0.050		1.358	
537	M67	24in Dia. CS Duct	Sec 4 - max	0.051	6	-0.180	1	0.102	8	-0.051	7	0.261	1	1.358	9	1.358	6	-1769.815	1	-0.121	1	0.003	0.010	0.050		1.358	
538	M67	24in Dia. CS Duct	Sec 4 - min	-0.051	9	-0.180	3	-0.102	7	-0.261	1	0.051	7	-1.358	6	-1.358	9	-3060.703	6	-0.209	6	0.003	0.010	0.050		1.358	
503	M64	24in Dia. CS Duct	Sec 2 - max	0.047	7	-0.165	1	0.093	6	0.264	6	-0.034	1	1.358	7	1.358	8	3060.703	7	0.209	7	0.003	0.010	0.050		1.358	
504	M64	24in Dia. CS Duct	Sec 2 - min	-0.047	8	-0.165	4	-0.093	9	0.034	1	-0.264	6	-1.358	8	-1.358	7	1769.815	1	0.121	1	0.003	0.010	0.050		1.358	
533	M67	24in Dia. CS Duct	Sec 2 - max	0.047	6	-0.165	1	0.093	8	0.264	7	-0.034	1	1.358	9	1.358	6	-1769.815	1	-0.121	1	0.003	0.010	0.050		1.358	
534	M67	24in Dia. CS Duct	Sec 2 - min	-0.047	9	-0.165	3	-0.093	7	0.034	1	-0.264	7	+1.358	6	-1.358	9	-3060.703	6	-0.209	6	0.003	0.010	0.050		1.358	
684	M79	24in Dia. CS Duct	Sec 2 - min	0.000	1	-0.022	1	-0.088	5	0.058	1	-1.446	3	-0.223	5	-0.223	4	-784.066	4	+0.054	4	0.000	0.054	0.008		1.445	
13	M2	24in Dia. CS Duct	Sec 2 - max	0.089	7	0.064	1	0.177	6	-0.343	1	0.608	7	0.985	9	0.985	6	833.704	5	0.067	5	0.005	0.018	0.036		0.985	
14	M2	24in Dia. CS Duct	Sec 2 - min	-0.089	8	-0.020	7	-0.177	9	-0.505	7	0.343	1	-0.985	6	-0.985	9	-833.704	4	-0.057	4	0.005	0.018	0.036		0.985	
505	M64	24in Dia. CS Duct	Sec 3 - max	0.049	7	-0.173	1	0.098	6	0.110	6	0.120	1	1.358	7	1.358	8	3060.703	7	0.209	7	0.003	0.004	0.050		1.358	
506	M64	24in Dia. CS Duct	Sec 3 - min	-0.049	8	-0.173	4	-0.098	9	-0.120	1	-0.110	6	-1.358	8	-1.358	7	1769.815	1	0.121	1	0.003	0.004	0.050		1.358	
535	M67	24in Dia. CS Duct	Sec 3 - max	0.049	6	-0.173	1	0.098	8	0.110	7	0.120	1	1.358	9	1.358	6	-1769.815	1	-0.121	1	0.003	0.004	0.050		1.358	
536	M67	24in Dia. CS Duct	Sec 3 - min	-0.049	9	-0.173	3	-0.098	7	-0.120	1	-0.110	7	-1.358	6	-1.358	9	-3060.703	6	-0.209	6	0.003	0.004	0.050		1.358	
651	M79	24in Dia. CS Duct	Sec 1 - max	0.294	2	2.026	8	0.087	4	0.846	3	-0.004	1	0.197	4	0.197	5	784.066	5	0.054	5	0.017	0.031	0.007		0.846	
648	M78	24in Dia. CS Duct	Sec 4 - min	-0.003	1	-0.011	1	-0.082	5	-1.294	2	-0.080	1	-0.127	5	-0.127	4	-548.338	6	-0.038	6	0.000	0.046	0.005		1.294	
111	M13	16in Dia. Duct	Sec 1 - max	0.079	8	0.085	3	0.070	9	0.657	2	0.549	3	0.067	4	0.277	1	340.435	3	0.067	3	0.006	0.029	0.012		0.657	
112	M13	16in Dia. Duct	Sec 1 - min	0.079	1	-0.085	2	-0.060	8	-0.643	3	-0.657	2	-0.277	1	-0.067	4	-338.027	2	-0.067	2	0.006	0.029	0.012		0.657	
113	M13	16in Dia. Duct	Sec 2 - max	0.080	8	0.087	3	0.071	9	0.625	2	0.511	3	0.054	4	0.275	1	340.435	3	0.067	3	0.006	0.028	0.012		0.625	
114	M13	16in Dia. Duct	Sec 2 - min	0.080	1	-0.087	2	-0.061	8	-0.511	3	-0.625	2	-0.275	1	-0.054	4	-338.027	2	-0.067	2	0.006	0.028	0.012		0.592	
115	M13	16in Dia. Duct	Sec 3 - max	0.081	8	0.088	3	0.072	9	0.592	2	0.479	3	0.041	4	0.273	1	340.435	3	0.067	3	0.006	0.026	0.012		0.592	
116	M13	16in Dia. Duct	Sec 3 - min	0.081	1	-0.088	2	-0.062	8	-0.479	3	-0.592	2	-0.273	1	-0.041	4	-338.027	2	-0.067	2	0.006	0.026	0.012		0.559	
117	M13	16in Dia. Duct	Sec 4 - max	0.082	8	0.090	3	0.073	9	0.559	2	0.446	3	0.027	4	0.271	1	340.435	3	0.067	3	0.006	0.025	0.012		0.559	
118	M13	16in Dia. Duct	Sec 4 - min	0.082	1	-0.090	2	-0.063	8	-0.446	3	-0.559	2	-0.271	1	-0.027	4	-338.027	2	-0.067	2	0.006	0.025	0.012		0.526	
119	M13	16in Dia. Duct	Sec 5 - max	0.083	8	0.091	3	0.073	9	0.526	2	0.412	3	0.012	4	0.270	1	340.435	3	0.067	3	0.006	0.023	0.012		0.526	
120	M13	16in Dia. Duct	Sec 5 - min	0.083	1	-0.091	2	-0.063	8	-0.412	3	-0.526	2	-0.270	1	-0.012	4	-338.027	2	-0.067	2	0.006	0.023	0.012		0.570	
140	M15	16in Dia. Duct	Sec 6 - min	-0.068	6	0.026	4	-0.046	7	-0.256	6	-0.570	9	-0.228	3	-0.249	2	-453.283	3	-0.090	3	0.005	0.025	0.011		0.434	
189	M32	16in Dia. Duct	Sec 5 - max	0.125	7	0.052	7	0.136	2	0.265	9	0.284	6	0.434	2	0.403	3	275.104	3	0.055	3	0.009	0.013	0.019		0.429	
130	M14	16in Dia. Duct	Sec 6 - min	-0.071	6	-0.017	4	-0.051	2	-0.304	6	-0.429	9	-0.340	3	-0.369	2	-134.756	3	-0.027	3	0.005	0.019	0.016		0.556	
136	M15	16in Dia. Duct	Sec 4 - min	-0.068	6	0.029	4	-0.047	2	-0.267	6	-0.536	9	-0.244	3	-0.268	2	-453.283	3	-0.090	3	0.005	0.024	0.012		0.743	
15	M2	24in Dia. CS Duct	Sec 3 - max	0.099	7	0.033	1	0.197	6	0.012	1	0.783	7	0.153	6	0.153	9	833.704	5	0.057	5	0.006	0.029	0.006		0.783	
16	M2	24in Dia. CS Duct	Sec 3 - min	-0.099	8	-0.071	7	-0.197	9	-0.783	7	-0.012	1	-0.153	9	-0.153	6	-833.704	4	-0.057	4	0.006	0.029	0.006		0.549	
91	M11	20in Dia. Duct	Sec 1 - max	0.043	9	0.019	9	0.042	2	0.191	6	0.277	9	0.488	3	0.549	2	743.957	3	0.081	3	0.003	0.012	0.024		0.501	
136	M15	16in Dia. Duct	Sec 3 - min	-0.068	6	0.031	4	-0.046	2	-0.278	6	-0.501	9	-0.260	3	-0.292	2	-453.283	3	-0.090	3	0.005	0.022	0.013		0.388	
128	M14	16in Dia. Duct	Sec 4 - min	-0.072	6	-0.015	6	-0.052	2	-0.298	6	-0.388	9	-0.358	3	-0.387	2	-134.756	3	-0.027	3	0.005	0.017	0.017		0.434	
190	M32	16in Dia. Duct	Sec 6 - min	0.107	6	-0.134	6	-0.136	3	-0.284	6	-0.265	9	-0.403	3	-0.434	2	-278.429	2	-0.055	2	0.008	0.013	0.019		0.846	
650	M78	24in Dia. CS Duct	Sec 6 - min	-0.003	1	-0.020	1	-0.087	5	0.064	1	-0.846	3	-0.215	5	-0.215	4	-548.338	6	-0.038	5	0.000	0.031	0.008		0.549	
92	M11	20in Dia. Duct	Sec 1 - min	0.036	8	-0.043	8	-0.042	3	-0.277	9	-0.191	6	-0.549	2	-0.488	3	-797.525	2	-0.087	2	0.003	0.012	0.024		0.537	
93	M11	20in Dia. Duct	Sec 2 - max	0.044	9	0.019	9	0.043	2	0.178	6	0.271	9	0.475	3	0.537	2	743.957	3	0.081	3	0.003	0.012	0.023		0.466	
134	M15	16in Dia. Duct	Sec 2 - min	-0.069	6	0.033	4	-0.049	2	-0.291	6	-0.465	9	-0.277	3	-0.299	2	-453.283	3	-0.090	3	0.006	0.021	0.013		0.846	
652	M79	24in Dia. CS Duct	Sec 1 - min	0.000	1	-0.020	1	-0.087	5	0.064	1	-0.846	3	-0.197	5	-0.197	4	-784.066	4	-0.054	4	0.000	0.031	0.007		0.570	
138	M15	16in Dia. Duct	Sec 5 - max	0.031	9	0.103	5	0.045	6	0.570	9	0.266	6	0.249	2	0.228	3	506.361	2	0.100	2	0.002	0.026	0.011		0.405	
126	M14	16in Dia. Duct	Sec 3 - min	-0.072	6	-0.014	6	-0.053	2	-0.293	6	-0.348	9	-0.375	3	-0.405	2	-134.756	3	-0.027	3	0.005	0.016	0.018		0.537	
94	M11	20in Dia. Duct	Sec 2 - min	0.037	8	-0.045	8	-0.043	3	-0.271	9	-0.178	6	-0.537	2	-0.475	3	-797.525	2	-0.087	2	0.003	0.012	0.024		0.624	
95	M11	20in Dia. Duct	Sec 3 - max	0.045	9	0.020	9	0.044	2	0.165	6	0.266	9	0.462	3	0.524	2	743.957	3	0.081	3	0.003	0.012	0.023		0.429	
132	M15	16in Dia. Duct	Sec 1 - min	-0.069	6	0.036	4	-0.051	2	-0.304	6	-0.429	9	-0.294	3	-0.316	2	-453.283	3	-0.090	3	0.006	0.019	0.014		0.536	
137	M15	16in Dia. Duct	Sec 4 - max	0.030	9	0.104	5	0.046	3	0.538	9	0.267	6	0.266	2	0.244	3	506.361	2	0.100	2	0.002	0.024	0.012		0.524	
96	M11	20in Dia. Duct	Sec 3 - min	0.038	8	-0.046	8	-0.044	3	-0.266	9	-0.165	6	-0.524	2	-0.462	3	-797.525	2	-0.087	2	0.003	0.012	0.023		0.424	
124	M14	16in Dia. Duct	Sec 2 - min	-0.073	6	-0.012	6	-0.055	2	-0.286	6	-0.307	9	-0.395	3	-0.424	2	-134.756	3	-0.027	3	0.005	0.014	0.019		0.661	
150	M16	16in Dia. Duct	Sec 5 - min	-0.058	4	0.061	9	-0.043	7	-0.150	6	-0.661	9	-0.063	3	-0.094	2	-539.140	3	-0.127	3	0.004	0.029	0.004		0.443	
122	M14	16in Dia. Duct	Sec 1 - min	-0.073	6	-0.010	8	-0.058	2	-0.284	6	-0.285	9	-0.414	3	-0.443	2	-134.756	3	-0.027	3	0.005	0.013	0.020		0.511	
97	M11	20in Dia. Duct	Sec 4 - max	0.046	9	0.020	9	0.045	2	0.151	6	0.260	9	0.449	3	0.511	2	743.957	3	0.081	3	0.003	0.012	0.023		0.387	
187	M32	16in Dia. Duct	Sec 4 - max	0.124	7	0.052	7	0.135	2	0.247	9	0.267	1	0.387	2	0.355	3	275.104	3	0.055	3	0.009	0.011	0.017		0.621	
101	M12	20in Dia. Duct	Sec 1 - max	0.040	2	0.047	3	0.039	7	0.521	2	0.459	3	0.139	6	0.253	9	340.435	3	0.037	3	0.003	0.023	0.011		0.521	
102	M12	20in Dia. Duct	Sec 1 - min	0.043	1	-0.047	2	-0.032	6	-0.459	3	-0.521	2	-0.253	9	-0.136	6	-338.027	2	-0.037	2	0.003	0.023	0.011			

D-2250

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_a	f_{by}/σ_a	f_{bz}/σ_a		f_t (ksi)	
148	M16	16in Dia. Duct	Sec 4 - min	-0.059	8	0.063	8	-0.043	7	-0.175	6	-0.639	9	-0.097	3	-0.188	2	-639.140	3	-0.127	3	0.004	0.026	0.005		0.639	
161	M18	16in Dia. Duct	Sec 1 - max	0.064	7	0.039	1	0.037	3	0.685	9	0.091	6	0.049	9	0.045	6	741.516	2	0.147	2	0.005	0.030	0.002		0.685	
149	M18	16in Dia. Duct	Sec 6 - max	0.050	5	0.094	1	0.042	8	0.661	9	0.150	6	0.094	2	0.083	3	708.830	2	0.140	2	0.004	0.029	0.004		0.661	
162	M18	16in Dia. Duct	Sec 1 - min	-0.052	8	-0.016	9	-0.038	2	-0.091	6	-0.685	9	-0.045	6	-0.049	9	-667.887	3	-0.132	3	0.004	0.030	0.002		0.685	
98	M11	20in Dia. Duct	Sec 4 - min	0.039	8	-0.047	8	-0.045	3	-0.260	9	-0.151	6	-0.511	2	-0.449	3	-797.525	2	-0.087	2	0.003	0.012	0.023		0.511	
146	M16	16in Dia. Duct	Sec 3 - min	-0.057	6	0.068	9	-0.044	7	-0.201	6	-0.617	9	-0.112	3	-0.123	2	-639.140	3	-0.127	3	0.004	0.027	0.005		0.617	
135	M15	16in Dia. Duct	Sec 3 - max	0.029	9	0.105	5	0.047	3	0.501	9	0.278	8	0.282	2	0.260	3	506.361	2	0.100	2	0.002	0.022	0.013		0.501	
147	M16	16in Dia. Duct	Sec 4 - max	0.049	9	0.096	1	0.043	8	0.630	9	0.175	6	0.108	2	0.097	3	708.830	2	0.140	2	0.004	0.029	0.005		0.639	
99	M11	20in Dia. Duct	Sec 5 - max	0.047	9	0.021	9	0.047	2	0.136	6	0.253	9	0.436	3	0.497	2	743.957	3	0.081	3	0.003	0.011	0.022		0.497	
144	M16	16in Dia. Duct	Sec 2 - min	-0.057	6	0.056	8	-0.045	7	-0.226	6	-0.594	9	-0.127	3	-0.136	2	-639.140	3	-0.127	3	0.004	0.026	0.005		0.594	
159	M17	16in Dia. Duct	Sec 5 - max	0.054	7	0.091	1	0.041	8	0.685	9	0.091	6	0.049	9	0.045	6	741.516	2	0.147	2	0.004	0.030	0.002		0.685	
150	M17	16in Dia. Duct	Sec 5 - min	-0.052	6	0.037	9	-0.041	7	-0.091	6	-0.685	9	-0.045	6	-0.049	9	-667.887	3	-0.132	3	0.004	0.030	0.002		0.685	
145	M16	16in Dia. Duct	Sec 3 - max	0.048	9	0.098	1	0.043	8	0.617	9	0.201	8	0.123	2	0.112	3	708.830	2	0.140	2	0.003	0.027	0.005		0.617	
142	M16	16in Dia. Duct	Sec 1 - min	-0.057	6	0.068	9	-0.046	7	-0.258	6	-0.570	9	-0.142	3	-0.184	2	-639.140	3	-0.127	3	0.004	0.025	0.007		0.570	
81	M10	20in Dia. Duct	Sec 1 - max	0.038	7	-0.013	9	0.037	2	0.267	6	0.251	9	0.435	3	0.489	2	1542.956	3	0.168	3	0.003	0.012	0.022		0.489	
185	M32	16in Dia. Duct	Sec 4 - min	0.106	6	-0.133	6	-0.135	3	-0.257	1	-0.247	8	-0.355	3	-0.357	2	-278.429	2	-0.055	2	0.008	0.011	0.017		0.357	
100	M11	20in Dia. Duct	Sec 5 - min	0.040	8	-0.049	8	-0.047	3	-0.253	9	-0.136	6	-0.497	2	-0.435	3	-797.525	2	-0.087	2	0.003	0.011	0.022		0.497	
143	M16	16in Dia. Duct	Sec 2 - max	0.048	9	0.100	1	0.044	8	0.604	9	0.228	6	0.138	2	0.127	3	708.830	2	0.140	2	0.003	0.026	0.006		0.594	
133	M15	16in Dia. Duct	Sec 2 - max	0.028	9	0.106	5	0.049	3	0.465	9	0.281	8	0.299	2	0.277	3	506.361	2	0.100	2	0.002	0.021	0.013		0.465	
157	M17	16in Dia. Duct	Sec 4 - max	0.054	5	0.092	1	0.041	8	0.679	9	0.106	6	0.043	9	0.038	6	741.516	2	0.147	2	0.004	0.030	0.002		0.679	
129	M14	16in Dia. Duct	Sec 6 - max	0.005	9	0.117	5	0.050	3	0.429	9	0.304	6	0.369	2	0.340	3	162.198	2	0.032	2	0.000	0.019	0.016		0.429	
158	M17	16in Dia. Duct	Sec 4 - min	-0.052	4	0.038	9	-0.042	7	-0.106	6	-0.679	9	-0.038	6	-0.043	9	-667.887	3	-0.132	3	0.004	0.030	0.002		0.679	
83	M10	20in Dia. Duct	Sec 2 - max	0.039	7	-0.013	9	0.038	2	0.249	6	0.265	9	0.424	3	0.477	2	1542.956	3	0.168	3	0.003	0.012	0.021		0.477	
141	M16	16in Dia. Duct	Sec 1 - max	0.047	9	0.101	1	0.046	8	0.570	9	0.256	6	0.164	2	0.142	3	708.830	2	0.140	2	0.003	0.025	0.007		0.570	
95	M10	20in Dia. Duct	Sec 3 - max	0.041	7	-0.014	9	0.039	2	0.230	6	0.269	9	0.413	3	0.465	2	1542.956	3	0.168	3	0.003	0.012	0.021		0.465	
155	M17	16in Dia. Duct	Sec 3 - max	0.054	5	0.093	1	0.041	8	0.673	9	0.120	6	0.037	9	0.032	6	741.516	2	0.147	2	0.004	0.030	0.002		0.673	
156	M17	16in Dia. Duct	Sec 3 - min	-0.052	4	0.039	9	-0.042	7	-0.120	6	-0.673	9	-0.032	6	-0.037	9	-667.887	3	-0.132	3	0.004	0.030	0.002		0.673	
87	M10	20in Dia. Duct	Sec 4 - max	0.042	7	-0.014	9	0.041	2	0.211	6	0.273	9	0.401	3	0.453	2	1542.956	3	0.168	3	0.003	0.012	0.020		0.453	
171	M31	16in Dia. Duct	Sec 1 - max	0.101	6	0.115	3	0.087	9	0.306	2	0.336	3	0.292	4	0.241	5	378.380	3	0.078	3	0.007	0.016	0.013		0.336	
172	M31	16in Dia. Duct	Sec 1 - min	0.101	1	-0.115	2	-0.078	8	-0.336	3	-0.306	2	-0.241	5	-0.292	4	-395.194	2	-0.078	2	0.007	0.015	0.013		0.488	
82	M10	20in Dia. Duct	Sec 1 - min	0.022	8	-0.060	6	-0.037	3	-0.251	9	-0.267	6	-0.488	2	-0.435	3	-1700.239	2	-0.185	2	0.002	0.012	0.022		0.429	
131	M15	16in Dia. Duct	Sec 1 - max	0.027	8	0.107	5	0.050	3	0.429	9	0.304	6	0.316	2	0.294	3	506.361	2	0.100	2	0.002	0.019	0.014		0.441	
89	M10	20in Dia. Duct	Sec 5 - max	0.043	7	-0.016	9	0.042	2	0.191	6	0.277	9	0.380	3	0.441	2	1542.956	3	0.168	3	0.003	0.012	0.020		0.441	
151	M17	16in Dia. Duct	Sec 1 - max	0.054	5	0.095	1	0.042	8	0.661	9	0.150	6	0.037	2	0.032	3	741.516	2	0.147	2	0.004	0.029	0.002		0.661	
153	M17	16in Dia. Duct	Sec 2 - max	0.054	5	0.094	1	0.042	8	0.667	9	0.135	6	0.031	2	0.026	3	741.516	2	0.147	2	0.004	0.030	0.001		0.667	
152	M17	16in Dia. Duct	Sec 1 - min	-0.052	4	0.041	9	-0.043	7	-0.150	6	-0.661	9	-0.032	3	-0.037	2	-667.887	3	-0.132	3	0.004	0.030	0.001		0.667	
154	M17	16in Dia. Duct	Sec 2 - min	-0.052	4	0.040	9	-0.042	7	-0.135	6	-0.667	9	-0.026	3	-0.031	2	-667.887	3	-0.132	3	0.004	0.030	0.001		0.388	
127	M14	16in Dia. Duct	Sec 4 - max	0.004	9	0.117	7	0.051	3	0.388	9	0.298	6	0.387	2	0.358	3	162.198	2	0.032	2	0.000	0.017	0.017		0.388	
103	M12	20in Dia. Duct	Sec 2 - max	0.046	2	0.050	3	0.041	7	0.485	2	0.422	3	0.111	6	0.223	9	340.435	3	0.037	3	0.003	0.022	0.010		0.485	
104	M12	20in Dia. Duct	Sec 2 - min	0.046	1	-0.050	2	-0.034	8	-0.422	3	-0.485	2	-0.223	9	-0.111	6	-336.027	2	-0.037	2	0.003	0.022	0.010		0.340	
185	M32	16in Dia. Duct	Sec 3 - max	0.123	7	0.051	7	0.134	2	0.229	9	0.243	1	0.340	2	0.309	3	275.104	3	0.055	3	0.009	0.011	0.015		0.477	
84	M10	20in Dia. Duct	Sec 2 - min	0.023	8	-0.062	6	-0.038	3	-0.265	9	-0.249	8	-0.477	2	-0.424	3	-1700.239	2	-0.185	2	0.002	0.012	0.021		0.466	
86	M10	20in Dia. Duct	Sec 3 - min	0.024	8	-0.064	6	-0.039	3	-0.269	9	-0.230	6	-0.465	2	-0.413	3	-1700.239	2	-0.185	2	0.002	0.012	0.020		0.453	
88	M10	20in Dia. Duct	Sec 4 - min	0.025	8	-0.066	6	-0.041	3	-0.273	9	-0.211	6	-0.453	2	-0.401	3	-1700.239	2	-0.185	2	0.002	0.012	0.020		0.405	
126	M14	16in Dia. Duct	Sec 3 - max	0.003	9	0.116	7	0.053	3	0.348	9	0.293	6	0.405	2	0.376	3	162.198	2	0.032	2	0.000	0.015	0.018		0.441	
90	M10	20in Dia. Duct	Sec 5 - min	0.025	8	-0.068	6	-0.042	3	-0.277	9	-0.191	6	-0.441	2	-0.389	3	-1700.239	2	-0.185	2	0.002	0.012	0.020		0.486	
163	M18	16in Dia. Duct	Sec 2 - max	0.071	7	0.006	1	0.015	3	0.496	9	-0.034	6	0.147	3	0.147	2	741.516	2	0.147	2	0.005	0.022	0.007		0.496	
164	M18	16in Dia. Duct	Sec 2 - min	-0.069	8	-0.049	9	-0.015	2	0.034	6	-0.496	9	-0.147	2	-0.147	3	-667.887	3	-0.132	3	0.005	0.022	0.007		0.340	
186	M32	16in Dia. Duct	Sec 3 - min	0.105	6	-0.132	6	-0.134	3	-0.243	1	-0.229	9	-0.309	3	-0.340	2	-278.429	2	-0.055	2	0.008	0.011	0.015		0.350	
71	M9	20in Dia. Duct	Sec 1 - max	0.029	7	-0.036	7	0.032	2	0.347	6	0.215	9	0.315	3	0.350	2	2189.074	3	0.239	3	0.002	0.015	0.016		0.424	
123	M14	16in Dia. Duct	Sec 2 - max	0.002	9	0.118	7	0.054	3	0.307	9	0.268	6	0.424	2	0.395	3	162.198	2	0.032	2	0.000	0.014	0.019		0.443	
121	M14	16in Dia. Duct	Sec 1 - max	0.001	9	0.116	7	0.055	3	0.285	9	0.284	6	0.443	2	0.414	3	162.198	2	0.032	2	0.000	0.013	0.020		0.294	
163	M32	16in Dia. Duct	Sec 2 - max	0.122	7	0.051	7	0.132	2	0.212	9	0.229	1	0.294	2	0.262	3	275.104	3	0.055	3	0.009	0.010	0.013		0.595	
41	M6	20in Dia. Duct	Sec 1 - max	0.000	1	0.000	1	0.000	1	0.595	6	-0.022	9	0.124	3	0.124	2	2852.532	3	0.289	3	0.000	0.026	0.006		0.595	
42	M6	20in Dia. Duct	Sec 1 - min	0.000	1	0.000	1	0.000	1	0.022	9	-0.595	6	-0.124	2	-0.124	3	-2939.238	2	-0.320	2	0.000	0.026	0.006		0.595	
43	M6	20in Dia. Duct	Sec 2 - max	0.000	7	-0.002	1	0.001	2	0.595	6	-0.022	9	0.124	3	0.124	2	2852.532	3	0.289	3	0.000	0.026	0.006		0.595	
44	M6	20in Dia. Duct	Sec 2 - min	0.000	6	-0.002	1	-0.001	3	0.022	9	-0.595	6	-0.124	2	-0.124	3	-2939.238	2	-0.320	2	0.000	0.026	0.006		0.594	
45	M6	20in Dia. Duct	Sec 3 - max	0.000	7	-0.004	1	0.002	2	0.594	6	-0.021	9	0.123	3	0.124	2	2852.532	3	0.289	3	0.000	0.026	0.006		0.594	
46	M6	20in Dia. Duct	Sec 3 - min	0.000	6	-0.004	1	-0.002	3	0.021	9	-0.594	6	-0.124	2	-0.123	3	-2939.238	2	-0.320	2	0.000	0.026	0.006		0.582	
47	M6	20in Dia. Duct	Sec 4 - max	0.001	7	-0.006	1	0.003	2	0.592	6	-0.019	9	0.122	3	0.123	2	2852.532	3	0.289	3	0.000	0.026	0.005		0.582	
48	M6	20in Dia. Duct	Sec 4 - min	-0.001	6	-0.006	1	-0.003	3	0.019	9	-0.592	6	-0.123	2	-0.122	3	-2939.238	2	-0.320	2	0.000	0.026	0.005		0.340	
73	M9	20in Dia. Duct	Sec 2 - max	0.030	7	-0.037	7	0.033	2	0.328	6	0.226	9	0.305	3	0.340	2	2189.074	3	0.239	3	0.002	0.015	0.015		0.590	
49	M6	20in Dia. Duct	Sec 5 - max	0.002	7	-0.009	1	0.005	2	0.590	6	-0.017	9	0.121	3	0.122	2	2852.532	3	0.289	3	0.000	0.026	0.005		0.590	
50	M6	20in Dia. Duct	Sec 5 - min	-0.002	6	-0.009	1	-0.005	3	0.017	9	-0.590	6	-0.122	2	-0.121	3	-2939.238	2	-0.320	2	0.000	0.026	0.005		0.590	
51	M7	20in Dia. Duct	Sec 1 - max	0.002	7	-0.009	7	0.005	2	0.590	6	-0.017	9	0.121	3	0.122	2	2852.532	3	0.289	3	0.000	0.026	0.005		0.446	
52	M7	20in Dia. Duct	Sec 1 - min	-0.002	6	-0.009	8	-0.005	3	0.017	9	-0.590	6	-0.122	2	-0.121	3	-2939.238	2	-0.320	2	0.000	0.026	0.005		0.446	
105	M12	20in Dia. Duct	Sec 3 - max	0.049	2	0.053	3	0.044	7	0.446	2	0.384	3	0.084	6	0.191	9	340.435	3	0.037	3	0.003	0.020	0.008		0.446	
106	M12	20in Dia. Duct	Sec 3 - min	0.049	1	-0.053	2	-0.037	6	-0.384	3	-0.446	2	-0.191	9	-0.084	6	-336.027	2	-0.037	2	0.003	0.020	0.008		0.350	
72	M9	20in Dia. Duct	Sec 1 - min	0.008	8	-0.063	6	-0.032	3	-0.215	9	-0.347	6	-0.350	2	-0.315	3	-2426.123	2	-0.264	2	0.001	0.015	0.016		0.401	
301	M44	14in Dia. Duct	Sec 1 - max	0.037	4	0.081	5	0.047	3	0.098	4	0.401	5	0.243	2	0.243	3	342.156	3	0.089	3	0.003	0.010	0.011		0.294	
184	M32	16in Dia. Duct	Sec 2 - min	0.104	6	-0.131	6	-0.132	3	-0.229	1	-0.212	9	-0.262	3	-0.294	2	-278.429	2	-0.055	2	0.007	0.010	0.013		0.330	
75	M9	20in Dia. Duct	Sec 3 - max	0.031	7	-0.038	7	0.035	2	0.309	6	0.237	9	0.295	3	0.330	2	2189.074	3	0.239	3	0.002	0.014	0.015		0.570	
63	M7	20in Dia. Duct	Sec 2 - max	0.004	7	-0.020	7	0.010	2	0.570	6	0.003	9	0.111	3	0.111	2	2852.532	3	0.289	3	0.000	0.025	0.005		0.570	
64	M7	20in Dia. Duct	Sec 2 - min	-0.004	6	-0.020	8	-0.010	3	-0.003	9	-0.570	6	-0.111	2	-0.111	3	-2939.238	2	-0.320	2	0.000	0.025	0.005		0.340	
74	M9	20in Dia. Duct	Sec 2 - min	0.009	8	-0.065	6	-0.033	3	-0.226	9	-0.328	6	-0.340	2	-0.305	3	-2426.123	2	-0.264	2	0.001	0.015	0.015		0.348	
192	M33	14in Dia. Duct	Sec 1 - min	-0.024	2	0.000	2	-0.028	4	-0.289	2	-0.099	3	-0.122	7	-0.346	8	-56.065	9	-0.015	9	0.002	0.013	0.015		0.476	
187	M18	16in Dia. Duct	Sec 4 - max	0.064	7	-0.050	1	0.030	2	-0.046	1	0.476	9	0.054	3	0.062	2	741.516	2	0.147	2	0.006	0.021	0.003			

