

START

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Mr. John Grantham
State of Washington
Department of Ecology
Nuclear & Mixed Waste Program
P. O. Box 47600
Olympia, WA 98504-7600

FLUOR DANIEL, INC.

Date: MAY 12, 1992

Reference: Hanford Waste Vitrification Plant
DOE Contract DE-AC06-86RL10838
Fluor Contract 8457

Transmittal No.: WDOE-131

Dear Mr. Grantham:

TRANSMITTAL

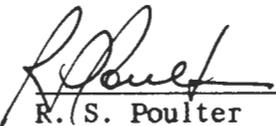
We enclose * copy of the items listed below. These are issued per US-DOE request.
* 5 FULLSIZE ROLLED, 1 REDUCED

Response due to Fluor: N/A
Responds to: FKG P340

NUMBER	Rev.	Date	TITLE
SEE TRANSMITTAL ATTACHMENT			PACKAGE P340 FRIT HANDLING SYSTEM
			*ISSUED AFC ONLY PENDING INCORPORATION OF CHANGES REQUIRED BY CR 664

Distribution:
Reference: FRP-410, FUP-139
R. L. Long: DOE-RL W/O
VPO/AME Corresp Cntrl Cntr, MSIN A5-10 (P340), w/o
P. Felise, WHC-RL (MSIN G6-16) 1 F
Environmental Data Management Center (MSIN H4-44) w/1 F *H4-14*
D. Duncan, US EPA, Region X w/o
MHF
RSP:MHF:lh

Very truly yours,


R. S. Poulter
Project Director



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TRANSMITTAL ATTACHMENT FOR PACKAGE SPECIFICATIONS

SPEC NUMBER	REV	SPECIFICATION TITLE	SECT	SECTION TITLE
B-595-P-P340	0	FRIT HANDLING SYSTEM	01730	OPERATION AND MAINTENANCE AND DATA
B-595-P-P340	0		14500	BULK FRIT HANDLING SYSTEM
B-595-P-P340	0		16150	MOTORS-INDUCTION
B-595-P-P340	0		16610	ELECTRICAL REQUIRMENTS F/PACKAGED EQUIP
B-595-P-P340	0		17853	DRY FRIT HANDLG SYS CONTRL PNL&ASSO INST
B-595-P-P340	0		17858	INST FRNSHD W/MECH EQP DRY FRIT HDLG SYS

2004-11-18

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PACKAGE TRANSMITTAL ATTACHMENT

DRAWING NUMBER	SHT NO.	REV	DATE	DRAWING TITLE
H-2-121699	1	0	05/11/92	LP-580-002 INSTRUMENT PANEL LAYOUT
H-2-121795	1	0	05/11/92	INSRTUMENT CONTROL LOGIC DIAGRAM LP-580-002
H-2-121795	2	0	05/11/92	INSTRUMENT CONTROL LOGIC DIAGRAM LP-580-002
H-2-121795	3	0	05/11/92	INSTRUMENT CONTROL LOGIC DIAGRAM LP-580-002

05/11/92

SPECIFICATIONS

**FRIT HANDLING SYSTEM
B-595-P-P340**

**HANFORD WASTE
VITRIFICATION PLANT**

**U.S. DEPARTMENT OF ENERGY
RICHLAND OPERATIONS OFFICE**



**FLUOR DANIEL
ADVANCED TECHNOLOGY DIVISION
CONTRACT 8457**

**DOE CONTRACT NO.
DE-AC06-86RL10838**

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FRIT HANDLING SYSTEM
SPECIFICATION B-595-P-P340

"APPROVED FOR CONSTRUCTION"

REVISION NO. 0
ISSUE DATE _____

SAFETY CLASS 3

APPROVED BY:

M. H. Featherston

M. H. Featherston

Procurement Packages P.E.

May 8, 92
Date

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J. L. Smets

Baseline Engineering Manager

5-8-92
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Date

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Q. A. Manager

5-8-92
Date

R. S. Poulter

R. S. Poulter

Project Director

8 May 92
Date

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**FRIT HANDLING SYSTEM
(B-595-P-P340)**

**TABLE OF CONTENTS
TECHNICAL SPECIFICATIONS**

DIVISION 1 - GENERAL REQUIREMENTS

Section	Title
01730	Operation and Maintenance Data

DIVISION 14 - CONVEYING SYSTEMS

Section	Title
14500	Bulk Frit Handling System

DIVISION 16 - ELECTRICAL

Section	Title
16150	Motors - Induction
16610	Electrical Requirements for Packaged Equipment

DIVISION 17 - INSTRUMENTATION

Section	Title
17853	Dry Frit Handling System Control Panel and Associated Instruments
17858	Instruments Furnished with Mechanical Equipment Dry Frit Handling System

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**SECTION 01730
OPERATION AND MAINTENANCE DATA**

PART 1 GENERAL

1.1 SUBMISSION OF OPERATION AND MAINTENANCE DATA

Submit operation and maintenance (O&M) data which is specifically applicable to this contract and a complete and concise depiction of the provided equipment or product. Data containing extraneous information to be sorted through to find applicable instructions will not be accepted. Present information in sufficient detail to clearly explain user O&M requirements at the system, equipment, component, and subassembly level. Include an index preceding each submittal. Submit the following in accordance with the Vendor Drawing and Data Requirements section of the Order/Subcontract.

1.1.1 Package Content

For each product, system, or piece of equipment requiring submission of O&M data, submit the package required in the individual technical section. Package content shall be as required in the Paragraph 1.3, "Schedule of Operations and Maintenance Data Packages."

1.2 TYPES OF INFORMATION REQUIRED IN O&M DATA PACKAGES

1.2.1 Operating Instructions

Include specific instructions, procedures, and illustrations for the following phases of operation:

1.2.1.1 Safety Precautions

List personnel hazards and equipment or product safety precautions for all operating conditions.

1.2.1.2 Operator Prestart

Include requirements to set up and prepare each system for use.

1.2.1.3 Start-Up, Shutdown, and Post-Shutdown Procedures

Include a control sequence for each of these operations.

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1.2.1.4 Normal Operations

Include control diagrams with data to explain operation and control of systems and specific equipment.

1.2.1.5 Emergency Operations

Include emergency procedures for equipment malfunctions to permit a short period of continued operation or to shut down the equipment to prevent further damage to systems and equipment. Include emergency shutdown instructions for fire, explosion, spills, or other foreseeable contingencies. Provide guidance on emergency operations of all utility systems including valve locations and portions of systems controlled.

1.2.1.6 Operator Service Requirements

Include instructions for services to be performed by the operator such as lubrication, adjustments, and inspection.

1.2.1.7 Environmental Conditions

Include a list of environmental conditions (temperature, humidity, and other relevant data) which are best suited for each product or piece of equipment and describe conditions under which equipment should not be allowed to run.

1.2.2 Preventive Maintenance

Include the following information for preventive and scheduled maintenance to minimize corrective maintenance and repair.

1.2.2.1 Lubrication Data

Include lubrication data, other than instructions for lubrication in accordance with Paragraph 1.2.1.6, Operator Service Requirements.

1.2.2.2 Preventive Maintenance Plan and Schedule

Include manufacturer's schedule for routine preventive maintenance, inspections, tests and adjustments required to ensure proper and economical operation and to minimize corrective maintenance and repair. Provide manufacturer's projection of preventive maintenance man-hours on a daily, weekly, monthly, and annual basis.

1.2.3 Corrective Maintenance

Include manufacturer's recommendations on procedures and instructions for correcting problems and making repairs.

1.2.3.1 Troubleshooting Guides and Diagnostic Techniques

Include step-by-step procedures to promptly isolate the cause of typical malfunctions. Describe clearly why the checkout is performed and what conditions are to be sought. Identify tests or inspections and test equipment required to determine whether parts and equipment may be reused or require replacement.

1.2.3.2 Wiring Diagrams and Control Diagrams

Wiring diagrams and control diagrams shall be point-to-point drawings of wiring and control circuits including factory-field interfaces. Provide a complete and accurate depiction of the actual job specific wiring and control work. On diagrams number electrical and electronic wiring and pneumatic control tubing and the terminals for each type, identically to actual installation numbering.

1.2.3.3 Maintenance and Repair Procedures

Include instructions and list tools required to restore product or equipment to proper condition or operating standards.

1.2.3.4 Removal and Replacement Instructions

Include step-by-step procedures and list required tools and supplies for removal, replacement, disassembly, and assembly of components, assemblies, subassemblies, accessories, and attachments. Provide tolerances, dimensions, settings and adjustments required. Instructions shall include a combination of text and illustrations.

1.2.3.5 Spare Parts and Supply Lists

Include lists of spare parts and supplies required for maintenance and repair to ensure continued service or operation without unreasonable delays.

1.2.3.6 Corrective Maintenance Man-Hours

Include manufacturer's projection of corrective maintenance man-hours. Corrective maintenance that requires participation of the equipment manufacturer shall be identified and tabulated separately.

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1.2.4 Appendices

Provide information specified in the preceding paragraphs pertinent to the maintenance or operation of the product or equipment. Include the following:

1.2.4.1 Parts Identification

Provide identification and coverage for all parts of each component, assembly, subassembly, and accessory of the end items subject to replacement. Include special hardware requirements, such as requirement to use high-strength bolts and nuts. Identify parts by make, model, serial number, and source of supply to allow reordering without further identification. Provide clear and legible illustrations, drawings, and exploded views to enable easy identification of the items. When illustrations omit the part numbers and description, both the illustrations and separate listing shall show the index, reference, or key number which will cross-reference the illustrated part to the listed part. Parts shown in the listings shall be grouped by components, assemblies, and subassemblies.

- A. Manufacturer's Standard Commercial Practice: The parts data may cover more than one model or series of equipment, components, assemblies, subassemblies, attachments, or accessories, such as a master parts catalog, in accordance with the manufacturer's standard commercial practice.
- B. Other Than Manufacturer's Standard Commercial Practice (MSCP): End item manufacturer may add a cross-reference to implement components' assemblies and parts requirements when implementation in manual form varies significantly from the style, format, and method of manufacturer's standard commercial practice. Use the format in the following example:

End Item Manufacturer's Alphanumeric Sequence	Actual Manufacturer's Name and MSCP	Actual Manufacturer Part No.
100001	John Doe & Co. 00000	2000002

1.2.4.2 Warranty Information

List and explain the various warranties and include the servicing and technical precautions prescribed by the manufacturers or contract documents to keep warranties in force.

1.2.4.3 Personnel Training Requirements

Provide information available from the manufacturers to use in training designated personnel to operate and maintain the equipment and systems properly.

1.2.4.4 Testing Equipment and Special Tool Information

Include information on test equipment required to perform specified tests and on special tools needed for the operation, maintenance, and repair of components.

1.3 SCHEDULE OF OPERATION AND MAINTENANCE DATA PACKAGES

Furnish the O&M data packages specified in individual technical sections. The required information for each O&M data package is as follows:

1.3.1 Data Package

- A. Operating instructions
- B. Safety precautions
- C. Operation prestart
- D. Start-up, shutdown, and post shutdown
- E. Normal operations
- F. Emergency operations
- G. Operator Service Requirements
- H. Environmental conditions
- I. Preventative maintenance
- J. Lubrication data
- K. Preventive maintenance plan and schedule
- L. Corrective maintenance
- M. Troubleshooting guides and diagnostic techniques
- N. Wiring diagrams and control diagrams
- O. Maintenance and repair procedures and manhour requirements
- P. Removal and replacement instructions
- Q. Spare parts and supply list

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- R. Parts identification
- S. Warranty information
- T. Personnel training requirements
- U. Testing equipment and special tool information

PART 2 PRODUCTS

(Not Used)

PART 3 EXECUTION

(Not Used)

END OF SECTION

ASME Section IX	1989 Qualification Standard for Welding and Brazing Procedures, Welders, Brazers, and Welding and Brazing Operators (Addenda 1990)
AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)	
ASTM A36/A36M	1990 Standard Specification for Structural Steel
ASTM A53	1990 Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
ASTM A105/A105M	1990 Standard Specification for Forgings, Carbon Steel, for Piping Components
ASTM A108	1990 Standard Specification for Steel Bars, Carbon, Cold-Finished, Standard Quality
ASTM A182/A182M	1990 Standard Specification for Forged or Rolled Alloy-Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High Temperature Service
ASTM A193/A193M	1990 Standard Specification for Alloy Steel and Stainless Steel Bolting Material for High-Temperature Service
ASTM A194/A194M	1990 Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High-Pressure and High-Temperature Service
ASTM A234/A234M	1990 Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures
ASTM A240	1991 Standard Specification for Heat Resisting Chromium and Chromium-Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels

ASTM A276	1990 Standard Specification for Stainless and Heat Resisting Steel Bars and Shapes
ASTM A307	1990 Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength
ASTM A312/A312M	1991 Standard Specification for Seamless and Welded Austenitic Stainless Steel Pipe
ASTM A403/A403M	1991 Standard Specification for Wrought Austenitic Stainless Steel Piping Fittings
ASTM A563	1991 Standard Specification for Carbon and Alloy Steel Nuts
ASTM F436	1990 Standard Specification for Hardened Steel Washers

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1	1990 Structural Welding Code
ANTI-FRICTION BEARING MANUFACTURERS ASSOCIATION (AFBMA)	
AFBMA 9	1990 Load Ratings and Fatigue Life for Ball Bearings
AFBMA 11	1990 Load Ratings and Fatigue Life for Roller Bearings

CONVEYOR EQUIPMENT MANUFACTURERS ASSOCIATION (CEMA)

ANSI/CEMA 300	1988 Screw Conveyors Standards
ANSI/CEMA 350	1988 Screw Conveyors

OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA)

OSHA 29 CFR 1910	1991 Code of Federal Regulations, Occupational Safety and Health Administration
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PIPE FABRICATION INSTITUTE (PFI)

ES-24 1990 Pipe Bending Methods,
Tolerances, Process and Material
Requirements

UNIFORM BUILDING CODE (UBC)

UBC 1988 Uniform Building Code

1.3 RELATED REQUIREMENTS

Specification Section 01730 Operation and Maintenance Data

Specification Section 16150 Motors-Induction

Specification Section 16610 Electrical Requirements for
Packaged Equipment

Specification Section 17853 Dry Frit Handling System Control
Panel

Specification Section 17858 Instruments Furnished with
Mechanical Equipment, Dry Frit
Handling System

1.4 DEFINITIONS

DS - Data Sheet

FSMT - Frit Slurry Make-up Tank

GMAW - Gas Metal Arc Welding

GTAW - Manual and Automatic Gas Tungsten Arc Welding

SMAW - Shielded Metal Arc Welding

1.5 SYSTEM DESCRIPTION

1.5.1 Dry frit is received at the HWVP site in 2500-pound flexible bulk bags. The bags are moved from the storage area to the slurry preparation area by a forklift truck. The bags are lifted up by a hoist and trolley attached to the bag unloader frame. The bags are emptied by placing them in a bag unloader and opening the bag spout, without releasing dust to the atmosphere. The bag unloader then discharges frit to a screw conveyor and then to a Z-type bucket elevator. The entire system will be connected to the dust collection system to further minimize discharge of dust. The frit is emptied from the Z-type bucket elevator to a magnetic chute to remove any tramp metals prior to discharging the frit to the lump breaker. The lump breaker pulverizes any agglomerations in the frit. A scalping screen then removes any oversized particles prior to discharging the frit to the frit weigh bin.