D-2250

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_a	f_{sy}/σ_a	f_{sz}/σ_a		f_c (ksi)	
165	M19	16in Dia. Duct	Sec 4 - min	-0.082	6	-0.114	9	-0.030	3	-0.476	9	0.046	1	-0.062	2	-0.054	3	-567.887	3	-0.132	3	0.008	0.021	0.003		0.476	
303	M44	14in Dia. Duct	Sec 2 - max	0.036	4	0.079	8	0.046	3	0.108	4	0.377	5	0.229	2	0.229	3	342.156	3	0.089	3	0.003	0.017	0.010		0.377	
77	M9	20in Dia. Duct	Sec 4 - max	0.032	7	-0.040	7	0.036	2	0.288	6	0.249	9	0.264	3	0.319	2	2169.074	3	0.239	3	0.002	0.013	0.014		0.319	
161	M32	16in Dia. Duct	Sec 1 - max	0.121	7	0.051	7	0.131	2	0.194	9	0.215	1	0.248	2	0.248	3	275.104	3	0.055	3	0.009	0.010	0.011		0.330	
76	M9	20in Dia. Duct	Sec 3 - min	0.009	8	-0.068	8	-0.035	3	-0.237	9	-0.309	6	-0.300	2	-0.295	3	-2426.123	2	-0.264	2	0.001	0.014	0.015		0.346	
191	M33	14in Dia. Duct	Sec 1 - max	-0.009	3	0.045	3	0.028	6	0.099	3	0.269	2	0.346	8	0.122	7	369.464	6	0.096	6	0.001	0.013	0.015		0.491	
302	M44	14in Dia. Duct	Sec 1 - min	0.000	5	0.033	4	-0.047	2	-0.401	5	-0.008	4	-0.243	3	-0.243	2	-342.156	2	-0.089	2	0.000	0.018	0.011		0.405	
107	M12	20in Dia. Duct	Sec 4 - max	0.051	2	0.056	3	0.046	7	0.405	2	0.343	3	0.056	6	0.157	9	340.435	3	0.037	3	0.004	0.018	0.007		0.405	
108	M12	20in Dia. Duct	Sec 4 - min	0.051	1	-0.056	2	-0.039	6	-0.343	3	-0.405	2	-0.157	9	-0.056	6	-338.027	2	-0.037	2	0.004	0.018	0.007		0.535	
55	M7	20in Dia. Duct	Sec 3 - max	0.006	7	-0.030	7	0.016	2	0.535	6	0.008	9	0.092	3	0.080	2	2652.532	3	0.289	3	0.000	0.024	0.004		0.535	
56	M7	20in Dia. Duct	Sec 3 - min	-0.006	6	-0.039	8	-0.016	3	-0.036	9	-0.535	6	-0.093	2	-0.092	3	-2939.238	2	-0.320	2	0.000	0.024	0.004		0.317	
194	M33	14in Dia. Duct	Sec 2 - min	-0.018	2	0.000	2	-0.021	4	-0.290	2	-0.180	3	-0.092	7	-0.317	8	-56.085	9	-0.016	9	0.001	0.013	0.014		0.248	
192	M32	16in Dia. Duct	Sec 1 - min	0.100	6	-0.139	8	-0.131	3	-0.215	1	-0.194	9	-0.216	3	-0.248	2	-276.429	2	-0.055	2	0.007	0.010	0.011		0.309	
79	M9	20in Dia. Duct	Sec 5 - max	0.033	7	-0.041	7	0.037	2	0.267	6	0.261	9	0.270	3	0.309	2	2169.074	3	0.239	3	0.002	0.012	0.014		0.401	
300	M43	14in Dia. Duct	Sec 5 - min	-0.043	6	-0.096	7	-0.032	3	-0.401	5	-0.088	4	-0.157	3	-0.157	2	-495.111	2	-0.129	2	0.003	0.018	0.007		0.320	
209	M34	14in Dia. Duct	Sec 5 - max	0.004	2	0.000	2	0.005	4	0.219	3	0.320	2	0.301	8	0.095	7	420.267	8	0.109	8	0.000	0.014	0.013		0.320	
207	M34	14in Dia. Duct	Sec 4 - max	0.003	2	0.000	2	0.003	4	0.221	3	0.320	2	0.301	8	0.094	7	420.267	8	0.109	8	0.000	0.014	0.013		0.353	
305	M44	14in Dia. Duct	Sec 3 - max	0.035	4	0.077	5	0.045	3	0.117	4	0.353	5	0.216	2	0.216	3	342.156	3	0.089	3	0.003	0.016	0.010		0.320	
210	M34	14in Dia. Duct	Sec 5 - min	0.002	3	-0.008	3	-0.005	5	-0.320	2	-0.219	3	-0.095	7	-0.301	8	-113.722	7	-0.030	7	0.000	0.014	0.013		0.320	
209	M34	14in Dia. Duct	Sec 4 - min	0.001	3	-0.006	3	-0.003	5	-0.320	2	-0.221	3	-0.094	7	-0.301	8	-113.722	7	-0.030	7	0.000	0.014	0.013		0.319	
205	M34	14in Dia. Duct	Sec 3 - max	0.002	2	0.000	2	0.002	4	0.223	3	0.319	2	0.300	8	0.094	7	420.267	8	0.109	8	0.000	0.014	0.013		0.319	
78	M9	20in Dia. Duct	Sec 4 - min	0.009	8	-0.070	8	-0.035	3	-0.249	9	-0.258	6	-0.319	2	-0.284	3	-2426.123	2	-0.264	2	0.001	0.013	0.014		0.319	
203	M34	14in Dia. Duct	Sec 2 - max	0.001	2	0.000	2	0.001	4	0.224	3	0.319	2	0.300	8	0.093	7	420.267	8	0.109	8	0.000	0.014	0.013		0.319	
201	M34	14in Dia. Duct	Sec 1 - max	0.000	1	0.000	1	0.000	1	0.225	3	0.319	2	0.300	8	0.093	7	420.267	8	0.109	8	0.000	0.014	0.013		0.319	
202	M34	14in Dia. Duct	Sec 1 - min	0.000	1	0.000	1	0.000	1	-0.319	2	-0.225	3	-0.093	7	-0.300	8	-113.722	7	-0.030	7	0.000	0.014	0.013		0.319	
204	M34	14in Dia. Duct	Sec 2 - min	0.000	3	-0.002	3	-0.001	5	-0.319	2	-0.224	3	-0.093	7	-0.300	8	-113.722	7	-0.030	7	0.000	0.014	0.013		0.319	
206	M34	14in Dia. Duct	Sec 3 - min	0.000	3	-0.004	3	-0.002	5	-0.319	2	-0.223	3	-0.094	7	-0.300	8	-113.722	7	-0.030	7	0.000	0.014	0.013		0.317	
193	M33	14in Dia. Duct	Sec 2 - max	-0.007	3	0.034	3	0.021	5	0.163	3	0.290	2	0.317	8	0.092	7	369.464	6	0.096	6	0.001	0.013	0.014		0.222	
179	M31	16in Dia. Duct	Sec 6 - max	0.112	6	0.131	3	0.097	9	0.191	3	0.222	2	0.194	9	0.216	1	376.360	3	0.075	3	0.008	0.010	0.010		0.222	
180	M31	16in Dia. Duct	Sec 5 - min	0.112	1	-0.131	2	-0.087	8	-0.222	2	-0.191	3	-0.215	1	-0.194	9	-395.194	2	-0.078	2	0.008	0.010	0.010		0.377	
219	M35	14in Dia. Duct	Sec 5 - max	0.008	7	-0.005	7	0.008	6	0.134	9	0.377	6	0.227	8	0.116	7	470.213	8	0.122	8	0.001	0.017	0.010		0.373	
217	M35	14in Dia. Duct	Sec 4 - max	0.007	7	-0.004	7	0.007	6	0.138	9	0.373	6	0.227	8	0.116	7	470.213	8	0.122	8	0.001	0.017	0.010		0.308	
311	M45	14in Dia. Duct	Sec 1 - max	0.037	4	0.067	5	0.043	3	0.136	4	0.308	5	0.243	2	0.243	3	176.771	3	0.046	3	0.003	0.014	0.011		0.231	
173	M31	16in Dia. Duct	Sec 2 - max	0.104	5	0.119	3	0.090	9	0.180	2	0.211	3	0.222	4	0.231	1	376.360	3	0.075	3	0.007	0.009	0.010		0.231	
174	M31	16in Dia. Duct	Sec 2 - min	0.104	1	-0.119	2	-0.080	8	-0.211	3	-0.180	2	-0.231	1	-0.222	4	-395.194	2	-0.078	2	0.007	0.009	0.010		0.401	
299	M43	14in Dia. Duct	Sec 5 - max	0.031	9	-0.019	8	0.033	2	0.088	4	0.401	5	0.157	2	0.157	3	495.111	3	0.129	3	0.002	0.018	0.007		0.370	
216	M35	14in Dia. Duct	Sec 3 - max	0.006	7	-0.004	7	0.006	6	0.141	9	0.370	6	0.226	8	0.116	7	470.213	8	0.122	8	0.000	0.016	0.010		0.377	
220	M35	14in Dia. Duct	Sec 5 - min	0.002	8	-0.016	8	-0.006	9	-0.377	6	-0.134	9	-0.115	7	-0.227	8	-215.224	7	-0.056	7	0.000	0.017	0.010		0.377	
304	M44	14in Dia. Duct	Sec 2 - min	0.000	5	0.032	4	-0.046	2	-0.377	5	-0.108	4	-0.229	3	-0.229	2	-342.156	2	-0.089	2	0.000	0.017	0.010		0.295	
196	M33	14in Dia. Duct	Sec 3 - min	-0.012	2	0.000	2	-0.014	4	-0.290	2	-0.243	3	-0.071	7	-0.295	8	-56.085	9	-0.015	9	0.001	0.013	0.013		0.373	
218	M35	14in Dia. Duct	Sec 4 - min	0.002	8	-0.014	8	-0.007	9	-0.373	6	-0.138	9	-0.115	7	-0.227	8	-215.224	7	-0.056	7	0.000	0.017	0.010		0.367	
213	M35	14in Dia. Duct	Sec 2 - max	0.005	7	-0.003	7	0.005	6	0.143	9	0.367	6	0.226	8	0.116	7	470.213	8	0.122	8	0.000	0.016	0.010		0.370	
219	M35	14in Dia. Duct	Sec 3 - min	0.002	8	-0.012	8	-0.006	9	-0.370	6	-0.141	9	-0.116	7	-0.226	8	-215.224	7	-0.056	7	0.000	0.016	0.010		0.419	
61	M8	20in Dia. Duct	Sec 1 - max	0.017	9	-0.047	7	0.027	2	0.419	6	0.155	9	0.143	3	0.156	2	2574.005	3	0.261	3	0.001	0.019	0.007		0.362	
109	M12	20in Dia. Duct	Sec 5 - max	0.054	2	0.059	3	0.049	7	0.362	2	0.290	3	0.037	4	0.153	1	340.435	3	0.037	3	0.004	0.016	0.007		0.362	
110	M12	20in Dia. Duct	Sec 5 - min	0.054	1	-0.059	2	-0.041	6	-0.299	3	-0.362	2	-0.153	1	-0.037	4	-338.027	2	-0.037	2	0.004	0.016	0.007		0.366	
211	M35	14in Dia. Duct	Sec 1 - max	0.004	7	-0.002	7	0.004	6	0.145	9	0.369	6	0.228	8	0.116	7	470.213	8	0.122	8	0.000	0.016	0.010		0.397	
214	M35	14in Dia. Duct	Sec 2 - min	0.001	8	-0.010	8	-0.005	9	-0.367	6	-0.143	9	-0.116	7	-0.226	8	-215.224	7	-0.056	7	0.000	0.016	0.010		0.366	
212	M35	14in Dia. Duct	Sec 1 - min	0.001	8	-0.008	8	-0.004	9	-0.365	6	-0.145	9	-0.116	2	-0.228	3	-215.224	7	-0.056	7	0.000	0.016	0.010		0.296	
195	M33	14in Dia. Duct	Sec 3 - max	-0.005	3	0.029	3	0.014	5	0.243	3	0.290	2	0.295	9	0.071	7	369.464	6	0.096	6	0.000	0.013	0.013		0.309	
80	M9	20in Dia. Duct	Sec 5 - min	0.009	8	-0.072	8	-0.037	3	-0.261	9	-0.267	6	-0.309	2	-0.273	3	-2426.123	2	-0.264	2	0.001	0.012	0.014		0.378	
298	M43	14in Dia. Duct	Sec 4 - min	-0.042	6	-0.095	7	-0.031	3	-0.378	5	-0.107	4	-0.147	3	-0.147	2	-495.111	2	-0.129	2	0.003	0.017	0.007		0.330	
307	M44	14in Dia. Duct	Sec 4 - max	0.035	4	0.076	5	0.044	3	0.127	4	0.330	5	0.202	2	0.202	3	342.156	3	0.089	3	0.003	0.015	0.009		0.291	
188	M33	14in Dia. Duct	Sec 4 - min	-0.006	2	0.000	2	-0.007	4	-0.281	2	-0.278	3	-0.058	7	-0.283	8	-56.085	9	-0.015	9	0.000	0.013	0.013		0.418	
62	M8	20in Dia. Duct	Sec 1 - min	-0.003	6	-0.055	6	-0.027	3	-0.156	9	-0.418	6	-0.156	2	-0.143	3	-2854.732	2	-0.311	2	0.000	0.019	0.007		0.401	
63	M8	20in Dia. Duct	Sec 2 - max	0.018	9	-0.049	7	0.029	2	0.401	6	0.169	9	0.135	3	0.148	2	2574.005	3	0.261	3	0.001	0.019	0.007		0.261	
197	M33	14in Dia. Duct	Sec 4 - max	-0.002	3	0.011	3	0.007	5	0.278	3	0.201	2	0.283	8	0.058	7	369.464	6	0.096	6	0.000	0.013	0.013		0.309	
312	M45	14in Dia. Duct	Sec 1 - min	0.016	5	0.002	4	-0.043	2	-0.308	5	-0.136	4	-0.243	3	-0.243	2	-176.771	2	-0.046	2	0.001	0.014	0.011		0.287	
313	M45	14in Dia. Duct	Sec 2 - max	0.038	4	0.066	6	0.042	3	0.136	4	0.287	5	0.230	2	0.230	3	176.771	3	0.046	3	0.003	0.013	0.010		0.375	
297	M43	14in Dia. Duct	Sec 4 - max	0.031	9	-0.018	8	0.032	2	0.107	4	0.375	5	0.147	2	0.147	3	495.111	3	0.129	3	0.002	0.017	0.007		0.291	
199	M33	14in Dia. Duct	Sec 5 - max	0.000	1	0.000	1	0.000	1	0.290	3	0.291	2	0.278	8	0.053	7	369.464	6	0.096	6	0.000	0.013	0.012		0.291	
200	M33	14in Dia. Duct	Sec 6 - min	0.000	1	0.000	1	0.000	1	-0.291	2	-0.290	3	-0.053	7	-0.278	8	-56.085	9	-0.015	9	0.000	0.013	0.012		0.363	
306	M44	14in Dia. Duct	Sec 3 - min	0.000	5	0.031	4	-0.045	2	-0.353	5	-0.117	4	-0.216	3	-0.216	2	-342.156	2	-0.089	2	0.000	0.016	0.010		0.413	
229	M36	14in Dia. Duct	Sec 5 - max	0.011	5	-0.013	5	0.014	2	0.080	9	0.413	5	0.135	3	0.106	2	510.983	3	0.133	3	0.001	0.018	0.006		0.464	
57	M7	20in Dia. Duct	Sec 4 - max	0.008	7	-0.041	7	0.022	2	0.464	6	0.089	9	0.066	3	0.066	2	2652.532	3	0.289	3	0.001	0.022	0.003		0.484	
58	M7	20in Dia. Duct	Sec 4 - min	-0.008	6	-0.041	8	-0.022	3	-0.089	9	-0.484	6	-0.066	2	-0.066	3	-2939.238	2	-0.320	2	0.001	0.022	0.003		0.405	
227	M36	14in Dia. Duct	Sec 4 - max	0.010	5	-0.012	5	0.013	2	0.066	9	0.405	5	0.140	3	0.111	2	510.983	3	0.133	3	0.001	0.018	0.006		0.398	
226	M36	14in Dia. Duct	Sec 3 - max	0.009	5	-0.011	5	0.011	2	0.091	8	0.398	5	0.144	3	0.116	2	510.983	3	0.133	3	0.001	0.018	0.006		0.369	
296	M43	14in Dia. Duct	Sec 3 - min	-0.042	6	-0.093	7	-0.030	3	-0.350	5	-0.115	4	-0.138	3	-0.137	2	-495.111	2	-0.129	2	0.003	0.016	0.006		0.401	
64	M8	20in Dia. Duct	Sec 2 - min	-0.004	6	-0.057	6	-0.028	3	-0.169	9	-0.401	6	-0.148	2	-0.135	3	-2854.732	2	-0.311	2	0.000	0.016	0.007		0.392	
223	M36	14in Dia. Duct	Sec 2 - max	0.008	6	-0.009	5	0.010	2	0.096	9	0.392	6	0.148	3	0.120	2	510.983	3	0.133	3	0.001	0.017	0.007		0.308	
309	M44	14in Dia. Duct	Sec 5 - max	0.034	4	0.074	5	0.043	3	0.136	4	0.308	5	0.189	2	0.189	3	342.156	3	0.089	3	0.002	0.014	0.008		0.384	
65	M8	20in Dia. Duct	Sec 3 - max	0.016	9	-0.061	7	0.030	2	0.384	6	0.164	9	0.126	3	0.139	2	2574.005	3	0.261	3	0.001	0.017	0.006		0.387	
221	M36	14in Dia. Duct	Sec 1 - max	0.007	5	-0.008	5	0.009	2	0.100	9	0.387	6	0.152	3	0.123	2	510.983	3	0.133	3	0.001	0.017	0.007		0.413	
230	M36	14in Dia. Duct	Sec 5 - min	-0.001	4	-0.025	4	-0.014	3	-0.413	6	-0.080	9	-0.106	2	-0.106	3	-359.432	2	-0.093	2	0.000	0.018	0.006		0.405	
228	M36	14in Dia. Duct	Sec 4 - min	-0.001	4	-0.023	4	-0.013	3	-0.405	6	-0.086	9	-0.111	2	-0.140	3	-359.432	2	-0.093	2	0.000	0.018	0.006		0.269	
315	M45	14in Dia. Duct	Sec 3 - max	0.035	4	0.084	5	0.041	3	0.137	4	0.268	5	0.218	2	0.218	3	176.771	3	0.046	3	0.003	0.012	0.010			

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	τ_y/σ_e	τ_z/σ_e	τ_t/σ_e		f_t (ksi)	
																						D-2250					
226	M38	14in Dia. Duct	Sec 3 - min	0.000	4	-0.021	4	-0.011	3	-0.398	6	-0.091	9	-0.116	2	-0.144	3	-359.432	2	-0.093	2	0.000	0.015	0.006		0.398	
314	M45	14in Dia. Duct	Sec 2 - min	0.015	5	0.002	4	-0.042	2	-0.287	5	-0.126	4	-0.230	3	-0.230	2	-178.771	2	-0.046	2	0.001	0.013	0.010		0.287	
224	M39	14in Dia. Duct	Sec 2 - min	0.000	4	-0.019	4	-0.010	3	-0.392	6	-0.096	9	-0.120	2	-0.148	3	-359.432	2	-0.093	2	0.000	0.017	0.007		0.392	
222	M39	14in Dia. Duct	Sec 1 - min	0.000	4	-0.017	4	-0.009	3	-0.387	6	-0.100	9	-0.123	2	-0.152	3	-359.432	2	-0.093	2	0.000	0.017	0.007		0.387	
295	M43	14in Dia. Duct	Sec 3 - max	0.031	9	-0.017	6	0.031	2	0.115	4	0.360	5	0.137	2	0.138	3	495.111	3	0.129	3	0.002	0.016	0.006		0.350	
306	M44	14in Dia. Duct	Sec 4 - min	0.000	5	0.031	4	-0.044	2	-0.330	5	-0.127	4	-0.202	3	-0.202	2	-342.155	2	-0.089	2	0.000	0.015	0.009		0.330	
68	M8	20in Dia. Duct	Sec 3 - min	-0.004	8	-0.059	6	-0.030	3	-0.184	9	-0.384	8	-0.139	2	-0.126	3	-2854.732	2	-0.311	2	0.000	0.017	0.006		0.384	
67	M8	20in Dia. Duct	Sec 4 - max	0.019	9	-0.053	7	0.031	2	0.366	6	0.199	9	0.117	3	0.130	2	2574.005	3	0.281	3	0.001	0.016	0.008		0.366	
294	M43	14in Dia. Duct	Sec 2 - min	-0.042	8	-0.092	7	-0.029	3	-0.325	5	-0.123	4	-0.129	3	-0.129	2	-495.111	2	-0.129	2?	0.003	0.014	0.006		0.325	
165	M16	16in Dia. Duct	Sec 3 - max	0.077	7	-0.027	1	0.007	6	0.215	1	0.039	6	0.168	3	0.172	2	741.616	2	0.147	2	0.006	0.010	0.008		0.215	
316	M45	14in Dia. Duct	Sec 3 - min	0.014	6	0.002	4	-0.041	2	-0.286	5	-0.137	4	-0.218	3	-0.218	2	-178.771	2	-0.046	2	0.001	0.012	0.010		0.286	
317	M45	14in Dia. Duct	Sec 4 - max	0.034	4	0.063	5	0.040	3	0.138	4	0.248	5	0.205	2	0.205	3	178.771	3	0.046	3	0.002	0.011	0.009		0.248	
166	M16	16in Dia. Duct	Sec 3 - min	-0.075	6	-0.081	9	-0.008	9	-0.039	6	-0.215	1	-0.172	2	-0.168	3	-667.857	3	-0.132	3	0.005	0.010	0.009		0.215	
293	M43	14in Dia. Duct	Sec 2 - max	0.031	8	-0.015	8	0.030	2	0.123	4	0.326	5	0.128	2	0.129	3	495.111	3	0.129	3	0.002	0.014	0.006		0.326	
68	M8	20in Dia. Duct	Sec 4 - min	-0.004	6	-0.062	6	-0.031	3	-0.199	9	-0.386	8	-0.130	2	-0.117	3	-2854.732	2	-0.311	2	0.000	0.016	0.006		0.347	
69	M8	20in Dia. Duct	Sec 5 - max	0.020	9	-0.055	7	0.032	2	0.347	6	0.215	9	0.106	3	0.121	2	2574.005	3	0.281	3	0.001	0.015	0.005		0.308	
310	M44	14in Dia. Duct	Sec 5 - min	0.000	5	0.030	4	-0.043	2	-0.308	5	-0.136	4	-0.199	3	-0.199	2	-342.156	2	-0.089	2	0.000	0.014	0.009		0.230	
321	M46	14in Dia. Duct	Sec 1 - max	0.031	4	0.046	5	0.039	3	0.138	4	0.230	5	0.214	2	0.214	3	20.738	3	0.005	3	0.002	0.010	0.010		0.309	
281	M40	14in Dia. Duct	Sec 1 - max	0.030	7	0.019	4	0.007	7	0.309	7	-0.098	8	0.123	8	0.130	7	530.767	3	0.138	3	0.002	0.014	0.008		0.309	
282	M40	14in Dia. Duct	Sec 1 - min	-0.030	8	-0.032	5	-0.006	8	0.098	8	-0.309	7	-0.130	7	-0.123	8	-530.444	2	-0.138	2	0.002	0.014	0.008		0.300	
292	M43	14in Dia. Duct	Sec 1 - min	-0.041	6	-0.090	7	-0.028	3	-0.300	5	-0.130	4	-0.120	3	-0.119	2	-495.111	2	-0.129	2	0.003	0.013	0.005		0.230	
322	M46	14in Dia. Duct	Sec 1 - min	0.024	5	-0.024	4	-0.039	2	-0.230	5	-0.138	4	-0.214	3	-0.214	2	-20.738	2	-0.005	2	0.002	0.010	0.010		0.221	
177	M31	16in Dia. Duct	Sec 4 - max	0.109	6	0.127	3	0.094	9	0.053	8	0.063	7	0.092	9	0.221	1	376.380	3	0.075	3	0.008	0.004	0.010		0.221	
178	M31	16in Dia. Duct	Sec 4 - min	0.109	1	-0.127	2	-0.085	8	-0.063	7	-0.053	8	-0.221	1	-0.092	9	-395.194	2	-0.078	2	0.008	0.004	0.010		0.230	
319	M45	14in Dia. Duct	Sec 5 - max	0.033	4	0.061	5	0.039	3	0.138	4	0.230	5	0.194	2	0.194	3	178.771	3	0.046	3	0.002	0.010	0.009		0.226	
176	M31	16in Dia. Duct	Sec 3 - max	0.106	8	0.123	3	0.092	9	0.051	2	0.061	3	0.147	4	0.226	1	376.380	5	0.075	3	0.008	0.004	0.010		0.226	
175	M31	16in Dia. Duct	Sec 3 - min	0.106	1	-0.123	2	-0.082	8	-0.061	3	-0.051	2	-0.226	1	-0.147	4	-395.194	2	-0.078	2	0.008	0.004	0.010		0.393	
232	M37	14in Dia. Duct	Sec 1 - min	-0.019	4	0.098	5	-0.044	7	-0.393	6	-0.050	9	-0.052	2	-0.041	3	-511.230	2	-0.133	2	0.001	0.017	0.002		0.248	
318	M45	14in Dia. Duct	Sec 4 - min	0.014	5	0.002	4	-0.040	2	-0.248	5	-0.138	4	-0.205	3	-0.205	2	-178.771	2	-0.046	2	0.001	0.011	0.009		0.347	
70	M8	20in Dia. Duct	Sec 5 - min	-0.004	6	-0.064	8	-0.032	3	-0.216	9	-0.347	6	-0.121	2	-0.109	3	-2854.732	2	-0.311	2	0.000	0.016	0.005		0.300	
291	M43	14in Dia. Duct	Sec 1 - max	0.031	9	-0.014	6	0.029	2	0.130	4	0.300	5	0.119	2	0.120	3	495.111	3	0.129	3	0.002	0.013	0.005		0.309	
259	M39	14in Dia. Duct	Sec 1 - max	0.018	7	0.071	4	0.015	9	0.309	7	-0.098	8	0.123	6	0.130	7	530.767	3	0.138	3	0.001	0.014	0.006		0.309	
260	M39	14in Dia. Duct	Sec 5 - min	-0.019	6	0.020	5	-0.015	6	0.098	8	-0.309	7	-0.130	7	-0.123	8	-530.444	2	-0.138	2	0.001	0.014	0.006		0.216	
323	M40	14in Dia. Duct	Sec 2 - max	0.030	4	0.046	6	0.038	3	0.131	4	0.216	5	0.203	2	0.203	3	20.738	3	0.005	3	0.002	0.010	0.009		0.416	
59	M7	20in Dia. Duct	Sec 6 - max	0.010	7	-0.052	7	0.027	2	0.418	6	0.156	9	0.031	3	0.031	2	2662.532	3	0.289	3	0.001	0.019	0.001		0.416	
60	M7	20in Dia. Duct	Sec 6 - min	-0.010	8	-0.052	8	-0.027	3	-0.155	9	-0.418	6	-0.031	2	-0.031	3	-2939.238	2	-0.320	2	0.001	0.019	0.009		0.216	
324	M46	14in Dia. Duct	Sec 2 - min	0.024	5	-0.023	4	-0.038	2	-0.216	5	-0.131	4	-0.203	3	-0.203	2	-20.738	2	-0.005	2	0.002	0.010	0.006		0.282	
263	M40	14in Dia. Duct	Sec 2 - max	0.030	7	0.015	4	0.009	7	0.282	7	-0.119	8	0.117	8	0.124	7	530.767	3	0.138	3	0.002	0.013	0.006		0.282	
264	M40	14in Dia. Duct	Sec 2 - min	-0.030	8	-0.036	5	-0.008	8	0.119	8	-0.282	7	-0.124	7	-0.117	8	-530.444	2	-0.138	2	0.002	0.013	0.006		0.230	
320	M45	14in Dia. Duct	Sec 6 - min	0.014	6	0.002	4	-0.039	2	-0.230	5	-0.138	4	-0.194	3	-0.194	2	-178.771	2	-0.046	2	0.001	0.010	0.009		0.294	
257	M39	14in Dia. Duct	Sec 4 - max	0.019	7	0.074	4	0.017	9	0.294	7	-0.054	8	0.113	8	0.121	7	530.767	3	0.138	3	0.001	0.013	0.005		0.294	
258	M39	14in Dia. Duct	Sec 4 - min	-0.019	6	0.023	5	-0.016	6	0.054	8	-0.294	7	-0.121	7	-0.113	8	-530.444	2	-0.138	2	0.001	0.013	0.005		0.393	
231	M37	14in Dia. Duct	Sec 1 - max	0.000	5	0.142	4	0.045	8	0.050	9	0.303	6	0.041	3	0.052	2	514.798	3	0.134	3	0.000	0.017	0.002		0.203	
328	M46	14in Dia. Duct	Sec 3 - max	0.030	4	0.043	5	-0.037	3	0.124	4	0.203	5	0.191	2	0.191	3	20.738	3	0.005	3	0.002	0.009	0.008		0.203	
326	M45	14in Dia. Duct	Sec 3 - min	0.023	5	-0.022	4	-0.037	2	-0.203	5	-0.124	4	-0.191	3	-0.191	2	-20.738	2	-0.005	2	0.002	0.009	0.008		0.300	
289	M42	14in Dia. Duct	Sec 6 - max	0.039	7	-0.027	4	0.029	2	0.130	4	0.300	5	0.067	2	0.069	3	530.767	3	0.138	3	0.003	0.013	0.003		0.300	
290	M42	14in Dia. Duct	Sec 6 - min	-0.039	8	-0.079	5	-0.028	3	-0.300	5	-0.130	4	-0.068	3	-0.067	2	-530.444	2	-0.138	2	0.003	0.013	0.003		0.342	
234	M37	14in Dia. Duct	Sec 2 - min	-0.019	4	0.094	5	-0.044	7	-0.342	6	-0.086	9	-0.058	2	-0.049	3	-511.230	2	-0.133	2	0.001	0.015	0.003		0.253	
265	M40	14in Dia. Duct	Sec 3 - max	0.031	7	0.011	4	0.010	7	0.253	7	-0.119	8	0.109	8	0.116	7	530.767	3	0.138	3	0.002	0.011	0.005		0.253	
266	M40	14in Dia. Duct	Sec 3 - min	-0.031	8	-0.040	5	-0.010	8	0.119	8	-0.253	7	-0.116	7	-0.109	8	-530.444	2	-0.138	2	0.002	0.011	0.005		0.190	
327	M46	14in Dia. Duct	Sec 4 - max	0.029	4	0.042	5	0.036	3	0.118	4	0.190	5	0.180	2	0.180	3	20.738	3	0.005	3	0.002	0.008	0.008		0.276	
255	M39	14in Dia. Duct	Sec 3 - max	0.016	7	0.077	4	0.018	9	0.276	7	-0.009	8	0.103	8	0.111	7	530.767	3	0.138	3	0.001	0.012	0.005		0.276	
256	M39	14in Dia. Duct	Sec 3 - min	-0.016	6	0.026	5	-0.017	6	0.008	8	-0.276	7	-0.111	7	-0.103	8	-530.444	2	-0.138	2	0.001	0.012	0.005		0.190	
329	M46	14in Dia. Duct	Sec 4 - min	0.022	5	-0.022	4	-0.036	2	-0.190	5	-0.118	4	-0.180	3	-0.180	2	-20.738	2	-0.005	2	0.002	0.008	0.008		0.342	
233	M37	14in Dia. Duct	Sec 2 - max	0.000	5	0.140	4	0.044	8	0.086	9	0.342	6	0.048	3	0.058	2	514.798	3	0.134	3	0.000	0.015	0.003		0.177	
329	M46	14in Dia. Duct	Sec 5 - max	0.028	4	0.041	5	0.035	3	0.111	4	0.177	5	0.170	2	0.170	3	20.738	3	0.005	3	0.002	0.008	0.008		0.258	
263	M39	14in Dia. Duct	Sec 2 - max	0.017	7	0.080	4	0.019	9	0.258	7	0.041	8	0.092	8	0.101	7	530.767	3	0.138	3	0.001	0.011	0.004		0.258	
264	M39	14in Dia. Duct	Sec 2 - min	-0.017	6	0.028	5	-0.016	6	-0.041	8	-0.258	7	-0.101	7	-0.092	8	-530.444	2	-0.138	2	0.001	0.011	0.004		0.177	
331	M47	14in Dia. Duct	Sec 1 - max	0.025	4	0.035	2	0.032	5	0.169	3	0.169	2	0.111	4	0.177	5	43.397	3	0.011	3	0.002	0.008	0.008		0.177	
332	M47	14in Dia. Duct	Sec 1 - min	0.025	1	-0.035	3	-0.032	4	-0.169	2	-0.169	3	-0.177	5	-0.111	4	-43.397	3	-0.011	3	0.002	0.008	0.008		0.291	
236	M37	14in Dia. Duct	Sec 3 - min	-0.019	4	0.092	5	-0.043	7	-0.291	6	-0.122	9	-0.064	2	-0.054	3	-511.230	2	-0.133	2	0.001	0.013	0.003		0.224	
267	M40	14in Dia. Duct	Sec 4 - max	0.032	7	0.007	4	0.012	7	0.224	1	-0.125	8	0.101	8	0.107	7	530.767	3	0.138	3	0.002	0.010	0.005		0.224	
268	M40	14in Dia. Duct	Sec 4 - min	-0.032	8	-0.044	5	-0.011	8	0.125	8	-0.224	1	-0.107	7	-0.101	8	-530.444	2	-0.138	2	0.002	0.010	0.005		0.177	
330	M46	14in Dia. Duct	Sec 5 - min	0.022	5	-0.021	4	-0.035	2	-0.177	5	-0.111	4	-0.170	3	-0.170	2	-20.738	2	-0.005	2	0.002	0.008	0.008		0.248	
287	M42	14in Dia. Duct	Sec 4 - max	0.030	7	-0.024	4	0.026	2	0.147	4	0.248	5	0.048	2	0.060	3	530.767	3	0.138	3	0.003	0.011	0.002		0.248	
288	M42	14in Dia. Duct	Sec 4 - min	-0.030	8	-0.076	5	-0.028	3	-0.248	5	-0.147	4	-0.059	3	-0.046	2	-530.444	2	-0.138	2	0.003	0.011	0.002		0.207	
269	M40	14in Dia. Duct	Sec 5 - max	0.033	7	0.003	4	0.013	7	0.207	4	-0.104	6	0.091	8	0.095	7	530.767	3	0.138	3	0.002	0.009	0.004		0.207	
270	M40	14in Dia. Duct	Sec 5 - min	-0.033	8	-0.046	5	-0.013	8	0.104	5	-0.207	4	-0.095	7	-0.091	8	-530.444	2	-0.138	2	0.002	0.009	0.004		0.291	
235	M37	14in Dia. Duct	Sec 3 - max	0.000	5	0.138	4	0.044	8	0.122	9	0.291	6	0.064	3	0.064	2	514.798	3	0.134	3	0.000	0.013	0.003		0.237	
281	M39	14in Dia. Duct	Sec 1 - max	0.017	7	0.084	4	0.020	9	0.237	7	0.091	6	0.080	8	0.090	7	530.767	3	0.138	3	0.001	0.011	0.004		0.237	
282	M39	14in Dia. Duct	Sec 1 - min	-0.017	6	0.032	5	-0.020	6	-0.091	8	-0.237	7	-0.090	7	-0.080	8	-530.444	2	-0.138	2	0.001	0.011	0.004		0.241	
238	M37	14in Dia. Duct	Sec 4 - min	-0.019	6	0.090	5	-0.042	7	-0.241	6	-0.157	9	-0.076	7	-0.066	8	-511.230	2	-0.133	2	0.001	0.011	0.003		0.237	
249	M38	14in Dia. Duct	Sec 5 - max	0.007	5	0.136	4	0.041	8	0.237	7	0.091	6	0.080	8	0.090	7	530.767	3	0.138	3	0.001	0.011	0.004		0.237	
250	M38	14in Dia. Duct	Sec 5 - min	-0.007	4	0.084	5	-0.040	6	-0.091	8	-0.237	7	-0.090	7	-0.080	8	-530.444	2	-0.138	2	0.001	0.011	0.004		0.241	
237	M37	14in Dia. Duct	Sec 4 - max	0.000	9	0.136	4	0.043	8	0.157	9	0.241	6	0.066	8	0.076	7	514.798	3	0.134	3	0.000	0.011	0.003		0.222	
247	M38	14in Dia. Duct	Sec 4 - max	0.007	5	0.136	4	0.041	8	0.222	7	0.113	8	0.073	8	0.083	7	530.767	3	0.138	3	0.001	0.010	0.004		0.222	
248	M38	14in Dia. Duct	Sec 4 - min	-0.007	4	0.085	5	-0.041	6	-0.113	8	-0.222	7	-0.083	7	-0.073	8	-530.444	2	-0.138	2	0.001	0.010	0.004			

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_a	f_{sy}/σ_s	f_{sz}/σ_s		f_c (ksi)	
240	M37	14in Dia. Duct	Sec 5 - min	-0.019	6	0.089	5	-0.042	7	-0.192	6	-0.191	9	-0.091	7	-0.092	8	-511,230	2	-0.133	2	0.001	0.009	0.004		0.192	
245	M38	14in Dia. Duct	Sec 3 - max	0.007	5	0.137	4	0.042	9	0.208	7	0.135	8	0.067	8	0.076	7	530,767	3	0.138	3	0.001	0.009	0.003		0.208	
246	M39	14in Dia. Duct	Sec 3 - min	-0.007	4	0.086	5	-0.041	6	-0.135	8	-0.208	7	-0.076	7	-0.087	6	-530,444	2	-0.138	2	0.001	0.009	0.003		0.208	
333	M47	14in Dia. Duct	Sec 2 - max	0.022	4	0.030	2	0.027	5	0.122	3	0.122	2	0.069	4	0.135	5	43,397	2	0.011	2	0.002	0.005	0.006		0.135	
334	M47	14in Dia. Duct	Sec 2 - min	0.022	1	-0.030	3	-0.027	4	-0.122	2	-0.122	3	-0.135	5	-0.069	4	-43,397	3	-0.011	3	0.002	0.005	0.006		0.135	
285	M42	14in Dia. Duct	Sec 3 - max	0.038	7	-0.021	4	0.024	2	0.163	4	0.198	5	0.031	2	0.033	3	530,767	3	0.138	3	0.003	0.009	0.001		0.198	
286	M42	14in Dia. Duct	Sec 3 - min	-0.038	8	-0.072	5	-0.024	3	-0.198	5	-0.163	4	-0.033	3	-0.031	2	-530,444	2	-0.138	2	0.003	0.009	0.001		0.198	
239	M37	14in Dia. Duct	Sec 5 - max	0.000	9	0.136	4	0.042	8	0.191	9	0.192	8	0.082	8	0.091	7	514,796	3	0.134	3	0.000	0.009	0.004		0.192	
281	M42	14in Dia. Duct	Sec 1 - max	0.036	7	-0.014	4	0.021	7	0.186	4	0.105	5	0.031	8	0.034	7	530,767	3	0.138	3	0.003	0.008	0.002		0.186	
282	M42	14in Dia. Duct	Sec 1 - min	-0.036	8	-0.086	6	-0.020	8	-0.105	5	-0.186	4	-0.034	7	-0.031	8	-530,444	2	-0.138	2	0.003	0.008	0.002		0.186	
243	M38	14in Dia. Duct	Sec 2 - max	0.007	5	0.138	4	0.042	9	0.193	7	0.157	8	0.060	8	0.070	7	530,767	3	0.138	3	0.001	0.009	0.003		0.193	
244	M38	14in Dia. Duct	Sec 2 - min	-0.007	4	0.087	6	-0.041	6	-0.157	8	-0.193	7	-0.070	7	-0.060	8	-530,444	2	-0.138	2	0.001	0.009	0.003		0.193	
542	M68	20in Dia. CS Duct	Sec 1 - min	-0.062	7	0.026	7	-0.048	6	-0.144	8	0.040	7	-0.073	9	-0.073	6	0.001	7	0.000	7	0.004	0.005	0.003		0.144	
552	M69	20in Dia. CS Duct	Sec 1 - min	-0.062	6	0.026	6	-0.048	8	-0.144	9	0.040	6	-0.073	7	-0.073	6	-0.003	7	0.000	7	0.004	0.005	0.003		0.144	
283	M42	14in Dia. Duct	Sec 2 - max	0.037	7	-0.018	4	0.022	2	0.175	4	0.150	5	0.017	8	0.019	7	530,767	3	0.138	3	0.003	0.008	0.001		0.175	
284	M42	14in Dia. Duct	Sec 2 - min	-0.037	8	-0.069	5	-0.021	3	-0.150	5	-0.175	4	-0.019	7	-0.017	6	-530,444	2	-0.138	2	0.003	0.008	0.001		0.175	
241	M38	14in Dia. Duct	Sec 1 - max	0.007	5	0.138	4	0.042	9	0.179	7	0.179	8	0.053	8	0.063	7	530,767	3	0.138	3	0.001	0.008	-0.003		0.179	
242	M38	14in Dia. Duct	Sec 1 - min	-0.007	4	0.087	5	-0.042	6	-0.179	8	-0.179	7	-0.063	7	-0.053	8	-530,444	2	-0.138	2	0.001	0.008	0.003		0.179	
336	M47	14in Dia. Duct	Sec 3 - max	0.018	4	0.025	2	0.022	5	0.092	3	0.092	2	0.034	4	0.100	5	43,397	2	0.011	2	0.001	0.004	0.004		0.100	
336	M47	14in Dia. Duct	Sec 3 - min	0.018	1	-0.025	3	-0.022	4	-0.092	2	-0.092	3	-0.100	5	-0.034	4	-43,397	3	-0.011	3	0.001	0.004	0.004		0.100	
541	M68	20in Dia. CS Duct	Sec 1 - max	-0.017	8	0.094	6	0.048	9	-0.040	7	0.144	8	0.073	8	0.073	9	0.004	8	0.000	8	0.001	0.005	0.003		0.144	
551	M69	20in Dia. CS Duct	Sec 1 - max	-0.017	9	0.094	9	0.048	7	-0.040	6	0.144	9	0.073	8	0.073	7	0.003	8	0.000	8	0.001	0.005	0.003		0.144	
544	M68	20in Dia. CS Duct	Sec 2 - min	-0.050	7	0.025	7	-0.046	6	-0.095	6	0.027	7	-0.048	9	-0.048	6	0.001	7	0.000	7	0.004	0.004	0.002		0.095	
554	M69	20in Dia. CS Duct	Sec 2 - min	-0.050	8	0.025	6	-0.046	6	-0.095	9	0.027	6	-0.048	7	-0.048	8	-0.003	7	0.000	7	0.004	0.004	0.002		0.095	
439	M57	20in Dia. CS Duct	Sec 5 - max	0.016	6	-0.017	6	0.031	8	-0.031	6	0.113	9	0.058	8	0.058	7	0.002	7	0.000	7	0.001	0.004	0.002		0.113	
479	M61	20in Dia. CS Duct	Sec 5 - max	0.016	7	-0.017	7	0.031	6	-0.031	7	0.113	8	0.058	6	0.058	8	-0.001	7	0.000	7	0.001	0.004	0.002		0.113	
440	M57	20in Dia. CS Duct	Sec 5 - min	0.004	9	-0.061	9	-0.031	7	-0.113	9	0.031	6	-0.058	7	-0.058	8	-0.002	6	0.000	8	0.000	0.004	0.002		0.113	
480	M61	20in Dia. CS Duct	Sec 5 - min	0.004	8	-0.061	8	-0.031	9	-0.113	6	0.031	7	-0.058	9	-0.058	6	-0.004	6	0.000	6	0.000	0.004	0.002		0.113	
337	M47	14in Dia. Duct	Sec 4 - max	0.015	4	0.020	2	0.017	5	0.049	3	0.049	2	0.005	4	0.071	5	43,397	2	0.011	2	0.001	0.002	0.003		0.071	
338	M47	14in Dia. Duct	Sec 4 - min	0.015	1	-0.020	3	-0.017	4	-0.049	2	-0.049	3	-0.071	5	-0.005	4	-43,397	3	-0.011	3	0.001	0.002	0.003		0.071	
543	M68	20in Dia. CS Duct	Sec 2 - max	-0.017	8	0.090	8	0.046	9	-0.027	7	0.095	8	0.048	8	0.048	9	0.004	8	0.000	8	0.001	0.004	0.002		0.095	
553	M69	20in Dia. CS Duct	Sec 2 - max	-0.017	9	0.090	9	0.046	7	-0.027	6	0.095	9	0.048	8	0.048	7	0.003	8	0.000	8	0.001	0.004	0.002		0.095	
546	M68	20in Dia. CS Duct	Sec 3 - min	-0.056	7	0.024	7	-0.044	6	-0.049	8	0.014	7	-0.025	9	-0.026	6	0.001	7	0.000	7	0.003	0.002	0.001		0.058	
556	M69	20in Dia. CS Duct	Sec 3 - min	-0.056	6	0.024	6	-0.044	8	-0.049	9	0.014	6	-0.025	7	-0.025	8	-0.003	7	0.000	7	0.003	0.002	0.001		0.058	
410	M54	20in Dia. CS Duct	Sec 5 - min	-0.024	6	0.005	6	-0.009	8	0.023	6	-0.063	8	-0.043	8	-0.043	7	-0.003	7	0.000	7	0.001	0.003	0.002		0.063	
450	M58	20in Dia. CS Duct	Sec 5 - min	-0.024	7	0.005	7	-0.009	6	0.023	7	-0.063	8	-0.043	6	-0.043	9	0.001	7	0.000	7	0.001	0.003	0.002		0.063	
408	M54	20in Dia. CS Duct	Sec 4 - min	-0.029	6	0.006	6	-0.011	8	0.020	6	-0.074	9	-0.038	6	-0.038	7	-0.003	7	0.000	7	0.002	0.003	0.001		0.074	
448	M58	20in Dia. CS Duct	Sec 4 - min	-0.029	7	0.006	7	-0.011	6	0.020	7	-0.074	8	-0.038	6	-0.038	8	0.001	7	0.000	7	0.002	0.003	0.001		0.074	
550	M68	20in Dia. CS Duct	Sec 6 - min	-0.054	7	0.022	7	-0.039	6	0.010	7	-0.037	8	-0.019	6	-0.019	9	0.001	7	0.000	7	0.003	0.001	0.001		0.054	
560	M69	20in Dia. CS Duct	Sec 6 - min	-0.054	6	0.022	6	-0.039	8	0.010	6	-0.037	9	-0.019	8	-0.019	7	-0.003	7	0.000	7	0.003	0.001	0.001		0.054	
406	M54	20in Dia. CS Duct	Sec 3 - min	-0.028	6	0.007	6	-0.013	8	0.017	6	-0.063	9	-0.033	8	-0.033	7	-0.003	7	0.000	7	0.002	0.002	0.001		0.063	
446	M58	20in Dia. CS Duct	Sec 3 - min	-0.028	7	0.007	7	-0.013	6	0.017	7	-0.063	8	-0.033	6	-0.033	8	0.001	7	0.000	7	0.002	0.002	0.001		0.063	
409	M54	20in Dia. CS Duct	Sec 6 - max	-0.007	9	0.016	9	0.009	7	0.083	9	-0.023	6	0.043	7	0.043	8	0.003	8	0.000	8	0.000	0.003	0.002		0.083	
449	M58	20in Dia. CS Duct	Sec 5 - max	-0.007	8	0.016	8	0.009	9	0.083	8	-0.023	7	0.043	9	0.043	6	0.004	8	0.000	8	0.000	0.003	0.002		0.083	
437	M57	20in Dia. CS Duct	Sec 4 - max	0.013	6	-0.016	6	0.029	8	-0.020	6	0.076	9	0.039	8	0.039	7	0.002	7	0.000	7	0.001	0.003	0.001		0.076	
477	M61	20in Dia. CS Duct	Sec 4 - max	0.013	7	-0.016	7	0.029	6	-0.020	7	0.076	8	0.039	6	0.039	9	-0.001	7	0.000	7	0.001	0.003	0.001		0.076	
412	M55	20in Dia. CS Duct	Sec 1 - min	-0.002	6	-0.027	9	-0.014	7	0.023	6	-0.063	9	-0.043	8	-0.043	7	-0.035	6	0.000	8	0.000	0.003	0.002		0.083	
452	M59	20in Dia. CS Duct	Sec 1 - min	-0.002	7	-0.027	8	-0.014	9	0.023	7	-0.063	8	-0.043	6	-0.043	9	-0.051	6	0.000	8	0.000	0.003	0.002		0.083	
411	M55	20in Dia. CS Duct	Sec 1 - max	0.000	9	-0.007	6	0.014	8	0.083	9	-0.023	6	0.043	7	0.043	8	0.035	7	0.000	7	0.000	0.003	0.002		0.083	
451	M59	20in Dia. CS Duct	Sec 1 - max	0.000	8	-0.007	7	0.014	6	0.083	8	-0.023	7	0.043	9	0.043	6	-0.017	7	0.000	7	0.000	0.003	0.002		0.083	
404	M54	20in Dia. CS Duct	Sec 2 - min	-0.030	6	0.008	6	-0.015	8	0.014	6	-0.051	9	-0.026	8	-0.026	7	-0.003	7	0.000	7	0.002	0.002	0.001		0.051	
444	M58	20in Dia. CS Duct	Sec 2 - min	-0.030	7	0.008	7	-0.015	6	0.014	7	-0.051	8	-0.026	6	-0.026	9	0.001	7	0.000	7	0.002	0.002	0.001		0.051	
407	M54	20in Dia. CS Duct	Sec 4 - max	-0.007	9	0.022	9	0.011	7	0.074	9	-0.020	6	0.036	7	0.036	8	0.003	8	0.000	8	0.000	0.003	0.001		0.074	
447	M58	20in Dia. CS Duct	Sec 4 - max	-0.007	8	0.022	8	0.011	9	0.074	8	-0.020	7	0.036	9	0.036	6	0.004	8	0.000	8	0.000	0.003	0.001		0.074	
414	M55	20in Dia. CS Duct	Sec 2 - min	-0.001	6	-0.028	9	-0.014	7	0.022	6	-0.080	9	-0.041	8	-0.041	7	-0.035	8	0.000	8	0.000	0.003	0.002		0.080	
454	M59	20in Dia. CS Duct	Sec 2 - min	-0.001	7	-0.028	8	-0.014	9	0.022	7	-0.080	8	-0.041	6	-0.041	9	-0.061	8	0.000	8	0.000	0.003	0.002		0.080	
438	M57	20in Dia. CS Duct	Sec 4 - min	0.004	9	-0.056	9	-0.029	7	-0.076	9	0.020	6	-0.039	7	-0.039	8	-0.002	6	0.000	8	0.000	0.003	0.001		0.076	
478	M61	20in Dia. CS Duct	Sec 4 - min	0.004	8	-0.056	8	-0.029	9	-0.076	8	0.020	7	-0.039	9	-0.039	6	-0.004	6	0.000	8	0.000	0.003	0.001		0.076	
413	M55	20in Dia. CS Duct	Sec 2 - max	0.000	9	-0.008	6	0.014	8	0.080	9	-0.022	6	0.041	7	0.041	8	0.035	7	0.000	7	0.000	0.003	0.002		0.080	
453	M59	20in Dia. CS Duct	Sec 2 - max	0.000	8	-0.008	7	0.014	6	0.080	8	-0.022	7	0.041	9	0.041	6	-0.017	7	0.000	7	0.000	0.003	0.002		0.080	
341	M48	14in Dia. Duct	Sec 1 - max	0.013	4	0.016	5	0.016	3	-0.017	4	0.050	5	0.027	2	0.027	3	31,986	2	0.008	2	0.001	0.002	0.001		0.050	
415	M55	20in Dia. CS Duct	Sec 3 - max	0.000	9	-0.008	6	0.015	8	0.077	9	-0.021	6	0.039	7	0.039	8	0.035	7	0.000	7	0.000	0.003	0.001		0.077	
455	M59	20in Dia. CS Duct	Sec 3 - max	0.000	8	-0.008	7	0.015	6	0.077	8	-0.021	7	0.039	9	0.039	6	-0.017	7	0.000	7	0.000	0.003	0.001		0.077	
416	M55	20in Dia. CS Duct	Sec 3 - min	0.000	6	-0.029	9	-0.015	7	0.021	6	-0.077	9	-0.039	8	-0.039	7	-0.035	8	0.000	8	0.000	0.003	0.001		0.077	
456	M59	20in Dia. CS Duct	Sec 3 - min	0.000	7	-0.029	8	-0.015	9	0.021	7	-0.077	8	-0.039	6	-0.039	9	-0.061	8	0.000	8	0.000	0.003	0.001		0.077	
342	M48	14in Dia. Duct	Sec 1 - min	0.010	5	-0.007	4	-0.010	2	-0.050	5	0.017	4	-0.027	3	-0.027	2	-31,986	3	-0.008	3	0.001	0.002	0.001		0.050	
457	M59	20in Dia. CS Duct	Sec 4 - max	0.000	8	-0.008	7	0.015	6	0.073	8	-0.020	7	0.037	9	0.038	8	-0.017	7	0.000	7	0.000	0.003	0.001		0.073	
458	M59	20in Dia. CS Duct	Sec 4 - min	0.000	7	-0.030	8	-0.016	9	0.020	7	-0.073	8	-0.038	6	-0.037	9	-0.061	8	0.000	8	0.000	0.003	0.001		0.073	
417	M55	20in Dia. CS Duct	Sec 4 - max	0.000	9	-0.008	6	0.015	8	0.073	9	-0.020	6	0.037	7	0.037	8	0.035	7	0.000	7	0.000	0.003	0.001		0.073	
418	M55	20in Dia. CS Duct	Sec 4 - min	0.000	6	-0.030	9	-0.015	7	0.020	6	-0.073	9	-0.037	8	-0.037	7	-0.035	8	0.000	8	0.000	0.003	0.001		0.073	
339	M47	14in Dia. Duct	Sec 5 - max	0.011	4	0.018	2	0.013	5	0.023	3	0.023	2	-0.017	4	0.050	5	43,397	2	0.011	2	0.001	0.001	0.002		0.050	
340	M47	14in Dia. Duct	Sec 5 - min	0.011	1	-0.016	3	-0.013	4	-0.023	2	-0.023	3	-0.050	5	0.017	4	-43,397	3	-0.011	3	0.001	0.001	0.002		0.050	
405	M54	20in Dia. CS Duct	Sec 3 - max	-0.008	9	0.025	9	0.013	7	0.063	9	-0.017	6	0.033	7	0.033	8	0.003	8	0.000	8	0.000	0.002	0.001		0.063	
445	M58	20in Dia. CS Duct	Sec 3 - max	-0.008	8	0.025	8	0.013	9	0.063	8	-0.017	7	0.033	9	0.033	6	0.004	8	0.000	8	0.000	0.002	0.001		0.063	
343	M48	14in Dia. Duct	Sec 2 - max	0.012	4	0.016	5	0.015	3	-0.016	4	0.040	5	0.024	2	0.024	3	31,986	2	0.009	2	0.001	0.002	0.001		0.040	
402	M54	20in Dia. CS Duct	Sec 1 - min	-0.032	6	0.009	6	-0.016	8	0.010	6	-0.037	9	-0.019	8	-0.019	7	-0.003	7	0.000	7	0.002	0.001	0.001		0.037	
442	M58	20in Dia. CS Duct	Sec 1 - min	-0.032	7	0.009	7	-0.016	6	0.010	7	-0.037	8	-0.019	6	-0.019	9	0.001	7	0.000	7	0.002	0.001	0.001		0.037	

D-2250

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_y/σ_y	f_z/σ_y	f_{yz}/σ_y		f_t (ksi)	
419	M55	20in Dia. CS Duct	Sec 5 - max	0.000	6	-0.008	6	0.016	8	0.070	9	-0.019	6	0.036	7	0.036	8	0.035	7	0.000	7	0.000	0.003	0.001		0.070	
420	M55	20in Dia. CS Duct	Sec 5 - min	0.000	9	-0.031	9	-0.016	7	0.019	6	-0.070	9	-0.036	8	-0.036	7	-0.035	8	0.000	8	0.000	0.003	0.001		0.070	
421	M56	20in Dia. CS Duct	Sec 1 - max	0.000	1	-0.008	6	0.016	8	0.070	9	-0.019	6	0.036	7	0.036	8	0.001	7	0.000	7	0.000	0.003	0.001		0.070	
422	M56	20in Dia. CS Duct	Sec 1 - min	0.000	1	-0.031	9	-0.016	7	0.019	6	-0.070	9	-0.036	8	-0.036	7	-0.001	8	0.000	8	0.000	0.003	0.001		0.070	
459	M59	20in Dia. CS Duct	Sec 5 - max	0.000	6	-0.008	7	0.016	8	0.070	8	-0.019	7	0.036	9	0.036	6	-0.017	7	0.000	7	0.000	0.003	0.001		0.070	
460	M59	20in Dia. CS Duct	Sec 5 - min	0.000	9	-0.031	8	-0.016	9	0.019	7	-0.070	8	-0.036	6	-0.036	9	-0.061	8	0.000	8	0.000	0.003	0.001		0.070	
461	M60	20in Dia. CS Duct	Sec 1 - max	0.000	1	-0.008	7	0.016	6	0.070	8	-0.019	7	0.036	9	0.036	6	-0.002	7	0.000	7	0.000	0.003	0.001		0.070	
462	M60	20in Dia. CS Duct	Sec 1 - min	0.000	1	-0.031	8	-0.016	9	0.019	7	-0.070	6	-0.036	6	-0.036	9	-0.007	6	0.000	8	0.000	0.003	0.001		0.070	
344	M48	14in Dia. Duct	Sec 2 - min	0.009	5	-0.006	4	-0.015	2	-0.046	5	0.018	4	-0.024	3	-0.024	2	-31.986	3	-0.008	3	0.001	0.002	0.001		0.046	
545	M68	20in Dia. CS Duct	Sec 3 - max	-0.018	8	0.086	8	0.044	9	-0.014	7	0.049	9	0.025	8	0.025	9	0.004	8	0.000	8	0.001	0.002	0.001		0.049	
555	M69	20in Dia. CS Duct	Sec 3 - max	-0.016	9	0.086	9	0.044	7	-0.014	6	0.049	9	0.025	8	0.025	7	0.003	8	0.000	8	0.001	0.002	0.001		0.049	
759	M90	16in Dia. Duct	Sec 5 - max	0.005	7	-0.027	1	0.018	2	-0.043	1	0.043	1	0.029	2	0.029	3	0.000	1	0.000	1	0.000	0.002	0.001		0.043	
760	M90	16in Dia. Duct	Sec 5 - min	-0.005	6	-0.027	1	-0.018	3	-0.043	1	0.043	1	-0.029	3	-0.029	2	0.000	1	0.000	1	0.000	0.002	0.001		0.056	
548	M89	20in Dia. CS Duct	Sec 4 - min	-0.058	7	0.023	7	-0.042	6	-0.005	8	0.002	7	-0.002	9	-0.002	6	0.001	7	0.000	7	0.003	0.000	0.000		0.056	
556	M89	20in Dia. CS Duct	Sec 4 - min	-0.056	6	0.023	6	-0.042	8	-0.005	9	0.002	6	-0.002	7	-0.002	8	-0.003	7	0.000	7	0.003	0.000	0.000		0.042	
345	M48	14in Dia. Duct	Sec 3 - max	0.011	4	0.015	5	0.014	3	-0.020	4	0.042	5	0.020	2	0.020	3	31.986	2	0.008	2	0.001	0.002	0.001		0.042	
346	M48	14in Dia. Duct	Sec 3 - min	0.009	5	-0.006	4	-0.014	2	-0.042	5	0.020	4	-0.020	3	-0.020	2	-31.986	3	-0.008	3	0.001	0.002	0.001		0.051	
403	M54	20in Dia. CS Duct	Sec 2 - max	-0.008	9	0.029	9	0.015	7	0.051	9	-0.014	6	0.026	7	0.026	8	0.003	8	0.000	8	0.000	0.002	0.001		0.051	
443	M58	20in Dia. CS Duct	Sec 2 - max	-0.008	8	0.029	8	0.015	9	0.051	8	-0.014	7	0.026	8	0.026	6	0.004	8	0.000	8	0.000	0.002	0.001		0.058	
423	M56	20in Dia. CS Duct	Sec 2 - max	0.001	6	-0.009	6	0.017	8	0.058	9	-0.016	6	0.030	7	0.030	8	0.001	7	0.000	7	0.000	0.002	0.001		0.058	
463	M60	20in Dia. CS Duct	Sec 2 - max	0.001	7	-0.009	7	0.017	6	0.058	8	-0.016	7	0.030	9	0.030	6	-0.002	7	0.000	7	0.000	0.002	0.001		0.058	
424	M56	20in Dia. CS Duct	Sec 2 - min	0.000	9	-0.033	9	-0.017	7	0.016	6	-0.058	9	-0.030	8	-0.030	7	-0.001	8	0.000	8	0.000	0.002	0.001		0.058	
464	M60	20in Dia. CS Duct	Sec 2 - min	0.000	8	-0.033	8	-0.017	9	0.016	7	-0.058	8	-0.030	6	-0.030	9	-0.007	8	0.000	8	0.000	0.002	0.001		0.036	
347	M46	14in Dia. Duct	Sec 4 - max	0.011	4	0.014	5	0.013	3	-0.021	4	0.036	5	0.017	2	0.017	3	31.986	2	0.006	2	0.001	0.002	0.001		0.036	
351	M49	14in Dia. Duct	Sec 1 - max	0.010	4	0.018	5	0.013	3	-0.022	4	0.035	5	0.020	2	0.020	3	16.326	2	0.004	2	0.001	0.002	0.001		0.036	
348	M48	14in Dia. Duct	Sec 4 - min	0.006	5	-0.005	4	-0.013	2	-0.036	5	0.021	4	-0.017	3	-0.017	2	-31.986	3	-0.006	3	0.001	0.001	0.001		0.037	
549	M68	20in Dia. CS Duct	Sec 6 - max	-0.015	8	0.077	8	0.039	9	0.037	8	-0.010	7	0.019	9	0.019	6	0.004	8	0.000	8	0.001	0.001	0.001		0.037	
559	M69	20in Dia. CS Duct	Sec 6 - max	-0.015	9	0.077	9	0.039	7	0.037	9	-0.010	6	0.019	7	0.019	8	0.003	8	0.000	8	0.001	0.001	0.001		0.035	
349	M48	14in Dia. Duct	Sec 5 - max	0.010	4	0.013	5	0.013	3	-0.022	4	0.035	5	0.014	2	0.014	3	31.986	2	0.006	2	0.001	0.002	0.001		0.041	
436	M57	20in Dia. CS Duct	Sec 3 - max	0.010	8	-0.014	6	0.026	8	-0.011	6	0.041	9	0.021	8	0.021	7	0.002	7	0.000	7	0.001	0.002	0.001		0.041	
475	M61	20in Dia. CS Duct	Sec 3 - max	0.010	7	-0.014	7	0.026	6	-0.011	7	0.041	8	0.021	6	0.021	8	-0.001	7	0.000	7	0.001	0.002	0.001		0.035	
350	M48	14in Dia. Duct	Sec 5 - min	0.009	5	-0.005	4	-0.013	2	-0.035	5	0.022	4	-0.014	3	-0.014	2	-31.986	3	-0.006	3	0.001	0.002	0.001		0.030	
353	M49	14in Dia. Duct	Sec 2 - max	0.009	4	0.018	5	0.012	3	-0.021	4	0.030	5	0.017	2	0.017	3	16.326	2	0.004	2	0.001	0.001	0.001		0.035	
352	M49	14in Dia. Duct	Sec 1 - min	0.004	5	0.005	4	-0.013	2	-0.036	5	0.022	4	-0.020	3	-0.020	2	-16.326	3	-0.004	3	0.000	0.002	0.001		0.046	
425	M56	20in Dia. CS Duct	Sec 3 - max	0.003	6	-0.010	6	0.019	6	0.046	9	-0.013	6	0.023	7	0.023	8	0.001	7	0.000	7	0.000	0.002	0.001		0.046	
465	M60	20in Dia. CS Duct	Sec 3 - max	0.003	7	-0.010	7	0.019	6	0.046	8	-0.013	7	0.023	9	0.023	6	-0.002	7	0.000	7	0.000	0.002	0.001		0.033	
721	M87	16in Dia. Duct	Sec 1 - max	0.004	6	0.022	1	0.015	3	-0.033	1	0.033	1	0.022	2	0.022	3	0.000	1	0.000	1	0.000	0.001	0.001		0.033	
722	M87	16in Dia. Duct	Sec 1 - min	-0.004	7	0.022	1	-0.015	2	-0.033	1	0.033	1	-0.022	3	-0.022	2	0.000	1	0.000	1	0.000	0.001	0.001		0.033	
731	M88	16in Dia. Duct	Sec 1 - max	0.004	6	0.022	1	0.015	3	-0.033	1	0.033	1	0.022	2	0.022	3	0.000	1	0.000	1	0.000	0.001	0.001		0.033	
732	M88	16in Dia. Duct	Sec 1 - min	-0.004	7	0.022	1	-0.015	2	-0.033	1	0.033	1	-0.022	3	-0.022	2	0.000	1	0.000	1	0.000	0.001	0.001		0.037	
401	M54	20in Dia. CS Duct	Sec 1 - max	-0.009	9	0.032	9	0.016	7	0.037	9	-0.010	6	0.019	7	0.019	8	0.003	8	0.000	8	0.001	0.001	0.001		0.037	
441	M58	20in Dia. CS Duct	Sec 1 - max	-0.009	8	0.032	8	0.016	9	0.037	8	-0.010	7	0.019	9	0.019	6	0.004	8	0.000	8	0.001	0.001	0.001		0.046	
426	M56	20in Dia. CS Duct	Sec 3 - min	0.000	9	-0.036	9	-0.018	7	0.013	6	-0.046	9	-0.023	8	-0.023	7	-0.001	6	0.000	8	0.000	0.002	0.001		0.046	
466	M60	20in Dia. CS Duct	Sec 3 - min	0.000	8	-0.036	8	-0.018	9	0.013	7	-0.046	8	-0.023	6	-0.023	9	-0.007	8	0.000	8	0.000	0.002	0.001		0.041	
430	M57	20in Dia. CS Duct	Sec 3 - min	0.003	9	-0.052	9	-0.026	7	-0.041	9	0.011	8	-0.021	7	-0.021	8	-0.002	8	0.000	8	0.000	0.002	0.001		0.041	
476	M61	20in Dia. CS Duct	Sec 3 - min	0.003	8	-0.052	8	-0.026	9	-0.041	8	0.011	7	-0.021	9	-0.021	6	-0.004	8	0.000	8	0.000	0.002	0.001		0.026	
358	M49	14in Dia. Duct	Sec 3 - max	0.009	4	0.016	5	0.011	3	-0.020	4	0.026	5	0.014	2	0.014	3	16.326	2	0.004	2	0.001	0.001	0.001		0.030	
354	M49	14in Dia. Duct	Sec 2 - min	0.004	5	0.005	4	-0.012	2	-0.030	5	0.021	4	-0.017	3	-0.017	2	-16.326	3	-0.004	3	0.000	0.001	0.001		0.029	
357	M49	14in Dia. Duct	Sec 4 - max	0.009	4	0.016	5	0.010	3	-0.019	8	0.023	7	0.012	2	0.012	3	16.326	2	0.004	2	0.001	0.001	0.001		0.026	
356	M49	14in Dia. Duct	Sec 3 - min	0.004	5	0.004	4	-0.011	2	-0.026	5	0.020	4	-0.014	3	-0.014	2	-16.326	3	-0.004	3	0.000	0.001	0.001		0.032	
427	M56	20in Dia. CS Duct	Sec 4 - max	0.004	6	-0.011	6	0.020	8	0.032	9	-0.009	6	0.016	7	0.016	8	0.001	7	0.000	7	0.000	0.001	0.001		0.032	
467	M60	20in Dia. CS Duct	Sec 4 - max	0.004	7	-0.011	7	0.020	6	0.032	8	-0.009	7	0.016	9	0.016	6	-0.002	7	0.000	7	0.000	0.001	0.001		0.021	
757	M90	16in Dia. Duct	Sec 4 - max	0.004	7	-0.022	1	0.015	2	-0.021	1	0.021	1	0.015	2	0.015	3	0.000	1	0.000	1	0.000	0.001	0.001		0.021	
758	M90	16in Dia. Duct	Sec 4 - min	-0.004	6	-0.022	1	-0.015	3	-0.021	1	0.021	1	-0.015	3	-0.015	2	0.000	1	0.000	1	0.000	0.001	0.001		0.020	
361	M50	14in Dia. Duct	Sec 1 - max	0.006	4	0.015	5	0.009	3	-0.018	6	0.020	7	0.010	2	0.010	3	6.236	2	0.002	2	0.000	0.001	0.000		0.020	
359	M49	14in Dia. Duct	Sec 5 - max	0.007	4	0.014	5	0.009	3	-0.018	6	0.020	7	0.010	2	0.010	3	16.326	2	0.004	2	0.001	0.001	0.000		0.032	
428	M56	20in Dia. CS Duct	Sec 4 - min	0.001	9	-0.039	9	-0.020	7	0.009	8	-0.032	9	-0.016	8	-0.016	7	-0.001	8	0.000	8	0.000	0.001	0.001		0.032	
468	M60	20in Dia. CS Duct	Sec 4 - min	0.001	8	-0.039	8	-0.020	9	0.009	7	-0.032	8	-0.016	6	-0.016	9	-0.007	8	0.000	8	0.000	0.001	0.001		0.023	
358	M49	14in Dia. Duct	Sec 4 - min	0.003	5	0.004	4	-0.010	2	-0.023	7	0.019	6	-0.012	3	-0.012	2	-16.326	3	-0.004	3	0.000	0.001	0.001		0.023	
741	M86	16in Dia. Duct	Sec 1 - max	0.000	1	0.000	1	0.000	1	0.022	1	-0.022	1	0.015	3	0.015	2	0.000	1	0.000	1	0.000	0.001	0.001		0.022	
742	M89	16in Dia. Duct	Sec 1 - min	0.000	1	0.000	1	0.000	1	0.022	1	-0.022	1	-0.015	2	-0.015	3	0.000	1	0.000	1	0.000	0.001	0.001		0.021	
743	M89	16in Dia. Duct	Sec 2 - max	0.000	7	-0.002	1	0.001	2	0.021	1	-0.021	1	0.014	3	0.014	2	0.000	1	0.000	1	0.000	0.001	0.001		0.021	
744	M89	16in Dia. Duct	Sec 2 - min	0.000	6	-0.002	1	-0.001	3	0.021	1	-0.021	1	-0.014	2	-0.014	3	0.000	1	0.000	1	0.000	0.001	0.000		0.020	
360	M49	14in Dia. Duct	Sec 5 - min	0.003	5	0.004	4	-0.009	2	-0.020	7	0.018	6	-0.010	3	-0.010	2	-16.326	3	-0.004	3	0.000	0.001	0.000		0.016	
363	M50	14in Dia. Duct	Sec 2 - max	0.005	4	0.014	5	0.009	3	-0.015	8	0.016	7	0.010	2	0.010	3	6.236	2	0.002	2	0.000	0.001	0.000		0.020	
746	M89	16in Dia. Duct	Sec 3 - max	0.000	7	-0.004	1	0.002	2	0.020	1	-0.020	1	0.014	3	0.014	2	0.000	1	0.000	1	0.000	0.001	0.001		0.020	
748	M89	16in Dia. Duct	Sec 3 - min	0.000	6	-0.004	1	-0.002	3	0.020	1	-0.020	1	-0.014	2	-0.014	3	0.000	1	0.000	1	0.000	0.001	0.001		0.019	
747	M89	16in Dia. Duct	Sec 4 - max	0.001	7	-0.005	1	0.004	2	0.019	1	-0.019	1	0.013	3	0.013	2	0.000	1	0.000	1	0.000	0.001	0.001		0.018	
746	M89	16in Dia. Duct	Sec 4 - min	-0.001	6	-0.005	1	-0.004	3	0.019	1	-0.019	1	-0.013	2	-0.013	3	0.000	1	0.000	1	0.000	0.001	0.001		0.020	
362	M50	14in Dia. Duct	Sec 1 - min	0.000	5	0.010	4	-0.009	2	-0.020	7	0.018	6	-0.012	3	-0.012	2	-6.236	3	-0.002	3	0.000	0.001	0.001		0.017	
749	M88	16in Dia. Duct	Sec 6 - max	0.001	7	-0.007	1	0.005	2	0.017	1	-0.017	1	0.012	3	0.012	2	0.000	1	0.000	1	0.000	0.001	0.001		0.017	
750	M88	16in Dia. Duct	Sec 6 - min	-0.001	6	-0.007	1	-0.005	3	0.017	1	-0.017	1	-0.012	2	-0.012	3	0.000	1	0.000	1	0.000	0.001	0.001		0.017	
751	M90	16in Dia. Duct	Sec 1 - max	0.001	7	-0.007	1	0.005	2	0.017	1	-0.017	1	0.012	3	0.012	2	0.000	1	0.000	1	0.000	0.001	0.001		0.017	
752	M90	16in Dia. Duct	Sec 1 - min	-0.001	6	-0.007	1	-0.005	3	0.017	1	-0.017	1	-0.012	2	-0.012	3	0.000	1	0.000	1	0.000	0.001	0.000		0.018	
420	M55	20in Dia. CS Duct	Sec 5 - max	0.006	6	-0.011	5	0.021	8	0.018	9	-0.005	6	0.009	7	0.009	8	0.002	7	0.000	7	0.000	0.001	0.000		0.018	
431	M57	20in Dia. CS Duct	Sec 1 - max	0.006	6	-0.011	6	0.021	8	0.018	9	-0.005	6	0.009	7	0.009	8	0.002	7	0.000	7	0.000	0.001	0.000		0.018	
469	M60	20in Dia. CS Duct	Sec 5 - max	0.006	7	-0.011	7	0.021	6	0.018	8	-0.005	7	0.009	9	0.009	6	-0.002	7	0.000	7	0.000	0.001	0.000			