The frit is then transported by batch process from the frit weigh bin to the frit slurry make-up tank through the frit weigh bin discharge valve, diverter valve, screw conveyor and rotary valve.

1.5.2 Items provided by Buyer

1.5.2.1 The Buyer will provide motor starters.

1.5.2.2 The Buyer will install the system in Buyer's facility.

1.5.2.3 The Buyer will supply both the recycling and disposable drums.

1.5.2.4 The Buyer will supply the forklift truck.

1.5.2.5 The Buyer will supply and connect all standard piping according to Attachment C.

1.5.2.6 The Buyer will supply and connect the instrument/plant air pipes to the equipment termination points.

1.6 SUBMITTALS

Seller shall submit the following in accordance with the Vendor Drawing and Data Requirements section of the Order/Subcontract.

1.6.1 General arrangement and assembly drawings which depict the design and all facility interfaces, and incorporate the following additional information:

1.6.1.1 The equipment nameplate and all its markings.

1.6.1.2 The equipment name and number.

1.6.1.3 Listing of additional drawings.

1.6.1.4 Cleaning, surface preparation, and labeling requirements.

1.6.1.5 Total fabricated weight, installed empty weight, operating weight of vessel (in pounds), and the location of the equipment center of gravity. The design loads and the design conditions shall be tabulated for each item in the system.

1.6.1.6 Location, type and size of all anchor bolts, hold-downs and/or base plate details. Clearly identify all interfaces between Seller-supplied items and the building structure or foundations.

1.6.2 Certified fabrication drawings by the Seller which show the following:

1.6.2.1 Dimensional details with applicable tolerances.

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- 1.6.2.2 Detailed Bill of Materials.
- 1.6.2.3 Drawings for each item shall identify the pipe connection nozzles and openings, internal parts, access openings, and attachments.
- 1.6.2.4 Drawings for each item shall identify the materials of construction including nominal and finished minimum thicknesses, code standards for the internal parts and all exposed surfaces.
- 1.6.3 Data Sheets
- Seller shall complete and submit the attached data sheets for each equipment.
- 1.6.4 Test Reports
- Seller shall prepare and submit Factory Acceptance Test procedures to Buyer for approval. Test reports stating that the Factory Acceptance Tests have been performed in accordance with procedures shall be submitted.
- 1.6.5 Installation
- Seller shall prepare and submit Installation Drawings and plans as well as any special instructions required to support the complete installation by Buyer (including the piping connections between the dust collector and all other items).
- 1.6.6 Operating and Maintenance Manuals
- Seller shall prepare and submit O&M data in accordance with Specification Section 01730.
- 1.6.7 Shipping
- 1.6.7.1 Seller shall submit detailed shop certified drawings indicating outline dimensions, enclosure construction, shipping splits, shipping weight, lifting and supporting points.
- 1.6.7.2 Seller shall provide approximate position of overall vertical and horizontal center of gravity for each unit.
- 1.6.8 Cleaning
- Seller shall submit the procedure for cleaning and maintaining the system parts free of contamination during material procurement, storage and handling, all phases of fabrication, testing, and preparation for shipment.

1.6.9 Training

Seller shall submit a plan and schedule for training at least one Buyer-designated individual in each of the following categories:

- A. Operating/Systems Engineer.
- B. Maintenance Engineer.

Each engineer shall be trained at a level so that others can be subsequently trained by those individuals.

1.6.10 Welding

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- 1.6.10.1 Piping Welding Procedure Specifications and Procedure Qualification Record in accordance with the requirements of ASME Section IX shall be submitted for Buyer approval. Submittals shall include a brief summary of the application of individual weld procedures with regard to types of weld joint and piping material.

Nondestructive Examination (NDE) procedures for shop-fabricated items shall be submitted for approval. Fabrication shall not start until these documents are returned to the Seller with authorization to proceed.

Weld repair procedure shall be submitted for Buyer approval.

- 1.6.10.2 For nonprequalified structural welding, a procedure shall be submitted for Buyer approval.

1.6.11 Structural

- 1.6.11.1 Structural calculations shall be performed in accordance with Paragraph 2.1.1.9 and submitted for approval.

1.7 CLASSIFICATION OF SYSTEMS AND COMPONENTS

(Not Used)

1.8 PROJECT OR SITE ENVIRONMENTAL CONDITIONS

1.8.1 Climatic and Geographic Site Conditions

- A. Site Elevation 714 feet above sea level
- B. Barometric Pressure 14.3 psia

C. Outside Design Temperature

- | | |
|--------------------------------|-------|
| 1) Maximum Design Temperature | 110°F |
| 2) Minimum Design Temperature | -20°F |
| 3) Wet Bulb Design Temperature | 68°F |

1.8.2 Operating Environment

- | | |
|-----------------------|----------------|
| A. Normal Temperature | 50° to 110°F |
| B. Relative Humidity | Not controlled |

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

2.1.1 General

2.1.1.1 The bulk frit handling system (Attachment A) shall consist of bag unloader with activator and hoist and trolley (DS-1), screw conveyor (DS-2), Z-type bucket elevator (DS-3), magnetic chute (DS-4), lump breaker (DS-5), scalping screen (DS-6), weigh bin with activator and load cells (DS-7), diverter valve (DS-8), screw conveyor (DS-9), rotary feeder (DS-10), and dust collector with blower (DS-11). When two or more of the same components are required, the components shall be identical (same manufacturer and catalog number).

2.1.1.2 The system shall be a complete package with all the necessary accessory components, interconnections, transitions, access for maintenance and inspection, structural support (for each piece of equipment - not building structure), controls, motors (with the exception of motor starters which will be supplied by Buyer), panels, switches, vibration probes, isolation devices, handrails, bolts, nuts and gaskets, all completely factory-assembled and operationally checked, ready for installation in the plant (in accordance with Attachments B and C). The selection of all accessories, materials and methods of fabrication not specifically covered by this specification, but which are necessary to complete the fabrication of the system, shall be the Seller's responsibility.

2.1.1.3 The package shall be designed dust-tight for indoor application. It shall be maintained under negative pressure to prevent dust leakage.

- 2.1.1.4 All product contact parts shall be abrasion-resistant type. Harder, more wear-resistant materials shall be used for moving contact parts such as (but not limited to) screw flights, rotary feeder blades, bucket edges and the diverter valve disc. Acceptable methods that shall be considered in the design include overlay, hard-facing, lining and/or replaceable tips.
- 2.1.1.5 All local controls and control panels shall be provided by the Seller in accordance with Specification Section 17853.
- 2.1.1.6 All equipment shall be provided with both inlet and outlet transition connections as well as flexible connections and clamps as required. Equipment subjected to routine vibration or shaking shall be protected from metal fatigue and weld fracture.
- 2.1.1.7 At each transition section or as required by design, the Seller shall provide a flanged outlet to be connected to the dust collection system (to minimize discharge of dust). The pipes between the dust collector and the various equipment will be provided by Buyer. Each pipe shall be equipped with manual ball valves.
- 2.1.1.8 All equipment shall be designed and powered to handle 10,000 pounds of dry frit per hour. (Normal flow will be approximately 2500 pounds of dry frit per hour.)
- 2.1.1.9 Seller shall design the equipment (including all supports, components and anchorage) for operating conditions including earthquake loads. Carbon steel and stainless steel components shall be designed, at minimum, in accordance with AISC M016. The allowable stresses for stainless steel components may be calculated using accepted industry standards, or by using AISC M016 and appropriate material properties. The UBC analysis for earthquake forces shall be done in accordance with Chapter 23 of the UBC for Zone 2B using an importance factor of 1.25. Calculations shall be prepared which show the design for the operating and earthquake loading conditions. These calculations shall be stamped by an engineer registered in the State of Washington. The materials used shall be clearly marked on the drawings. They shall also be shown in the calculations.
- 2.1.1.10 All structural steel shall be in accordance with the following:
- 2.1.1.10.1 The materials used shall be in accordance with accepted industry standards as specified by ASTM A36/A36M, A53, A108, A193/A193M, A240, A276, A307, A312/A312M, A563 and F436.
- 2.1.1.10.2 Detailing, fabrication and erection of steel components shall be in accordance with accepted industry standards such as AISC M016.

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2.1.1.11 All piping shall be in accordance with the following:

2.1.1.11.1 Pipe

1/2" - 12" Seamless stainless steel, ASTM A312/A312M, Grade TP316L, Schedule 80S.

Seamless carbon steel, ASTM A53, Grade B, Schedule 40 (vent line from frit weigh bin to scalping screen).

2.1.1.11.2 Fittings (See Notes at end of Paragraph 2.1.1.11.8)

1/2" - 12" Stainless steel, ASTM A403/A403M, Grade WP316L-S, butt weld type, Schedule 80S.

ASTM A234/A234M, Grade WPB, for 3" and larger, Schedule 40.

ASTM A105/A105M socket weld for 2" and smaller (see Note 2).

2.1.1.11.3 Branch Construction

Use reducing tees.

2.1.1.11.4 Flanges

1/2" - 12" Class 150 raised face weld neck flange, ASME/ANSI B16.5, stainless steel, ASTM A182/A182M, Grade F316L, Schedule 80S bore.

1/2" - 12" Class 150 raised face blind flange, ASME/ANSI B16.5, stainless steel, ASTM A182/A182M, Grade F316

1/2" - 12" Class 150 raised face weld neck flange, ASME/ANSI B16.5, carbon steel, ASTM A105/A105M, Schedule 40 bore.

1/2" - 12" Class 150 raised face blind flange, ASME/ANSI B16.5, carbon steel, ASTM A105/A105M.

2.1.1.11.5 Transition Connections

Transition connections (chutework) shall be fabricated from abrasion-resistant plate. The plate thickness shall match the thickness either of the pipe or the equipment (whichever is greater) and shall be bevelled to match the thickness of the thinner connecting element at the appropriate connection. It

shall be designed to ensure proper material flow without blockages.

2.1.1.11.6 Gaskets

1/2" - 12" Class 150, 316L SS spiral wound with Teflon or equal filler, with 316L SS inner centering guide and metallic outer centering guide. Flexitallic CG or approved equal.

2.1.1.11.7 Bolting

Type 304 stainless steel stud bolt, ASTM A193/A193M, Grade B8 Class 2 with two heavy hex nuts, ASTM A194/A194M Grade 8S. (Use at stainless steel flanges.)

Alloy steel stud bolt, ASTM A193/A193M, Grade B7 with two heavy hex nuts, ASTM A194/A194M Grade 2H.

2.1.1.11.8 Thread Compounds

For flange bolts: Never-Seez Regular Grade or approved equal.

NOTES:

1. Avoid pockets for slurry service. All reducers in the horizontal orientation shall be eccentric bottom flat.
2. For vent line from frit weigh bin to scalping screen, use carbon steel pipe and fittings as specified in Paragraphs 2.1.1.11.1 and 2.1.1.11.2, depicted as class "L" on Attachment C.
3. 316L stainless steel piping material as specified in this section is depicted as class "B" on Attachment C.
4. Use five diameter pipe bends in place of elbows for all line sizes. Bend quality shall be in accordance with PFI ES-24.