D-2250

	Member	Duct Size		Axial (ksi)	Load Case	y Shear (ksi)	Load Case	z Shear (ksi)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_a/σ_a	f_{by}/σ_a	f_{bz}/σ_a		f_s (ksi)	
471	M61	20in Dia. CS Duct	Sec 1 - max	0.006	7	-0.011	7	0.021	6	0.016	6	-0.005	7	0.009	9	0.009	6	-0.001	7	0.000	7	0.000	0.001	0.000		0.018	
365	M50	14in Dia. Duct	Sec 3 - max	0.004	4	0.012	5	0.008	3	-0.013	5	0.013	4	0.008	2	0.008	3	6.236	2	0.002	2	0.000	0.001	0.000		0.013	
547	M68	20in Dia. CS Duct	Sec 4 - max	-0.016	8	0.082	8	0.042	9	-0.002	7	0.005	8	0.002	6	0.002	9	0.004	8	0.000	8	0.001	0.000	0.000		0.016	
557	M69	20in Dia. CS Duct	Sec 4 - max	-0.016	9	0.082	9	0.042	7	-0.002	6	0.005	9	0.002	8	0.002	7	0.003	8	0.000	8	0.001	0.000	0.000		0.016	
723	M67	16in Dia. Duct	Sec 2 - max	0.003	6	0.017	1	0.011	3	-0.013	1	0.013	1	0.009	2	0.009	3	0.000	1	0.000	1	0.000	0.001	0.000		0.013	
724	M67	16in Dia. Duct	Sec 2 - min	-0.003	7	0.017	1	-0.011	2	-0.013	1	0.013	1	-0.009	3	-0.009	2	0.000	1	0.000	1	0.000	0.001	0.000		0.013	
733	M68	16in Dia. Duct	Sec 2 - max	0.003	6	0.017	1	0.011	3	-0.013	1	0.013	1	0.009	2	0.009	3	0.000	1	0.000	1	0.000	0.001	0.000		0.013	
734	M68	16in Dia. Duct	Sec 2 - min	-0.003	7	0.017	1	-0.011	2	-0.013	1	0.013	1	-0.009	3	-0.009	2	0.000	1	0.000	1	0.000	0.001	0.000		0.013	
364	M50	14in Dia. Duct	Sec 2 - min	0.000	5	0.010	4	-0.009	2	-0.016	7	0.015	8	-0.010	3	-0.010	2	-6.236	3	-0.002	3	0.000	0.001	0.000		0.016	
430	M56	20in Dia. CS Duct	Sec 5 - min	0.002	9	-0.042	9	-0.021	7	0.005	6	-0.018	9	-0.009	6	-0.009	7	-0.001	8	0.000	8	0.000	0.001	0.000		0.018	
432	M57	20in Dia. CS Duct	Sec 1 - min	0.002	9	-0.042	9	-0.021	7	0.005	8	-0.018	9	-0.009	8	-0.009	7	-0.002	8	0.000	8	0.000	0.001	0.000		0.018	
470	M60	20in Dia. CS Duct	Sec 5 - min	0.002	8	-0.042	8	-0.021	9	0.005	7	-0.018	8	+0.009	6	+0.009	9	-0.007	8	0.000	8	0.000	0.001	0.000		0.018	
472	M61	20in Dia. CS Duct	Sec 1 - min	0.002	8	-0.042	8	-0.021	9	0.005	7	-0.018	8	-0.009	6	-0.009	9	-0.004	8	0.000	8	0.000	0.001	0.000		0.018	
367	M50	14in Dia. Duct	Sec 4 - max	0.004	8	0.011	9	0.007	3	-0.010	5	0.011	4	0.006	2	0.006	3	6.236	2	0.002	2	0.000	0.000	0.000		0.011	
433	M57	20in Dia. CS Duct	Sec 2 - max	0.006	6	-0.013	6	0.024	8	-0.002	6	0.010	9	0.005	8	0.005	7	0.002	7	0.000	7	0.000	0.000	0.000		0.010	
473	M61	20in Dia. CS Duct	Sec 2 - max	0.006	7	-0.013	7	0.024	6	-0.002	7	0.010	8	0.005	6	0.005	9	+0.001	7	0.000	7	0.000	0.000	0.000		0.010	
366	M50	14in Dia. Duct	Sec 3 - min	0.000	5	0.009	4	-0.008	2	-0.013	4	0.013	5	-0.008	3	-0.008	2	-6.236	3	-0.002	3	0.000	0.001	0.000		0.013	
701	M84	16in Dia. Duct	Sec 1 - max	0.000	1	0.000	1	0.000	1	0.011	1	-0.011	1	0.008	3	0.008	2	0.000	1	0.000	1	0.000	0.000	0.000		0.011	
702	M84	16in Dia. Duct	Sec 1 - min	0.000	1	0.000	1	0.000	1	0.011	1	-0.011	1	-0.008	2	+0.008	3	0.000	1	0.000	1	0.000	0.000	0.000		0.011	
703	M84	16in Dia. Duct	Sec 2 - max	0.000	7	-0.002	1	0.001	2	0.011	1	-0.011	1	0.008	3	0.008	2	0.000	1	0.000	1	0.000	0.000	0.000		0.011	
704	M84	16in Dia. Duct	Sec 2 - min	0.000	6	-0.002	1	-0.001	3	0.011	1	-0.011	1	+0.008	2	-0.008	3	0.000	1	0.000	1	0.000	0.000	0.000		0.011	
711	M85	16in Dia. Duct	Sec 1 - max	0.000	1	0.000	1	0.000	1	0.011	1	-0.011	1	0.008	3	0.008	2	0.000	1	0.000	1	0.000	0.000	0.000		0.011	
712	M85	16in Dia. Duct	Sec 1 - min	0.000	1	0.000	1	0.000	1	0.011	1	-0.011	1	-0.008	2	-0.008	3	0.000	1	0.000	1	0.000	0.000	0.000		0.011	
713	M85	16in Dia. Duct	Sec 2 - max	0.000	7	-0.002	1	0.001	2	0.011	1	-0.011	1	0.008	3	0.008	2	0.000	1	0.000	1	0.000	0.000	0.000		0.011	
714	M85	16in Dia. Duct	Sec 2 - min	0.000	6	-0.002	1	-0.001	3	0.011	1	-0.011	1	+0.008	2	+0.008	3	0.000	1	0.000	1	0.000	0.000	0.000		0.011	
729	M87	16in Dia. Duct	Sec 5 - max	0.000	1	0.000	1	0.000	1	0.011	1	-0.011	1	0.008	3	0.008	2	0.000	1	0.000	1	0.000	0.000	0.000		0.011	
730	M87	16in Dia. Duct	Sec 5 - min	0.000	1	0.000	1	0.000	1	0.011	1	-0.011	1	-0.008	2	-0.008	3	0.000	1	0.000	1	0.000	0.000	0.000		0.011	
739	M88	16in Dia. Duct	Sec 5 - max	0.000	1	0.000	1	0.000	1	0.011	1	-0.011	1	0.008	3	0.008	2	0.000	1	0.000	1	0.000	0.000	0.000		0.011	
740	M88	16in Dia. Duct	Sec 5 - min	0.000	1	0.000	1	0.000	1	0.011	1	-0.011	1	-0.008	2	-0.008	3	0.000	1	0.000	1	0.000	0.000	0.000		0.011	
369	M50	14in Dia. Duct	Sec 5 - max	0.003	6	0.010	9	0.008	3	-0.007	5	0.009	4	0.005	2	0.005	3	6.236	2	0.002	2	0.000	0.000	0.000		0.009	
372	M51	14in Dia. Duct	Sec 1 - min	-0.002	9	0.009	7	-0.005	2	-0.009	4	0.007	5	-0.006	3	-0.006	2	-1.304	3	0.000	3	0.000	0.000	0.000		0.009	
763	M90	16in Dia. Duct	Sec 2 - max	0.002	7	-0.012	1	0.008	2	0.009	1	-0.009	1	0.006	3	0.006	2	0.000	1	0.000	1	0.000	0.000	0.000		0.009	
764	M90	16in Dia. Duct	Sec 2 - min	-0.002	6	-0.012	1	-0.008	3	0.009	1	-0.009	1	-0.006	2	-0.006	3	0.000	1	0.000	1	0.000	0.000	0.000		0.009	
365	M50	14in Dia. Duct	Sec 4 - min	0.000	9	0.008	6	-0.007	2	-0.011	4	0.010	5	-0.006	3	-0.006	2	-6.236	3	-0.002	3	0.000	0.000	0.000		0.011	
705	M84	16in Dia. Duct	Sec 3 - max	0.000	7	-0.004	1	0.002	2	0.010	1	-0.010	1	0.007	3	0.007	2	0.000	1	0.000	1	0.000	0.000	0.000		0.010	
706	M84	16in Dia. Duct	Sec 3 - min	0.000	6	-0.004	1	-0.002	3	0.010	1	-0.010	1	-0.007	2	-0.007	3	0.000	1	0.000	1	0.000	0.000	0.000		0.010	
715	M85	16in Dia. Duct	Sec 3 - max	0.000	7	-0.004	1	0.002	2	0.010	1	-0.010	1	0.007	3	0.007	2	0.000	1	0.000	1	0.000	0.000	0.000		0.010	
716	M85	16in Dia. Duct	Sec 3 - min	0.000	6	-0.004	1	-0.002	3	0.010	1	-0.010	1	-0.007	2	-0.007	3	0.000	1	0.000	1	0.000	0.000	0.000		0.010	
371	M51	14in Dia. Duct	Sec 1 - max	0.001	8	0.009	6	0.006	3	-0.007	5	0.009	4	0.006	2	0.006	3	1.304	2	0.000	2	0.000	0.000	0.000		0.009	
707	M84	16in Dia. Duct	Sec 4 - max	0.001	7	-0.005	1	0.004	2	0.009	1	-0.009	1	0.006	3	0.006	2	0.000	1	0.000	1	0.000	0.000	0.000		0.009	
708	M84	16in Dia. Duct	Sec 4 - min	-0.001	8	-0.005	1	-0.004	3	0.009	1	-0.009	1	-0.006	2	-0.006	3	0.000	1	0.000	1	0.000	0.000	0.000		0.009	
717	M85	16in Dia. Duct	Sec 4 - max	0.001	7	-0.005	1	0.004	2	0.009	1	-0.009	1	0.006	3	0.006	2	0.000	1	0.000	1	0.000	0.000	0.000		0.009	
718	M85	16in Dia. Duct	Sec 4 - min	-0.001	8	-0.005	1	-0.004	3	0.009	1	-0.009	1	-0.006	2	-0.006	3	0.000	1	0.000	1	0.000	0.000	0.000		0.009	
727	M87	16in Dia. Duct	Sec 4 - max	0.001	6	0.006	1	0.004	3	0.009	1	-0.009	1	0.006	3	0.006	2	0.000	1	0.000	1	0.000	0.000	0.000		0.009	
728	M87	16in Dia. Duct	Sec 4 - min	-0.001	7	0.006	1	-0.004	2	0.009	1	-0.009	1	-0.006	2	-0.006	3	0.000	1	0.000	1	0.000	0.000	0.000		0.009	
737	M88	16in Dia. Duct	Sec 4 - max	0.001	6	0.006	1	0.004	3	0.009	1	-0.009	1	0.006	3	0.006	2	0.000	1	0.000	1	0.000	0.000	0.000		0.009	
738	M88	16in Dia. Duct	Sec 4 - min	-0.001	7	0.006	1	-0.004	2	0.009	1	-0.009	1	-0.006	2	-0.006	3	0.000	1	0.000	1	0.000	0.000	0.000		0.009	
434	M57	20in Dia. CS Duct	Sec 2 - min	0.002	9	-0.047	9	-0.024	7	-0.010	9	0.002	6	-0.005	7	-0.005	8	-0.002	8	0.000	8	0.000	0.000	0.000		0.010	
474	M61	20in Dia. CS Duct	Sec 2 - min	0.002	8	-0.047	8	-0.024	8	-0.010	8	0.002	7	-0.005	9	-0.005	6	-0.004	8	0.000	8	0.000	0.000	0.000		0.007	
374	M61	14in Dia. Duct	Sec 2 - min	-0.002	9	0.008	7	-0.005	2	-0.007	4	0.005	5	-0.004	3	-0.004	2	-1.304	3	0.000	3	0.000	0.000	0.000		0.009	
370	M50	14in Dia. Duct	Sec 5 - min	0.000	9	0.007	6	-0.006	2	-0.009	4	0.007	5	-0.005	3	-0.005	2	-6.236	3	-0.002	3	0.000	0.000	0.000		0.007	
709	M84	16in Dia. Duct	Sec 5 - max	0.001	7	-0.007	1	0.005	2	0.007	1	-0.007	1	0.005	3	0.005	2	0.000	1	0.000	1	0.000	0.000	0.000		0.007	
710	M84	16in Dia. Duct	Sec 5 - min	-0.001	6	-0.007	1	-0.005	3	0.007	1	-0.007	1	-0.005	2	-0.005	3	0.000	1	0.000	1	0.000	0.000	0.000		0.007	
719	M85	16in Dia. Duct	Sec 5 - max	0.001	7	-0.007	1	0.005	2	0.007	1	-0.007	1	0.005	3	0.005	2	0.000	1	0.000	1	0.000	0.000	0.000		0.007	
720	M85	16in Dia. Duct	Sec 5 - min	-0.001	8	-0.007	1	-0.005	3	0.007	1	-0.007	1	-0.005	2	-0.005	3	0.000	1	0.000	1	0.000	0.000	0.000		0.007	
373	M51	14in Dia. Duct	Sec 2 - max	0.001	6	0.008	6	0.005	3	-0.005	5	0.007	4	0.004	2	0.004	3	1.304	2	0.000	2	0.000	0.000	0.000		0.004	
765	M90	16in Dia. Duct	Sec 3 - max	0.003	7	-0.017	1	0.011	2	-0.004	1	0.004	1	0.003	2	0.003	3	0.000	1	0.000	1	0.000	0.000	0.000		0.004	
766	M90	16in Dia. Duct	Sec 3 - min	-0.003	6	-0.017	1	-0.011	3	-0.004	1	0.004	1	-0.003	3	-0.003	2	0.000	1	0.000	1	0.000	0.000	0.000		0.004	
376	M51	14in Dia. Duct	Sec 3 - min	-0.002	5	0.007	5	-0.005	2	-0.005	4	0.004	5	-0.003	3	-0.003	2	-1.304	3	0.000	3	0.000	0.000	0.000		0.005	
375	M51	14in Dia. Duct	Sec 3 - max	0.001	4	0.007	4	0.005	3	-0.004	5	0.005	4	0.003	2	0.003	3	1.304	2	0.000	2	0.000	0.000	0.000		0.004	
378	M51	14in Dia. Duct	Sec 4 - min	-0.002	6	0.005	6	-0.004	2	-0.004	4	0.002	5	-0.002	3	-0.002	2	-1.304	3	0.000	3	0.000	0.000	0.000		0.003	
362	M52	14in Dia. Duct	Sec 1 - min	-0.003	5	0.002	5	-0.003	2	-0.000	4	0.001	5	+0.001	3	+0.001	2	0.000	1	0.000	1	0.000	0.000	0.000		0.004	
377	M51	14in Dia. Duct	Sec 4 - max	0.001	4	0.006	4	0.004	3	-0.002	5	0.004	4	0.002	2	0.002	3	1.304	2	0.000	2	0.000	0.000	0.000		0.003	
380	M51	14in Dia. Duct	Sec 5 - min	-0.002	5	0.004	5	-0.003	2	-0.003	4	0.001	5	-0.001	3	-0.001	2	-1.304	3	0.000	3	0.000	0.000	0.000		0.003	
379	M51	14in Dia. Duct	Sec 5 - max	0.001	4	0.005	4	0.003	3	-0.001	5	0.003	4	0.001	2	0.001	3	1.304	2	0.000	2	0.000	0.000	0.000		0.002	
364	M52	14in Dia. Duct	Sec 2 - min	-0.002	5	0.002	5	-0.002	2	-0.001	4	0.000	5	0.000	3	0.000	2	0.000	1	0.000	1	0.000	0.000	0.000		0.003	
381	M52	14in Dia. Duct	Sec 1 - max	0.000	4	0.006	4	0.003	3	-0.001	5	0.003	4	0.001	2	0.001	3	0.000	1	0.000	1	0.000	0.000	0.000		0.002	
725	M87	16in Dia. Duct	Sec 3 - max	0.002	6	0.011	1	0.007	3	0.000	1	0.000	1	0.000	3	0.000	2	0.000	1	0.000	1	0.000	0.000	0.000		0.002	
726	M87	16in Dia. Duct	Sec 3 - min	-0.002	7	0.011	1	-0.007	2	0.000	1	0.000	1	0.000	2	0.000	3	0.000	1	0.000	1	0.000	0.000	0.000		0.002	
735	M88	16in Dia. Duct	Sec 3 - max	0.002	6	0.011	1	0.007	3	0.000	1	0.000	1	0.000	3	0.000	2	0.000	1	0.000	1	0.000	0.000	0.000		0.002	
736	M88	16in Dia. Duct	Sec 3 - min	-0.002	7	0.011	1	-0.007	2	0.000	1	0.000	1	0.000	2	0.000	3	0.000	1	0.000	1	0.000	0.000	0.000		0.001	
382	M52	14in Dia. Duct	Sec 3 - min	-0.001	5	0.001	5	-0.002	2	0.000	4	0.000	5	0.000	3	0.000	2	0.000	1	0.000	1	0.000	0.000	0.000		0.001	
383	M52	14in Dia. Duct	Sec 2 - max	0.000	4	0.004	4	0.002	3	0.000	5	0.001	4	0.000	2	0.000	3	0.000	1	0.000	1	0.000	0.000	0.000		0.000	
385	M52	14in Dia. Duct	Sec 3 - max	0.000	4	0.003	4	0.002	3	0.000	5	0.000	4	0.000	2	0.000	3	0.000	1	0.000	1	0.000	0.000	0.000		0.000	
387	M52	14in Dia. Duct	Sec 4 - max	0.000	4	0.001	4	0.000	3	0.000	5	0.000	4	0.000	2	0.000	3	0.000	1	0.000	1	0.000	0.000	0.000		0.000	
388	M52	14in Dia. Duct	Sec 4 - min	0.000	5	0.000	5	0.000	2	0.000	4	0.000	5	0.000	3	0.000	2	0.000	1	0.000	1	0.000	0.000	0.000		0.000	
389	M52	14in Dia. Duct	Sec 5 - max	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000		0.000	

	Member	Duct Size		Axial (kal)	Load Case	y Shear (kal)	Load Case	z Shear (kal)	Load Case	y top Bending (ksi)	Load Case	y bot Bending (ksi)	Load Case	z top Bending (ksi)	Load Case	z bot Bending (ksi)	Load Case	Torque (k-in)	Load Case	Torsional Shear (ksi)	Load Case	f_y/σ_a	D-2260 f_{sy}/σ_a	f_{sz}/σ_a	[redacted]	f_c (ksi)	[redacted]
390	MS2	14in Dia. Duct	Seg 6 - min	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	1	0.000	0.000	0.000	[redacted]	0.000	[redacted]

amec

CALCULATION SHEET

CALC. NO.:	145579-V-CA-005	REV:	1	DATE:	March 26, 2006
CALC. TITLE:	Off-Gas Treatment System Pipe Stress Analysis				
PROJECT NO.:	145579	PROJECT TITLE:	Final DBVS Design		

Attachment 14: Expansion Joint Schedule

NOTE: This cover sheet represents the approval signatures of the originator and checker for all pages of this attachment

ORIGINATOR:	DATE:	CHECKER:	DATE:
Kevin M. Jones KMJ	3/26/06	J. Van Corbach JVC	3/26/06

Calculation 145579-V-CA-005 Model 1 Expansion Joint Schedule

Tag Number	Node Numbers	X-Dspl (max)	X-Dspl (min)	Y-Dspl (max)	Y-Dspl (min)	Z-Dspl (max)	Z-Dspl (min)	X - Max Total Dspl	Y - Max Total Dspl	Z - Max Total Dspl
EJ-407	N95	-0.012	-0.024	0.009	0.007	-0.181	-0.253	0.024	0.009	**0.253**
	N96	0	0	0	0	0	0	Lateral	Lateral	**Axial**
EJ-502	N198	0.012	0.009	0.048	0.046	-1.537	-1.544	0.017	0.067	**1.725**
	N199	-0.004	-0.005	-0.018	-0.019	0.181	0.181	Lateral	Lateral	**Axial**
EJ-503	N84	0.121	-0.003	0.733	0.733	0.57	0.425	0.988	1.833	0.904
	N90	-0.805	-0.867	-0.577	-0.6	0.479	-0.28	Lateral	Axial	Lateral
EJ-601	N142	0	-0.001	0.183	0.024	0.161	-0.881	0.041	0.146	**1.763**
	N148	0.04	-0.021	0.17	0.124	0.882	0.395	Lateral	Lateral	**Axial**
EJ-602	N117	0.001	0	0	0	-0.087	-0.087	0.13	0.384	0.937
	N118	-0.068	-0.129	0.384	0.372	0.85	0.278	Lateral	Lateral	Axial
EJ-603	N127	0	0	0	0	0.446	-0.116	0.002	0.001	**0.526**
	N128	0	-0.002	0.001	0	0.08	0.08	Lateral	Lateral	**Axial**
EJ-622	N208	0	0	-1.713	-1.746	0	0	0.009	1.819	0.02
	N209	0.009	0	0.073	0.073	0.012	-0.02	Lateral	Axial	Lateral
EJ-623	N210	0.092	0.026	-0.296	-0.34	-0.843	-0.969	0.056	0.344	**2.414**
	N212	0.082	0.074	0.004	0.001	1.445	1.276	Lateral	Lateral	**Axial**
EJ-627	N67	0.13	0.009	-0.087	-0.14	-0.072	-0.078	0.328	0.262	0.174
	N68	-0.055	-0.198	0.122	0.046	0.096	0.087	Lateral	Lateral	Axial
EJ-638	N21	-0.245	-0.265	0.328	0.218	0.543	-0.472	0.265	0.328	**0.543**
	N24	0	0	0	0	0	0	Lateral	Lateral	**Axial**
EJ-	N206	0	0	0	0	0	0	0.399	0	0.065
	N274	0.399	0.381	0	0	-0.021	-0.065	Lateral	Lateral	Axial

Calculation 145579-V-CA-005 Model 2 Expansion Joint Schedule										
Tag Number	Node Numbers	X-Dspl (max)	X-Dspl (min)	Y-Dspl (max)	Y-Dspl (min)	Z-Dspl (max)	Z-Dspl (min)	X - Max Total Dspl	Y - Max Total Dspl	Z - Max Total Dspl
EJ-624	N33	0	0	0	-0.163	0	0	0	**0.458**	0
	N73A	0	0	0.295	-0.033	0	0	Lateral	**Axial**	Lateral
EJ-625	N30	0	0	0	-0.163	0	0	0.001	**0.345**	0
	N72A	0.001	0	0.182	-0.101	0	0	Lateral	**Axial**	Lateral
EJ-626	N63A	0	-0.576	0.026	0.017	0	0	**0.951**	0.009	0
	N64A	0.375	0	0.024	0.017	0	0	**Axial**	Lateral	Lateral
EJ-628	N16	0.013	0	0.001	0	0.086	0	0.013	0.002	**1.059**
	N64	0.013	0	0.002	0.002	0	-0.973	Lateral	Lateral	**Axial**
EJ-629	N69A	0	-0.219	0.013	0.004	0	-0.002	**2.233**	0.01	0.002
	N70A	2.014	0.004	0.011	0.003	0	-0.001	**Axial**	Lateral	Lateral

Calculation 145579-V-CA-005 Model 3 Expansion Joint Schedule										
Tag Number	Node Numbers	X-Dspl (max)	X-Dspl (min)	Y-Dspl (max)	Y-Dspl (min)	Z-Dspl (max)	Z-Dspl (min)	X - Max Total Dspl	Y - Max Total Dspl	Z - Max Total Dspl
EJ-406	N1	0	-0.015	0	0	0.257	-0.011	0.015	0	**0.257**
	N17	0	0	0	0	0	0	Lateral	Lateral	**Axial**
EJ-501	N18	0	0	0	0	0	0	0.017	0.062	**0.695**
	N19	0.017	-0.008	-0.002	-0.062	-0.007	-0.695	Lateral	Lateral	**Axial**

Calculation 145579-V-CA-005 Model 4 Expansion Joint Schedule										
Tag Number	Node Numbers	X-Dspl (max)	X-Dspl (min)	Y-Dspl (max)	Y-Dspl (min)	Z-Dspl (max)	Z-Dspl (min)	X - Max Total Dspl	Y - Max Total Dspl	Z - Max Total Dspl
EJ-630	N132A	0	-0.014	0.004	-0.006	0.006	0	**1.519**	0.119	0.107
	N137	1.505	0	0.016	-0.115	0	-0.101	**Axial**	Lateral	Lateral
EJ-631	N87	0	-0.005	0	0	0.014	0	0.011	0.002	**2.846**
	N88	0	-0.011	0.002	0.001	-0.025	-2.832	Lateral	Lateral	**Axial**
EJ-633	N1	0	0	0	0	0	0	0.025	0.007	**0.274**
	N131	0.005	-0.025	0	-0.007	0	-0.274	Lateral	Lateral	**Axial**

Calculation 145579-V-CA-005 Model 5 Expansion Joint Schedule

Tag Number	Node Numbers	X-Dspl (max)	X-Dspl (min)	Y-Dspl (max)	Y-Dspl (min)	Z-Dspl (max)	Z-Dspl (min)	X - Max Total Dspl	Y - Max Total Dspl	Z - Max Total Dspl
EJ-604	N19	0	-1.185	-0.019	-0.027	0.42	-0.214	**1.185**	0.027	0.42
	N20	0	0	0	0	0	0	**Axial**	Lateral	Lateral
EJ-605	N9	0.067	0	0	-0.095	0.067	0	0.106	**0.149**	0.106
	N10	0	-0.039	0.054	0	0	-0.039	Lateral	**Axial**	Lateral
EJ-606	N16	0	-1.185	-0.019	-0.027	0.214	-0.42	**1.185**	0.027	0.42
	N17	0	0	0	0	0	0	**Axial**	Lateral	Lateral
EJ-607	N4	0.067	0	0	-0.095	0	-0.067	0.106	**0.149**	0.106
	N5	0	-0.039	0.054	0	0.039	0	Lateral	**Axial**	Lateral
EJ-608	N54	0	0	0	0	0	0	0.041	0.179	**0.499**
	N56	0.041	-0.037	0.179	-0.003	0.499	-0.001	Lateral	Lateral	**Axial**
EJ-609	N100	0	0	0	0	0	0	0	0	**0.054**
	N108	0	0	0	0	0.054	0	Lateral	Lateral	**Axial**
EJ-610	N90	0	0	0	0	0	-0.061	0	0	**0.061**
	N96	0	0	0	0	0	0	Lateral	Lateral	**Axial**
EJ-611	N91	0	0	0	0	0	-0.061	0	0	**0.061**
	N97	0	0	0	0	0	0	Lateral	Lateral	**Axial**
EJ-632	N79	0	-0.013	0.016	0	0.099	0	0.048	0.03	**0.349**
	N80	0.035	0	0.03	0	0.349	-0.002	Lateral	Lateral	**Axial**

amec

CALCULATION SHEET

CALC. NO.:	145579-V-CA-005	REV:	1	DATE:	March 26, 2006
CALC. TITLE:	Off-Gas Treatment System Pipe Stress Analysis				
PROJECT NO.:	145579	PROJECT TITLE:	Final DBVS Design		

Attachment 15: RISA 3D Validation and Verification Coversheets

DMJMH+N

VERIFICATION & VALIDATION REVIEW AND APPROVAL FORM

SOFTWARE TITLE	DMJM H+N SOFTWARE ID NO.	DMJM H+N COMPUTER ID NO.
RISA-3D Rapid Interactive Structural Analysis – 3 Dimensional	3D03875	102561

VALIDATION PERFORMED BY (Print Name/Sign): James Van Corbach **DATE:** Nov. 10, 2004

PURPOSE AND SCOPE OF VALIDATION:

PURPOSE:
The purpose of this verification and validation is to ensure RISA-3D produces reliable data consistent with industry standards.

SCOPE:
The scope of this verification and validation includes static analysis of structures for deflection, stress, thermal loading, and "code check" values on standard steel shapes as well as tapered wide flanges and wooden structures.

REQUIREMENTS FOR SOFTWARE (INPUT RANGE, ETC):
Perform standard checks on structures to determine structural adequacy.

REV.	AFFECTED PAGES	REVISION DESCRIPTION	PREPARER	APPROVED BY	DATE:
0	All	Initial V & V	James Van Corbach	Michael R Curtis	4/17/05

DESCRIPTION OF SOFTWARE/USE:
RISA-3D is a three-dimensional structural analysis modeling package used to reduce the length of time necessary to calculate stresses/forces in structures by hand.

ORIGIN OF SOFTWARE: © 2001 RISA Technologies

REVISION	DOCUMENT NUMBER	TITLE	DATE	
N/A	N/A	RISA-3D Rapid Interactive Structural Analysis – 3 Dimensional Verification Problems	N/A	V&V REFERENCE
5.0d	N/A	RISA-3D Rapid Interactive Structural Analysis – 3 Dimensional Version 5.0d User's Guide	©2004	USER MANUAL

METHOD OF SOFTWARE VALIDATION

A. ☒ COMPARE TO HAND CALCULATIONS
B. ☒ COMPARE TO VALIDATED COMPUTER ANALYSIS RESULTS
C. ☒ OTHER (DESCRIBE): Compare output to that in the V & V reference which compares previous output to both hand calculations and computer analysis results.

METHOD OF HARDWARE VALIDATION

A. ☒ COMPARE TO HAND CALCULATIONS
B. ☒ COMPARE TO VALIDATED COMPUTER ANALYSIS RESULTS
C. ☒ OTHER (DESCRIBE): Compare output to that in the V & V reference which compares previous output to both hand calculations and computer analysis results.

RESULTS: The Verification and Validation of RISA-3D on DMJMH+N computer # 102561 is acceptable.

ATTACHMENTS

Attachment	Name	Sheets
A	RISA-3D Verification Problems	37
B	RISA Technologies Letter	1

Total number of pages of this V&V, including cover sheets and attachments – 86

DMJM technology

VERIFICATION & VALIDATION REVIEW AND APPROVAL FORM

SOFTWARE TITLE	DMJM H+N SOFTWARE ID NO.	DMJM H+N COMPUTER ID NO.
RISA-3D Rapid Interactive Structural Analysis – 3 Dimensional Version 5.0d	3D03875	9WQSP51

VALIDATION PERFORMED BY (Print Name/Sign): Kevin M. Jones Kevin M Jones **DATE: November 18, 2004**

PURPOSE AND SCOPE OF VALIDATION:

PURPOSE:
The purpose of this verification and validation is to ensure RISA–3D produces reliable data consistent with industry standards.

SCOPE:
The scope of this verification and validation includes static analysis of structures for deflection, stress, thermal loading, and "code check" values on standard steel shapes as well as tapered wide flanges and wooden structures.

REQUIREMENTS FOR SOFTWARE (INPUT RANGE, ETC):
Perform standard checks on structures to determine structural adequacy.

REV.	AFFECTED PAGES	REVISION DESCRIPTION	PREPARER	APPROVED BY	DATE:
0	All	Initial V & V	Kevin M. Jones	Michael R. Custer	
				Michael R. Custer	11-22-04

DESCRIPTION OF SOFTWARE/USE:
RISA-3D is a three-dimensional structural analysis modeling package used to reduce the length of time necessary to calculate stresses/forces in structures by hand.

ORIGIN OF SOFTWARE: © 2004 RISA Technologies

REVISION	DOCUMENT NUMBER	TITLE	DATE	
N/A	N/A	RISA-3D Rapid Interactive Structural Analysis – 3 Dimensional Verification Problems	N/A	V&V REFERENCE
4.5b	N/A	RISA-3D Rapid Interactive Structural Analysis – 3 Dimensional Version 4.5 User's Guide	©2001	USER MANUAL

METHOD OF SOFTWARE VALIDATION

A. ☒ COMPARE TO HAND CALCULATIONS
B. ☒ COMPARE TO VALIDATED COMPUTER ANALYSIS RESULTS
C. ☒ OTHER (DESCRIBE): Compare output to that in the V & V reference which compares previous output to both hand calculations and computer analysis results.

METHOD OF HARDWARE VALIDATION

A. ☒ COMPARE TO HAND CALCULATIONS
B. ☒ COMPARE TO VALIDATED COMPUTER ANALYSIS RESULTS
C. ☒ OTHER (DESCRIBE): Compare output to that in the V & V reference which compares previous output to both hand calculations and computer analysis results.

RESULTS: The Verification and Validation of RISA-3D on DMJMH+N computer # HK4CH31 is acceptable.

ATTACHMENTS

Attachment	Name	Sheets
A	RISA-3D Verification Problems	37
B	RISA Technologies Letter	1

Total number of pages of this V&V, including cover sheets and attachments – 86

amec

CALCULATION SHEET

CALC. NO.:	145579-V-CA-005	REV:	1	DATE:	March 26, 2006
CALC. TITLE:	Off-Gas Treatment System Pipe Stress Analysis				
PROJECT NO.:	145579	PROJECT TITLE:	Final DBVS Design		

Attachment 16: UBC 1997 Seismic Force Evaluation

DMJM H&N | AECOM

UBC 1997—Evaluation and Application of Seismic Force Components in the Design Analysis of PC-2 Duct and Duct Supports

January 2006

DMJM Technology
250 Port of Benton Blvd
Richland, WA 99354-1670
Phone: 509 375 7274
Fax: 509 375 5311

The *Demonstration Bulk Vitrification System Specification* (RPP-17403) provides a list of the codes and standards to be applied in the design and analysis of the Demonstration Bulk Vitrification (DBVS) project. The document by direct reference and through another listed reference—*Design Loads for Tank Farm Facilities* [TFC-ENG-STD-06], CH2M HILL Hanford Group, Inc. provides the requirements and design basis information for the structural design and analysis of the DBVS facilities.

Further reference within TFC-ENG-STD-06 (per Section 3.6.5.1) requires earthquake loads applied in the design of PC-2 SSCs to comply with the *1997 Uniform Building Code* (UBC 1997) for Seismic Zone 2B, essential facilities.

The UBC, as indicated in Section 1630.0, "Minimum Design Lateral Forces and Related Effects," describes the general application and requirements for earthquake loads and states in general that the vertical, seismic component may be taken as zero for Allowable Stress Design.

Further review of the UBC reveals in Section 1632 (Eq. 32-2): "Lateral Force on Elements of Structures, Nonstructural components and Equipment Supported by Structures" was determined appropriate for application in establishing the required, seismic forces to be applied in the design of PC-2, ASME AG-1, HVAC systems and support structures. (Information from calculations for the Off-Gas Treatment System Pipe Stress Analysis [i.e., Calculation 145579-V-CA-005] is provided as an example analysis for reference.) In applications, such as those performed in accordance with ASME AG-1, the 1/3 increase in allowable stresses normally permitted under Section 1612.3.3 by the UBC code in the load combinations in Section 1612.3.2 would not be implemented, rather, the load combinations, allowable stresses and deflection limits imposed by ASME AG-1 would be applied in the design, based on the Service Level requirements of the system.

Equation 32-2 from the UBC is evaluated as follows:

F_P = [(ap Ca Ip)/ Rp] [1 + 3 (hx/ hr)] Wp

a_P	=	1.0	(UBC 1997, Table 16-0, Item 3.B, "Electrical, mechanical, and plumbing equipment and associated conduit and ductwork and piping).
Rp	=	3.0	(UBC 1997, Table 16-0, Item 3.B, "Electrical, mechanical, and plumbing equipment and associated conduit and ductwork and piping).
Ca	=	0.24	(Report of Geotechnical Engineering Services, AMEC, Earth & Environmental, Report No. 4-94M-000310-660)
Ip	=	1.5	(UBC 1997, Table 16-K)
hx	=	45.69 ft	(Element or component attachment elevation with respect to grade. Actual dimensional references are from calculation

145579-V-CA-005 for the Off-Gas Treatment System Pipe Stress Analysis)

hr = 42.75 (Structure roof elevation with respect to grade. Actual dimensional references are from calculation 145579-V-CA-005 for the Off-Gas Treatment System Pipe Stress Analysis)

Wp (Weight of element or component)

F_P = 0.50 Wp

Fp not required to be greater than the following:

Fp max = 4.0 Ca Ip Wp (UBC 1997, Eq. 32-3)

Fp max = 1.44 Wp

Fp shall not be less than the following:

Fp min = 0.7 Ca Ip Wp (UBC 1997, Eq. 32-3)

Fp min = 0.25 Wp

Fp = 0.50 Wp would be the total, design lateral seismic force applied in the analysis performed under the UBC code.

The ASCE 7-98 (also a referenced design code in TFC-ENG-STD-06) provides design requirements for analysis of ductwork, as described in Section 9.6.3.10, "HVAC Ductwork." The following equation in Section 9.6.1.3-1 is referenced from Section 9.6.3.10 for determining the seismic forces to be applied in the design of the ductwork and supports. The equation is somewhat similar to that per the UBC, shown as follows:

$F_P = [(0.4\, a_P\, S_{DS})\, I_P / R_p]\, [1 + 2\,(z / h)]\, Wp$

a_P = 1.0 (ASCE 7-98, Table 9.6.2.2)

Rp = 2.5 (ASCE 7-98, Table 9.6.2.2)

S_s = 0.5 (ASCE 7-98, Figure 9.4.1.1)

F_a = 1.2 (ASCE 7-98, Table 9.4.1.2.4a, Site Class C)

$S_{MS} = F_a * S_s = 0.6$ (ASCE 7-98, Equation 9.4.1.2.4-1)

$S_{DS} = 2/3 * S_{MS} = 0.4$ (ASCE 7-98, Equation 9.4.1.2.5-1)

Ip = 1.5 (ASCE 7-98, Section 9.6.3.10)

z	=	45.69 ft	(Height in the structure at point of attachment of component. Dimensional references indicated are from calculation 145579-V-CA-005 for the Off-Gas Treatment System Pipe Stress Analysis)
h	=	42.75 ft	(Average roof height of structure relative to grade elevation. Dimensional references are from calculation 145579-V-CA-005 for the Off-Gas Treatment System Pipe Stress Analysis)
Wp			(component operating weight)

$F_P = 0.30$ Wp

Fp not required to be greater than the following:

Fp max = 1.6 S_{DS} Ip Wp (ASCE 7-98, Eq. 9.6.1.3-1)

Fp max = 0.96 Wp

Fp shall not be less than the following:

Fp min = 0.3 S_{DS} Ip Wp (ASCE 7-98, Eq. 9.6.1.3-2)

Fp min = 0.18 Wp

Fp = 0.30 Wp would be the total design lateral seismic force applied in the analysis performed under the ASCE 7-98 Standard.

Total seismic force, E for application in load combinations per ASCE 7-98, Section 2.4.1 is determined as defined under Section 9.5.2.7, "Combination of Load Effects," as follows:

$E = \rho\, Q_E + 0.2 S_{DS}\, D$ (ASCE 7-98, Eq. 9.5.2.7-1), (D, Effect of Dead Load)

$Q_E = F_P$, $\rho = 1.0$ (ASCE 7-98, Section 9.6.1.3)

The horizontal and vertical components as shown are summed for application in the load combination, however the more appropriate application of these components in the analysis is by vectorial combination of the components by square root of-the-sum of the squares, as follows:

Horizontal Seismic Force Component, $E_H = 0.30$ Wp

Vertical Seismic Force Component, $E_V = 0.08$ D

$E = [(E_H)^2 + (E_V)^2]^{1/2}$

E = 0.31 (Combined SRSS)

The ASCE approach provides a less conservative loading using the SRSS value, as compared to the loading per UBC.

Based on the preceding information and considering that the UBC 1997 is the principal code for determining the earthquake loads for this analysis, sufficient direction and basis is presented to provide a conservative design for the subject ductwork and support system, and application of other referenced codes is not necessary.

References

ASCE 7-98, *Minimum Design Loads for Buildings and Other Structures*, American Society of Civil Engineers, Reston, Virginia.

ASME AG-1, *Code on Nuclear Air and Gas Treatment*, American Society of Mechanical Engineers, New York, New York.

CH2M HILL, 2005, *Demonstration Bulk Vitrification System Specification*, RPP-17403, Revision 3, CH2M HILL Hanford Group, Inc., Richland, Washington.

TFC-ENG-STD-06, *Design Loads for Tank Farm Facilities*, Revision A, CH2M HILL Hanford Group, Inc., Richland, Washington.

UBC, 1997, *1997 Uniform Building Code*, International Conference of Building Officials, Whittier, California.

amec

CALCULATION SHEET

CALC. NO.:	145579-V-CA-005	REV:	1	DATE:	March 26, 2006
CALC. TITLE:	Off-Gas Treatment System Pipe Stress Analysis				
PROJECT NO.:	145579	PROJECT TITLE:	Final DBVS Design		

Attachment 17: ChemMet, LTD Corrosion Evaluation

CHEMMET, LTD., PC
POB 4068
West Richland, WA 99353
(509) 967-2309 or (800) 570-2309 Fax (509) 967-2459

March 24, 2006

Ja-Kael Luey, PE
DMJM Technologies
3250 Port of Benton Blvd
Richland, WA 99354-1670

Dear Mr Luey

Technical Specifications: *Sintered Metal Filter* (143643-V-SP-002, Rev 2), *Exhaust Fans* (145579-V-SP-004, Rev 4), *HEGA Filter Skid* (145579-V-SP-010, Rev 1), *Wet Scrubber Skid Assembly Design and Fabrication* (145579-D-SP-037, Rev 1), *Off-Gas Treatment System Bypass Filter/Fan and Bypass Bleed Skid Assemblies* (145579-V-SP-017, Rev 0) – A Corrosion Review

This document presents a limited number of general remarks about corrosion in the specifications and recommendations. Some remarks pertain to more than one system and are included in this introductory section.

- It is often stated in the documentation that the various 300 series stainless steels may be interchanged at will. Generally, for this system, this is true but it is strongly recommended that the stainless steel off-gas/process lines be 316L unless they remain above the dew-point.
- The off-gas typically contains much more NO_x than SO_x, HCl, or HF and therefore condensate is expected to be rather inert towards stainless steel because it should contain an excess of HNO_3.
- In many specifications, it is stated that stainless steel nuts are required with stainless steel bolts. Unless an anti-galling compound is used, it is worth considering the use of Nitronic 60 for one of the components, probably the nut, to prevent galling.
- If any of the particulates are hygroscopic at a system's operating temperature, there is a possibility of deposits and localized corrosion – no information is available about this.
- No stainless steel component should have carbon steel braces or supports welded directly to it if the interior of the stainless steel is exposed to process fluids.

***Sintered Metal Filter* (143643-V-SP-002, Rev 2)**

- In Table 2-2, where the ASME B&PV code is referenced, mention is made of brazing. Many brazes for stainless steel contain copper or silver. This is absolutely prohibited if there is any opportunity for condensate liquids to be present. These brazes dissolve rapidly in nitric acid!
- Section 3.3.1.11.1: Where 304/304L and 316/316L stainless steels and carbon steel are used in the same system, Positive Material Identification (PMI) is strongly recommended to ensure the wrong alloys are not used during welding.

Exhaust Fans **(145579-V-SP-004, Rev 4)**

- Any of the appropriate comments above apply here also. If condensate forms, there is some possibility of corrosion fatigue, but that does not appear too likely under the given conditions.

HEGA Filter Skid **(145579-V-SP-010, Rev 1)**

- Section 3.3.1.1 – As mentioned in the letter report last year, is there any chance of the NO_x reacting with the carbon to form a fire hazard? If so, what is the maximum temperature attainable? Is there a fire suppression system that could cause water to be present which would lead to the formation of carbon monoxide and hydrogen through the reaction of water with the carbon? This question is raised again because of a fire in a similar operation at Hanford this year.

Wet Scrubber Skid Assembly Design and Fabrication **(145579-D-SP-037, Rev 1)**

- Most of the ducting is resistant to the environment. However, at the entry to quencher, 36-N83-034, condensate conditions are expected to be more corrosive. (Based on Table 3-2 information and also area E7 on drawing F-145579-36-A-0100, Rev L.) Because the temperature there is less than 135 °F, and there is a high NO_x content relative to the HCl, SO_x, and HF, the corrosion is expected to be minimal.

Off-Gas Treatment System Bypass Filter/Fan and Bypass Bleed Skid Assemblies **(145579-V-SP-017, Rev 0)**

- Section 3.2.1.1 – it appears that if the temperature drops from the inlet value, nitric acid could condense. The stainless steel ducting and fans will accommodate this condition.
- Section 3.3.1.3.4 – If the heating coils are exposed to the off-gas, they may suffer some corrosion, particularly under off-normal conditions; the literature does not indicate a major problem but the coils should be monitored..
- Drawing 145579-36-V-0007, Rev G – shows the use of mild steel ducting/pipe after the SCR. If the temperature remains above the dew-point of the off-gas, bare mild steel would be acceptable for the 2-y design life of the system – particularly if it is schedule 10 pipe, or better. With off-normal conditions, it is possible that significant NO_x would be present and additional corrosion should be expected at temperatures below the dew-point. If un-coated pipe is used, the bottom of the line should be checked for corrosion whenever operation below the dew-point is conducted. In accordance with Section 3.3.6, however, coating the interior of the pipe with an acid resistant coating is recommended.
- Miscellaneous mild steel vent lines – some water will condense in the lower sections of the lines and result in corrosion. Corrosion rates will probably be less than about 5-mpy (0.005-inch/y) but definitely less than 10-mpy. Thus for a 2-y design life, a minimum corrosion allowance of about 0.02-inch should be used. The other consideration is that corrosion products will fall into the associated vessels.

Sincerely,

James R. Divine, PhD, PE
NACE Corrosion Specialist, #867
Chief Engineer

JAMES R. DIVINE
STATE OF WASHINGTON
12231
REGISTERED
PROFESSIONAL ENGINEER
EXPIRES: 3-11-08

DMJMH+N CALCULATION DESIGN VERIFICATION CHECKLIST	Task/Project #: A77977	
Calculation Number: 145579-V-CA-005 DBVS OGTS Pipe Stress Analysis	Revision 1	Safety Related N/A
Reviewer/Checker (print name): Douglas M. Chenault Reviewer performed or supervised subject calculation. __X__ NO _____YES Justification Attachment _____, _____ pages Alternate Verification method approved N/A Method		Date 3/27/2006

ITEM(S) CHECKED Note: Calculation Forms are per *amec*© format.	Accept Y/N	OBJECTIVE EVIDENCE Sheets		INITIAL/ DATE
1. Cover forms properly completed.	Y	1 & 2	of 602	DMC/3/27/06 DMC
2. Calculation Sheet headers complete with calc. no., rev., etc.	Y	1	thru 90	DMC/3/27/06 DMC
3. Calculation Sheet contents complete per format.	Y	3	thru 90	DMC/3/27/06 DMC
4. Listed attachments included.	Y	Att. 1 thru 17	512 pages	DMC/3/27/06 DMC
5. Calculation Objective clearly described.	Y	3	Section 1.1,1.2	DMC/3/27/06 DMC
6 Criteria are suitable and properly referenced to task-specific documents.	Y	4	Section 2.2	DMC/3/27/06 DMC
7. Assumptions and data described and attached or referenced to task documents.	Y	5,6	Section 2.3	DMC/3/27/06 DMC
8. Calculation method identified and appropriate for the design activity.	Y	9, 10	Section 4.0	DMC/3/27/06 DMC
9. Calculation results reasonable and correctly described in Results and Conclusions.	Y	10 thru 18	Section 5.0	DMC/3/27/06 DMC
10. Computer Program identified with version and revision.	Y	9	Section 4.0	DMC/3/27/06 DMC
11. Computer Program references method used, etc.	Y	19	Section 6.0	DMC/3/27/06 DMC
12. Computer input/output provided.	Y	Various pages	Attachment 4 thru 13	DMC/3/27/06 DMC
13. Computer run traceable to calculation.	Y	All pages of Listed Att.	Attachment 4 thru 8	DMC/3/27/06 DMC
14. Computer input data within permissible design input range.	Y	As noted in Section. 6.0 pages 19 to 90	Attachment 4 thru 13	DMC/3/27/06 DMC
15. Computer Program validation/verification addressed.	Y	9	Section 4.0	DMC/3/27/06 DMC

REMARKS:

Douglas M Chenault

D. M. Chenault

Reviewer/Checker Signature

Printed Name

Date 3-26-06

Subcontractor Calculation Review Checklist
DBVS OGTS Calculations

Subject: Off-Gas Treatment System Pipe Stress Analysis

The subject document has been reviewed by the undersigned.
The checker reviewed and verified the following items as applicable.

Documents Reviewed: 145570-V-CA-005 Rev 1, OGTS Pipe Stress Analysis

Analysis Performed By: AMEC

- Design Input
- Basic Assumptions
- Approach/Design Methodology
- Consistency with item or document supported by the calculation
- Conclusion/Results Interpretation
- Impact on existing requirements
- _____

Checker (printed name, signature, and date)

Tom Mackey T. Mackey 4/24/2006

Organizational Manager (printed name, signature and date)

Mike Sutey M. Sutey 4/24/06

The drawings need to be updated to match the analysis. Calculations are needed for each duct support type. Detailed location of duct supports needs to be shown on the drawings. Update calculations to clearly state that the duct is analyzed to 0.5 Wp. Calculations need to be updated to fully describe duct runs analyzed including isometric sketches.

This page intentionally left blank.

IN-CONTAINER VITRIFICATION SYSTEM AND OFF-GAS TREATMENT SYSTEM DESIGN SUBMITTALS

4

JULY 2006

Permit Attachment LL DBVS

Appendix 7 Off Gas Treatment System

Section 2 Independent Qualified Registered Professional Engineer Design Assessment Reports

DR-012, Rev. 0, "Review of Demonstration Bulk Vitrification System IQRPE/RCRA Design Review Package RPP-24544, Revision E, Section 2.5, Main Off-Gas Treatment System."

Attachment 5
06-ESQ-051

IQRPE Design Assessment Report No. DR-012, Revision 0,
"Review of Demonstration Bulk Vitrification System IQRPE/RCRA
Design Review Package RPP-24544, Revision E, Section 2.5,
Main Off-Gas Treatment System"

Independent Qualified Registered Professional Engineer Support to Demonstration Bulk Vitrification Project

CH2M Hill Requisition # 114648

IQRPE Design Assessment Report No. DR-012, Rev. 0

Review of

Demonstration Bulk Vitrification System IQRPE/RCRA Design Review Package, RPP-24544, Revision E

Section 2.5, Main Off-Gas Treatment System (90 Percent Design)

Prepared by:

Timothy J. Oliver, Environmental PE
Cooper Zietz Engineers, Inc.
421 SW Sixth Avenue, Suite 1210
Portland, Oregon 97204
For
TechnoGeneral Services Company

Reviewed by:

Karl M. Walterskirchen, PE, Chief Engineer
TechnoGeneral Services Company
710 N. 4th Avenue
Pasco, Washington 99301

At the request of:

CH2M Hill Hanford Group, Inc.
POB 1500

Richland, Washington 99352

April 19, 2006

Table of Contents

1.0 INTRODUCTION 4
1.1 Project Description 4
1.2 Design Review Requirements 4
1.3 OGTS Design Overview 6
1.3.1 Sintered Metal Filters Overview 7
1.3.2 Wet Scrubber Skid Assembly Overview 7
1.3.3 HEPA Filter Skid Overview 8
1.3.4 HEGA Filter Skid Overview 8
1.3.5 SCR Skid Overview 9

1.3.8 Exhaust and Inlet Stack Overview 9
1.3.9 Off-Gas Stack Monitoring System Overview 10
1.4 Scope of IQRPE Design Assessment 11

2.0 ASSESSMENT 12
2.1 Codes, Standards and Regulations 13
2.2 Basis of Design 14
2.2.1 Structural Design Standards 14
2.2.2 Waste Compatibility 18
2.2.3 Pressure Control System 22
2.2.4 Secondary Containment System 25
2.2.5 Ancillary Equipment Design 29
2.2.6 Corrosion Assessment 30
2.2.7 Recommended Inspection Schedule 33

3.0 DESIGN REVIEW ASSESSMENT CERTIFICATIONS 36

Tables

Table 1. Air Stream Properties Entering OGTS Components 14

Table 2. HEPA Filter Skid Assemblies Preliminary IQRPE Inspection Points 34

Figures

Figure 1. Demonstration Bulk Vitrification System Site Three-Dimensional View. 5

Figure 2. OGTS Three-Dimensional View. 13

Attachments

A OGTS System IQRPE Disposition of Reviewed Calculations, Specifications, and Drawings

B OGTS Design Deliverables to be Reviewed with the Construction Certification Package

C Codes, Standards, and Regulations Incorporated into Technical Specification Packages

D OGTS Piping & Instrumentation Diagrams

1.0 INTRODUCTION

The Washington State Department of Ecology (Ecology) has issued a permit for the Demonstration Bulk Vitrification System (DBVS) that mandates the use of an Independent Qualified Registered Professional Engineer (IQRPE) to perform a third-party independent review of the design of Ecology sensitive portions of the DBVS project. TechnoGeneral Services Company (TGS) has prepared this IQRPE Design Assessment Report in conjunction with Cooper Zietz Engineers, Inc. (CZE), at the request of CH2M Hill Hanford Group, Inc. (CH2M HILL), the project co-operator. TGS is the IQRPE of record for this project.

1.1 Project Description

The DBVS is a demonstration waste treatment plant operated under a Research, Development and Demonstration (RD&D) Permit issued by Ecology. The RD&D Permit is issued to the U.S. Department of Energy, Office of River Protection (DOE-ORP) and CH2M HILL. The DBVS plant will be located at the 200 West Area of the Hanford Site. The DBVS is being designed, constructed, and operated by AMEC, an engineering/services company from Vancouver, British Columbia, under contract to CH2M HILL. AMEC is tasked to comply with the RD&D Permit. Figure 1 is a three-dimensional graphic view of the DBVS project.

The DBVS is designed to process a liquid salt solution of low-activity mixed waste (LAW) originating from Tank 241-S-109. The DBVS facility is located adjacent to Tank 241-S-109. The LAW is to be converted into solid glass form by drying the LAW and soil, mixing the LAW/soil material with glass formers, and melting it with an electric current. The project is intended to demonstrate the viability of immobilizing LAW from the tank farm utilizing a proprietary AMEC vitrification system. The demonstration is to involve treating up to 600,000 gal of waste (5M Na solution) in 24 months, producing up to 50 In-Container Vitrification (ICV™) melt boxes of stabilized vitrified waste.

About 13,170 gal of LAW are to be processed in one melt box. A detailed description of the process is provided in Attachments AA and BB of the RD&D Permit.

1.2 Design Review Requirements

Many of the components of the DBVS will handle dangerous or mixed waste and are regulated by Ecology in the RD&D Permit. The RD&D Permit requires an IQRPE review of the design of these components prior to installation.

The Compliance Schedules, Sections IV.A.8 and V.I of the RD&D Permit, define the design documents to include drawings, specifications, calculations and other information as deemed necessary to support the design. The RD&D Permit identifies 7 systems, including the foundations system that will have design packages prepared for IQRPE review. CH2M HILL is providing the IQRPE with design review packages as AMEC completes the design.

As a basis for the IQRPE certification, a review is performed on a final version of the document "Demonstration Bulk Vitrification System IQRPE/RCRA Design Review Package", RPP-24544

as prepared by AMEC and reviewed and approved by CH2M HILL. Each design review package includes a body of text that explains the purpose and scope of the DBVS and describes the overall process as well as the specific system addressed in the design package. Included as supporting information (appendices) are calculations, site maps, drawings, sketches, piping and instrumentation drawings (P&ID), waste characteristics, technical specifications for materials and equipment, and miscellaneous supporting data. Each design review package will be a revision of the RPP-24544 specific to the system addressed in the package. CH2M HILL is not requiring AMEC to seal/stamp final design documents per WAC for any DBVS work other than the Site Improvements work (foundations and site work). Documents such as drawings, calculations, and specifications included in the design review package that are marked as final and have signatures for the preparer, checker, and approver, will be reviewed by the IQRPE as a complete document. All other documents will be reviewed as preliminary or supportive information.

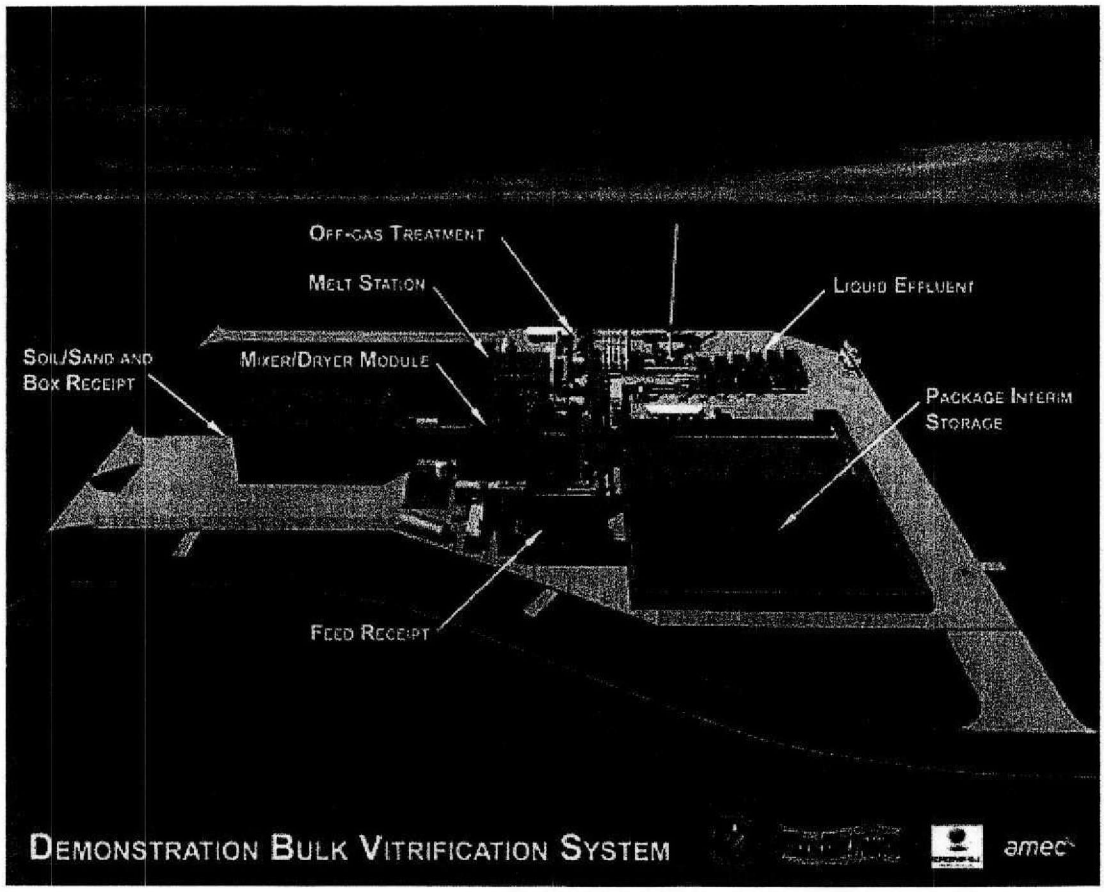


Figure 1. Demonstration Bulk Vitrification System Site Three-Dimensional View.

Preliminary design data was submitted and reviewed by the IQRPE reviewer as part of this certification, but only in an effort to familiarize the reviewer with the design until receipt of the final version.

The final system identified for IQRPE design review is the Off-Gas Treatment System (OGTS), Section 2.5 of RPP-24544. The primary functions of the OGTS are to temper, scrub, condense, consolidate, filter, chemically and catalytically treat, and monitor off-gases before discharge to the atmosphere. The OGTS collects gases, particulates, and vapors from the waste dryer condenser, the ICV box, the AWTE hood, the waste receipt tanks, and the secondary waste tanks.

This IQRPE review of Design Package 2.5 is based on Revision E, dated March 28, 2006, as supplied to TGS by CH2M HILL.

1.3 OGTS Design Overview

This certification of the OGTS is based on the information presented in the Demonstration Bulk Vitrification System IQRPE/RCRA Design Review Package, Revision 0 (RPP-24544). The design package includes multiple calculations, specifications, and drawings, as summarized in Attachment A. TGS is providing one IQRPE design review report for the OGTS.

The OGTS includes the following major components:

- Sintered Metal Filters 1 & 2 (V-SP-002)
- Wet Scrubber Skid (D-SP-037)
    - Quencher
    - Scrubber Feed Tank
    - Heat Exchanger
    - Venturi Srubber
    - Mist Eliminator 1 & 2
    - Scrubber Condenser
    - HEPA Filter Heater
- HEPA Filter Skid (D-SP-036)
    - HEPA Filters 1 through 4
- HEGA Filter Skid (V-SP-010)
    - Carbon Filter 1 & 2
    - Polishing Filter 1 & 2

- SCR Skid (V-SP-001)
  - SCR Heat Exchanger
  - SCR Heater
  - SCR Catalyst Bed
  - Ammonia Vaporizers
- Exhaust Fans 1 & 2 (V-SP-004)
- Exhaust Stack (V-SP-005)
- Stack Monitoring System (Technical Data Sheet DS-002.1)
- OGTS Bypass System (V-SP-017)
  - OGTS Bypass Bleed Skid
  - OGTS Bypass Filter/Fan Skids 1 & 2

The following subsections outline the major subsystems included as part of the OGTS.

1.3.1 Sintered Metal Filters Overview

Two sintered metal filters connected in series filter the particulate emissions from the ICV box and AWTE. The particulates trapped by the sintered metal filters are returned to the waste dryer using the vacuum in the dryer as the motive force. The two sintered metal filters in the series arrangement are rated for 99.97 percent efficiency for removing particles above 0.3 microns. Each filter will be capable of rejecting material when back-pulsed. The sintered metal filters are normally operated in series to achieve the required particulate removal.

The sintered metal filters are supported by the melt area structure. IQRPE certification of the foundation is provided in a separate report.

1.3.2 Wet Scrubber Skid Assembly Overview

The wet scrubber skid consists of the process airflow treatment equipment. The process airflow treatment equipment (wet scrubber system), consists of a quencher (36-N83-034), venturi scrubber (36-N73-035), a mist eliminator (36-N24-036), followed by a liquid cooled condenser (26-D10-040), another mist eliminator (36-N24-041), and finally a HEPA filter heater (36-N84-042). The condenser is a finned tube heat exchanger with a chilled water/glycol solution circulated to an air-cooled chiller for the condenser cooling source. The HEPA filter heater is an electric resistance heater used to heat the off-gas to reduce the relative humidity before the HEPA filter trains.

The wet scrubber system also contains a scrubber tank (36-D74-052); an off-gas caustic storage tank (36-D74-010); and a heat exchanger (36-D30-046). The quench solution and scrubber solution is pumped from the scrubber tank to the quencher and the scrubber. The quench and scrubber solution are piped to the heat exchanger where heat is removed from the solution before returning to the scrubber tank. The condenser is a shell and tube heat exchanger with a chilled water/glycol solution circulated to an air-cooled chiller for the condenser cooling source. The pH level in the scrubber tank is monitored and adjusted by making up caustic from the caustic storage tank and bleeding excess solution to the scrubber bleed tanks.

The technical specification for the wet scrubber skid assembly (D-SP-037) also includes provisions for an enclosure with lighting, air conditioning, and heating equipment. Except for the capability of the air conditioning and heating equipment to allow proper operation of the process airflow treatment equipment, these aspects of the wet scrubber skid are not included in this certification.

1.3.3 HEPA Filter Skid Overview

The HEPA filter skid consists of two parallel filter trains: one train normally operating and one on standby. The HEPA filter skid includes two pneumatically operated butterfly valves (36-HV-313 and 36-HV-309), two inlet round duct to rectangular transitions, two inlet test sections, two HEPA filter banks in series (36-N02-114A and 36-N02-114B), two combination test sections, two HEPA filter banks in series (36-N02-114C and 36-N02-114D), two outlet test sections, and two outlet rectangular to round transitions. Each filter train will be configured in a two-high by two-wide filter arrangement to accommodate the process flow and be completely assembled on a structural steel frame.

The HEPA filter skid also contains a condensate collection system consisting of a condensate tank, valved condensate drain lines from each of the HEPA filter train sections, a condensate removal pump, and secondary containment. The condensate tank and secondary containment will include provisions for level instrumentation and alarms.

The HEPA filter skid assembly will be located on the off-gas treatment equipment concrete Foundation #13. IQRPE certification of the foundation is provided in a separate report.

1.3.4 HEGA Filter Skid Overview

The HEGA filter skid consists of two parallel filter trains: one normally operating and one on standby. The HEGA filter skid includes two round to rectangular inlet transitions, two inlet test sections, two HEGA filters (36-N02-064 and 36-N02-106), two combination test sections between banks, two 80-percent polishing filters (36-N02-079 and 36-N02-107), two outlet test sections, two outlet rectangular to round transitions, two butterfly valves, and two pneumatically operated butterfly valves. Each HEGA filter train will be configured in a two-high by two-wide filter arrangement to accommodate the process flow and be completely assembled on a structural steel frame. The purpose of the HEGA filter is to adsorb organic compounds and radioactive iodine. The polishing filter will capture carbon particles from the HEGA filters, due to filter degradation, to prevent carryover into the SCR skid.

The HEGA filter skid will be located on the off-gas treatment equipment concrete Foundation #13. IQRPE certification of the foundation is provided in a separate report.

1.3.5 SCR Skid Overview

The SCR skid (36-D58-105) will be used to remove the NO_x and CO from the off-gas stream. The SCR consists of an air-to-air heat exchanger (36-D30-077), used to preheat the off-gas inlet air stream; an electric in-line heater (36-N84-078), which is used to heat the off-gas air stream to the required catalyst reaction temperature; an SCR unit containing the reactor catalyst bed (36-D59-003), used to aid the reaction of the NO_x and CO with the ammonia; an ammonia atomizer, used to atomize the ammonia in the high-velocity air stream; and an ammonia supply tank (36-D38-008), used to store ammonia and supply the ammonia atomizer.

The SCR skid will be located on the off-gas treatment equipment concrete Foundation #13. The ammonia tank and ammonia vaporizer will be located south of the SCR skid on the liquid ammonia storage tank Foundation #12. IQRPE certification of the foundations is provided in separate reports.

The ammonia storage tank (36-D38-008) is an 8,000-lb capacity ASME-coded vessel. The ammonia storage tank and atomizer are not discussed further in this report as they are outside the scope of this IQRPE certification.

1.3.6 Exhaust Fans Overview

The OGTS includes two exhaust fans (36-N31-025 and 36-N31-026): one fan operates continuously and the other is on standby. The exhaust fans provide the motive force to move the exhaust gases and vapors through the OGTS. The exhaust fans are direct drive configuration, centrifugal type. Variable frequency drives will be used with the exhaust fans during start-up.

The OGTS exhaust fans are located north of the SCR, adjacent to the exhaust stack, on concrete Foundation #10. IQRPE certification of the foundation (C-CA-015) was reviewed as part of this certification report.

1.3.7 Exhaust Stack Overview

The OGTS exhaust stack (36-N26-024), is designed to disperse the quenched, filtered, and scrubbed off-gas to the atmosphere without disturbance to local air conditions. The exhaust stack will also provide the location for the stack monitoring system sample probes and air velocity traverse ports. The exhaust stack includes lightning protection, ladders, platforms, gas sampling ports, velocity ports, drainage ports, support rings, access doors, and supports. The OGTS exhaust stack has a 48-in. outside diameter at the base, and a 24-in. outside diameter at its exit, and discharges 155 ft. above grade.

The OGTS exhaust stack is located north of the SCR on concrete Foundation #10. IQRPE certification of the foundation (C-CA-015) was reviewed as part of this certification report.

1.3.8 Off-Gas Stack Monitoring System Overview

The OGTS stack monitoring system will analyze the off-gas stream, collect data and samples for regulatory reporting, provide feedback for the performance of the OGTS, and provide warnings to personnel in the event of elevated exhaust stack emissions. The stack monitoring system consists of the following components:

- Continuous radiation monitor (located before the SCR)
- Record sampler(s)
- Continuous gas emissions monitor
- Continuous stack particulate collection: P-10 (sub 10-micron particle)
- Off-gas stack flow measurement
- Off-gas stack temperature measurement
- Shrouded sample probes
- Heat-traced sample transport lines
- Cabinets/enclosures required to house and protect equipment

The stack monitoring system shrouded sample probes, stack off-gas temperature measurement, and off-gas stack flow measurement devices will be located in the OGTS exhaust stack. The continuous radiation monitor (located before the SCR), radiation record sampler, continuous gas emissions monitor, continuous stack particulate collection device, hardware, and software will be located in cabinets at the base of the OGTS exhaust stack.

The OGTS continuous radiation monitor located upstream of the SCR unit will monitor the off-gas for beta and gamma (^{129}I) sources. The OGTS multi-gas analyzer will monitor the off-gas for NO_x, SO_2, HCl, CO, total hydrocarbons, Cl_2, and NH_3.

Radiation monitoring is beyond the scope of the IQRPE certification and is not discussed further in this report.