2.1.1.12 All motors shall be in accordance with Specification Section 16150.

2.1.1.13 All instruments furnished shall be in accordance with Specification Section 17858.

2.1.1.14 All drives shall be constant speed, with sprockets or sheaves to allow speed change in future.

2.1.1.15 All electrical requirements shall be in accordance with Specification Section 16610.

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- 2.1.1.16 The system shall be designed for a service life of 20 (twenty) years.
 - 2.1.1.17 The system shall meet or exceed the occupational safety requirements of OSHA 29 CFR 1910 applicable subparts.
 - 2.1.1.18 The maximum allowable free field sound level, measured 3 feet from the equipment, in any direction, shall not exceed 85 dBA. The system shall be in accordance with ANSI S1.6, S1.11 and S1.13 sound measurement requirements.
 - 2.1.2 Bag Unloader with Activator, Hoist and Trolley.
 - 2.1.2.1 The bag unloader shall be designed to unload bulk dry frit in (approximately) 2500-pound flexible bags (size 35 inches by 35 inches by 42 inches) safely and securely without endangering the operator.
 - 2.1.2.2 The bag unloader design shall allow the excess bag emptying spout (14 inch diameter by 18 inches long) to be pulled out, stretched over and opened without releasing dust. It shall be furnished with a dust-tight seal design between the bag spout and the unloader discharge spout.
 - 2.1.2.3 The bag unloader shall be provided with a flanged outlet to be connected to the dust collection system. The duct between the dust collector and the bag unloader shall be provided by Seller.
 - 2.1.2.4 The bag unloader shall be equipped with an activator to prevent bridging.
 - 2.1.2.5 The bag unloader shall be equipped both with an indicator to indicate when the bag is emptied and a dynamometer to verify the weight of each bag.
 - 2.1.2.6 Controls for both local and remote operation shall be provided by Seller.
 - 2.1.2.7 All controls shall be mounted on a panel furnished with the bag unloader.
 - 2.1.2.8 The bag unloader shall be furnished with a 2-ton electric hoist, an electric trolley and a bag lifting adapter mounted on the unloader frame with safety stops. This will be used to lift bags.
 - 2.1.2.9 The bag unloader shall be furnished with a screen or grid to keep bags and other objects (such as tools, feet and hands) from being caught in the screw auger. The size of the screen shall be determined by Seller.

- 2.1.3 Screw Conveyor (From Bag Unloader)
- 2.1.3.1 The screw conveyor shall be used to transfer and regulate material flow from the bag unloader to the Z-Type Bucket elevator.
- 2.1.3.2 The screw conveyor shall be dust-tight. It shall be designed in accordance with ANSI/CEMA 300 and 350. The hanger bearings shall be hard iron. They shall be in accordance both with AFBMA 9 and AFBMA 11.
- 2.1.4 Z-Type Bucket Elevator
- 2.1.4.1 The Z-Type Bucket Elevator shall transfer material from the first to the third level, and discharge to the magnetic chute.
- 2.1.4.2 The Z-Type Bucket Elevator shall be dust-tight.
- 2.1.4.3 The Z-Type Bucket elevator shall have easy access for cleaning and maintenance.
- 2.1.5 Magnetic Chute
- 2.1.5.1 The magnetic chute shall be capable of removing all ferrous materials from glass frit stream.
- 2.1.5.2 The magnetic chute shall have permanent plate magnets.
- 2.1.5.3 The magnetic chute shall be dust-tight with built-in slide frame for manual cleanout, inspection and maintenance when system is not operating.
- 2.1.6 Lump Breaker
- 2.1.6.1 The lump breaker shall be used to break down agglomerates in glass frit stream before discharging frit to the scalping screen. The maximum allowable lump size discharged from the lump breaker shall be determined by Seller (this is to minimize any obstacles in the scalping screen).
- 2.1.7 Scalping Screen
- 2.1.7.1 The scalping screen will be used to remove any oversized particles larger than 80 mesh prior to discharging the frit. It shall have a dust-tight design.
- 2.1.7.2 Solids accumulated in the scalping screen are discharged into a recycling drum. All connections from the scalping screen to the recycling drum (including the custom-made lid, valve and flexible connection) shall be supplied by Seller.

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- 9413154.0326
- 2.1.8 Weigh Bin, Activator, Load Cells, Discharge Valve, Frame and Controls
 - 2.1.8.1 The weigh bin capacity shall be not less than 350 cubic feet.
 - 2.1.8.2 The weigh bin shall be provided with an activator to prevent bridging. The bin shall include access doors both in the top and in the hopper, a flexible connection on the inlet and a dust pick-up on the bin to maintain a negative pressure. The valley angle on the hopper shall be not less than 50°. The need for a handrail around the top of the equipment should be evaluated based both on the physical location of the equipment and its anticipated size and configuration.
 - 2.1.8.3 The weigh bin shall be supported on electronic load cells to monitor the frit weight. An isolation design is required to maintain proper load cell operation and accuracy.
 - 2.1.8.4 The weigh bin shall be provided with a weight controller. This controller shall be capable of weighing batches of glass frit between 500 and 20,000 pounds with an accuracy of 0.1 percent of total load.
 - 2.1.8.5 The weigh bin shall use the gain-in-weight system to measure the amount of frit charged from the bag unloader.
 - 2.1.8.6 The weigh bin shall use the loss-in-weight system to measure the amount of frit discharged to the next process unit.
 - 2.1.8.7 The weigh bin shall be equipped with a remotely-controlled discharge valve.
 - 2.1.9 Diverter Valve
 - 2.1.9.1 The diverter valve shall be two-way mounted at weigh bin discharge to divert product into either the screw conveyor or a recycling drum.
 - 2.1.9.2 The diverter valve shall be off-set design.
 - 2.1.9.3 The diverter valve shall be manually operated. Access to the valve for its manual operation shall be provided.
 - 2.1.10 Screw Conveyor (From Weigh Bin)
 - 2.1.10.1 The dust-tight screw conveyor shall be used to transfer and regulate material from the weigh bin to the Frit Slurry Make-up Tank (FSMT). The screw conveyor shall be located between the diverter valve and the rotary feeder. The design requirements shall be the same as the screw conveyor in Paragraph 2.1.3.

2.1.11 Rotary Feeder

2.1.11.1 The rotary feeder shall be used as an airlock. It shall not be used to regulate the flow coming out of the screw conveyor into the Frit Slurry Make-up Tank (FSMT).

2.1.11.2 The rotary feeder shall operate at a higher capacity than the screw conveyor. This is to reduce the risk of damage to the screw conveyor.

2.1.12 Dust Collector with Blower

2.1.12.1 The dust collector shall be provided with a blower designed for cold start conditions, and a variable-vane inlet damper for flow control. The fan outlet should be ducted to the building exterior. The outlet duct shall be provided with a bird screen and appropriate weather protection. All duct design shall be in accordance with ASHRAE, Chp 32.

2.1.12.2 The dust collection ducting system must be designed as a balanced system to minimize material build-up and wear in ducting. The dust collector discharge shall be in accordance with the Clean Air Act particulate emissions requirements (< 0.1 gr/acf).

2.1.12.3 The dust collector shall be self-cleaning. It shall include:

- A. Either pulse-jet or medium pressure reverse air type with continuous cleaning controls.
- B. A rotary airlock below the hopper.
- C. Access doors and platforms with ladders for bag replacement (from the clean air side of the plenum only).
- D. A level indicator in the hopper.
- E. An access door and poke hole in the hopper.
- F. Flanged duct and chute connections.
- G. An exhaust fan located on the clean air side of the plenum.

The hopper valley angle shall be not less than 60°.

Dust collected will be discharged to a drum. Connections from the dust collector to drum shall be supplied by Seller.

2.1.13 The means of determining when the recycle and discard drums are full and ready to be changed shall be supplied by Seller.

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2.2 FABRICATION AND MANUFACTURE

2.2.1 Factory Acceptance Test (FAT)

2.2.1.1 All equipment shall be subjected to factory acceptance tests both at operating conditions and design conditions, after approval of procedures by Buyer.

2.2.1.2 Buyer shall be informed ten (10) calendar days in advance of the date that factory tests are to be conducted. Buyer reserves the right to attend and witness all factory tests.

2.2.1.3 Seller shall provide frit for factory testing. Proper disposal of frit shall be Seller's responsibility.

2.2.2 Finishes

2.2.2.1 The equipment shall be cleaned, primed and painted for maximum protection from the environment.

2.2.2.2 Painting and painting inspection for carbon steel shall be performed in accordance with manufacturer's standards. Color shall be selected from manufacturer's standards.

2.2.3 Welding

2.2.3.1 All equipment welding shall be in accordance with manufacturer's standard.

2.2.3.2 Pipe Welding

2.2.3.2.1 All piping welding shall be in accordance with ASME B31.3.

2.2.3.2.2 Nondestructive examination shall be in accordance with ASME/ANSI B31.3.

2.2.3.2.3 Weld root pass shall be made with the GTAW process. Back purging gas shall be used. The purge shall be maintained until not less than 0.125 inch depth of weld metal has been deposited or the joint is filled, whichever is less. Weld fill passes may be deposited either by the SMAW or GMAW (spray transfer) process.

2.2.3.2.4 Filler metal for 316L stainless steel shall be E/ER 316L. Filler metal shall be E/ER 309L when the base material is carbon steel on one side and 316L stainless steel on the other.

2.2.3.3 Structural Welding

All equipment structural frame welding shall be in accordance with AWS D1.1.

U.S. DEPARTMENT OF ENERGY
Hanford Waste Vitrification Plant
Richland, Washington
DOE Contract DE-AC06-86RL10838

FLUOR DANIEL, INC.
Advanced Technology Division
Fluor Contract 8457

Rev. 0

PART 3 EXECUTION

(Not Used)

END OF SECTION

200151082

ATTACHMENT A

 FLUOR DANIEL EQUIPMENT SPECIFICATIONS U. S. Department of Energy Hanford Waste Vitrification Plant Richland, Washington DOE Contract DE-AC06-86RL10838 BAG UNLOADER	NO	BY DATE	REVISION	SHEET NO. <i>DS-1</i>	REV. <i>0</i>	
	▲				DATE <i>02-05-92</i>	CONTRACT <i>845734</i>
	▲				MANUFACTURER	
	▲				FLUOR P.O.	
	▲				ORIG BY <i>MF</i>	CHK'D <i>VP</i>
	▲				APPR'D	

ALL ITEMS SHALL COMPLY WITH GENERAL SPECIFICATION *P-340-14500* P&ID NO.: *H-2-123070-1*

ITEM NO.: *HD-580-001V*
 NO. ITEMS: *ONE*
 MATERIAL:

DESCRIPTION:

ONE UNLOADER TO EMPTY FLEXIBLE INTERMEDIATE BULK CONTAINERS (IFBC's) CONTAINING 2,000 TO 3,000 LBS OF GLASS FRIT AT THE RATE OF 10,000 LB/HR.

UNLOADER TO BE A FREE-STANDING UNIT COMPLETE WITH RIGGING FRAME, HOIST, FUNNEL, FLOW INDUCER (E. G., VIBRATOR), DYNAMOMETER, EMPTY BAG SIGNAL, & INSTRUMENT PANEL (LP1).

BAGS MAY VARY IN DIMENSIONS & MAY HAVE INTERNAL DISPOSABLE LINER.

DISCHARGE SHALL BE DUST-FREE & MEET APPLICABLE OSHA STANDARDS. CONNECTION TO DUST-COLLECTOR (BY OTHERS) MUST BE PROVIDED.

OPERATOR SHALL NOT BE EXPOSED TO DANGER FROM FALLING BAGS.

GLASS FRIT COMPOSITION IS SHOWN ON DS-12.

SAFETY CLASSIFICATION	<u> 3 </u>
IMPACT LEVEL	<u> 3 </u>

9413154.0330

ATTACHMENT A

FLUOR DANIEL EQUIPMENT SPECIFICATIONS U. S. Department of Energy Hanford Waste Vitrification Plant Richland, Washington DOE Contract DE-AC06-86RL10838 SCREW CONVEYOR	NO	BY DATE	REVISION	SHEET NO. DS-2	REV. 0	
	▲			DATE 02-05-92	CONTRACT 845734	
	▲			MANUFACTURER		
	▲			FLUOR P.O.		
	▲			MF	CHK'D RMM	APPR'D
	▲					
ALL ITEMS SHALL COMPLY WITH GENERAL SPECIFICATION P-340-14500 P & ID NO.: H-2-123070-1						
ITEM NO HD-580-002 SERVICE GLASS FRIT						
PROCESS DATA						
PROCESS MAT'L:	GLASS FRIT		MOISTURE CONTENT	< 0.1 WT% FREE		
CAPACITY, NORMAL	1.25	STPH	MAT'L FEED TEMP.	60 - 104 °F		
DESIGN	5.0	STPH	MAT'L PROPERTIES - DEGREE:	VERY	MODERATE	
MAT'L BULK DENSITY	70 TO 94 #/FT ³		ABRASIVE	X		
PARTICLE SHAPE	IRREGULAR		CORROSIVE			
SIEVE ANALYSIS - TYLER	X	U.S.	HYGROSCOPIC			
MESH	-80 + 200		FRIABLE	X		
CUMUL. %	< 10% FINES		DUSTY	X		
ANGLE OF REPOSE	30 TO 43 °					
GENERAL DESIGN						
TROUGH LOADING, MAX.		%	SCREW SPEED	R.P.M.		
OPERATING ANGLE					° INCLINE, DECLINE, TO FLOW	
FEED & DISCH. ORIENTATION						
DRIVE ASSY. ORIENTATION						
EQPT. OPERATING CYCLE	ONE	HR/DAY				
MECHANICAL DESIGN						
SCREW ASSY - LENGTH OVERALL						
	SECTS. @		&	SECTS@		
TUBING - O.D.	WALL			MAT'L		
FLIGHTS - TYPE	HAND		PITCH	MAT'L		
- DIAM.	FACING			WELD. SCHED		
CPLG. SHAFTS - O.D.	MAT'L					
CPLG. JOINTS - TYPE	BOLTS		AT		° ROTATION	
HANGER BRGS. - TYPE	MAT'L			LUBE		
END BRGS -	TYPE		SIZE		MINIMUM DESIGN LIFE	
DRIVE - O.B.						
DRIVE - I.B.						
TAIL						
HOUSINGS - TYPE	MOUNTING			BOLTS		
SEALS - TYPE						
THROUGH ASSY - LENGTH OVERALL						
	SECTS. @		&	SECTS @		
TROUGH - EFFECT, I.D.	MAT'L			GAUGE		
JOINTS - NO	TYPE			SEAL		
COVER - TYPE	SEAL		MAT'L	GAUGE		
END PLATES - TYPE	MAT'L					
END SEALS - TYPE	MOUNTING					
SUPPORTS - TYPE	SPACING			NO.		
SETTING DETAIL -						
SPECIAL FEATURES - JACKET			DUST CONT.			
OTHER						
DRIVER ASSY. - FULL LOAD TORQUE - STARTING			RUNNING			
MOTOR - SEE SPECIFICATON SP -						
- HP	RPM	V	PH	CY	VA	
COUPLING - TYPE		RATING			TORQUE CONT.	
GEAR - TYPE		RATING			RATIO	
- SERV. FACTOR			AGMA CLASS			
TRANSMISSION - TYPE		RATING			RATIO	
GUARD - TYPE						
DRIVE ASSY. MOUNTING - TYPE						
ITEMS TO BE ESTABLISHED BY VENDOR - MARK *				SAFETY CLASSIFICATION 3		
REMARKS				IMPACT LEVEL 3		

9413154.0331

ATTACHMENT A

 FLUOR DANIEL EQUIPMENT SPECIFICATIONS U. S. Department of Energy Hanford Waste Vitrification Plant Richland, Washington DOE Contract DE-AC06-86RL10838 MAGNETIC CHUTE	NO	BY	REVISION	SHEET NO.	REV.	
	△	DATE			<i>DS-4</i>	<i>0</i>
	△				DATE	CONTRACT
	△				<i>02-05-92</i>	<i>845734</i>
	△				MANUFACTURER	
	△				FLUOR P.O.	
△			ORIG BY	CHK'D	APPR'D	
△			<i>MF</i>	<i>RMM</i>		

ALL ITEMS SHALL COMPLY WITH GENERAL SPECIFICATION

P-340 - 14500

P & ID NO.: H-2-123070-1

ITEM NO.: *HD-580-004*
 NO. ITEMS: *ONE*
 MATERIAL:

DESCRIPTION:

PERMANENT PLATE MAGNETS. TO REMOVE ALL FERROUS MATERIALS FROM GLASS FRIT STREAM.

NORMAL FLOW RATE: 2,500 LB/HR.
DESIGN FLOW RATE: 10,000 LB/HR.

GLASS FRIT COMPOSITION IS SHOWN ON DS-12.

SAFETY CLASSIFICATION 3
 IMPACT LEVEL 3

9413154.0353

ATTACHMENT A

FLUOR DANIEL EQUIPMENT SPECIFICATIONS U. S. Department of Energy Hanford Waste Vitrification Plant Richland, Washington DOE Contract DE-AC06-86RL10838 LUMP BREAKER	NO	BY DATE	REVISION	SHEET NO. <i>DS-5</i>	REV. <i>0</i>	
	▲			DATE <i>02-05-92</i>	CONTRACT <i>845734</i>	
	▲			MANUFACTURER		
	▲			FLUOR P.O.		
	▲			ORIG BY <i>MF</i>	CHK'D <i>RMM</i>	APPR'D
	▲					

ALL ITEMS SHALL COMPLY WITH GENERAL SPECIFICATION

P-340-14500

P&ID NO.: *H-2-123070-1*

ITEM NO.: *HD-580-005*
 NO. ITEMS: *ONE*
 MATERIAL:

DESCRIPTION:

TO BREAK DOWN AGGLOMERATES IN GLASS FRIT STREAM.

NORMAL FLOW: 2,500 LB/HR.
DESIGN FLOW: 10,000 LB/HR.

GLASS FRIT COMPOSITION IS SHOWN ON DS-12.

SAFETY CLASSIFICATION	<u> 3 </u>
IMPACT LEVEL	<u> 3 </u>

9413154.0334

ATTACHMENT A

 FLUOR DANIEL EQUIPMENT SPECIFICATIONS U. S. Department of Energy Hanford Waste Vitrification Plant Richland, Washington DOE Contract DE-AC06-86RL10838 SCALPING SCREEN	NO	BY DATE	REVISION	SHEET NO. <i>DS-6</i>	REV. <i>0</i>	
	▲			DATE <i>02-05-92</i>	CONTRACT <i>845734</i>	
	▲			MANUFACTURER		
	▲			FLUOR P.O.		
	▲			ORIG BY <i>MF</i>	CHK'D <i>RMM</i>	APPR'D
	▲					
	▲					
	▲					

ALL ITEMS SHALL COMPLY WITH GENERAL SPECIFICATION *P-340-14500* P & ID NO.: *H-2-123070-1*

ITEM NO. : *HD-580-006*
 NO. ITEMS: *ONE*
 MATERIAL:

DESCRIPTION:

DESIGN TO REMOVE ALL PARTICLES LARGER THAN 80 MESH FROM A GLASS FRIT STREAM.

NORMAL FLOW RATE: 2,500 LB/HR.
DESIGN FLOW RATE: 10,000 LB/HR.
OVERSIZE PARTICLES: 1.3 WT. % OF FEED

GLASS FRIT COMPOSITION IS SHOWN ON DS-12.

SAFETY CLASSIFICATION 3
 IMPACT LEVEL 3

9413154.0335

ATTACHMENT A

 FLUOR DANIEL EQUIPMENT SPECIFICATIONS U. S. Department of Energy Hanford Waste Vitrification Plant Richland, Washington DOE Contract DE-AC06-86RL10838 WEIGH BIN WITH ACTIVATOR	NO	BY DATE	REVISION	SHEET NO. DS-7	REV. 0	
	▲			DATE 02-05-92	CONTRACT 845734	
	▲			MANUFACTURER		
	▲			FLUOR P.O.		
	▲			ORIG BY MF	CHK'D RMM	APPR'D
	▲					
	▲					
	▲					

ALL ITEMS SHALL COMPLY WITH GENERAL SPECIFICATION

P-340 - 14500

P & ID NO.: *H-2-123070-1*

ITEM NO. : *HD-580-007V*
 NO. ITEMS: *ONE*
 MATERIAL:

DESCRIPTION:

- BIN TO WEIGH BATCHES OF GLASS FRIT BETWEEN 500 & 20,000 LBS WITH AN ACCURACY OF 0.1 % OF TOTAL LOAD.*
- BIN TO OPERATE AUTOMATICALLY.*
- ACTIVATOR TO PREVENT BRIDGING TO MAINTAIN CONSTANT FLOW.*
- BIN DISCHARGES TO SCREW CONVEYOR.*
- INCLUDE IRIS DISCHARGE VALVE.*
- GLASS FRIT COMPOSITION IS SHOWN ON DS-12.*

SAFETY CLASSIFICATION	<u> 3 </u>
IMPACT LEVEL	<u> 3 </u>

9413154.0336

ATTACHMENT A

 FLUOR DANIEL EQUIPMENT SPECIFICATIONS U. S. Department of Energy Hanford Waste Vitrification Plant Richland, Washington DOE Contract DE-AC06-86RL10838 DIVERTER VALVE	NO	BY DATE	REVISION	SHEET NO. <i>DS-8</i>	REV. <i>0</i>	
	▲			DATE <i>02-05-92</i>	CONTRACT <i>845734</i>	
	▲			MANUFACTURER		
	▲			FLUOR P.O.		
	▲			ORIG BY <i>MF</i>	CHK'D <i>RMM</i>	APPR'D
	▲					
	▲					

ALL ITEMS SHALL COMPLY WITH GENERAL SPECIFICATION *P-340-14500* P & ID NO.: *H-2-123070-1*

ITEM NO.: *HD-580-008*
 NO. ITEMS: *ONE*
 MATERIAL:

DESCRIPTION:

TO DIVERT ALL FRIT FROM WEIGH BIN EITHER TO SCREW CONVEYOR (ON-SPEC) OR TO RECYCLING DRUM (OFF-SPEC).

*NORMAL FLOW RATE: 2,500 LB/HR.
 DESIGN FLOW RATE: 10,000 LB/HR.*

GLASS FRIT COMPOSITION IS SHOWN ON DS-12.

SAFETY CLASSIFICATION 3
 IMPACT LEVEL 3

9413154.0357

ATTACHMENT A

FLUOR DANIEL EQUIPMENT SPECIFICATIONS U. S. Department of Energy Hanford Waste Vitrification Plant Richland, Washington DOE Contract DE-AC06-86RL10838 SCREW CONVEYOR	NO	BY DATE	REVISION	SHEET NO. DS-9	REV. 0	
	▲			DATE 02-05-92	CONTRACT 845734	
	▲			MANUFACTURER		
	▲			FLUOR P.O.		
	▲			MF	CHK'D RMM	APPR'D
	▲					
ALL ITEMS SHALL COMPLY WITH GENERAL SPECIFICATION P-340-14500 P & ID NO.: H-2-123070-1						
ITEM NO	HD-580-009	SERVICE	GLASS FRIT			
PROCESS DATA						
PROCESS MAT'L:	GLASS FRIT		MOISTURE CONTENT	< 0.1	WT% FREE	
CAPACITY, NORMAL	1.25	STPH	MAT'L FEED TEMP.	60 - 104	° F	
DESIGN	5.0	STPH	MAT'L PROPERTIES - DEGREE:	VERY	MODERATE	
MAT'L BULK DENSITY	70 TO 94	#/FT ³	ABRASIVE		X	
PARTICLE SHAPE	IRREGULAR		CORROSIVE			
SIEVE ANALYSIS - TYLER	X	U.S.	HYGROSCOPIC			
MESH	-80 + 200		FRIABLE		X	
CUMUL. %	< 10% FINES		DUSTY		X	
ANGLE OF REPOSE	30 TO 43	°				
GENERAL DESIGN						
TROUGH LOADING, MAX.		%	SCREW SPEED		R.P.M.	
OPERATING ANGLE					° INCLINE, DECLINE, TO FLOW	
FEED & DISCH. ORIENTATION						
DRIVE ASSY. ORIENTATION						
EQPT. OPERATING CYCLE	ONE		HR/DAY			
MECHANICAL DESIGN						
SCREW ASSY - LENGTH OVERALL		SECTS. @	&	SECTS @		
TUBING - O.D.		WALL		MAT'L		
FLIGHTS - TYPE		HAND	PITCH	MAT'L		
- DIAM.		FACING		WELD. SCHED		
CPLG. SHAFTS - O.D.		MAT'L				
CPLG. JOINTS - TYPE		BOLTS		AT	° ROTATION	
HANGER BRGS. - TYPE		MAT'L		LUBE		
END BRGS -		TYPE	SIZE	MINIMUM DESIGN LIFE		
DRIVE - O.B.						
DRIVE - I.B.						
TAIL						
HOUSINGS - TYPE		MOUNTING		BOLTS		
SEALS - TYPE						
THROUGH ASSY - LENGTH OVERALL		SECTS. @	&	SECTS @		
TROUGH - EFFECT. I.D.		MAT'L		GAUGE		
JOINTS - NO		TYPE		SEAL		
COVER - TYPE		SEAL	MAT'L	GAUGE		
END PLATES - TYPE		MAT'L				
END SEALS - TYPE		MOUNTING				
SUPPORTS - TYPE		SPACING		NO.		
SETTING DETAIL -						
SPECIAL FEATURES - JACKET				DUST CONT.		
OTHER						
DRIVER ASSY. - FULL LOAD TORQUE - STARTING				RUNNING		
MOTOR - SEE SPECIFICATON SP -						
- HP	RPM	V	PH	CY	VA	
COUPLING - TYPE		RATING			TORQUE CONT.	
GEAR - TYPE		RATING			RATIO	
- SERV. FACTOR				AGMA CLASS		
TRANSMISSION - TYPE		RATING			RATIO	
GUARD - TYPE						
DRIVE ASSY. MOUNTING - TYPE						
ITEMS TO BE ESTABLISHED BY VENDOR - MARK *				SAFETY CLASSIFICATION	3	
REMARKS				IMPACT LEVEL	3	

9413154.0338

ATTACHMENT A

FLUOR DANIEL EQUIPMENT SPECIFICATIONS U. S. Department of Energy Hanford Waste Vitrification Plant Richland, Washington DOE Contract DE-AC06-86RL10838 ROTARY FEEDER	NO	BY DATE	REVISION	SHEET NO. DS-10	REV. 0
	▲			DATE 02-05-92	CONTRACT 845734
	▲			MANUFACTURER	
	▲			FLUOR P.O.	
	▲			ORIG BY MF	CHK'D RMM

ALL ITEMS SHALL COMPLY WITH GENERAL SPECIFICATION	P-340-14500	P & ID NO.: H-2-123070-1
ITEM NO HD-580-010	SERVICE	NO OF UNITS REQUIRED ONE

MATERIAL CHARACTERISTICS			
NAME OF BULK MATERIAL	GLASS FRIT		
MOISTURE CONTENT	< 0.1	WT. %	
BULK DENSITY	70 TO 94	LBS./CU. FT.	
PARTICLE DENSITY	155 TO 157	LBS./CU. FT.	
ANGLE OF REPOSE	30 TO 43	DEGREES	
PARTICLE SIZE			
MAXIMUM	80 MESH		
MEDIAN			
MINIMUM	200 MESH		
TEMPERATURE	60 - 104	°F	