1.3.9 Off-Gas Treatment System Bypass System

The OGTS Bypass System is designed to provide continuous flow through the ICV box to the exhaust stack. This system is engaged if flow into the ICV box falls below a target level. Once engaged, gases from the process are drawn through HEPA filters and then discharged through the exhaust stack. To ensure that the Bypass System provides immediate gas flow from the ICV box, one of the two fans is always running. Air is drawn through a HEPA filter, located on a skid near the Melt Area. When valves switch the flow path from the Main OGTS to the Bypass System, there is still some flow through the HEPA filter, but the majority of the flow is now from the ICV box. This operational approach minimizes the lag time for establishing flow from the ICV box through the Bypass System.

The technical specification for the OGTS Bypass (V-SP-017) also includes provisions for an uninterruptible power supply, diesel generator, and automatic transfer switch. Except for the capability of these devices to allow continuous operation of the induced draft fans, these aspects of the OGTS Bypass are not included in this certification.

1.4 Scope of IQRPE Design Assessment

This IQRPE design report number is DR-012. This IQRPE design assessment includes a comprehensive review of the Demonstration Bulk Vitrification System IQRPE/RCRA Design Review Package, Revision E (RPP-24544) in accordance with the requirements of the DBVS RD&D Permit IV.A.8.b.i through IV.A.8.b.viii, IV.A.8.c.i,and V.I.2.a through V.I.2.f, and V.I.3.a through V.I.3.f. Exceptions are listed in Section 2.2 below. The documents included in this review and the level at which each document was reviewed is summarized in Attachment A.

The following items are not covered by the WAC dangerous waste regulations or the RD&D Permit for the facility, and are therefore outside of the scope of this certification:

- Plant utilities, including chemical supply storage and piping supply systems, instrument and plant air supply lines, and electrical power beyond the first upstream device or uninterruptible power supply systems.
- Structural features not related to hazardous waste secondary containment.
- Architectural features not related to hazardous waste containment.
- Lighting systems.
- System design features related to protection of the system due to vehicular traffic.
- Electrical or signal lines beyond the first upstream field termination box (FTB), motor control center (MCC), or instrument control panel (ICS). Specifications for electrical feed, including wiring, local hand switches, terminations, breakers, and other equipment or instruments located in motor control centers were reviewed. Specifications for instrument cabling and terminations were reviewed only between locally mounted devices and field termination boxes and/or local instrumentation and control panels.
- Radiation monitoring or detection components that may be mounted at various locations throughout the system.
- Verification of functional logic for operation and control of the OGTS.

This certification also excludes the review of the Design Review Package to the following design standards included in RPP-17403 because the Design Review Package does not address these issues:

- Section 3.1.2.1.1.3 and Table 3-3 requirements regarding waste feed radionuclide properties, including all radioactive and radionuclide property considerations.

- Section 3.1 requirements for the DBVS that the design:
  - Ensure exposure of plant operating personnel to radioactive process streams (radiation) is as-low as reasonably achievable (ALARA). See also Sections 3.2.4 and 3.3.6.1.1.
  - Minimize the production of secondary waste streams.
  - Ensure that all process byproducts are safe for long-term storage or release into the environment.
- Section 3.3.1.6 requirements for the DBVS that the design include the capability for flushing components for decontamination.
- Section 3.3.6 requirements for the DBVS that the design related to the following:
  - Personnel Safety
  - Fire Protection
  - Non-Radioactive Airborne Emissions (Section 3.3.6.3.4)
  - Radioactive Airborne Emissions (Section 3.3.6.3.6)
- Section 3.3.8 (Decontamination and Deactivation) or Section 3.3.9 (Nuclear Safety) requirements for the DBVS.

Because the 90 percent design of the OGTS has been developed as a purchase specification, much of the 'design' activities have been designated the responsibility of the equipment vendor or SELLER. Therefore, this information will not be available until fabrication of the equipment is underway and will require further IQRPE review as part of the installation assessment certification package. Design calculations and documentation to be reviewed by the IQRPE for inclusion with the construction certification package includes the deliverables listed in Attachment B. A preliminary list of inspection points requiring IQRPE review during fabrication and construction are described in Section 2.2.7 below.

2.0 ASSESSMENT

The OGTS includes the following major specified components:

- Sintered Metal Filters 1 & 2 (V-SP-002)
- Wet Scrubber Skid (D-SP-037)
- HEPA Filter Skid (D-SP-036)
- HEGA Filter Skid (V-SP-010)
- SCR Skid (V-SP-001)
- Exhaust Fans 1 & 2 (V-SP-004)

- Exhaust Stack (V-SP-005)
- Stack Monitoring System (Technical Data Sheet DS-002.1)
- OGTS Bypass System (V-SP-017)

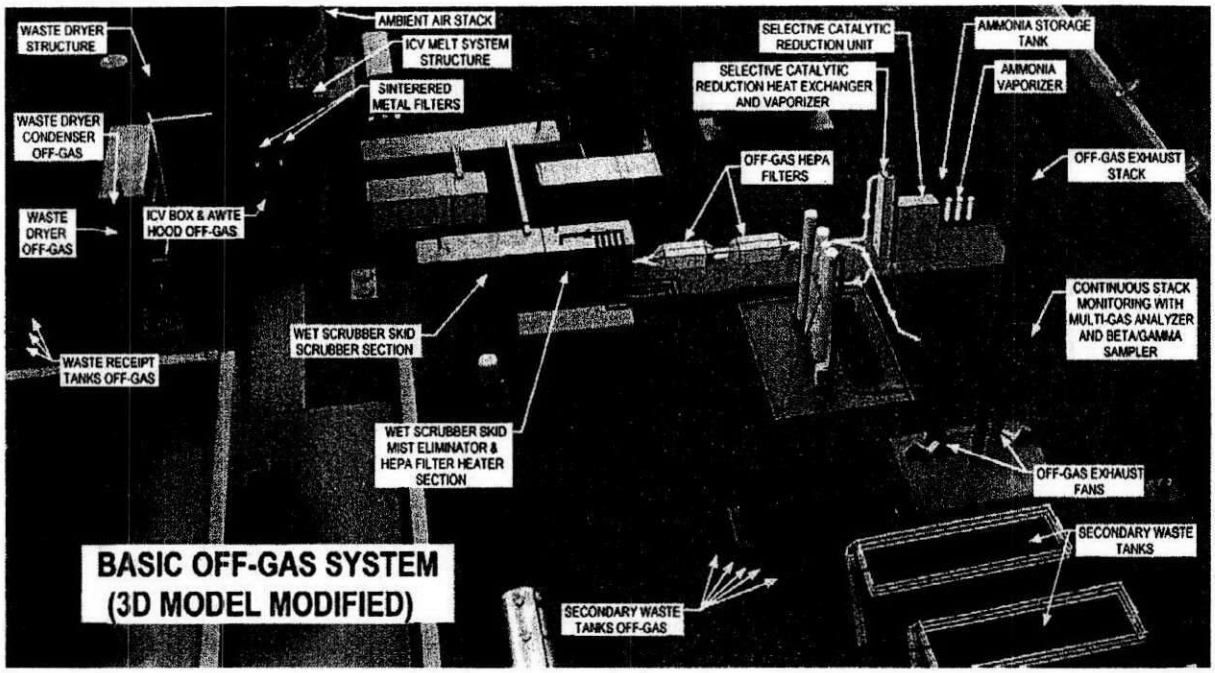


Figure 2. OGTS Three-Dimensional View.

Figure 2 shows a three-dimensional representation of these components at the DBVS site. The following subsections identify the basis and methods used to complete this IQRPE design certification.

2.1 Codes, Standards and Regulations

The codes, standards, and regulations specifically used during the preparation of this certification are referenced as necessary throughout this report. A complete list of codes, standards, and regulations that have been incorporated into the Technical Specification packages is included as Attachment C to this report. The IQRPE concurs with the use of the codes, standards, and regulations that have been designated in the Technical Specifications.

The DBVS has been evaluated in accordance with HNF-IP-1266, TFC-ENG-STD-13, and TFC-ENG-SB-C-06 to establish ignition source control applicability for the prevention of flammable gas accumulation and ignition. Ignition source controls were not considered routinely applicable to the DBVS OGTS equipment (RPP-23429). Only if flammable gas concentrations in the tank head space were to exceed 25% of the lower flammability limit (LFL) will ignition source controls be potentially required. This may require the use of administrative controls to ensure that any equipment or components not included in the ignition control set identified in TFC-ENG-STD-13 be de-energized should this situation arise. The IQRPE has reviewed the

Technical Specifications to ensure that the appropriate requirements have been incorporated into the design as a result of this classification.

2.2 Basis of Design

The OGTS is anticipated to operate for a service life of 2 years while handling LAW from Tank S-109. Equipment has been specified with a design life of 5 years. The primary operating characteristics are presented in Table 1.

Table 1. Air Stream Properties Entering OGTS Components

Properties	Sintered Metal Filter	Wet Scrubber Skid	HEGA Skid	HEPA Skid	SCR Skid
Design Air Flow Rate, acfm	536	3,115	4,560	4,560	7,692
Estimated Temperature, °F	572 (300 °C)	134 (57°C)	200 (93 °C) maximum	200 (93 °C) maximum	128 (53 °C)
Estimated Pressure, in. w.g.	-2.6	-13.6	-90.8	-85.1	-96.2
Air Stream Chemical Components					
SO_2 (ppmV)	721	72	2	2	1.1
NO_x (ppmV)	69,951	6,930	6,125	6,125	3,425
HCl (ppmV)	70	7	0.15	0.15	0.08

HEGA = high-efficiency gas adsorber
HEPA = high-efficiency particulate air
ppbM = parts per billion by mass
ppmV = parts per million by volume
TRU = transuranic
w.g. = water gauge

The following sections highlight the structural design standards, waste compatibility, pressure control system, secondary containment system, ancillary equipment design, corrosion assessment, and inspection schedule recommendations for the OGTS.

2.2.1 Structural Design Standards

Ecology (1995) requires in RD&D Permit Condition V.I.3.a that an IQRPE certify that the proposed subsystems associated with the OGTS have sufficient structural integrity and are acceptable for storing and treating dangerous waste in accordance with WAC 173-303-640(3)(a). This assessment must show that the foundation, structural support, seams, connections, and pressure controls are adequately designed and that the tank system has sufficient structural strength, compatibility with the wastes to be stored or treated, and corrosion protection to ensure that it will not collapse, rupture, or fail in accordance with WAC 173-303-640(3)(a).

The following activities have been conducted in the review of the design standards for the OGTS:

- The structural design standards and criteria used have been reviewed to ensure that they clearly and specifically reference applicable industry standards and recommended practice codes.

- Design criteria that apply to a specific tank or group of tanks have been reviewed to ensure that they are clearly indicated.

Structural calculations are normally part of the IQRPE review. Because the Technical Specifications prepared for the OGTS IQRPE/RCRA Design Review Package are purchase specifications that place the responsibility for the structural calculations on the SELLER, a complete review of the structural calculations has not been completed.

Structural calculations to be submitted by the SELLER and reviewed by the IQRPE at a later date are listed in Attachment B. The OGTS equipment and structures will be analyzed and designed in accordance with the Performance Category 2 requirements of TFC-ENG-STD-06. The applicable structural analysis requirements from this standard have been incorporated into the specifications, calculations, and drawings being provided in the Technical Specification packages.

Where possible, the IQRPE has reviewed the report to ensure that the following activities have been incorporated into the Technical Specifications as part of the design basis:

- Structural calculations will be provided for the nonstandard "off-specification" OGTS "tanks".

- The OGTS process equipment shells will be designed based on a full "tank".

- Calculations will be provided that account for liquid specific gravity, external hydrostatic pressure, and variables such as internal vapor pressure.

- Provisions have been made such that the initially computed shell thickness will be increased to account for the assumed corrosion rate.

- Design parameters used in structural calculations will be clearly indicated and labeled on clarifying sketches.

- Seismic considerations, which are appropriate to the seismic risk zone in which the facility is located, will be accounted for in the structural calculations.

- The foundation underlying the tank systems will support the load of a full tank plus the secondary containment structure per the requirements of WAC 173-303-640(3)(a)(v)(A). This was certified by the IQRPE as part of DR-006.

- The foundation has been designed to prevent failure due to settlement, compression, and uplift per the requirements of WAC 173-303-640(4)(c)(II). This was certified by the IQRPE as part of DR-006.

- The design plans require that homogeneous, porous, noncorrosive backfill material be placed below and around tank system foundations and underground piping to provide

uniform structural support and prevent excessive settlement. This was certified by the IQRPE as part of DR-006.

- The tank systems have been designed to withstand the effects of frost heave per the requirements of WAC 173-303-640(3)(a)(v)(C). This was certified by the IQRPE as part of DR-006.

The following subsections highlight the IQRPE Structural Design Standard review for each of the major OGTS subsystems, and also identify specific exceptions to this IQRPE certification report as they relate to the structural review.

Mechanical calculations performed for the OGTS have been prepared in accordance with requirements in ASME AG-1, B31.3, or ASME STS-1a-2003 as contained in the specifications. Calculations include the following areas as applicable:

- Pipe/housing wall thickness calculations for pressure;
- Stress calculations for sustained loads because of pressure, dead load, and any other sustained loads;
- Stress calculations for displacement stresses, such as thermal loads; and
- Stress calculations for occasional load such as pressure, dead weight, other sustained loads, and earthquake loads.

Stress calculation V-CA-005 analyzed the OGTS ductwork in accordance with ASME AG-1 Service Level B. Calculation B-CA-023 analyzed the OGTS Bypass System ductwork in accordance with ASME AG-1.

2.2.1.1 Sintered Metal Filter Assemblies (V-SP-002)

The Technical Specification was reviewed to ensure that provisions for the proper loads, supports, and design basis had been incorporated. Calculations regarding structural stability for dead loads, live loads, snow loads, wind loads, hoisting and rigging loads are required to be submitted by the SELLER.

The IQRPE concurs that this design basis meets the requirements of the DBVS RD&D Permit and WAC 173-303-640.

2.2.1.2 Wet Scrubber Skid Assembly (D-SP-037)

The Technical Specification was reviewed to ensure that provisions for the proper loads, supports, and design basis had been incorporated. Calculations regarding structural stability for dead loads, live loads, earthquake loads, snow loads, wind loads, hoisting and rigging loads are required to be submitted by the SELLER. Furthermore, the SELLER is required to submit secondary containment volume calculations and skid assembly structural calculations. Mechanical calculations for pipe wall thickness, stress calculations, and hanger stresses are also required to be completed by the SELLER.

The IQRPE concurs that this design basis meets the requirements of the DBVS RD&D Permit and WAC 173-303-640.

2.2.1.3 HEPA Filter Skid Assemblies (D-SP-036)

The Technical Specification was reviewed to ensure that provisions for the proper loads, supports, and design basis had been incorporated. Calculations regarding structural stability for dead loads, live loads, snow loads, ash loads, wind loads, hoisting and rigging loads are required to be submitted by the SELLER. Additionally, hydrostatic pressure of liquid in the condensate collection primary and secondary containment tanks is also required to be evaluated by the SELLER. Mechanical calculations for pipe wall thickness, stress calculations, and hanger stresses are also required to be completed by the SELLER.

The IQRPE concurs that this design basis meets the requirements of the DBVS RD&D Permit and WAC 173-303-640.

2.2.1.4 HEGA Filter Skid Assemblies (V-SP-010)

The HEGA filter skid is to be designed to ASME AG-1 standards.

The Technical Specification was reviewed to ensure that provisions for the proper loads, supports, and design basis had been incorporated. The IQRPE concurs that this design basis meets the requirements of the DBVS RD&D Permit and WAC 173-303-640.

2.2.1.5 SCR Skid Assemblies (V-SP-001)

The Technical Specification was reviewed to ensure that provisions for the proper loads, supports, and design basis had been incorporated. Calculations regarding structural stability for dead loads, live loads, earthquake loads, snow loads, wind loads, hoisting and rigging loads are required to be submitted by the SELLER.

The IQRPE concurs that this design basis meets the requirements of the DBVS RD&D Permit and WAC 173-303-640.

2.2.1.6 Exhaust Fan 1 & 2 Assemblies (V-SP-004)

The Technical Specification was reviewed to ensure that provisions for the proper loads, supports, and design basis had been incorporated. Both exhaust fans will be analyzed and designed to applicable requirements of ASME AG-1.

The IQRPE concurs that this design basis meets the requirements of the DBVS RD&D Permit and WAC 173-303-640.

2.2.1.7 Exhaust Stack Assembly (V-SP-005)

The Technical Specification was reviewed to ensure that provisions for the proper loads, supports, and design basis had been incorporated. The exhaust stack will be analyzed and designed to applicable requirements of ASME STS-1 (Steel Stacks).

Calculations regarding structural stability for dead loads, live loads, earthquake loads, snow loads, wind loads, and thermal expansion are required to be submitted by the SELLER.

The IQRPE concurs that this design basis meets the requirements of the DBVS RD&D Permit and WAC 173-303-640.

2.2.1.8 Stack Monitoring System Assemblies (Technical Data Sheet DS-002.1)

Structural calculations are not required for these assemblies.

2.2.1.9 OGTS Bypass System (V-SP-017)

The OGTS Bypass system is to be designed to ASME AG-1 standards. The OGTS Bypass duct has been designed to ASME AG-1 standards (B-CA-023).

The Technical Specification and calculations were reviewed to ensure that provisions for the proper loads, supports, and design basis had been incorporated. The IQRPE concurs that this design basis meets the requirements of the DBVS RD&D Permit and WAC 173-303-640.

2.2.1.10 Structural Design Exceptions

There are no IQRPE certification exceptions to the structural review.

2.2.2 Waste Compatibility

Ecology (1995) requires that an IQRPE certify that the proposed tank system has been designed of materials compatible with the waste to be stored or treated. The following activities have been conducted in the review of the design standards for the OGTS:

- The proposed materials for the tank system are compatible with the wastes to be stored or treated per the requirements of WAC 173-303-640(3)(a).

- The proposed dangerous wastes or treatment reagents may be placed into the proposed tank system without causing the tank system to rupture, leak, corrode, or otherwise fail per the requirements of WAC 173-303-640(5)(a).

The IQRPE reviewed the waste property information in conjunction with the design specifications. The IQRPE also reviewed systems designed to prevent freezing or precipitation of the waste materials within the system that might impact the basis for the assessment. This included a review of pipe heat tracing specifications, insulation requirements, and OGTS storage tank heater requirements.

A completed waste compatibility evaluation is normally part of the IQRPE review, including an assessment showing that the characteristics of the waste to be stored or treated are compatible with the material properties of the tank system—including material properties of any interior lining used. Because the Technical Specifications prepared for the OGTS IQRPE/RCRA Design Review Package are purchase specifications that place the responsibility on the SELLER, a complete review of the proposed coating and the associated preparation and application procedures has not been completed.

The following subsections highlight the IQRPE Waste Compatibility review for each of the major OGTS subsystems and specific exceptions to this IQRPE certification report as they relate to the waste compatibility review.

2.2.2.1 Sintered Metal Filter Assemblies (V-SP-002)

All components of the SMF assembly contacting process materials are to be constructed of series 300 stainless steel and comply with ASTM A240. No protective coatings are to be used.

Mechanical calculations to be provided by SELLER will account for compatibility of the selected material components with the waste material to be handled, and assess if an allowance is required for corrosion, or other wear (such as erosion), in the design of the system. Additional calculations that may be performed include sizing and wear allowances.

The technical specifications also include appropriate requirements for the design and installation of the SMF in an outdoor environment.

The IQRPE concurs that this design basis meets the requirements of the DBVS RD&D Permit and WAC 173-303-640.

2.2.2.2 Wet Scrubber Skid Assemblies (D-SP-037)

The materials of construction for the wet scrubber are specified by the SELLER. The wet scrubber system will be installed in an insulated enclosure. The wet scrubber system enclosure will be heated by an electric resistance heater for freeze protection at a minimum of 40 °F, and cooled for equipment protection by a split system ductless air conditioning system at a maximum of 85 °F.

The off-gas from the sintered metal filters flows through the quencher, scrubber, and mist eliminators. The quencher and scrubber remove acid gases by circulating a dilute caustic (sodium hydroxide) solution through the quencher and scrubber. The caustic solution is circulated from a scrubber tank that has controls to maintain pH level and scrubber tank bleed off.

The dilute caustic solution is supplied from a "day-use" tank located inside the wet scrubber skid. As dictated by processing conditions, caustic solution is added to the scrubber tanks to maintain the scrubber tank solution in a basic pH range (to be developed during full-scale testing with nonregulated material). This addition is achieved using pump 36-D61-094. The day-use tank provides two functions: (1) allows the wet scrubber system to be self-contained and (2) allows for the flexibility to further dilute the caustic solution if required. If dilution is required, filtered water is added to the tank until a target density (measured by 36-DE-225) is achieved. A mixer (36-XC-095) is provided in the tank to ensure a homogeneous solution.

The IQRPE concurs that this design basis meets the requirements of the DBVS RD&D Permit and WAC 173-303-640.

2.2.2.3 HEPA Filter Skid Assemblies (D-SP-036)

All portions of the HEPA filter skid that contact the gas stream are constructed of stainless steel components. Provisions for coating of the carbon steel materials used for structural support are included in the technical specification.

The IQRPE concurs that this design basis meets the requirements of the DBVS RD&D Permit and WAC 173-303-640.

2.2.2.4 HEGA Filter Skid Assemblies (V-SP-010)

All portions of the HEGA filter skid that contact the gas stream are to be constructed of austenitic stainless steel components.

The IQRPE concurs that this design basis meets the requirements of the DBVS RD&D Permit and WAC 173-303-640.

2.2.2.5 SCR Skid Assemblies (V-SP-001)

The off-gas from the HEPA filter/HEGA filter skid proceeds to the SCR unit. The SCR unit is constructed of series 300 stainless steel. No condensation is expected in this unit.

Before entering the SCR unit, ambient air is mixed with the off-gas stream to reduce the concentration of NO_x to meet the requirements of the SCR. The entering temperature is monitored by 36-TE-505 and the entering NO_x concentration is monitored by 36-AE-503.

The off-gas is pre-heated with an air-to-air heat exchanger. The off-gas that has been heated and treated is routed through the air-to-air heat exchanger to recover the energy from the treated air

before the additional heating required for the off-gas stream for NO_x removal in the SCR unit. The temperature downstream of the air-to-air heat exchanger is monitored by 36-TE-506. The mixed air is reheated by an electric heater to the SCR bed's operating temperature. The heater is modulated by temperature controller 36-E02-108 to maintain the inlet off-gas temperature through the SCR that varies the current through the heating elements.

The off-gas passes through the SCR bed which consists of a multi-pass catalyst bed where ammonia is injected into the air stream. Anhydrous ammonia is fed from a storage tank through an electric vaporizer, mixed with air, and injected into a venturi within the SCR bed (flow is regulated based on NOx concentration at the SCR outlet). The SCR bed will consist of a multi-pass catalyst bed to provide high-efficiency removal of NO_x and CO. The off-gas on the discharge of the catalyst bed is monitored for temperature by 36-TE-510, ammonia concentration by 36-AE-509, and NOx concentration by 36-AE-508. The treated off-gas stream is routed through the air-to-air heat exchanger where the off-gas leaving air temperature is monitored by 36-TE-511 and then routed to the exhaust fans and out the exhaust stack.

The IQRPE concurs that this design basis meets the requirements of the DBVS RD&D Permit and WAC 173-303-640.

2.2.2.6 Exhaust Fan 1 & 2 Assemblies (V-SP-004)

The SELLER is responsible for determining the materials of construction for the exhaust fans. Because the exhaust gas at this point in the DBVS system is not expected to typically contain high concentrations of gases or moisture that would impact material compatibility, the IQRPE concurs that this design basis meets the requirements of the DBVS RD&D Permit and WAC 173-303-640.

2.2.2.7 Exhaust Stack Assembly (V-SP-005)

The exhaust stack will be fabricated from carbon steel. Because the exhaust gas at this point in the DBVS system is not expected to typically contain high concentrations of gases or moisture that would impact material compatibility, the IQRPE concurs that this design basis meets the requirements of the DBVS RD&D Permit and WAC 173-303-640.

2.2.2.8 Stack Monitoring System Assemblies (Technical Data Sheet DS-002.1)

The stack monitoring equipment specified by the technical data sheet is standard off-the-shelf equipment. No special equipment is necessary to be compatible with the stack gas expected at this point in the DBVS system.

2.2.2.9 OGTS Bypass System (V-SP-017)

All portions of the OGTS bypass that contact the gas stream are constructed of stainless steel components. Provisions for coating of the carbon steel materials used for structural support are included in the technical specification.

The IQRPE concurs that this design basis meets the requirements of the DBVS RD&D Permit and WAC 173-303-640.

2.2.2.10 Waste Compatibility Exceptions

IQRPE Certification exceptions to the waste compatibility review are as follows:

1. The materials of construction for specific components of the Wet Scrubber Skid are not included in the technical specification (D-SP-037).

2. The example data sheets included as Appendix C to D-SP-037 are not complete and will require review once complete.

These issues will require IQRPE review once vendor information is available. This review will be documented in the IQRPE installation inspection report.

2.2.3 Pressure Control System

Ecology (1995) requires that an IQRPE certify that the proposed tank system has been designed with appropriate pressure control systems. A review of the pressure control system is normally part of the IQRPE review. Because the Technical Specifications prepared for the OGTS IQRPE/RCRA Design Review Package are purchase specifications that place the responsibility for the purchase of the pressure control system instrumentation, breather filters, and pressure relief valves on the SELLER, a complete review of the pressure control system has not been completed.

Pressure control system information to be submitted by the SELLER and reviewed by the IQRPE at a later date is listed in Attachment B.

The following have been checked as part of the review of the design standards for the OGTS:

- The Technical Specifications include an acceptable preliminary piping and instrumentation system that will allow for adequate pressure control, per the requirements of WAC 173-303-640(3)(a).

- The Technical Specifications include the following basis for the detailed design of the tank system:

    - Tank capacity and design pressure.

    - The applicable characteristics of the waste to be stored.

    - Maximum inflow and outflow rates.

    - The type of roof and how it is attached to the tank.

    - Locations of pressure relief vents and other pressure controls.

- The pressure control system discharge locations.

The following subsections highlight the IQRPE Pressure Control System review for each of the major OGTS subsystems, and also identify specific exceptions to this IQRPE certification report as they relate to the pressure control system review.

The OGTS is a constant-volume system. The primary exhaust fan will operate continuously at a fixed revolution per minute. The stand-by fan will operate at the same conditions as the primary fan if the primary fan fails to provide operational flow and pressure. System flow is balanced using HEPA-filtered ambient air inlets at various locations before the final HEPA filter skid, and a 80-percent efficient (medium efficiency) filtered ambient air inlet downstream of the HEPA filter skid as shown on the P&IDs.

2.2.3.1 Sintered Metal Filter Assemblies (V-SP-002)

The SMF housing is to be designed to ASME B&PV Code Section VIII for full vacuum and 100 psig positive pressure.

Particulate matter collected by the OGTS from the melt is impinged on the sintered metal filters, causing the pressure drop across the filters to increase. Compressed air, controlled by a timer, is used to back-pulse all of the sintered metal filter elements. The time period between back-pulses may be adjusted based on the trend of the pressure drop across the sintered metal filters. The particulates are collected at the bottom of the sintered metal filter housing. These particulates are then returned to the dryer, using vacuum from the dryer as the motive force and bleed air, for incorporation into the next batch of material for the melt. The sintered metal filters are normally operated in series to achieve the required particulate removal; however, each of the sintered metal filters can be bypassed using specific combinations of six remotely operated valves.

The IQRPE concurs that this design basis meets the requirements of the DBVS RD&D Permit and WAC 173-303-640.

2.2.3.2 Wet Scrubber Skid Assemblies (D-SP-037)

The technical specifications estimate a pressure drop of 60 in w.g. through the wet scrubber skid. The SELLER is required to verify the design conditions on the performance of the selected equipment in accordance with ASME N509. The system will be instrumented with differential pressure transmitters to monitor the condition of the system.

The IQRPE concurs that this design basis meets the requirements of the DBVS RD&D Permit and WAC 173-303-640.

2.2.3.3 HEPA Filter Skid Assemblies (D-SP-036)

The HEPA skid is a stainless steel shell specified for –94 in w.g. of static pressure.

The negative pressure entering the HEPA filter skid is monitored by 36-PDIT-312. In addition, each HEPA filter, carbon adsorber, and polishing filter is monitored for differential pressure

(36-PDIS-311, 36-PDIS-315, 36-PDIS-317, 36-PDIS-335, 36-PDIT-327, 36-PDIT-332, 36-PDIT-333, and 36-PDIT-334). Upon a high differential pressure alarm (indicating a plugged filter) or on a low differential pressure alarm (indicating a potentially breached filter), the operating filter train will be valved-out using 36-HV-309 and 36-HV-310, and the off-gas routed through the standby HEPA filter/HEGA filter skid train opening valves 36-HV-313 and 36-HV-314. The temperature is monitored entering each HEPA filter train (36-TE-340, 36-TE-344, 36-TE-342, 36-TE-346) and at each HEPA filter element (36-TE-341, 36-TE-345, 36-TE-343, and 36-TE-347).

The IQRPE concurs that this design basis meets the requirements of the DBVS RD&D Permit and WAC 173-303-640.

2.2.3.4 HEGA Filter Skid Assemblies (V-SP-010)

The HEGA skid is a stainless steel shell rated for –95.8 in w.g. of static pressure. All access doors and frames will be designed to meet the allowable leakage determined by ASME AG-1.

The IQRPE concurs that this design basis meets the requirements of the DBVS RD&D Permit and WAC 173-303-640.

2.2.3.5 SCR Skid Assemblies (V-SP-001)

The design operating pressure for the SCR unit is –98.4 in w.g. Because the unit will operate under negative pressure, no provisions are required for fugitive emissions control.

The IQRPE concurs that this design basis meets the requirements of the DBVS RD&D Permit and WAC 173-303-640.

2.2.3.6 Exhaust Fan 1 & 2 Assemblies (V-SP-004)

The exhaust fans are controlled manually via operator initiated start and stop commands. The primary exhaust fan is shutdown on High-High fan motor vibration levels, High-High fan motor windings temperature, or motor low speed.

The temperature and pressure of the off-gas stream is measured downstream of the exhaust fans prior to entering the stack at 36-TE-522 and 36-PIT-521.

The IQRPE concurs that this design basis meets the requirements of the DBVS RD&D Permit and WAC 173-303-640.

2.2.3.7 Exhaust Stack Assembly (V-SP-005)

The exhaust stack will operate at positive pressure downstream of the exhaust fans. The stack will not handle gases that require the control of fugitive emissions and is therefore not the subject of the pressure control requirements of the DBVS RD&D Permit and WAC 173-303-640.

2.2.3.8 Stack Monitoring System Assemblies (Technical Data Sheet DS-002.1)

No special pressure control equipment is required for the operation of the monitoring system or control of the stack gas at this point in the DBVS system. The equipment will be located outside of the stack and operate at ambient pressure.

2.2.3.9 OGTS Bypass System (V-SP-017)

The OGTS Bypass to be designed for the maximum pressure drop of the induced draft fan selected; estimated to be about –15 in w.g. of static pressure.

The negative pressure entering the induced draft fans is monitored by 36-PIT-904 and -905. In addition, each HEPA filter is monitored for differential pressure (36-PDIT-912 through 36-PDIT-915). The inlet temperature to each HEPA filter is measured in the OGTS bypass duct (36-TE-908).

The IQRPE concurs that this design basis meets the requirements of the DBVS RD&D Permit and WAC 173-303-640.

2.2.3.10 Pressure Control System Exceptions

IQRPE Certification exceptions to the pressure control system review are as follows:

1. The wet scrubber skid includes provisions for the installation of a breather filter. Specifications for this breather filter are not included in the technical specification (D-SP-037).

This issue will require IQRPE review once vendor information is available. This review will be documented in the IQRPE installation inspection report.

2.2.4 Secondary Containment System

Ecology (1995) requires that an IQRPE certify that the proposed tank system has been designed with appropriate secondary containment system. Secondary containment for tank systems that store, accumulate, or treat dangerous waste must be designed and installed to meet the requirements of WAC 170-303-640(4)(b). A review of the secondary containment system is normally part of the IQRPE review. Because the Technical Specifications prepared for the OGTS IQRPE/RCRA Design Review Package are purchase specifications that place the responsibility for the final design of the system components on the SELLER, a complete review of the secondary containment system has not been completed.

Secondary containment system information to be submitted by the SELLER and reviewed by the IQRPE at a later date is listed in Attachment B.

The following have been considered as part of the review of the design standards for the OGTS:

- The system is designed to prevent any migration of wastes or accumulated liquid out of the secondary containment system to the soil, groundwater, or surface water at any time during the use of the tank system.
- The system is capable of detecting and collecting releases and accumulated liquids until the collected material is removed.
- The system is constructed of materials that are compatible with the wastes to be placed in the tank system.
- The system has been specified to have sufficient strength to withstand stresses due to static head during a release, pressure gradients, climatic conditions, nearby vehicle traffic, and other stresses resulting from daily operations.
- The system will be placed on a foundation or base that will support the secondary containment system, provide resistance to pressure gradients above and below the system and prevent failure due to excessive settlement, compression, or uplift.
- The system will be provided with a leak detection system that will detect the failure of either the primary or secondary containment structure or the presence of any release of dangerous waste or accumulated liquid in the secondary containment system within 24 hours.
- The system will be sloped or otherwise designed or operated to drain and remove liquids resulting from leaks, spills, or precipitation.

There are no double walled tanks designed to contain dangerous waste included as part of the OGTS that are subject to the additional requirements of WAC 173-303-640(e)(iii).

The following subsections highlight the IQRPE Secondary Containment System review for each of the major OGTS subsystems and specific exceptions to this IQRPE certification report as they relate to the secondary containment system review.

2.2.4.1 Sintered Metal Filter Assemblies (V-SP-002)

The AWTE and ICV gas streams feeding the sintered metal filters are designed to be free of liquid. Additionally, the sintered metal filters are maintained under a negative pressure to assure that if the housing leaks, that material will remain within the housing and the OGTS. The sintered metal filters have no secondary containment or dried waste leak detection. In lieu of leak detection, the filters are pressure tested before installation, tested as part of an overall system check, and will be periodically inspected.

The IQRPE concurs that this design basis meets the requirements of the DBVS RD&D Permit and WAC 173-303-640.

2.2.4.2 Wet Scrubber Skid Assemblies (D-SP-037)

The secondary containment requirement for the enclosure is specified to contain at least the total capacity of the caustic recirculation system inventory. The wet scrubber skid assembly will have leak detection capability and a pump-out port for removal of any liquid contained in the skid assembly. The sump will be designed such that 1.5 gal of liquid will provide a pool depth of at least 1 in. The enclosure shall have a minimum 1/8-in./ft. slope toward the side of the enclosure with the sumps. Leak detection shall provide dry contacts to the MCS termination panel or be part of a packaged system alarm status signal.

The secondary containment will be designed into the wet scrubber system enclosure. The enclosure is specified to be constructed of stainless steel with air tight doors, and to meet ISO 1496-2 air leakage requirements.

The IQRPE concurs that this design basis meets the requirements of the DBVS RD&D Permit and WAC 173-303-640.