FEEDER DESIGN			
FEEDER MFR	MODEL NO.		
FEEDER TYPE: METERING <input type="checkbox"/>	AIR LOCK <input checked="" type="checkbox"/>	BLOW THRU <input type="checkbox"/>	OTHER <input type="checkbox"/>
FEEDER RECEIVES MATERIAL FROM	SCREW CONVEYOR	@	ATMOS psi
FEEDER DISCHARGES MATERIAL TO	FRIT SLURRY MAKE-UP TANK (FSMT)	@	ATMOS psi
CAPACITY: MAX.	10,000 LBS/HR @	RPM; MIN.	2,500 LB/HR @ RPM
DISPLACEMENT	CU. FT / REV.	EFFICIENCY	
BEARINGS: TYPE	MFR	LUBE	
ACCESS			
SEALS: TYPE	SEAL MATERIAL	GAS PURGE (YES, NO)	
ACCESS			
ROTOR: NO. VANES	DIA	POCKET (OPEN, CLOSED), RENEWABLE VANE TIPS (YES, NO)	
SHAPE OF POCKET		DEPTH OF POCKET	
CLEARANCE: VANE TO HOUSING		ROTOR TO END PLATE	
SHAFT DIA.		VENTED RETURN POCKETS (YES, NO)	
ACCESS			
MATERIALS: HOUSING	SS	ROTOR	SS
END PLATE		VANE TIPS	
SHAFT	SS	ROTOR COATING	
INLET FLANGE DESCRIPTION			
OUTLET FLANGE DESCRIPTION			
FLANGE FACE TO FLANGE FACE DIMENSION			

DRIVE			
SYSTEM BY (VENDOR, FLUOR) TYPE: BELT <input type="checkbox"/> CHAIN <input type="checkbox"/> OTHER <input type="checkbox"/>			
SPEED REDUCER: MFR.	MODEL	RATIO	
SHEAVES / SPROCKETS: MFR.	MODEL	RATIO	
BELT / CHAIN: MFR.	MODEL	RATIO	
OVERLOAD PROTECTION (YES, NO) TYPE			
SPEED INDICATOR: REMOTE <input type="checkbox"/>	LOCAL <input type="checkbox"/>	NONE <input type="checkbox"/>	TYPE
SPEED CONTROL: AUTOMATAIC <input type="checkbox"/>	MANUAL <input type="checkbox"/>	NONE <input type="checkbox"/>	TYPE
DRIVE MOTOR BY (VENDOR, FLUOR)		MOTOR STARTER BY (VENDOR, FLUOR)	
MFR	BHP	RPM	VOLTS PHASE CYCLE
ENCLOSURE: OPEN <input type="checkbox"/>	TENV <input type="checkbox"/>	TEFC <input type="checkbox"/>	EXPLOSION PROOF <input type="checkbox"/> WEATHER PROOF <input type="checkbox"/> OTHER <input type="checkbox"/>

SAFETY CLASSIFICATION	3
IMPACT LEVEL	3

9413154.0339

ATTACHMENT A

FLUOR DANIEL EQUIPMENT SPECIFICATIONS U. S. Department of Energy Hanford Waste Vitrification Plant Richland, Washington DOE Contract DE-AC06-86RL10838	NO	BY DATE	REVISION	SHEET NO. DS-11	REV. 0	
	▲				DATE 02-05-92	CONTRACT 845734
	▲				MANUFACTURER	
	▲				FLUOR P.O.	
	▲				ORIG BY MF	CHK'D RMM
	▲				APPR'D	

BAG HOUSE DUST COLLECTOR

ALL ITEMS SHALL COMPLY WITH GENERAL SPECIFICATION P-340-14500		P & ID NO.: H-2-123070-1	
ITEM NUMBER SE-580-001V	SERVICE GLASS FRIT	QUANTITY REQUIRED	1
TITLE DUST COLLECTOR WITH BLOWER SE-580-001V-BL		NAME OF PROCESS STREAM GLASS FRIT	

PROCESS DATA

Gas To Be Filtered	Air		
Volume of Gas CFM	110		
Operating Pressure PSIA	14.3 In. Water Gage		
Operating Temperature	77°F		
Maximum Allowable Pressure Drop - Dirty	PSI	10	In Water Gage
Particulate Material	Name	Glass Frit	
Properties	Sticky	No	Abrasive Moderately
	Corrosive	No	Inflammable No
	Explosive	No	Poisonous No
	Particle Size	Maximum	200 Mesh Min Fines Are All < 200 Mesh
Quantity of Particulate to be Removed	# Per Hr	250 Max	(Normal = 35 Lb / Hr)
Reverse Jet Gas	Air	@ PSIG	100
Instrument Air Available PSIG	80	Area Classification	
Electrical Power Available	Volts	120/208 or 480	Phase 3 Hz 60

MECHANICAL DESIGN

Design Pressure	PSIG	In Water Gage	Design Temperature	°F
Codes: ASME	<input type="checkbox"/> Yes <input type="checkbox"/> No	Stamp	<input type="checkbox"/> Yes <input type="checkbox"/> No	Other
Materials of Construction				
Bag Material				
Air to Cloth Ratio				
Cleaning Cycle	Manual	Semi Automatic	Automatic	
Connections:	Size	Type		
Inlet				
Outlet - Gas				
Outlet - Particulate				
Cleaning Gas				
Housing Supports				
Sandblast	Paint Primer	Paint Finish	Insulation	
Manometer				

DATA BY VENDOR

Manufacturer	Type
Model Number	Number Required
Number of Cleaning Elements	Diameter
Material	Length
Air to Cloth Ratio	Total Surface Area
Shipping Weight	Pressure Drop W. G.
Describe Methods of Element Removal	Lbs.

Is Dimensional Outline Attached Yes No Is Unit in Complete Accord With Specification? Yes No
 If No Explain

Notes - (1) Unit Quoted Shall Include Initial Set of Bags

SAFETY CLASSIFICATION	3
IMPACT LEVEL	3

9413154.0340

ATTACHMENT A



FLUOR DANIEL
EQUIPMENT SPECIFICATIONS

U. S. Department of Energy
Hanford Waste Vitrification Plant
Richland, Washington
DOE Contract DE-AC06-86RL10838

GLASS FRIT COMPOSITION

NO	BY DATE	REVISION	SHEET NO.	REV.	
			DS-12	0	
			DATE	CONTRACT	
			02-05-92	845734	
			MANUFACTURER		
			FLUOR P.O.		
			ORIG BY	CHK'D	APPR'D
			AT		

ALL ITEMS SHALL COMPLY WITH GENERAL SPECIFICATION P-340-14500 P & ID NO.:

ASSUMED OXIDE

WT %

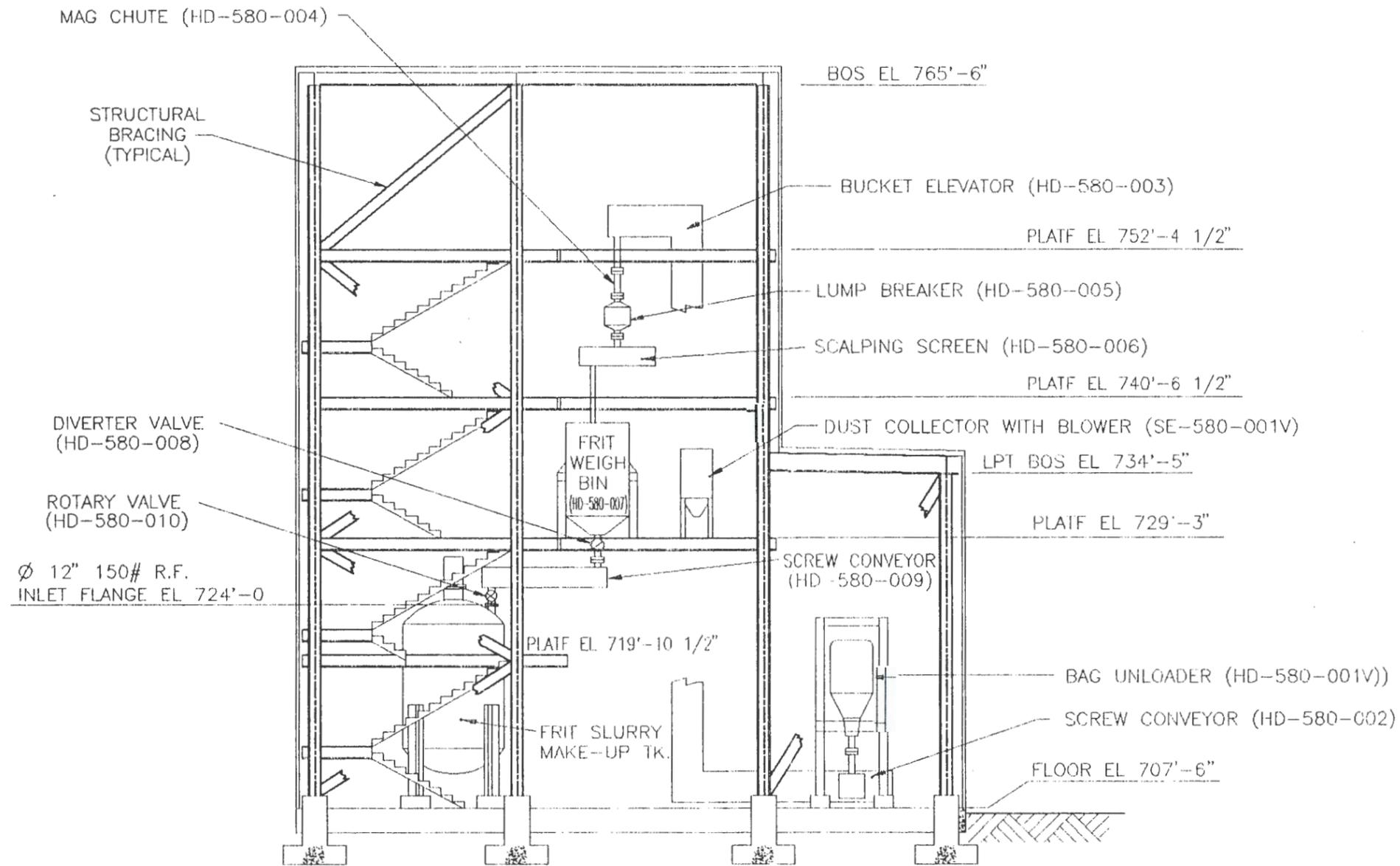
SiO ₂	70.0
B ₂ O ₃	14.0
Na ₂ O	9.0
Li ₂ O	5.0
CaO	1.0
MgO	1.0

PHYSICAL PROPERTIES

Particle Size:	-80 + 200 mesh. (No more than 10 wt% of fines less than 200 mesh.)
Bulk Density:	70 to 94 lb/ft ³
Specific Density:	155 to 157 lb/ft ³
Angle of Repose:	30° to 43°
Temperature:	60° F - 104° F
Free Moisture:	< 0.1 %
Shape:	Irregular
Nature:	Free flowing

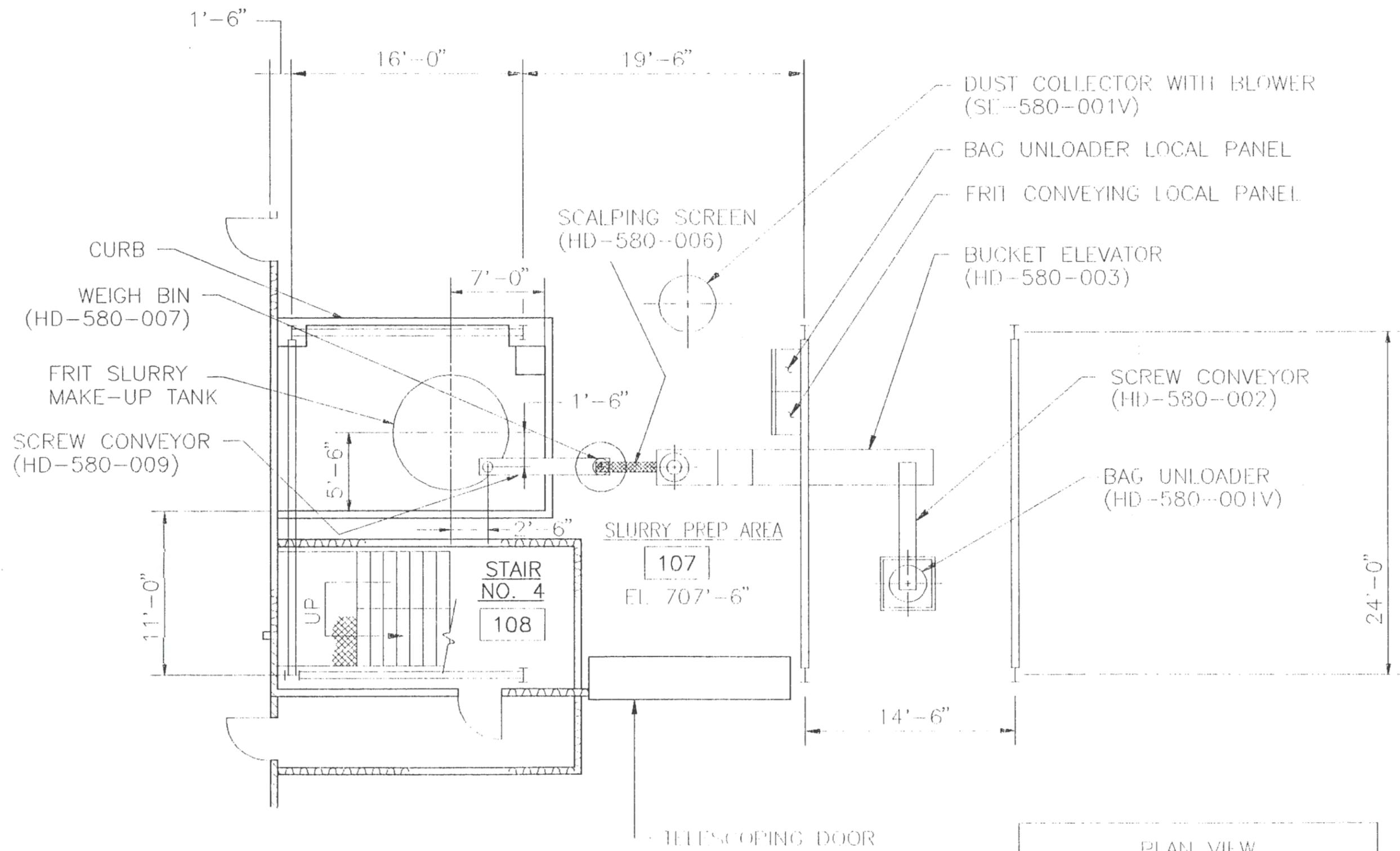
SAFETY CLASSIFICATION _____
IMPACT LEVEL _____

9413154.0341



GENERAL ARRANGEMENT
 BULK FRIT HANDLING SYSTEM
 (REFERENCE ONLY)

9413154.0392



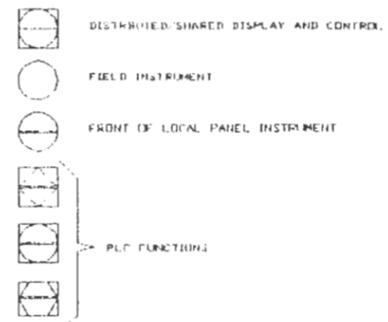
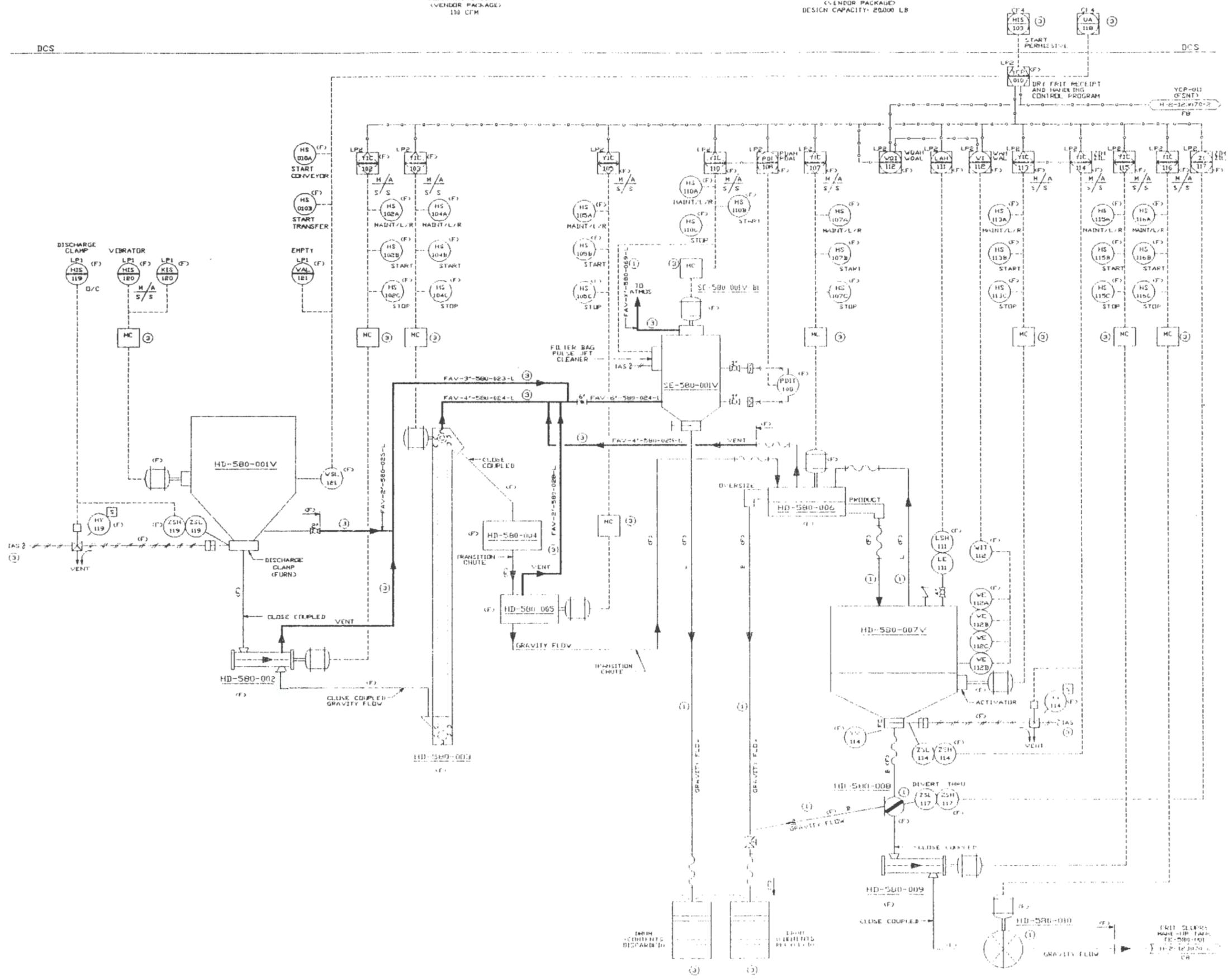
PLAN VIEW
GENERAL ARRANGEMENT
BULK FRIT HANDLING SYSTEM
(REFERENCE ONLY)

9413154.0343

HD-580-001V BAG UNLOADER (VENDOR PACKAGE) DESIGN CAPACITY: 10,000 LB/HR
 HD-580-002 SCREW CONVEYER DESIGN CAPACITY: 10,000 LB/HR
 HD-580-003 BUCKET ELEVATOR DESIGN CAPACITY: 10,000 LB/HR
 HD-580-004 MAGNETIC CHUTE DESIGN CAPACITY: 10,000 LB/HR
 SE-580-001V DUST COLLECTOR WITH BLOWER (VENDOR PACKAGE) 110 CFM
 SE-580-001V BL BLOWER (FURN.)
 HD-580-005 LUMP BREAKER DESIGN CAPACITY: 10,000 LB/HR
 HD-580-006 SCALPING SCREEN DESIGN CAPACITY: 10,000 LB/HR
 HD-580-007V IRRIT WEIGHT BIN WITH BIN ACTIVATOR (VENDOR PACKAGE) DESIGN CAPACITY: 20,000 LB
 HD-580-009 SCREW CONVEYER DESIGN CAPACITY: 10,000 LB/HR
 HD-580-008 DIVERTER VALVE DESIGN CAPACITY: 10,000 LB/HR
 HD-580-010 ROTARY FEEDER DESIGN CAPACITY: 10,000 LB/HR

DCS

DCS



NOTES:
 ① LINE SIZE WILL BE DETERMINED WHEN VENDOR DATA ON ADDITIONAL EQUIPMENT IS AVAILABLE.
 ② EQUIPMENT AND INSTRUMENTS MARKED WITH AN (F) ARE FURNISHED BY P340 VENDOR.
 ③ EQUIPMENT AND INSTRUMENTS NOT FURNISHED BY P340 VENDOR.
 VENT LINES: FAV-31-580-023-L, 4, 024, 025-L & 029-L
 DCS INSTRUMENTS: HIS-103 & UA-119
 MC: ALL
 DRIMS
 IAS: INSTRUMENT AIR SUPPLY
 ALL ELECTRICAL INSTRUMENT WIRING FROM INSTRUMENTS TO LPE, FROM MC TO MOTORS AND LPE AND FROM LPE TO DCS.
 ④ B = 316L STAINLESS STEEL
 L = CARBON STEEL

DRY FRUIT HANDLING
 ATTACHMENT C

9413154-0344

**SECTION 16150
MOTORS - INDUCTION**

PART 1 GENERAL

1.1 SUMMARY

This specification covers the technical requirements for standard induction motors for horizontal drive applications.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

ANTI-FRICTION BEARING MANUFACTURERS ASSOCIATION (AFBMA)

- | | |
|----------|---|
| AFBMA 9 | 1990 Load Ratings and Fatigue Life for Ball Bearings |
| AFBMA 11 | 1990 Load Ratings and Fatigue Life of Roller Bearings |

INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS (IEEE)

- | | |
|----------|---|
| IEEE 43 | 1974 Recommended Practice for Testing Insulation Resistance of Rotating Machinery |
| IEEE 112 | 1984 Standard Test Procedure for Polyphase Induction Motors and Generators |

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

- | | |
|-----------|--|
| NEMA MG1 | 1987 (Rev. 1 1989) Standards for Motors and Generators |
| NEMA MG2 | 1983 Safety Standard for Construction and Guide for Selection, Installation and Use of Electric Motors |
| NEMA MG13 | 1984 Frame Assignments for Alternating Current, Integral-Horsepower Induction Motors |

1.3 **RELATED REQUIREMENTS**

Specification Section 01730 Operation and Maintenance Data

1.4 **DEFINITIONS**

TEFC - Totally Enclosed Fan Cooled

1.5 **SYSTEM DESCRIPTION**

(Not Used)

1.6 **SUBMITTALS**

Seller shall submit the following in accordance with the Vendor Drawing and Data Requirements section of the Order/Subcontract.

1.6.1 Speed/torque and speed/current curves.

1.6.2 Certification of Conformance of motor performance to requirements of this specification. Specific requirements of driven equipment narrative specifications shall be completed by Seller in Data Sheet Attachment A.

1.6.3 Motor outline drawings, shaft dimensions and weight.

1.6.4 Detail drawings of main and/or auxiliary junction boxes.

1.6.5 Completed electric motor specification sheet, Attachment A, DS-1.

1.6.6 A list of manufacturer's recommended spare parts for one (1) year's routine operation. Sufficient data to permit procurement from the original manufacturer or any subsupplier shall be included.

1.6.7 Operation and maintenance data shall be provided in accordance with Specification Section 01730.

1.6.8 Inspection checklist in accordance with Paragraph 3.2.4.

1.6.9 Motor test data in accordance with Paragraph 2.6.

1.6.10 Completed data sheets for all electric motors in accordance with sample data sheet attached.

1.6.11 Seller shall submit test procedures to the Buyer for approval.

1.7 **CLASSIFICATION OF SYSTEMS AND COMPONENTS**

(Not Used)

1.8 PROJECT OR SITE ENVIRONMENTAL CONDITIONS

1.8.1 Climatic and Geographic Site Conditions

- A. Site Elevation 714 feet above sea level
- B. Barometric Pressure 14.3 psia
- C. Outside Design Temperature
 - 1) Maximum Design Temperature 110°F
 - 2) Minimum Design Temperature -20°F
 - 3) Wet Bulb Design Temperature 68°F
- D. Operating Environment
 - 1) Normal Temperature 50°F to 110°F
 - 2) Maximum Temperature 110°F
 - 3) Relative Humidity Not controlled

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. The following requirements apply to all electrical motors furnished in accordance with this specification. Special electric motor requirements established by the driven equipment specifications and/or Contract Drawings shall take precedence over this specification.
- B. When two or more components of a specification section are furnished and have identical characteristics and identical data sheets they shall be provided from the same manufacturer and shall have the same catalog number.

GENERAL REQUIREMENTS

Electric motors and motor accessories furnished in accordance with this specification shall be in full compliance with NEMA MG1, MG2 and MG13 Standards.

A. Motor Rating

Seller shall be fully responsible for specifying electric motor horsepower, speed and torque characteristics for each motor furnished as part of Seller's driven equipment package.

B. Electrical Power Supply

Motors 1/2 HP and larger furnished in accordance with this specification shall be designed for 480V/3 Phase/60 Hz power supply. Motors smaller than 1/2 HP furnished in accordance with this specification shall be designed for 120V/1 Phase/60 Hz power supply. All motors shall be designed for full voltage across the line starting and rated for continuous duty. The main power junction box shall be large enough to accommodate oversized incoming power conductors and conductors for externally-mounted power factor correction capacitors. Power junction box shall be rotatable by 90° in each direction.

C. Grounding

Each electric motor shall include provisions for motor frame grounding. The ground shall utilize a hex head bolt tapped into the motor frame from within the main junction box.

D. Space Heaters

- 1) Electric motor space heaters shall not be provided unless otherwise specified by the driven equipment specifications and/or Contract Drawings.
- 2) When driven equipment specifications and/or Contract Drawings establish the requirement for electric motor space heaters, they shall operate from 120V/1 Ph/60 HZ power supply with a maximum sheath temperature of 392°F. Space heater electrical leads shall be brought out to a separate junction box mounted to the motor on the opposite side from the main junction box.

E. Elastomers

For standard electric motors, elastomer seals and gaskets shall be compatible with the motor application and/or operating environment in accordance either with the driven equipment specifications or Contract Drawings.

2.2 FABRICATION AND MANUFACTURE

2.2.1 Electrical motors furnished in accordance with this specification shall be in accordance with NEMA MG1, Normal Starting Torque, Low Slip, Electrical Type A, Design B, for polyphase motors with cast iron or fabricated carbon steel motor frames.

A. Service Factor

Electric motors shall be designed and selected with a service factor of 1.15 for polyphase motors and 1.25 for single-phase motors unless otherwise established by the driven equipment specifications and/or Contract Drawings.

B. High-efficiency motors shall be used for motors of 5 HP and larger.

C. Power factor correction capacitors shall be provided for motors of 20 HP or larger to improve the power factor at the motor terminals to 95 percent when the motor is at 3/4 load.

D. Insulation

Insulation systems for motors on general services shall be Class F or better in accordance both with NEMA MG1 and NEMA MG2. Motor leads shall be copper with compression lugs, both sized for 125 percent load current at motor cooling air discharge temperature.

E. Temperature Rise

Temperature rise in accordance with NEMA MG2 shall not be greater than Class F, 330°F rise above a maximum 110°F ambient temperature.

F. Enclosure

Enclosure shall be totally enclosed fan cooled (TEFC).

G. Seals

Motors shall be equipped with suitable shaft seals. The seals shall prevent moisture, dirt and corrosive agents from entering the motor enclosure and bearings along the shaft.

2.2.2 Bearings

A. General service motors shall be furnished with bearing housings designed for re-lubrication of anti-friction

bearings, with provisions for flushing out the old lubricant as new lubricant is added.