2.2.4.3 HEPA Filter Skid Assemblies (D-SP-036)

The HEPA skid specification includes provisions for a condensate collection system that includes a minimum 30-gal primary tank and secondary containment tank constructed of 304L stainless steel. Liquid level measurement in the secondary containment will provide an alarm and indication that the primary condensate tank has failed.

The HEPA filter skid control specifications allow for monitoring the level in the condensate collection tank (36-LE-322), the condensate collection tank secondary containment, and at each HEPA filter housing at 36-LSH-318, 36-LSH-319, 36-LSH-320, and 36-LSH-321. If liquid is detected in a HEPA filter housing, a switch is made to the standby train. When appropriate, the drain valves on the affected housing train are opened to drain liquid into the condensate collection tank. The liquid can be pumped from the collection tank to a container using the local station at the skid at a specified minimum rate of 1 gpm. The specifications for the drain lines and collection tank include requirements for insulation and heat tracing.

The IQRPE concurs that this design basis meets the requirements of the DBVS RD&D Permit and WAC 173-303-640.

2.2.4.4 HEGA Filter Skid Assemblies (V-SP-010)

The HEGA skid will include a manual drainage port and removable container to catch any condensate from the system. Condensate is not routinely anticipated in this unit.

The IQRPE concurs that this design basis meets the requirements of the DBVS RD&D Permit and WAC 173-303-640.

2.2.4.5 SCR Skid Assemblies (V-SP-001)

No condensation is anticipated in the SCR. All components of the SCR unit are to be constructed of stainless steel. No other secondary containment is required.

The IQRPE concurs that this design basis meets the requirements of the DBVS RD&D Permit and WAC 173-303-640.

2.2.4.6 Exhaust Fan 1 & 2 Assemblies (V-SP-004)

The SELLER is responsible for determining the actual configuration of the exhaust fans. While condensation is not typically expected at this point in the DBVS system, provisions for the collection and draining of any condensate should be incorporated into the final design.

2.2.4.7 Exhaust Stack Assembly (V-SP-005)

The stack design includes flanging and valves to be used for draining condensate from the stack. The condensate is not subject to the secondary containment requirements of the DBVS RD&D Permit or WAC 173-303-640.

2.2.4.8 Stack Monitoring System Assemblies (Technical Data Sheet DS-002.1)

No secondary containment is required for the monitoring system. Condensation is not expected at this point in the DBVS system.

2.2.4.9 OGTS Bypass System (V-SP-017)

The OGTS HEPA filters will include manual drainage ports for any condensate from the system. Condensate is not routinely anticipated in this unit as the system is designed to heat the gas to less than 70 percent relative humidity.

The IQRPE concurs that this design basis meets the requirements of the DBVS RD&D Permit and WAC 173-303-640.

2.2.4.10 Secondary Containment System Exceptions

IQRPE Certification exceptions to the secondary containment system review are as follows:

1. The type of level instrument for detecting the liquid in the Condensate Drain Primary Collection System (V-SP-002) is not specified.

2. The type of level instrument for detecting the liquid in the Wet Scrubber Skid secondary containment (D-SP-037) is not specified.

3. The exhaust fans (V-SP-004) should be designed to include provisions for the collection and draining of condensate.

4. Secondary containment volume for the HEPA filter skid condensate tank will be provided by the vendor.

5. Secondary containment volume for the wet scrubber skid assembly will be provided by the vendor.

These issues will require IQRPE review once vendor information is available. This review will be documented in the IQRPE installation inspection report.

2.2.5 Ancillary Equipment Design

Ecology (1995) requires that an IQRPE certify that the proposed tank system has been designed with appropriate ancillary equipment in accordance with the requirements of WAC 170-303-640(3)(f) and (4)(f). A review of the ancillary equipment design is normally part of the IQRPE review. Because the Technical Specifications prepared for the OGTS IQRPE/RCRA Design Review Package are purchase specifications that place responsibility for the final piping configuration and the purchase of all instrumentation, valves, and electronics on the SELLER, a complete review of the ancillary equipment design has not been completed.

Ancillary equipment design information to be submitted by the SELLER and reviewed by the IQRPE at a later date is listed in Attachment B.

The following have been considered as part of the review of the design standards for the OGTS:

- The Technical Specifications provide for secondary containment for tank system ancillary equipment that cannot be visually inspected for leaks on a daily basis.

- Secondary containment has been provided for flanges, joints, and valves and other connections regardless of whether or not they are welded to the piping and visually inspected for leaks on a daily basis.

- Secondary containment has been provided where pumps and valves transfer dangerous wastes between tanks regardless of whether they are seamless and can be visually inspected on a daily basis.

The following subsections highlight the IQRPE Ancillary Equipment Design review as applied to the specifications, P&IDs, and data sheets; and also identifies specific exceptions to this IQRPE certification report as they relate to the ancillary equipment design review.

2.2.5.1 P&ID Review

All P&IDs were reviewed for the following basic considerations:

- Appropriate location of pressure, temperature, and flow sensing equipment.

- Necessary piping, valve, and instrumentation labeling.

- Proper positioning of instrumentation to prevent undue influence from upstream equipment.
- Necessary isolation valves to allow instrumentation maintenance.
- Identification of preliminary interlocks.
- Designation of valves as fail-open or fail-close.
- Location of check valves or back-flow preventers.
- General designation of appropriate alarms and recorded information.

2.2.5.2 Data Sheet Review

Data sheets included as part of Appendix H5 of the Design Review Package were reviewed for the following:

- Appropriate materials of construction
- Appropriate functionality
- Hazard classification requirements
- Appropriate pressure and temperature ratings

2.2.5.3 Ancillary Equipment Exceptions

IQRPE Certification exceptions to the ancillary equipment review are as follows:

1. General. WAC requirements specify that the IQRPE review the design of ancillary equipment to ensure that it is supported and protected against physical damage and excessive stress due to settlement, vibrations, expansions, or contractions. Sufficient information is not available at this time to complete this level of review.

These issues will require IQRPE review once vendor information is available. This review will be documented in the IQRPE installation inspection report.

2.2.6 Corrosion Assessment

An IQRPE corrosion assessment is only required for the external shell of primary containment that is in direct contact with soil or water per the requirements of WAC 173-303-640(3)(a)(iii). Because all primary components are located within secondary containment on devices that are located on concrete pads, these requirements do not apply to the IQRPE review of the OGTS IQRPE/RCRA Design Review Package.

However, the following activities have been conducted in the review of the design standards for the OGTS:

- A review of the design information for the presence of any stray electrical current from nearby equipment using external power sources.
- A review of the corrosion protection recommendation for coatings and a cathodic protection system.
- A review of the provisions for corrosion allowance.

The following subsections highlight the IQRPE Corrosion Assessment review for each of the major OGTS subsystems and specific exceptions to this IQRPE certification report as they relate to the corrosion assessment review.

2.2.6.1 Sintered Metal Filter Assemblies (V-SP-002)

All components of the SMF assembly contacting process materials are to be constructed of series 300 stainless steel and comply with ASTM A240. No protective coatings are to be used. The technical specifications include requirements for grounding of the entire skid.

The IQRPE concurs that this design basis meets the requirements of the DBVS RD&D Permit and WAC 173-303-640.

2.2.6.2 Wet Scrubber Skid Assemblies (D-SP-037)

The materials of construction for specific components of the Wet Scrubber Skid are left to the SELLER. The selection of materials will be reviewed by the IQRPE as part of the installation inspection and final design review.

2.2.6.3 HEPA Filter Skid Assemblies (D-SP-036)

All components of the HEPA skid assembly contacting process materials are to be constructed of series 300 stainless steel. No protective coatings are to be used. The technical specifications include requirements for grounding of the entire skid.

The IQRPE concurs that this design basis meets the requirements of the DBVS RD&D Permit and WAC 173-303-640.

2.2.6.4 HEGA Filter Skid Assemblies (V-SP-010)

All components of the HEPA skid assembly contacting process materials are to be constructed of Austenitic stainless steel. No protective coatings are to be used.

The IQRPE concurs that this design basis meets the requirements of the DBVS RD&D Permit and WAC 173-303-640.

2.2.6.5 SCR Skid Assemblies (V-SP-001)

All components of the SCR skid assembly contacting process materials are to be constructed of series 300 stainless steel. No protective coatings are to be used. The technical specifications include requirements for grounding of the entire skid.

The IQRPE concurs that this design basis meets the requirements of the DBVS RD&D Permit and WAC 173-303-640.

2.2.6.6 Exhaust Fan 1 & 2 Assemblies (V-SP-004)

The SELLER is responsible for determining the materials of construction for the exhaust fans. Because the exhaust gas at this point in the DBVS system is not expected to typically contain any components that would impact corrosion rates, the IQRPE concurs that this design basis meets the requirements of the DBVS RD&D Permit and WAC 173-303-640.

2.2.6.7 Exhaust Stack Assembly (V-SP-005)

The exhaust stack is to be constructed of carbon steel. The exposed surfaces are to be coated in accordance with recommendations to be made by the SELLER. Because the exhaust gas at this point in the DBVS system is not expected to typically contain any components that would impact corrosion rates, the IQRPE concurs that this design basis meets the requirements of the DBVS RD&D Permit and WAC 173-303-640.

2.2.6.8 Stack Monitoring System Assemblies (Technical Data Sheet DS-002.1)

The stack monitoring equipment specified by the technical data sheet is standard off-the-shelf equipment. No special equipment is necessary to be compatible with the stack gas expected at this point in the DBVS system.

2.2.6.9 OGTS Bypass System (V-SP-017)

All components of the OGTS bypass contacting process materials are to be constructed of series 300 stainless steel. No protective coatings are to be used. The technical specifications include requirements for grounding of the entire skid.

The IQRPE concurs that this design basis meets the requirements of the DBVS RD&D Permit and WAC 173-303-640.

2.2.6.10 Corrosion Assessment Exceptions

IQRPE Certification exceptions to the corrosion assessment review are as follows:

1. The design of the tanks for the wet scrubber system and HEPA filter assembly have not been completed at this time. This information will be provided in the vendor submittals.

This issue will require IQRPE review once vendor information is available. This review will be documented in the IQRPE installation inspection report.

2.2.7 Recommended Inspection Schedule

Inspection of the OGTS components will be performed at the supplier's facility to ensure they comply with the design requirements. Additionally, before placing the systems into service, the components will be inspected by an IQRPE for structural damage and proper installation. The IQRPE will also review the vendor inspection and testing reports, as they are available. This inspection will include the following:

- Evaluation of the welds to verify no cracking or lack of fusion.
- Confirmation that no punctures, scrapes of protective coating, cracks, corrosion, or other structure damage are present.
- Performance of tank tightness test to verify no leaks are present and that pressure or vacuum did not change beyond specifications over the test period.
- Verification of the protection of ancillary equipment against physical damage and stress.
- Installation inspection that conforms to consensus-recognized standards including the documentation of findings and corrective actions documented in a post-inspection report.

Because the equipment has been specified with a design life of 5 years but the system is only specified to operate for a service life of 2 years while handling LAW, the IQRPE does not recommend any additional inspections after the system is placed into service. The need for additional annual inspections will be determined by the Owner/Operator in accordance with RD&D Permit Condition IV.A.8.d.i and WAC 173-303-640(6).

The following subsections highlight the IQRPE Recommended Inspection Items for each of the major OGTS subsystems. In many cases, there are no recommended inspections prior to final IQRPE installation and design certification review (including a review of the final design submittals highlighted in Attachment B). The IQRPE cautions that this approach could lead to significant project delays should design issues affecting the completed fabrication be identified.

2.2.7.1 Sintered Metal Filter Assemblies (V-SP-002)

There are no recommended inspections for the Sintered Metal Filter assemblies prior to final IQRPE inspection and design conformance review (including a review of the final design submittals highlighted in Attachment B).

2.2.7.2 Wet Scrubber Skid Assemblies (D-SP-037)

There are no recommended inspections for the Wet Scrubber Skid assemblies prior to final IQRPE inspection and design conformance review (including a review of the final design submittals highlighted in Attachment B).

2.2.7.3 HEPA Filter Skid Assemblies (D-SP-036)

Table 2 lists the recommended inspections for the HEPA Filter Skid Assemblies prior to final IQRPE inspection and design conformance review (including a review of the final design submittals highlighted in Attachment B).

Table 2. HEPA Filter Skid Assemblies Preliminary IQRPE Inspection Points

Activity	Comments
Filter Housing Leak Tests	This activity is critical to demonstrating the performance of the HEPA filter and should be witnessed by the IQRPE.
Condensate Collection System Leak Test	This activity is critical to demonstrating the performance of the condensate collection system and should be witnessed by the IQRPE.

2.2.7.4 HEGA Filter Skid Assemblies (V-SP-010)

There are no recommended inspections for the HEGA Skid assemblies prior to final IQRPE inspection and design conformance review (including a review of the final design submittals highlighted in Attachment B).

2.2.7.5 SCR Skid Assemblies (V-SP-001)

There are no recommended inspections for the SCR Skid assemblies prior to final IQRPE inspection and design conformance review (including a review of the final design submittals highlighted in Attachment B).

2.2.7.6 Exhaust Fan 1 & 2 Assemblies (V-SP-004)

There are no recommended inspections for the Exhaust Fan assemblies prior to final IQRPE inspection and design conformance review (including a review of the final design submittals highlighted in Attachment B).

2.2.7.7 Exhaust Stack Assembly (V-SP-005)

There are no recommended inspections for the exhaust stack assembly prior to final IQRPE inspection and design conformance review (including a review of the final design submittals highlighted in Attachment B).

2.2.7.8 Stack Monitoring System Assemblies (Technical Data Sheet DS-002.1)

There are no recommended inspections for the Stack Monitoring System assemblies prior to final IQRPE inspection and design conformance review (including a review of the final design submittals highlighted in Attachment B).

2.2.7.9 OGTS Bypass System (V-SP-017)

Table 3 lists the recommended inspections for the OGTS Bypass HEPA Filters prior to final IQRPE inspection and design conformance review (including a review of the final design submittals highlighted in Attachment B).

Table 3. OGTS Bypass Preliminary IQRPE Inspection Points

Activity	Comments
HEPA Filter Housing Leak Tests	This activity is critical to demonstrating the performance of the HEPA filter and should be witnessed by the IQRPE.

2.2.7.10 Recommended Inspection Exceptions

IQRPE Certification exceptions to the recommended inspection assessment review are as follows:

1. The recommended inspection activities described in this section are based on the design basis operating life, operating conditions, and waste characteristics outlined in the Design Basis Report. Should any of these parameters change (for example: extended operating life, increased operating temperatures, lower waste pH), the inspection schedule must be re-evaluated by the IQRPE.

3.0 DESIGN REVIEW ASSESSMENT CERTIFICATIONS

The Off-Gas Treatment System IQRPE/RCRA Design Review Package, RPP-24544, Revision E, for System 2.5, dated March 28, 2006, has been reviewed by the IQRPE. System design, based on the data and premises provided in this design document and with the exceptions listed herein, was assessed to be in compliance with the applicable sections of WAC 173-303-640 and the RD&D Permit for the DBVS as stated in Section 1.4 of this report. These results are based on a review of the applicable codes, standards and documents. The certifications below are in accordance with the requirements of WAC 173-303-640(2)(b) and 173-303-810(13)(a).

Report Lead IQRPE: I certify under penalty of the law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine or imprisonment for knowing violations.

TIMOTHY JAMES OLIVER
STATE OF WASHINGTON
41543
REGISTERED
PROFESSIONAL ENGINEER
EXPIRES: 04-07-2008

04/18/06

Report Reviewed by:

Robert L. Goodman, PE

19 Apr 06.

Karl M. Walterskirchen, PE

Date

Chief Engineer, TGS

4.0 REFERENCES

145579-Q-SP-001, Revision C DRAFT. "Construction Specification for the Demonstration Bulk Vitrification System", Division 15 Mechanical, AMEC Earth and Environmental. February 2005.

CH2M Hill Hanford Group, Inc. Ignition Source Control Evaluation. TFC-ENG-STD-13. Ignition Source Control Evaluation. Revision D-1. January 5

CH2M Hill Hanford Group, Inc. 2004. TFC-ENG-DESIGN-P-26. Determination of Equipment Safety Classification and Quality Assurance Level. Revision B-4. November 2.

HNF-SD-GN-ER-501, Rev. 1B, "Natural Phenomena Hazards, Hanford Site, South Central Washington."

RPP-17403. 2004. RPP-17043. "Function and System Design Requirements for the Demonstration Bulk Vitrification System." CH2M Hill Hanford Group, Inc. Revision 2.

RPP-24544. 2004. Demonstration Bulk Vitrification System IQRPE/RCRA Design Review Package, Revision C. February 21.

Washington State Department of Ecology. 1995. Guidance for Assessing Dangerous Waste Secondary Containment Systems. Publication 95-420. September.

Washington State Department of Ecology. 1994. Guidance for Assessing and Certifying Tank Systems that Store and Treat Dangerous Waste. Publication 94-114. June.

ATTACHMENT A

OGTS SYSTEM

IQRPE DISPOSITION OF REVIEWED CALCULATIONS, SPECIFICATIONS, AND DRAWINGS

(Nine Sheets)

ATTACHMENT A

OGTS CALCULATIONS, SPECIFICATIONS, AND DRAWINGS

Document Number	Document Title	Comments
	Calculations	
34005-CA-0001 Revision C (Appendix A5)	HEGA Skid– Organic Load Capacity	This calculation was reviewed in its entirety. Specific IQRPE review activities and any exceptions are described in Section 2.2 of this report.
145579-B-CA-023 Revision 1 (Appendix A5)	DBVS OGTS Bypass Structural Analysis	This calculation was reviewed in its entirety. Specific IQRPE review activities and any exceptions are described in Section 2.2 of this report.
145579-B-CA-001 Revision 1 (Appendix A5)	Tri-Mer Scrubber Foundation (11)	This calculation was reviewed as part of IQRPE certification report DR-001. A separate review was not conducted for this report.
145579-B-CA-010 Revision 1 (Appendix A5)	PC-2 Basic Foundations (3, 7, 10, 12, and 13)	This calculation was reviewed as part of IQRPE certification report DR-006. A separate review was not conducted for this report.
145579-C-CA-015 Revision 2 (Appendix A5)	OGTS Steel Stack Foundation (10)	This calculation was reviewed in its entirety. Specific IQRPE review activities and any exceptions are described in Section 2.2 of this report.
145579-C-CA-016 Revision 0 (Appendix A5)	Reagent Tank Foundations (21 & 22)	This calculation was used for information purposes only.
145579-D-CA-043 Revision A (Appendix A5)	DBVS Detectable Leak Volume for the OGTS Wet Scrubber System	This calculation was reviewed in its entirety. Specific IQRPE review activities and any exceptions are described in Section 2.2 of this report.

Document Number	Document Title	Comments
145579-D-CA-056 Revision 1 (Appendix A5)	DBVS OGTS Bypass System Thermal Hydraulics Analysis	This calculation was reviewed in its entirety. Specific IQRPE review activities and any exceptions are described in Section 2.2 of this report.
145579-D-CA-061 Revision 0 (Appendix A5)	DBVS OGTS Thermal Hydraulics Analysis	This calculation was reviewed in its entirety. Specific IQRPE review activities and any exceptions are described in Section 2.2 of this report.
145579-B-CA-004 Revision 1 (Appendix A5)	Off-Gas Chiller	This calculation was reviewed in its entirety. Specific IQRPE review activities and any exceptions are described in Section 2.2 of this report.
145579-B-CA-005 Revision 1 (Appendix A5)	Off-Gas Treatment System Pipe Stress Analysis	This calculation was reviewed in its entirety. Specific IQRPE review activities and any exceptions are described in Section 2.2 of this report.
OGTS Drawings		
F-145579-00E-0082 Revision C (Appendix C5)	Bulk Vitrification Fire Detection System Block Diagram	This drawing was used for information purposes only. The IQRPE certification for the OGTS does not address the specific content of this drawing.
F-145579-00-P-0001 Revision E (Appendix C5)	Bulk Vitrification Typical Pipe Support Details (Sheet 1 of 4)	This drawing was reviewed in its entirety. Specific IQRPE review activities and any exceptions are described in Section 2.2 of this report.
F-145579-00-P-0002 Revision E (Appendix C5)	Bulk Vitrification Typical Pipe Support Details (Sheet 2 of 4)	This drawing was reviewed in its entirety. Specific IQRPE review activities and any exceptions are described in Section 2.2 of this report.
F-145579-00-P-0003 Revision E (Appendix C5)	Bulk Vitrification Typical Pipe Support Details (Sheet 3 of 4)	This drawing was reviewed in its entirety. Specific IQRPE review activities and any exceptions are described in Section 2.2 of this report.

Document Number	Document Title	Comments
F-145579-00-P-0004 Revision E (Appendix C5)	Bulk Vitrification Typical Pipe Support Details (Sheet 4 of 4)	This drawing was reviewed in its entirety. Specific IQRPE review activities and any exceptions are described in Section 2.2 of this report.
B-145579-36-V-0001 Revision H (Appendix C5)	Bulk Vitrification Off-Gas Treatment Plot Plan	This drawing was used for information purposes only. The IQRPE certification for the OGTS does not address the specific content of this drawing.
B-145579-36-V-0002 Revision H (Appendix C5)	Bulk Vitrification Off-Gas Treatment Waste Receipt Area Plan	This drawing was used for information purposes only. The IQRPE certification for the OGTS does not address the specific content of this drawing.
B-145579-36-V-0003 Revision K (Appendix C5)	Bulk Vitrification Off-Gas Treatment Melt & Dryer Lower Plan	This drawing was used for information purposes only. The IQRPE certification for the OGTS does not address the specific content of this drawing.
B-145579-36-V-0004 Revision J (Appendix C5)	Bulk Vitrification Off-Gas Treatment Melt & Dryer Middle Plan	This drawing was used for information purposes only. The IQRPE certification for the OGTS does not address the specific content of this drawing.
B-145579-36-V-0005 Revision H (Appendix C5)	Bulk Vitrification Off-Gas Treatment Melt & Dryer Upper Plan	This drawing was reviewed in its entirety. Specific IQRPE review activities and any exceptions are described in Section 2.2 of this report.
B-145579-36-V-0006 Revision H (Appendix C5)	Bulk Vitrification Off-Gas Treatment Wet Scrubber Skid Plan	This drawing was used for information purposes only. The IQRPE certification for the OGTS does not address the specific content of this drawing.
B-145579-36-V-0007 Revision H (Appendix C5)	Bulk Vitrification Off-Gas Treatment Scrub & Stack Plan	This drawing was used for information purposes only. The IQRPE certification for the OGTS does not address the specific content of this drawing.
B-145579-36-V-0008 Revision H (Appendix C5)	Bulk Vitrification Off-Gas Treatment Secondary Waste Area Plan	This drawing was used for information purposes only. The IQRPE certification for the OGTS does not address the specific content of this drawing.

Document Number	Document Title	Comments
B-145579-36-V-0016 Revision G (Appendix C5)	Bulk Vitrification Sintered Metal Filters Details	This drawing was reviewed in its entirety. Specific IQRPE review activities and any exceptions are described in Section 2.2 of this report.
B-145579-36-V-0019 Revision E (Appendix C5)	Bulk Vitrification Off-Gas Treatment SCR & Ammonia Feed Details	This drawing was reviewed in its entirety. Specific IQRPE review activities and any exceptions are described in Section 2.2 of this report.
B-145579-36-V-0023 Revision E (Appendix C5)	Bulk Vitrification Off-Gas Treatment Standard Details – Sheet 1	This drawing was reviewed in its entirety. Specific IQRPE review activities and any exceptions are described in Section 2.2 of this report.
B-145579-36-V-0024 Revision F (Appendix C5)	Bulk Vitrification Off-Gas Treatment Duct Support Details – Sheet	This drawing was reviewed in its entirety. Specific IQRPE review activities and any exceptions are described in Section 2.2 of this report.
B-145579-36-V-0025 Revision G (Appendix C5)	Bulk Vitrification Off-Gas Treatment Overall Section	This drawing was used for information purposes only. The IQRPE certification for the OGTS does not address the specific content of this drawing.
B-145579-36-V-0026 Revision F (Appendix C5)	Bulk Vitrification Off-Gas Treatment Waste Receipt Area Section 'A'	This drawing was used for information purposes only. The IQRPE certification for the OGTS does not address the specific content of this drawing.
B-145579-36-V-0027 Revision H (Appendix C5)	Bulk Vitrification Off-Gas Treatment Melt & Dryer Sections A&B	This drawing was used for information purposes only. The IQRPE certification for the OGTS does not address the specific content of this drawing.
B-145579-36-V-0028 Revision K (Appendix C5)	Bulk Vitrification Off-Gas Treatment Melt & Dryer Section 'C'	This drawing was used for information purposes only. The IQRPE certification for the OGTS does not address the specific content of this drawing.
B-145579-36-V-0029 Revision J (Appendix C5)	Bulk Vitrification Off-Gas Treatment Melt & Dryer Section 'D'	This drawing was used for information purposes only. The IQRPE certification for the OGTS does not address the specific content of this drawing.

Document Number	Document Title	Comments
B-145579-36-V-0030 Revision J (Appendix C5)	Bulk Vitrification Off-Gas Treatment Melt & Dryer Section 'E'	This drawing was used for information purposes only. The IQRPE certification for the OGTS does not address the specific content of this drawing.
B-145579-36-V-0031 Revision G (Appendix C5)	Bulk Vitrification Off-Gas Treatment Wet Scrubber Skid Sections	This drawing was used for information purposes only. The IQRPE certification for the OGTS does not address the specific content of this drawing.
B-145579-36-V-0033 Revision H (Appendix C5)	Bulk Vitrification Off-Gas Treatment Scrub & Stack Section	This drawing was used for information purposes only. The IQRPE certification for the OGTS does not address the specific content of this drawing.
B-145579-36-V-0034 Revision H (Appendix C5)	Bulk Vitrification Off-Gas Treatment Scrub & Stack Sections	This drawing was used for information purposes only. The IQRPE certification for the OGTS does not address the specific content of this drawing.
B-145579-36-V-0035 Revision G (Appendix C5)	Bulk Vitrification Off-Gas Treatment Secondary Waste Area Section 'A'	This drawing was used for information purposes only. The IQRPE certification for the OGTS does not address the specific content of this drawing.
B-145579-36-V-0037 Revision B (Appendix C5)	Bulk Vitrification Off-Gas Treatment Wet Scrubber Skid Sections	This drawing was used for information purposes only. The IQRPE certification for the OGTS does not address the specific content of this drawing.
H-14-106795 Revision 1 (Appendix C5)	Bulk Vitrification Tri-Mer Scrubber Foundation – Plan & Details	This drawing was used for information purposes only. The IQRPE certification for the OGTS does not address the specific content of this drawing.
ECN 722545 Revision 0 (Appendix C5)	ECN to Drawing H-14-106795 Sheet 1, Revision 1	This drawing was used for information purposes only. The IQRPE certification for the OGTS does not address the specific content of this drawing.
H-14-106796 Revision 0 (Appendix C5)	Bulk Vitrification Off-Gas Area Foundations – Plans & Sections	This drawing was used for information purposes only. The IQRPE certification for the OGTS does not address the specific content of this drawing.

Document Number	Document Title	Comments
H-14-106798 Revision 0 (Appendix C5)	Bulk Vitrification Minor Foundations General Arrangement	This drawing was used for information purposes only. The IQRPE certification for the OGTS does not address the specific content of this drawing.
H-14-106800 Revision 0 (Appendix C5)	Bulk Vitrification Miscellaneous Foundations – Plans & Details	This drawing was used for information purposes only. The IQRPE certification for the OGTS does not address the specific content of this drawing.
F-145579-00-A-0099 Revision J (Appendix D5)	Bulk Vitrification P&ID "Typicals" Legend	This drawing was used for information purposes only. The IQRPE certification for the OGTS does not address the specific content of this drawing.
F-145579-00-A-0100 Revision Q (Appendix D5)	Bulk Vitrification P&ID Symbol Legend	This drawing was used for information purposes only. The IQRPE certification for the OGTS does not address the specific content of this drawing.
F-145579-35-A-0100 Revision P (Appendix D5)	Bulk Vitrification ICV Box P&ID	This drawing was reviewed in its entirety. Specific IQRPE review activities and any exceptions are described in Section 2.2 of this report.
F-145579-36-A-0099 Revision M (Appendix D5)	Bulk Vitrification Off Gas Dust Removal P&ID	This drawing was reviewed in its entirety. Specific IQRPE review activities and any exceptions are described in Section 2.2 of this report.
F-145579-36-A-0100 Revision N (Appendix D5)	Bulk Vitrification Wet Scrubber Skid No. 1 P&ID	This drawing was reviewed in its entirety. Specific IQRPE review activities and any exceptions are described in Section 2.2 of this report.
F-145579-36-A-0102 Revision P (Appendix D5)	Bulk Vitrification Off-Gas Trailer Scrubber Filter P&ID	This drawing was reviewed in its entirety. Specific IQRPE review activities and any exceptions are described in Section 2.2 of this report.
F-145579-36-A-0103 Revision M (Appendix D5)	Bulk Vitrification Selective Catalytic Reduction P&ID	This drawing was reviewed in its entirety. Specific IQRPE review activities and any exceptions are described in Section 2.2 of this report.

Document Number	Document Title	Comments
F-145579-36-A-0105 Revision N (Appendix D5)	Bulk Vitrification Stack Monitoring P&ID	This drawing was reviewed in its entirety. Specific IQRPE review activities and any exceptions are described in Section 2.2 of this report.
F-145579-36-A-0106 Revision J (Appendix D5)	Bulk Vitrification Off-Gas Treatment Chilled Water Treatment	This drawing was used for information purposes only. The IQRPE certification for the OGTS does not address the specific content of this drawing.
F-145579-36-A-0107 Revision H (Appendix D5)	Bulk Vitrification Off-Gas HEPA & HEGA Filter P&ID	This drawing was reviewed in its entirety. Specific IQRPE review activities and any exceptions are described in Section 2.2 of this report.
F-145579-36-A-0108 Revision F (Appendix D5)	Bulk Vitrification OGTS Bypass P&ID	This drawing was reviewed in its entirety. Specific IQRPE review activities and any exceptions are described in Section 2.2 of this report.
F-145579-36-A-0109 Revision C (Appendix D5)	Bulk Vitrification Duct Monitoring P&ID	This drawing was reviewed in its entirety. Specific IQRPE review activities and any exceptions are described in Section 2.2 of this report.
Technical Specifications		
145579-V-SP-001 Revision 2 (Appendix G5)	Specification for Selective Catalytic Reduction Unit (SCR)	This specification was reviewed in its entirety, except for Appendix A (Control of Counterfeit/Suspect Items). Specific IQRPE review activities and any exceptions are described in Section 2.2 of this report.
145579-V-SP-002 Revision 2 (Appendix G5)	Sintered Metal Filter	This specification was reviewed in its entirety, except for Appendix A (Suspect Fastener Headmark List) Specific IQRPE review activities and any exceptions are described in Section 2.2 of this report.
145579-V-SP-004 Revision 4 CN.001 (Appendix G5)	Exhaust Fans	This specification was reviewed in its entirety, except for Appendix A (Control of Counterfeit/Suspect Items). Specific IQRPE review activities and any exceptions are described in Section 2.2 of this report.

Document Number	Document Title	Comments
145579-V-SP-005 Revision 3 CN.001 and CN.002 (Appendix G5)	Steel Exhaust Stack	This specification was reviewed in its entirety, except for Appendix A (Control of Counterfeit/Suspect Items). Specific IQRPE review activities and any exceptions are described in Section 2.2 of this report.
145579-V-SP-010 Revision 1 (Appendix G5)	HEGA Filter Skid	This specification was reviewed in its entirety, except for Appendix A. Specific IQRPE review activities and any exceptions are described in Section 2.2 of this report.
145579-V-SP-011 Revision 1 CN.001, CN.002, and CN.005 (Appendix G5)	Off-Gas Chiller Pump Skid	This specification was reviewed in its entirety, except for Appendix A. Specific IQRPE review activities and any exceptions are described in Section 2.2 of this report.
145579-V-SP-017 Revision 0 (Appendix G5)	OGTS Bypass Filter/Fan and Bypass Bleed Skid Assemblies	This specification was reviewed in its entirety, except for Appendix E. Specific IQRPE review activities and any exceptions are described in Section 2.2 of this report.
145579-D-SP-036 Revision 1 CN.001 through CN.006 (Appendix G5)	Off-Gas Treatment System HEPA Filter Skid Assembly Design and Fabrication	This specification was reviewed in its entirety, except for Appendix E (Control of Counterfeit/Suspect Items). Specific IQRPE review activities and any exceptions are described in Section 2.2 of this report.
145579-D-SP-037 Revision 1 (Appendix G5)	Wet Scrubber Skid Assembly Design and Fabrication	This specification was reviewed in its entirety, except for Appendix D (Control of Counterfeit/Suspect Items). Specific IQRPE review activities and any exceptions are described in Section 2.2 of this report.
Supporting Information		
145579-D-DS-058.5 Revision 2 (Appendix G5)	NaOH 15% Solution Tank	This data sheet was used for information purposes only. The IQRPE certification for the OGTS does not address the specific content of this data sheet.

Document Number	Document Title	Comments
145579-E-DS-013.01 Revision 0 (Appendix G5)	Off-Gas Bypass UPS – Uninterruptible Power Supply	This data sheet was used for information purposes only. The IQRPE certification for the OGTS does not address the specific content of this data sheet.
145579-E-DS-013.02 Revision 0 (Appendix G5)	Off-Gas Bypass UPS – Automatic Transfer Switch	This data sheet was used for information purposes only. The IQRPE certification for the OGTS does not address the specific content of this data sheet.
145579-F-DS-002.1 Revision 1 (Appendix G5)	Off-Gas Stack Monitoring Equipment Data Sheets	This data sheet was used for information purposes only. The IQRPE certification for the OGTS does not address the specific content of this data sheet.
145579-F-DS-002.2 Revision 0 (Appendix G5)	Off-Gas Radiation Monitoring Equipment Data Sheets	This data sheet was used for information purposes only. The IQRPE certification for the OGTS does not address the specific content of this data sheet.
145579-V-DS-012.1 Revision 2 (Appendix G5)	Air Cooled Scroll Chiller	This data sheet was used for information purposes only. The IQRPE certification for the OGTS does not address the specific content of this data sheet.
145579-V-DS-004.1 Revision 3 (Appendix G5)	Exhaust Fans	This data sheet was used for information purposes only. The IQRPE certification for the OGTS does not address the specific content of this data sheet.
145579-V-DS-004.2 Revision A (Appendix G5)	Exhaust Fan Variable Frequency Drive	This data sheet was used for information purposes only. The IQRPE certification for the OGTS does not address the specific content of this data sheet.
Appendix H5, Corrosion Review	Corrosion Review	This information was reviewed in its entirety. Specific IQRPE review activities and any exceptions are described in Section 2.2 of this report.