- B. Antifriction bearings shall be in accordance with the AFBMA Standards 9 and 11. Each electric motor nameplate shall show the data required by NEMA MG1 and include both front and rear AFBMA bearing part numbers.
- C. Ball bearings and roller bearings shall be designed and constructed for 100,000 continuous hours, L-10 minimum life in the specified service in accordance with AFBMA Standards 9 and 11. The design shall be based on continuous operation.
- D. Labyrinth-type bearing protectors/isolators shall be required on all motors to provide maximum protection from abrasion.
- E. Extended bearing life periods, when required, shall be in accordance either with the driven equipment specifications and/or Contract Drawings.

2.2.3 Balancing and Vibration Criteria

- A. Motors shall be dynamically balanced. Welding or soldering to effect balancing is unacceptable. Parent metal shall be removed to improve balance without affecting the structural strength of the rotating element.
- B. Maximum vibration amplitude (peak to peak) as measured on the rotor shaft shall not exceed 0.001 inches for 3,600 rpm motors, 0.0015 inches for 1,800 rpm motors, 0.002 inches for 1,200 rpm motors and 0.0025 inches for 900 rpm and slower motors. For vibration amplitude measurements, motors shall be operated at rated operating speed and frequency with a one-half key installed in the key seat. Motors shall be mounted on isolators during vibration amplitude measurements in accordance with NEMA MG1.

2.3 LABELING

In addition to the identification plate, each electric motor and each electric motor accessory shall be supplied with a stainless steel tag. This tag shall contain the equipment name and equipment number as shown in the driven equipment specifications and the minimum motor data requirements of NEMA MG1 Standards. Each tag shall be permanently affixed.

2.4 PACKAGING, HANDLING AND STORAGE

Preparation for shipment and packing may conform to the manufacturer's standards. At minimum, the packaging shall provide protection against corrosion and damage from normal handling and storage. Minimum preparation shall include the requirements listed below.

- A. Machined surfaces, threads, bearings and bearing housings shall be protected during shipment by application of grease or other suitable rust inhibiting compound.
- B. Threaded connections and tapped holes shall be capped or plugged using compatible materials to prevent thread damage.
- C. The motor shall be fully protected against moisture penetration to the electrical compartments and winding.
- D. Mechanical seals and other sealing devices shall be installed for shipment.
- E. Bracing, supports and rigging connections shall be provided to prevent damage during shipment, lifting and unloading.
- F. Separate or loose parts shall be completely boxed and attached to the main item to be shipped as a unit. All shipping boxes shall be identified by the Seller's order number, equipment number, and equipment description. The boxes shall be labeled with ink, paint or other indelible material.
- G. One complete set of installation, operating and maintenance instructions shall be packed with each assembly.
- H. The equipment shall be stored and handled in such a manner as to keep it clean and free from damage and/or deterioration.

2.4.1 Delivery, Storage and Handling

- 2.4.1.1 All equipment shall be delivered in the manufacturer's original unopened protective packaging.
- 2.4.1.2 The equipment shall be stored and handled in such a manner as to keep it clean and free from damage and/or deterioration.

150.16150.0351

2.5 COATINGS

After completion of all fabrication procedures the external surfaces of each electric motor shall be thoroughly cleaned of all foreign material including rust. Manufacturer's standard prime and finish paint or coatings shall be applied. Unless specified otherwise stainless steel, nickel, brass, copper, monel, aluminum, hastelloy, lead, galvanized steel, plastics, elastomers and glass surfaces shall not be painted.

2.6 TESTING

2.6.1 Source Testing

2.6.1.1 Motor Manufacturer Tests

Each electric motor furnished in accordance with this specification shall be tested by the motor manufacturer prior to shipment. These tests shall include, but shall not be limited to, High-Potential Tests in accordance with NEMA MG1, Part 3 and Routine Tests in accordance with IEEE Std. 112. Seller shall submit motor manufacturer's certified copies of all motor test results.

2.6.1.2 Resistance Tests

Seller shall subject all electric motors furnished in accordance with this specification to insulation resistance tests in accordance with IEEE Standard 43. Insulation resistance measured during these tests shall not be less than 5 megohms. Seller shall submit completed copies of Attachment B for each electric motor furnished.

2.6.1.3 Performance Test

All required electric motor performance tests shall be conducted in accordance with the applicable driven equipment specification. Performance testing, herein defined as those additional tests referenced in Section 3 of IEEE Standard 112, is not within the scope of this specification.

PART 3 EXECUTION

3.1 PREPARATION

(Not Used)

3.2 INSTALLATION, APPLICATION AND ERECTION

3.2.1 Prior to installation all equipment shipping braces, supports, packing, threaded connection protecting devices, flange protecting devices and moisture absorbent material shall be removed. Equipment shall be thoroughly cleaned. All shipping protective greases and rust-inhibiting compounds shall be removed.

3.2.2 Electric motors shall be installed in accordance with driven equipment specifications.

3.2.3 To ensure protection from the environment, Seller shall paint or coat each piece of equipment where coating has been disturbed with matching paint and/or coatings in accordance with Paragraph 2.5.

3.2.4 Inspection after Installation

A. Preparation for Inspection

Seller shall prepare a checklist for the inspection of each electric motor to assure compliance with this specification. At minimum, this checklist shall include all steps of inspection listed in the following paragraph.

B. Steps of Inspection

- 1) Each electric motor is installed in accordance both with driven equipment specifications and this specification.
- 2) Equipment has been leveled, aligned and securely anchored.
- 3) Equipment has been installed to provide access and pull space for removing motor bearings, seals, rotor and motor frame.
- 4) Equipment is clean, undamaged and free of foreign material.
- 5) Bearings are aligned and lubricated in accordance both with the manufacturer's recommendation and Paragraph 2.2.2 of this specification.
- 6) Each electric motor has been checked for freedom of rotation.
- 7) Equipment has been painted as required in accordance with Paragraph 2.5.

3.3 **SHOP QUALITY CONTROL**

Inspection and examination shall be in accordance with Paragraph 3.2.4.

3.4 **ADJUSTMENTS**
(Not Used)

3.5 **CLEANING**
(Not Used)

3.6 **PROTECTION**
(Not Used)

3.7 **DEMONSTRATION**
(Not Used)

3.8 **SCHEDULES**
(Not Used)

END OF SECTION

ATTACHMENT B

INSULATION RESISTANCE READINGS
ROTATING ELECTRICAL EQUIPMENT

Description _____ Area _____

Test Equipment _____ Ref. _____ Rev. No. _____

Calibration Date _____ Ref. Spec/Section _____

EQUIPMENT NO.	ENVIRONMENTAL CONDITIONS		INSUL. RESIST. Ø-GRD. [Megohms]	TEST VOLTAGE [Megohms]	VISUAL CHECK
	AMBIENT TEMP [°C]	RELATIVE HUMIDITY			

913154056

SELLER'S REPRESENTATIVE _____ DATE _____

1.3 **RELATED REQUIREMENTS**

Specification Section 01730	Operation and Maintenance Data
Specification Section 17853	Dry Frit Handling System Control Panel and Associated Instruments

1.4 **DEFINITIONS**

(Not Used)

1.5 **SYSTEMS DESCRIPTION**

(Not Used)

1.6 **SUBMITTALS**

Submit the following in accordance with the Vendor Drawing and Data Requirements section of the Order/Subcontract:

- 1.6.1 Dimensional outline drawing showing the location of all major electrical equipment, including junction boxes, panelboards and motors, with all the applicable device ratings. Location and size of Buyer's conduit connections to the junction boxes shall be shown.
- 1.6.2 Elementary wiring diagrams for all circuits.
- 1.6.3 Connection wiring diagrams for all electrical equipment including junction boxes with terminal block identification and terminal point numbers.
- 1.6.4 Detailed bills of material including name of the manufacturer and catalogue number of all components.
- 1.6.5 Recommended spare parts list.
- 1.6.6 Test Reports
A factory Acceptance Test Report.
- 1.6.7 Installation Instructions
Manufacturer's installation instructions.
- 1.6.8 Operation and maintenance data in accordance with Specification Section 01730, Operation and Maintenance Data.

1.6.9 Test Procedures

Test procedures for Buyer's approval, to include the factory tests described under Quality Control paragraph of this section.

1.7 CLASSIFICATIONS OF SYSTEMS AND COMPONENTS

(Not Used)

1.8 PROJECT OR SITE ENVIRONMENTAL CONDITIONS

1.8.1 Climatic and Geographic Site Conditions

A. Site Elevation 714 feet above sea level

B. Barometric Pressure 14.3 psia

C. Outside Design Temperature

1) Maximum Design Temperature 110°F

2) Minimum Design Temperature -20°F

3) Wet Bulb Design Temperature 68°F

1.8.2 Operating Environment

A. Normal Temperature 65°F to 95°F

B. Relative Humidity Not controlled

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

2.1.1 General

2.1.1.1 Electrical components and materials shall be in accordance with National Electrical Code (NFPA 70). When applicable, all electrical materials and equipment shall be listed by Underwriter's Laboratories and shall bear the UL label.

2.1.1.2 When two or more components of the same specifications are required the components shall be identical (same manufacturer and catalog number).

2.1.2 Power Supply

2.1.2.1 Motors from 1/2 hp to 200 hp and heaters over 2 kW shall be rated for use on a 480 volt power supply system. Buyer shall supply a separate controller and a separate 480 volt, 3 phase, 3 wire power feeder directly to each 480 volt load.

2.1.2.2 Buyer shall provide one or more feeders, as required, to furnish power to all other loads. Feeder shall be either 120/208 volt, 3 phase, 4 wire or 480 volt, 3 phase, 3 wire system, 60 Hz.

2.1.2.3 Electrical control and instrument power supplies shall be powered by 120 Vac, single phase, 60 Hz power source. If other voltages are required, Seller shall supply transformers with transformer protection. Seller shall provide all electrical equipment and material to form a complete, assembled and wired unit to operate from the single power source.

2.1.3 Conduit System

2.1.3.1 Conduit shall be intermediate metal conduit in accordance with UL 1242 or liquid-tight flexible steel conduit in accordance with UL 360. Minimum conduit size shall be 3/4 inch.

2.1.3.2 Flexible conduit connections shall be used to avoid transmission of vibration from vibrating equipment to the conduit system. Flexible conduit shall also be used to terminate periodically removable connections such as to motors and instruments. Maximum length of flexible conduit connections shall be 36 inches.

2.1.3.3 Conduit connections to junction boxes shall be made using insulated watertight threaded hubs, factory threaded hubs or lock nuts.

2.1.3.4 Conduit fittings shall be metallic zinc or cadmium coated steel and shall be in accordance with UL 514B.

2.1.3.5 Conduit product shall bear the UL listing mark on the product or product container. (Refer to UL Directory - 1991 Electrical Appliance and Utilization Equipment Directory.)

2.1.4 Conductors

2.1.4.1 Wires shall be single conductor, copper, with a 600 volt rated, insulation of flame-retardant, heat and moisture resistant cross-linked polyethylene. Conductors shall be UL listed type XHHW or THWN/THHN, if applicable, in accordance with National Electrical Code, NFPA 70, (Article 310).

- 2.1.4.2 Conductors for power and lighting circuits shall not be smaller than No. 12 AWG. Conductors for control circuits shall not be smaller than No. 14 AWG. Conductors smaller than No. 8 AWG shall be solid and No. 8 AWG conductors and larger shall be stranded.
- 2.1.4.3 The surface of the insulation shall have a durable marking, at intervals not exceeding 24 inches, which shall consist of: manufacturer's name, trademark, or other distinctive marking which identifies the organization responsible for the product; the type letters (XHHW) the wire size in AWG or circular mils; maximum voltage (600 volts); and UL marking. (Refer to UL Directory - 1991 Electrical Appliance and Utilization Equipment Directory.)
- 2.1.4.4 Conductors for internal panel wiring shall be in accordance with Specification Section 17853, Dry Frit Handling Systems Control Panel.
- 2.1.4.5 Conductors for instrumentation shall be UL listed twisted, shielded pair or triad copper with a drain wire and 300 volt rated PVC insulation and jacket. Conductor size shall be No. 16 AWG.
- 2.1.4.6 Conductors shall be identified at each end. Identification of conductors shall be by means of heat shrinkable insulated tubing with conductor identification by heat impressed black on white characters, Thomas and Betts Catalogue No. WHT-700 or equal. Identification inscription shall be by individual and distinctive numbers for each conductor (i.e., 1., 2., 3., 4...)
- 2.1.5 Terminal Blocks
- 2.1.5.1 Terminal blocks shall be in accordance with UL 1059.
- 2.1.5.2 Terminal blocks shall bear the UL listing mark on the product or product container. (Refer to UL Directory - 1991 Recognized Component Directory.)
- 2.1.5.3 Terminal blocks for wiring smaller than #8 AWG shall be two-screw terminal type for use with ring-tongue terminals and shall be rated at 600 volts, 30 amperes, furnished without covers and furnished with white marking strips for the identification of terminated wires.
- 2.1.5.4 Terminal blocks for wiring #8 AWG and larger shall be tubular screw compression type rated at 600 volts, 150 amperes, furnished without covers and furnished with white marking strips for the identification of terminated wires.
- 2.1.5.5 No more than two wires or one wire and one jumper strap shall be terminated on any one terminal block terminal screw. Where more wires are required, additional terminals shall be used. No

uninsulated, exposed conductors shall extend beyond the sides of the terminal block or its insulated barriers. Each terminal block shall have its own identification symbols.