ATTACHMENT B

OGTS DESIGN DELIVERABLES TO BE REVIEWED WITH THE CONSTRUCTION CERTIFICATION PACKAGE

(Ten Sheets)

ATTACHMENT B

OGTS DESIGN DELIVERABLES TO BE REVIEWED WITH THE CONSTRUCTION CERTIFICATION PACKAGE

Submittal Number	Submittal Title
V-SP-002, Sintered Metal Filter Data Sheet 143643-V-DS-002.1, Rev. 0, Bidder's Drawing & Data Commitments	Proof of NQA-1 or equivalent program
V-SP-002, Sintered Metal Filter Data Sheet 143643-V-DS-002.1, Rev. 0, Bidder's Drawing & Data Commitments	Outline drawings and layout drawings indicating weights and dimensions
V-SP-002, Sintered Metal Filter Data Sheet 143643-V-DS-002.1, Rev. 0, Bidder's Drawing & Data Commitments	Technical brochures on purchased components
V-SP-002, Sintered Metal Filter Data Sheet 143643-V-DS-002.1, Rev. 0, Bidder's Drawing & Data Commitments	Electrical schematics, wiring, diagrams and nameplate lists
V-SP-002, Sintered Metal Filter Data Sheet 143643-V-DS-002.1, Rev. 0, Bidder's Drawing & Data Commitments	Calculations
V-SP-002, Sintered Metal Filter Data Sheet 143643-V-DS-002.1, Rev. 0, Bidder's Drawing & Data Commitments	Set of installation and maintenance manuals c/w technical literature for all equipment and devices
V-SP-002, Sintered Metal Filter Data Sheet 143643-V-DS-002.1, Rev. 0, Bidder's Drawing & Data Commitments	Site commissioning record & test results
V-SP-002, Sintered Metal Filter Data Sheet 143643-V-DS-002.1, Rev. 0, Bidder's Drawing & Data Commitments	Factory Acceptance Testing Plan (FAT)
V-SP-002, Sintered Metal Filter Data Sheet 143643-V-DS-002.1, Rev. 0, Bidder's Drawing & Data Commitments	ASME U-1 Form for Air Receiver

Submittal Number	Submittal Title
D-SP-036, HEPA Filter Skid Appendix D, Bidder's Drawing & Data Commitments	Completed data sheet
D-SP-036, HEPA Filter Skid Appendix D, Bidder's Drawing & Data Commitments	Test Plan/Test Procedure
D-SP-036, HEPA Filter Skid Appendix D, Bidder's Drawing & Data Commitments	NDE personnel certifications
D-SP-036, HEPA Filter Skid Appendix D, Bidder's Drawing & Data Commitments	Visual weld/NDE procedures
D-SP-036, HEPA Filter Skid Appendix D, Bidder's Drawing & Data Commitments	Visual weld examination procedure/weld map
D-SP-036, HEPA Filter Skid Appendix D, Bidder's Drawing & Data Commitments	Welding procedures, procedure qualification records, and welder procedure qualification records
D-SP-036, HEPA Filter Skid Appendix D, Bidder's Drawing & Data Commitments	AWS CWI certificate
D-SP-036, HEPA Filter Skid Appendix D, Bidder's Drawing & Data Commitments	Protective coating specifications
D-SP-036, HEPA Filter Skid Appendix D, Bidder's Drawing & Data Commitments	Fabrication travelers

Submittal Number	Submittal Title
D-SP-036, HEPA Filter Skid Appendix D, Bidder's Drawing & Data Commitments	100% Design and Fabrication Package -Mechanical, Structural, and Electrical Drawings -Mechanical, Structural, and Electrical Calculations -Completed Equipment Data Sheets -Vendor Cut Sheets/Technical Brochures -Completed AG-1 Compliance Matrix
D-SP-036, HEPA Filter Skid Appendix D, Bidder's Drawing & Data Commitments	Preliminary Data Package Including: -As-Built drawings and weld maps -System assembly instructions -Operation and maintenance manuals -Completed Test results (document and video records) -Field Calibration Procedures and Reports -Inspection Reports -COCs/CMTRs -NEC inspection certificate & electromagnetic interference test results
D-SP-036, HEPA Filter Skid Appendix D, Bidder's Drawing & Data Commitments	Final Data Package Including: - Approved Preliminary Data Package - - Final FAT results
D-SP-037, Wet Scrubber Skid Appendix F, Bidder's Drawing & Data Commitments	Proof of NQA-1 or equivalent QA program
D-SP-037, Wet Scrubber Skid Appendix F, Bidder's Drawing & Data Commitments	Completed Data Sheet
D-SP-037, Wet Scrubber Skid Appendix F, Bidder's Drawing & Data Commitments	Test Plan/Test Procedure

Submittal Number	Submittal Title
D-SP-037, Wet Scrubber Skid Appendix F, Bidder's Drawing & Data Commitments	NDE personnel certifications
D-SP-037, Wet Scrubber Skid Appendix F, Bidder's Drawing & Data Commitments	Visual Weld/NDE procedures
D-SP-037, Wet Scrubber Skid Appendix F, Bidder's Drawing & Data Commitments	Visual weld examination procedure/weld map
D-SP-037, Wet Scrubber Skid Appendix F, Bidder's Drawing & Data Commitments	Welding procedures, procedure qualification records, and welder procedure qualification records
D-SP-037, Wet Scrubber Skid Appendix F, Bidder's Drawing & Data Commitments	AWS CWI certificate
D-SP-037, Wet Scrubber Skid Appendix F, Bidder's Drawing & Data Commitments	Material Control Procedures
D-SP-037 Appendix G5, Bidder's Drawing & Data Commitments	Protective coating specifications
D-SP-037, Wet Scrubber Skid Appendix F, Bidder's Drawing & Data Commitments	Fabrication travelers
D-SP-037, Wet Scrubber Skid Appendix F, Bidder's Drawing & Data Commitments	100% Design and Fabrication Package including: - Mechanical, Structural and Electrical Drawings - Mechanical, Structural and Electrical Calculations - Completed Equipment Data Sheets - Vendor Cut Sheets/Technical Brochures - Bill of Materials

Submittal Number	Submittal Title
D-SP-037, Wet Scrubber Skid Appendix F, Bidder's Drawing & Data Commitments	Preliminary Data Package Including: - As-Built Drawings and Weld Maps - Fabrication Traveler Closeout - Recommended spare parts and frequency of replacement - Rigging sketches - System assembly instructions - Operation and maintenance manuals - Completed Test Results (document and video records) - Packing list and identification of shipping supports - Field Calibration Procedures and Reports - Inspection Reports - CoC's / CMTRs - NEC inspection Certification & electromagnetic interference test
D-SP-037, Wet Scrubber Skid Appendix F, Bidder's Drawing & Data Commitments	Final Data Package including: - Approved Preliminary Data Package - Final FAT results -Completed AG-1 compliance matrix
DS-002.1, Off-Gas Monitoring System Bidder's Drawing & Data Commitments	Outline Drawings and layout drawings recommending component locations
DS-002.1, Off-Gas Monitoring System Bidder's Drawing & Data Commitments	Technical brochures on purchased components
DS-002.1, Off-Gas Monitoring System Bidder's Drawing & Data Commitments	Electrical schematics, wiring, diagrams and nameplate lists
DS-002.1, Off-Gas Monitoring System Bidder's Drawing & Data Commitments	Installation and maintenance manuals including technical literature for all equipment and devices
DS-002.1, Off-Gas Monitoring System Bidder's Drawing & Data Commitments	Site test for 40CFR 52 Appendix E 168 Flow Meter Test (700A only)

Submittal Number	Submittal Title
DS-002.1, Off-Gas Monitoring System Bidder's Drawing & Data Commitments	Site commissioning record & test results
SP-001, Selective Catalytic Reduction Unit Bidder's Drawing & Data Commitments	Outline drawings and layout drawings indicating weights and dimensions
SP-001, Selective Catalytic Reduction Unit Bidder's Drawing & Data Commitments	Technical brochures on purchased components
SP-001, Selective Catalytic Reduction Unit Bidder's Drawing & Data Commitments	Electrical schematics, wiring, diagrams and nameplate list
SP-001, Selective Catalytic Reduction Unit Bidder's Drawing & Data Commitments	Calculations and technical datasheets for all equipment
SP-001, Selective Catalytic Reduction Unit Bidder's Drawing & Data Commitments	Set of installation and maintenance manuals c/w technical literature for all equipment and devices
SP-001, Selective Catalytic Reduction Unit Bidder's Drawing & Data Commitments	NEC inspection certificate & electromagnetic interface test certificate
SP-001, Selective Catalytic Reduction Unit Bidder's Drawing & Data Commitments	U/L and motor lists
SP-001, Selective Catalytic Reduction Unit Bidder's Drawing & Data Commitments	Site commissioning record & test results
SP-001, Selective Catalytic Reduction Unit Bidder's Drawing & Data Commitments	Factory Acceptance Testing Plan (FAT)
SP-004, Exhaust Fans Technical Data Sheet 145579-V-DS-004.1, Bidder's Drawing & Data Commitments	Outline drawings and layout drawings indicating weights and dimensions
SP-004, Exhaust Fans Technical Data Sheet 145579-V-DS-004.1, Bidder's Drawing & Data Commitments	Technical brochures an purchased components

Submittal Number	Submittal Title
V-SP-004, Exhaust Fans Technical Data Sheet 145579-V-DS-004.1, Bidder's Drawing & Data Commitments	Calculations
V-SP-004, Exhaust Fans Technical Data Sheet 145579-V-DS-004.1, Bidder's Drawing & Data Commitments	Set of instructions and maintenance manuals c/w technical literature for all equipment and devices
V-SP-004, Exhaust Fans Technical Data Sheet 145579-V-DS-004.1, Bidder's Drawing & Data Commitments	NEC inspection certificate & electromagnetic interference test results
V-SP-004, Exhaust Fans Technical Data Sheet 145579-V-DS-004.1, Bidder's Drawing & Data Commitments	U/L and motor list
V-SP-004, Exhaust Fans Technical Data Sheet 145579-V-DS-004.1, Bidder's Drawing & Data Commitments	Site commissioning record & test results
V-SP-005, Exhaust Stack Technical Data Sheet 145579-V-DS-005.1, Bidder's Drawing & Data Commitments	QA program
V-SP-005, Exhaust Stack Technical Data Sheet 145579-V-DS-005.1, Bidder's Drawing & Data Commitments	Experience list and maintainability information
V-SP-005, Exhaust Stack Technical Data Sheet 145579-V-DS-005.1, Bidder's Drawing & Data Commitments	Outline drawings and layout drawings indicating weights and dimensions
V-SP-005, Exhaust Stack Technical Data Sheet 145579-V-DS-005.1, Bidder's Drawing & Data Commitments	Technical brochures on purchased components
V-SP-005, Exhaust Stack Technical Data Sheet 145579-V-DS-005.1, Bidder's Drawing & Data Commitments	Calculations
V-SP-005, Exhaust Stack Technical Data Sheet 145579-V-DS-005.1, Bidder's Drawing & Data Commitments	Set of installation and maintenance manuals c/w technical literature for all equipment and devices

Submittal Number	Submittal Title
V-SP-005, Exhaust Stack Technical Data Sheet 145579-V-DS-005.1, Bidder's Drawing & Data Commitments	Site commissioning record & test results
V-SP-010, HEGA Skid Technical Data Sheet 145579-V-DS-010.2, Bidder's Drawing & Data Commitments	Outline drawings and layout drawings indicating weights and dimensions
DS-010.2 Appendix G5, Bidder's Drawing & Data Commitments	Technical brochures on purchased components
V-SP-010, HEGA Skid Technical Data Sheet 145579-V-DS-010.2, Bidder's Drawing & Data Commitments	Calculations
V-SP-010, HEGA Skid Technical Data Sheet 145579-V-DS-010.2, Bidder's Drawing & Data Commitments	Set of installation and maintenance manuals c/w technical literature for all equipment and devices
V-SP-010, HEGA Skid Technical Data Sheet 145579-V-DS-010.2, Bidder's Drawing & Data Commitments	Site commissioning record & test results
DS-004.2, Exhaust Fan Variable Frequency Drive Technical Data Sheet 145579-V-DS-004.02, Bidder's Drawing & Data Commitments	Weights, dimensions and heat dissipation
DS-004.2, Exhaust Fan Variable Frequency Drive Technical Data Sheet 145579-V-DS-004.02, Bidder's Drawing & Data Commitments	Detailed specifications for proposed equipment including customer power and control connections
DS-004.2, Exhaust Fan Variable Frequency Drive Technical Data Sheet 145579-V-DS-004.02, Bidder's Drawing & Data Commitments	Installation and maintenance manuals, with technical literature for all equipment and devices.

Submittal Number	Submittal Title
DS-004.2, Exhaust Fan Variable Frequency Drive Technical Data Sheet 145579-V-DS-004.02, Bidder's Drawing & Data Commitments	Final Data Package including: Shop drawings, schematics, wiring diagrams
V-SP-017, Off-Gas Treatment System Bypass Filter/Fan and Bypass Bleed Skid Assemblies Design and Fabrication Appendix D, Bidder's Drawing & Data Commitments	Complete data sheets
V-SP-017, Off-Gas Treatment System Bypass Filter/Fan and Bypass Bleed Skid Assemblies Design and Fabrication Appendix D, Bidder's Drawing & Data Commitments	Test plan/Test procedures
V-SP-017, Off-Gas Treatment System Bypass Filter/Fan and Bypass Bleed Skid Assemblies Design and Fabrication Appendix D, Bidder's Drawing & Data Commitments	NDE personnel certification
V-SP-017, Off-Gas Treatment System Bypass Filter/Fan and Bypass Bleed Skid Assemblies Design and Fabrication Appendix D, Bidder's Drawing & Data Commitments	Visual weld/NDE procedures
V-SP-017, Off-Gas Treatment System Bypass Filter/Fan and Bypass Bleed Skid Assemblies Design and Fabrication Appendix D, Bidder's Drawing & Data Commitments	Visual weld examination procedures/weldmap
V-SP-017, Off-Gas Treatment System Bypass Filter/Fan and Bypass Bleed Skid Assemblies Design and Fabrication Appendix D, Bidder's Drawing & Data Commitments	AWS CWI Certificate

Submittal Number	Submittal Title
V-SP-017, Off-Gas Treatment System Bypass Filter/Fan and Bypass Bleed Skid Assemblies Design and Fabrication Appendix D, Bidder's Drawing & Data Commitments	Protective Coating Specifications
V-SP-017, Off-Gas Treatment System Bypass Filter/Fan and Bypass Bleed Skid Assemblies Design and Fabrication Appendix D, Bidder's Drawing & Data Commitments	100% Design and Fabrication Package including: Mechanical, Structural and Electrical Drawings Mechanical, Structural and Electrical Calcualtions Completed equipment data sheets Vendor cut sheets/Technical brochures
V-SP-017, Off-Gas Treatment System Bypass Filter/Fan and Bypass Bleed Skid Assemblies Design and Fabrication Appendix D, Bidder's Drawing & Data Commitments	Final Data Package including: Approved preliminary package Final FAT results

ATTACHMENT C

CODES, STANDARDS, AND REGULATIONS INCORPORATED INTO TECHNICAL SPECIFICATION PACKAGES

(Thirteen Sheets)

ATTACHMENT C

CODES, STANDARDS, AND REGULATIONS INCORPORATED INTO TECHNICAL SPECIFICATION PACKAGES

10 CFR 830	"Nuclear Safety Management," *Code of Federal Regulations*, as amended.
10 CFR 835	"Occupational Radiation Protection," *Code of Federal Regulations,* as amended.
29 CFR 1910	"Occupational Safety and Health Standards," *Code of Federal Regulations,* as amended.
40 CFR 60	"Standards of performance for New Stationary Sources," *Code of Federal Regulations,* as amended.
40 CFR 61	"National Emissions Standards for Hazardous Air Pollutants: Radionuclides," *Code of Federal Regulations,* as amended.
40 CFR 264	"Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities," subpart J. *Code of Federal Regulations*, as amended.
47 CFR 15	"Radio Frequency Devices," *Code of Federal Regulations*, as amended.
AATCC Test Method 27	*Water Resistance: Hydrostatic Pressure Test,* American Association of Textile Chemists and Colorists, Research Triangle Park, North Carolina.
ACI 318-02	*Building Code Requirements for Structural Concrete (ACI 318-02) and Commentary (ACI 318R-02),* American Concrete Institution, Farmington Hills, Michigan.
AISC Allowable Stress Design	*Manual of Steel Construction – Allowable Stress Design*, Ninth Edition, American Institute of Steel Construction, Chicago, Illinois.
AISC Load and Resistance Factor Design	*Manual of Steel Construction – Load and Resistance Factor Design.* Third Edition, American Institute of Steel Construction, Chicago, Illinois.

ASME AG-1	*Code on Nuclear Air and Gas Treatment,* Society of Mechanical Engineers, New York, New York.
ASME STS-1a-2003	*Steel Stacks,* Addenda to ASME STS-1-2000 Edition, American Society of Mechanical Engineers, New York, New York.
ANSI C63.16	*American National Standard Guide for Electrostatic Discharge Test Methodologies and Criteria for Electronic Equipment,* American National Standards Institute, Washington, D.C.
ANSI FCI 70-2	*Control Valve Seat Leakage,* Fluid Controls Institute, Inc., Cleveland, Ohio.
ANSI/ISA-82.02.01-1999	(IEC 61010-1MOD), *American National Standard for Safety Standard for Electrical and Electronic Test, Measuring, Controlling, and Related Equipment-General Requirements,* The Instrumentation, Systems, and Automation Society, Research Triangle Park, North Carolina.
ANSI/ISA-82.02.02-1996	(IEC 61010-2-031), *American National Standard for Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use,* The Instrumentation, Systems, and Automation Society, Research Triangle Park, North Carolina.
ANSI Y14.1,	*Drawing Sheet Size and Format,* American National Standards Institute, Inc., New York, New York.
ANSI Y14.5M	*Dimensioning and Tolerancing,* American National Standards Institute, New York, New York.
ANSI/ASHRAE 87.1-1992	*Method of Testing Fan Vibration-Blade Vibrations and Critical Speeds.* American National Standards Institute, Inc., Washington D.C.
ANSI/ASME B1.20.1	*Pipe Threads, General Purpose (Inch).* American National Standards Institute, New York, New York.
ANSI/AWWA D100	*AWWA Standard for Welded Steel Tanks for Water Storage,* American Water Works Association, Denver, Colorado.
ANSI/HI 3.1-3.5	*American National Standard for Rotary Pumps for Nomenclature, Definitions, Applications and Operation,* Hydraulic Institute, Parsippany, New Jersey.

ANSI/HI 3.6	*American National Standard for Rotary Pump Tests*, Hydraulic Institute, Parsippany, New Jersey.
ANSI N13.1-1999	*Health Physics Society Sampling and Monitoring Releases,* American National Standards Institute, Inc., New York, New York.
ANSI/IESNA RP-7	*Lighting Industrial Facilities*, Illuminating Engineering Society of North America, New York, New York.
API 620	*Design and Construction of Large, Welded, Low-Pressure Storage Tank, Tenth Edition,* American Petroleum Institute, Washington, D.C.
ASCE 4-98	*Seismic Analysis of Safety-Related Nuclear Structures*, American Society of Civil Engineers, Reston, Virginia.
ASCE 7-98	*Minimum Design Loads for Buildings and Other Structures,* American Society of Civil Engineers, Reston, Virginia.
ASHRAE Fundamentals Handbook	*2001 ASHRAE Handbook – Fundamentals,* American Society of Heating, Refrigerating, and Air Conditioning Engineers, Atlanta, Georgia.
ASME B&PV Code Sections I, VIII and IX	*ASME Boiler and Pressure Vessel Code,* American Society of Mechanical Engineers, New York, New York.
ASME B16.5	*Pipe Flanges and Flanged Fittings,* American Society of Mechanical Engineers, New York, New York.
ASME B16.9	*Factory-Made Wrought Steel Buttwelding Fittings,* American Society of Mechanical Engineers, New York, New York.
ASME B16.11	*Forged Fittings, Socket Welding and Threaded,* American Society of Mechanical Engineers, New York, New York.
ASME B16.34	*Valves, Flanged Threaded and Welding End,* American Society of Mechanical Engineers, New York, New York.

ASME B18.2.1	*Square and Hex Bolts and Screws Inch Series,* American Society of Mechanical Engineers, New York, New York.
ASME B18.2.2	*Square and Hex Nuts,* American Society of Mechanical Engineers, New York, New York.
ASME B30.9-2003	*Slings,* American Society of Mechanical Engineers, New York, New York.
ASME B30.20,	*Below-the-Hook Lifting Devices,* American Society Of Mechanical Engineers, New York, New York.
ASME B31.1	*Power Piping,* , American Society Of Mechanical Engineers, New York, New York.
ASME B31.3	*Process Piping,* American Society of Mechanical Engineers, New York, New York.
ASME B31.5	*Refrigeration Piping Procedures,* , American Society of Mechanical Engineers, New York, New York.
ASME NQA-1, 1994	*Quality Assurance Program Requirements for Nuclear Facilities,* American Society of Mechanical Engineers, New York, New York.
ANSI N509-2002,	*Nuclear Power Plant Air-Cleaning Units and Components,* American National Standards Institute, Inc., New York, New York.
ASME N510	*Testing of Nuclear Air Treatment Systems,* American Society Of Mechanical Engineers, New York, New York.
ASME PCC-1	*Guidelines for Pressure Boundary Bolted Flange Joint Assembly,* American Society of Mechanical Engineers, New York, New York.
ASNT SNT-TC-1A	*Recommended Practice,* American Society of Nondestructive Testing, Columbus, Ohio.
ASTM A36/A36M	*Standard Specification for Carbon Structural Steel, American Society of Testing and Materials,* New York, New York.
ASTM A53/A53M	*Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless,* American Society of Testing and Materials, New York, New York.

ASTM A105/A105M	*Standard Specification for Carbon Steel Forgings for Piping Applications,* American Society for Testing and Materials, West Conshohocken, Pennsylvania
ASTM A106	*Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service,* American Society for Testing and Materials, West Conshohocken, Pennsylvania
ASTM A108	*Standard Specification for Steel Bars, Carbon, Cold-Finished, Standard Quality,* American Society for Testing and Materials, West Conshohocken, Pennsylvania
ASTM A176	*Standard Specification for Stainless and Heat-Resisting Chromium Steel Plate, Sheet, and Strip,* American Society for Testing and Materials, West Conshohocken, Pennsylvania.
ASTM A182/A182M	*Standard Specification for Forged or Rolled Alloy Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High Temperature Service*, American Society for Testing and Materials, West Conshohocken, Pennsylvania
ASTM A193/A193M	*Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service,* American Society for Testing and Materials, West Conshohocken, Pennsylvania
ASTM A194/A194M	*Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure and High Temperature Service or Both,* American Society for Testing and Materials, West Conshohocken, Pennsylvania
ASTM A234/A234M	*Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy for Moderate and High Temperature Service,* American Society for Testing and Materials, West Conshohocken, Pennsylvania
ASTM A240/A240M	*Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications,* American Society for Testing and Materials, West Conshohocken, Pennsylvania

ASTM A269	*Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service,* American Society of Testing and Materials, New York, New York.
ASTM A276	*Standard Specification for Stainless Steel Bars and Shapes,* American Society of Testing and Materials, New York, New York.
ASTM A307	*Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength,* American Society for Testing and Materials, West Conshohocken, Pennsylvania.
ASTM A312/A312M	*Standard Specification for Seamless and Welded Austenitic Stainless Steel Pipes,* American Society for Testing and Materials, West Conshohocken, Pennsylvania
ASTM A325	*Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength,* American Society for Testing and Materials, West Conshohocken, Pennsylvania
ASTM A351/A351M-03	*Standard Specification for castings, Austenitic, Austenitic-Ferritic (Duplex), for Pressure-Containing Parts,* American Society for Testing and Materials, West Conshohocken, Pennsylvania
ASTM A354	*Standard Specification for Quenched and Tempered Alloy Steel Bolts, Studs, and other Externally Threaded Fasteners,* American Society for Testing and Materials, West Conshohocken, Pennsylvania
ASTM A403/A403M	*Standard Specification for Wrought Austenitic Stainless Steel Piping Fittings,* American Society for Testing and Materials, West Conshohocken, Pennsylvania
ASTM A480/A480M	*Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip,* American Society for Testing and Materials, West Conshohocken, Pennsylvania
ASTM A500	*Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes,* American Society for Testing and Materials, West Conshohocken, Pennsylvania

ASTM A516/A516M	*Standard Specification for Pressure vessel Plates, Carbon Steel, for Moderate- and Lower-Temperature Service,* American Society for Testing and Materials, West Conshohocken, Pennsylvania
ASTM A563a	*Standard Specification for Carbon and Alloy Steel Nuts,* American Society for Testing and Materials, West Conshohocken, Pennsylvania
ASTM A569	*Standard Specification for Steel, Carbon (0.15 Maximum, Percent) Hot-Rolled Sheet and Strip Commercial,* American Society for Testing and Materials, West Conshohocken, Pennsylvania
ASTM B187/B187M-03	*Standard Specification for Copper, Bus Bar, Rod, Shapes and General Purpose Rod, Bar, and Shapes,* American Society for Testing and Materials, West Conshohocken, Pennsylvania
ASTM C518	*Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus,* American Society for Testing and Materials, West Conshohocken, Pennsylvania
ASTM D380	*Standard Test Methods for Rubber Hose,* American Society for Testing and Materials, West Conshohocken, Pennsylvania.
ASTM D991	*Standard Test Method for Rubber Property-Volume Resistivity of Electrically Conductive and Antistatic Products,* American Society for Testing and Materials, West Conshohocken, Pennsylvania.
ASTM D1056	*Standard Specification for Flexible Cellular Materials-Sponge or Expanded Rubber,* American Society for Testing and Materials, West Conshohocken, Pennsylvania.
ASTM D1621	*Standard Test Method for Compressive Properties of Rigid Cellular Plastics,* American Society for Testing and Materials, West Conshohocken, Pennsylvania
ASTM D1622	*Standard Test Method for Apparent Density of Rigid Cellular Plastics,* American Society for Testing and Materials, West Conshohocken, Pennsylvania

ASTM D2854-96 (2000)	*Standard Test Method for Apparent Density of Activated Carbon,* American Society for Testing and Materials, West Conshohocken, Pennsylvania
ASTM D2862-97 (2004)	*Standard Test Method for Particle Size Distribution of Granular Activated Carbon,* American Society for Testing and Materials, West Conshohocken, Pennsylvania
ASTM D3803-91 (2004)	*Standard Test Method for Nuclear-Grade Activated Carbon,* American Society for Testing and Materials, West Conshohocken, Pennsylvania
ASTM D5162	*Standard Practice for Discountability (Holiday) Testing of Nonconductive Protective Coating on Metallic Substrates,* American Society for Testing and Materials, West Conshohocken, Pennsylvania.
ASTM E84	*Standard Test Method for Surface Burning Characteristics of Building Materials,* American Society for Testing and Materials, West Conshohocken, Pennsylvania
ASTM E96	*Standard Test Methods for Water Vapor Transmission of Materials,* American Society for Testing and Materials, West Conshohocken, Pennsylvania
ASTM E285	*Standard Test Method for Oxyacetylene Ablation Testing of Thermal Insulation Materials,* American Society for Testing and Materials, West Conshohocken, Pennsylvania.
ASTM F436	*Standard Specification for Hardened Steel Washers,* American Society for Testing and Materials, West Conshohocken, Pennsylvania.
AWS D1.1/D1.1M	*Structural Welding Code* – Steel, American Welding Society, Miami, Florida
ANSI/AWS D1.3-98	*Structural Welding Code* – Sheet Steel, American Welding Society, Miami, Florida
AWS D1.6	*Structural Welding Code* – Stainless Steel, American Welding Society, Miami, Florida.
AWS QC-1	*Standard for AWS Certification of Welding Inspectors,* American Welding Society, Miami, Florida.

Bagasen, L.M., J.H. Westsik, Jr., and T,M, Brouns, 2005, *Waste-Form Qualification Compliance Strategy for Bulk Vitrification,* PNNL-15048 Pacific Northwest National Laboratory, Richland, Washington.

CH2M HILL, 2004, *Initial DBVS Design Site Improvement Package,* RPP-22537, Revision 0, Prepared by AMEC Earth and Environmental, Richland, Washington, and AMEC Americas Limited, Trail, British Columbia under Document Number 14643-G-RP-001, for CH2M HILL Hanford Group, Inc. Richland, Washington.

DOE-HDBK-1169-2003 *DOE Handbook-Nuclear Air Cleaning Handbook,* U.S. Department of Energy, Washington, D.C.

DOE/RL-92-36 *Hanford Site Hoisting and Rigging Manual,* U.S. Department of Energy, Richland, Washington.

Fuller, P., 2004 *Hydraulic Fluid Compatibility with TraceTek Leak Detection System and Mini-Probe,* RPP-19524, Rivision 1, CH2M HILL Hanford Group, Inc., Richland, Washington.

HNF-2962 *A List of EMI/EMC Requirements,* Rev. O, Numatec Hanford Corporation for Fluor Daniel Hanford, Inc. Richland, Washington.

HNF-SD-GN-ER-501 *Natural Phenomena Hazards*, Hanford Site, Washington, Revision 1B, Westinghouse Hanford Company, Richland, Washington.

IEC 61000-4-2 *Electromagnetic Compatibility (EMC) – Part 4-2: Testing and Measurement Techniques – Electrostatic Discharge Immunity Test,* International Engineering Consortium, Chicago, Illinois.

IEEE Std C2 *National Electrical Safety Code,* Institute of Electrical and Electronic Engineers, New York, New York.

IEEE C62.41 *IEEE Recommended Practice on Surge Voltages in Low-Voltages AC Power Circuits,* Institute of Electrical and Electronic Engineers, New York, New York.

IEEE C62.41.1	*IEEE Guide on the Surge Environment in Low-Voltage (1000 V and Less) AC Power Circuits,* Institute of Electrical and Electronics Engineers, New York, New York.
IEEE C62.41.2	*IEEE Recommended Practice on Characterization of Surges in Low Voltage (1000 V and Less) AC Power Circuits,* Institute of Electrical and Electronics Engineers, New York, New York
IEEE C37.90.2	*IEEE Standard for Withstand Capability of Relay Systems to Radiated Electromagnetic Interference from Transceivers,* Institute of Electrical and Electronics Engineers, New York, New York.
IEEE 141	*IEEE Recommended Practice for Electric Power Distribution for Industrial Plants,* Institute of Electrical and Electronics Engineers, New York, New York.
IEEE 142	*IEEE Recommended Practice for Grounding of Industrial and Commercial Power Systems,* Institute of Electrical and Electronics Engineers, New York, New York.
IEEE 242	*IEEE Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems,* Institute of Electrical and Electronics Engineers, New York, New York.
IEEE 519	*Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems,* Institute of Electrical and Electronics Engineers, New York, New York.
IESNA HB-9	*IESNA Lighting Handbook,* 9th Edition, Illuminating Engineering Society of North America, New York, New York.
IP-2	The 2003 Hose Handbook, 7th Edition, Rubber Manufacturers of America, Washington, D.C.
ISA-82.03-1988	*Standard for Safety Standard for Electrical and Electronic Test, Measuring, Controlling, and Related Equipment,* The Instrumentation, Systems, and Automation Society, Research Triangle Park, North Carolina.

ISO 668	*Series 1 Freight Containers Classification, Dimensions and Ratings,* International Organization for Standardization, Geneva, Switzerland.
ISO 1161	*Series 1 Freight Containers – Corner Fittings – Specification,* International Organization for Standardization, Geneva, Switzerland.
ISO 1496-2	*Series 1 Freight Containers – Specification and Testing – Part 2: Thermal Containers,* International Organization for Standardization, Geneva, Switzerland.
Leonard, M.W., 2004,	*Interface Control Document Between the Demonstration Bulk Vitrification System (DBVS)[CH2M HILL Hanford Group, Inc.] and the Effluent Treatment Facility (ETF) [Flour Hanford],* Revision 0, CH2M HILL Hanford Group, Inc., Richland, Washington.
MSS SP-69	*Pipe Threads and Supports,* Manufacturing Standardization Society of the Valve and Fittings Industry, Inc. Vienna, Virginia.
MSS SP-72	*Ball Valves with Flanged or Butt-Welding Ends for General Service,* Manufacturing Standardization Society of the Valve and Fittings Industry, Inc. Vienna, Virginia.
MSS SP-82	*Valve Pressure Testing Methods,* Manufacturing Standardization Society of the Valve and Fittings Industry, Inc. Vienna, Virginia.
NEMA MG-1	*Motors and Generators,* National Electrical Manufacturers Association, Rosslyn, Virginia
NEMA MG-13	*Frame Assignments for Alternating-Current Integral-Horsepower Induction Motors,* National Electrical Manufacturers Association, Rosslyn, Virginia
NFPA 70	*National Electrical Code,* 2002 Edition, National Fire Protection Association, Quincy, Massachusetts.
NFPA 90A	*Standard for the Installation of Air-Conditioning and Ventilating Systems,* 1999 Edition National Fire Protection Association, Quincy, Massachusetts.

NFPA 91	*Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Noncombustible Particulate Solids, 1999* Edition, National Fire Protection Association, Quincy, Massachusetts.
RPP-17403	*Demonstration Bulk Vitrification System Specifications,* Revision 2, CH2M HILL Hanford Group, Inc., Richland, Washington.
SAE J429	*Mechanical and Material Requirements for Externally Threaded Fasteners,* Society of Automotive Engineers, Warrendale, Pennsylvania.
SAE J534	*Lubrication Fittings* Society of Automotive Engineers, Warrendale, Pennsylvania.
TFC-ENG-STD-06	*Design Loads for Tank Farm Facilities,* Revision A, CH2M HILL Hanford Group, Inc., Richland, Washington.
TFC-ENG-STD-12	*Tank Farm Equipment Identification Numbering and Labeling Standard,* Revision A, CH2M HILL Hanford Group, Inc., Richland, Washington.
TFC-ENG-STD-21	*Hose–in-Hose Transfer Lines,* Revision A, CH2M HILL Hanford Group, Inc., Richland, Washington.
TFC-ESHQ-Q-C-C-03	*Control of Suspect Counterfeit Items,* Revision B, CH2M HILL Hanford Group, Inc., Richland, Washington.
TFC-PLN-09	*Human Factors Program,* Revision A-1, CH2M HILL Hanford Group, Inc., Richland, Washington.
UBC, 1997	*1997 Uniform Building Code,* International Conference of Building Officials, Whittier, California.
UL 142	*Standard for Safety-Steel Aboveground Tanks for Flammable and Combustible Liquids,* Underwriters Laboratories, Inc., Northbrook, Illinois.
UL 508A	*Standard for Safety Industrial Control Panels,* Underwriters Laboratories, Inc., Northbrook, Illinois.
UL 586	*Standard for Safety High-Efficiency Particulate Air Filter Unit,* Underwriters Laboratories, Inc., Northbrook, Illinois.

UL 840	*Insulation Coordination Including Clearances and Creepage Distances for Electrical Equipment,* Underwriters Laboratories, Inc., Northbrook, Illinois.
UL 900	*Air Filter Units,* Underwriters Laboratories, Inc., Northbrook, Illinois.
UL-Listed	*Electrical Appliance and Utilization Equipment Directory*, Underwriters Laboratories, Inc., Northbrook, Illinois.
WAC 173-303-640	"Tank Systems," *Washington Administrative Code*, as Amended.
WAC 173-400	"General Regulations for Air Pollution Sources," *Washington Administrative Code*, as Amended.
WAC 246-247	"Radiation Protection-Air Emissions," *Washington Administrative Code*, as Amended.