- 2.1.5.6 Terminal blocks shall have at least 20 percent spare terminal positions or two spare terminals for each terminal strip as a minimum.
- 2.1.6 Design
 - 2.1.6.1 In general, each alarm, instrument and control device shall be wired back to terminal blocks in junction boxes. Separate boxes shall be used for the following:
 - 2.1.6.1.1 120 Volt Control and Power
 - 2.1.6.1.2 Milliamp Signals and Alarms
 - 2.1.6.2 Junction boxes shall be NEMA 12 in accordance with NEMA 250 and shall have hinged doors and mounting panels for terminal strips.
 - 2.1.6.3 All noncurrent carrying parts of electrical equipment shall be bonded together and made electrically continuous. Two grounding pads shall be furnished for connection by the Buyer to the area ground grid. Grounding lugs shall be provided inside the terminal boxes to terminate the ground conductor.
 - 2.1.6.4 Wiring between electrical components shall be routed in hot dipped galvanized intermediate metal conduit or liquid-tight flexible steel conduit.
 - 2.1.6.5 Termination of conductors on screw terminals shall be made with tin plated, copper compression, ring-tongue, nylon insulated terminals. Terminals shall be in accordance with UL 486A; Thomas and Betts Catalogue No. RB-14 (#18-14 AWG) and RC-10 (#12-10 AWG) or equal with bolt holes for mounting.
 - 2.1.6.6 Termination of pigtail leads and/or splicing of conductors (No. 10 AWG and smaller) shall be made with pressure connectors and shall be in accordance with UL 486A; Thomas and Betts "Sta-Kon" or equal.
 - 2.1.6.7 Connections for incoming power, interlocks and remote indication shall be wired to terminal blocks.

2.1.7 Nameplates

- 2.1.7.1 All electrical equipment and enclosures shall be identified with nameplates. Nameplates shall be of machine-engraved, phenolic, with black figures on white background and shall be firmly attached with stainless steel self-tapping screws or stainless steel rivets.

PART 3 EXECUTION

3.1 **PREPARATION**

(Not Used)

3.2 **INSTALLATION, APPLICATION AND ERECTION**

- 3.2.1 Electrical installation shall be in accordance with National Electrical Codes (NFPA 70).

- 3.2.2 All wiring shall be continuous from terminal to terminal without splices.

- 3.2.3 Exposed conduit shall be run vertically, horizontally, or parallel to the packaged equipment. Conduit bodies and junction boxes shall be supported independent of conduit system. Whenever practical, horizontal conduits shall be sloped for drainage.

3.3 **QUALITY CONTROL**

- 3.3.1 The equipment shall be visually inspected by the Seller and the following tests shall be performed:

- 3.3.1.1 All circuits shall be checked for continuity.

- 3.3.1.2 Wiring at all specified voltage levels, except for low energy and electronic circuits shall be checked for insulation resistance. Resistance values less than 10 megohms are not acceptable.

- 3.3.1.3 A functional test to ensure proper operation of all devices and components shall be performed and the test results shall be submitted to the Buyer.

- 3.3.2 A factory acceptance test report shall be submitted to the Buyer with shipment.

3.4 **ADJUSTMENTS**

(Not Used)

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- 3.5 **CLEANING**
 (Not Used)
- 3.6 **PROTECTION**
 (Not Used)
- 3.7 **DEMONSTRATION**
 (Not Used)
- 3.8 **SCHEDULES**
 (Not Used)

END OF SECTION

SECTION 17853
DRY FRIT HANDLING SYSTEM CONTROL PANEL
AND ASSOCIATED INSTRUMENTS

PART 1 GENERAL

1.1 SUMMARY

This section describes the technical requirements for the fabrication, operation and testing of the Dry Frit Handling System Control Panel, Tag Number LP-580-002.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to by the basic designation only.

FEDERAL STANDARDS (FED-STD)

FED-STD-595B 1989 Colors Used in Government Procurement
Revision B - December 15, 1989

INSTRUMENT SOCIETY OF AMERICA (ISA)

ISA RP60.6 1984 Nameplates, Labels and Tags for
Control Centers

ISA S5.2 1976 Standard, Binary Logic Diagrams for
Process Operations

ISA S20 1981 Specification Forms for Process
Measurement and Control Instruments,
Primary Elements and Control Valves

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA ICS 6 1988 Enclosures for Industrial Controls
and Systems

NEMA 250 1985 Enclosures for Electrical Equipment
(1000 Volts Maximum) Revision 2 - May 1988

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 1990 National Electrical Code

UNDERWRITERS LABORATORIES INC. (UL)

Directory	1990 Electric Appliance and Utilization Equipment Directory
Directory	1991 Recognized Component Directory
UL 50	1992 Cabinets and Boxes; Ninth Edition
UL 83	1983 Thermoplastic-Insulated Wires and Cables Ninth Edition; February 22, 1989
UL 486A	1989 Wire Connectors and Soldering Lugs for use with Copper Conductors
UL 1059	1988 Terminal Blocks Second Edition; August 2, 1989

1.3 RELATED REQUIREMENTS

Specification Section 01730	Operation and Maintenance Data
Specification Section 14500	Bulk Frit Handling-System
Drawing No. H-2-121699	Instrument Panel Layout LP-580-002
Drawing No. H-2 121795	Instrument Control Logic Diagram LP-580-002

1.4 DEFINITIONS

CCR	- Central Control Room
CRT	- Cathodic Ray Tube (Monitor)
DCS	- Distributed Control System
FO	- Field Operator
FRIT	- The calcined or partly fused material from which glass is made
FSMT	- Frit Slurry Make-Up Tank
PLC	- Programmable Logic Controller

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1.5 **SYSTEM DESCRIPTION**

1.5.1 The Dry Frit Handling System Control Panel shall employ a PLC with a shared graphic display (CRT) to control the flow of dry frit from the Bag Unloader to the FSMT. Refer to Attachment C of Specification Section 14500.

The program (YCP-580-010) shall be divided into two separate sequences, dry frit conveying and dry frit transfer, which shall include surplus frit disposal.

The PLC shall perform all logic functions necessary to complete each sequence.

The CRT and the Seller created graphic screens provide the primary man-machine interface for the system.

1.6 **SUBMITTALS**

Submit the following in accordance with the Vendor Drawing and Data Requirements section of the Order/Subcontract.

1.6.1 Catalog information: Including overall dimensions, weight, model number, and connection sizes.

1.6.2 Certified drawings: Fully dimensioned and detailed component, assembly, outline, and layout drawings pertinent to each item. The size and location of all attachment points (attachment bolt size, etc.) as well as all pertinent mounting details and the thickness of instrument/panel material at the attachment points shall be shown.

1.6.3 Manufacturer's installation, operating, and maintenance manuals in accordance with Specification Section 01730, Operation and Maintenance Data.

1.6.4 Wiring diagrams including termination connections.

1.6.5 Data sheets: The Seller shall submit completed instrument data sheets similar to ISA S20.

1.6.6 Detailed parts list including manufacturer's part numbers.

1.6.7 Recommended spare parts list for one year's operation.

1.6.8 Process Control Description (PCD), similar to Attachment A, specific to Seller's system.

- 1.6.9 The following documents shall be submitted to the Buyer for his approval prior to the programming of the PLC and graphics packages:
 - 1.6.9.1 Each graphic display screen.
 - 1.6.9.2 Logic diagram/ladder logic to be used for programming the PLC.
 - 1.6.9.3 Narrative/help screen layouts.
 - 1.6.9.4 Communication protocol for PLC interface to the DCS.
- 1.6.10 Prior to the start of fabrication the Seller shall submit the following documents for approval:
 - 1.6.10.1 Panel instrument data sheets (per Paragraph 1.6.5).
 - 1.6.10.2 General arrangement drawings, front and rear views.
 - 1.6.10.2.1 Overall dimensional front view of panel.
 - 1.6.10.2.2 Rear view showing internal layout of the panel.
 - 1.6.10.3 Panel wiring diagram.
 - 1.6.10.4 Steel fabrication drawings.
- 1.6.11 The following "as built" drawings shall be provided by the Seller after panel completion, checkout and acceptance by Buyer:
 - 1.6.11.1 General arrangement front and rear view.
 - 1.6.11.2 Graphic screen layouts.
 - 1.6.11.3 Logic diagram/ladder logic.
 - 1.6.11.4 System write-up - operation and tuning descriptions.
 - 1.6.11.5 PLC software listing, program documentation, and user manual.
- 1.6.12 Factory Acceptance Test procedure in accordance with Paragraph 2.13.
- 1.6.13 Inspection/Test Report in accordance with Paragraph 2.13.

1.7 **CLASSIFICATION OF SYSTEMS AND COMPONENTS**
(Not Used)

1.8 PROJECT OR SITE ENVIRONMENTAL CONDITIONS

1.8.1 Climatic and Geographic Site Conditions

- A. Site Elevation 714 feet above sea level
- B. Barometric Pressure 14.3 psia
- C. Outside Design Temperature
 - 1) Maximum Design temperature 110°F
 - 2) Minimum Design Temperature -20°F
 - 3) Wet Bulb Design Temperature 68°F

1.8.2 Operating Environment

- A. Normal Temperature 50°F to 110°F
- B. Relative Humidity Not controlled

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

- 2.1.1 The selection of all accessories, materials, and methods of fabrication not specifically covered by this specification, but which are necessary to complete the fabrication of control panels, shall be the responsibility of the Seller.
- 2.1.2 When two or more components of the same specifications are required the components shall be identical (same manufacturer and catalog number).
- 2.1.3 No deviation from this specification will be permitted unless such deviation is called to the attention of the Buyer by the Seller and resolved in writing before proceeding with fabrication.

2.2 FABRICATION

- 2.2.1 The basic panel shall be a standard, steel, factory-made NEMA 250, Type 12 enclosure, Hoffman A-722424FS or equal. The panel shall be modified as necessary to support the instrumentation and accessories to be mounted in the panel. The panel shall retain its NEMA 12 rating after all modifications have been made.

2.2.2 All hardware, including door hinges, handles, locking mechanisms, mounting nuts washers, and bolts, etc., shall be stainless steel. Cadmium plating, electroplate, etc., is not acceptable.

2.2.3 Conduit entry shall be from the top of the panel.

2.3 VENTILATION

Panel sides shall have screened or filtered louvers for ventilation. Other means of environmental control shall be utilized by the Seller as necessary to prevent overheating of panel instruments and to prevent condensation inside the panel.

2.4 PAINTING

2.4.1 The control panels shall be painted with the Seller's paint system. The outside of the panel shall be painted semi-gloss green (Federal Color No. 24277) per FED-STD-595B.

2.4.2 The inside of the panels, as well as any supporting brackets, mounting plates, etc., shall be painted white (Federal Color No. 27880) per FED-STD-595B.

2.4.3 The reference to federal colors is for the determination of color and hue only. The panel paint is not required to use the same pigments or the formulation specified in the federal standard.

2.4.4 One quart of paint of each color shall be furnished and shipped with each panel to be used for field touch-up.

2.5 EQUIPMENT MOUNTING

2.5.1 Equipment shall be mounted so that adjustments are readily accessible and that replaceable components may be replaced without removing other equipment.

2.5.2 Terminals shall be located or insulated as required to minimize the shock hazard to personnel performing routine adjustments or maintenance.

2.5.3 Two spare fuses of each kind used in each panel shall be supplied in a clear, sealed, plastic bag marked "Spare Fuses." This bag shall be tie-wrapped to the interior of the panel.

2.6 ELECTRICAL WIRING

2.6.1 All wiring material and installation shall comply with NFPA 70.

2.6.2 Wiring shall be contained in metal or plastic raceway or conduit.

2.6.3 Terminal blocks shall be provided and mounted in junction boxes and terminal cabinets. The greater of 25 percent or two spare terminals shall be provided for each terminal strip. The number of spares provided shall be an even number. Terminal blocks shall be channel mounting type rated 600 volts with tubular screws and pressure plate. Terminal blocks shall be in accordance with UL 1059. Allen Bradley Catalog Number 1492-H1 or equal.

2.6.4 All incoming and outgoing wiring between panel mounted devices shall be terminated on numbered terminal strips. No more than two wires or one wire and one jumper shall be terminated on any terminal. No uninsulated or exposed conductors shall extend beyond the sides of the terminal strip or its insulated barriers.

2.6.5 The main 120 Vac power to the panel shall be divided into the required number of circuits. The line side of each circuit shall have its own fused disconnect switch. The neutral side of each circuit shall be terminated on a neutral terminal. The power shall be divided into the following circuits as minimum:

CRT

PLC Supply

PLC Output

2.6.6 Each circuit shall be provided with a laminated plastic nameplate giving circuit number, circuit description and fuse rating (see 2.7).

2.6.7 All AC power wiring shall be color coded as follows:

Hot side of line - Black

Neutral side of line - White

Ground - Green

2.6.8 Panel wiring shall be in accordance with NFPA-70, Article 725, Class 1 and Class 2. The wire/cable shall be No. 16 AWG UL labeled stranded copper with MTW 600 volt insulation in accordance with UL 83.

2.6.8.1 Panel wiring shall be terminated at both ends.

2.6.8.2 Termination of conductors on screw terminals shall be made with tin plated copper, compression, ring-tongue, nylon insulated terminals. Terminals shall be in accordance with UL 486A; Thomas and Betts Catalog No. RB-14 (#18-14 AWG) and RC-10 (#12-10 AWG) or equal.

- 2.6.9 The control panel shall have a copper ground bus furnished and bolted to the frame. The bus shall have screws to fasten a minimum of 8 ground wires (10 to 14 gauge). A similar, but isolated, instrument ground bus of the same size shall also be furnished.
- 2.6.10 Wires and cables within the panel shall be identified on both ends with tubular shrink-on sleeves. The sleeves shall be white with permanently imprinted black letters and numbers. The wire number shall be the same at both ends of the wire or cable. Daisy chained wires shall maintain the same wire number throughout their run.
- 2.6.11 The wire number shall be the instrument number and a sequential number depending on the number of wires connected to the instrument, or the power circuit number.

2.7 NAMEPLATES

- 2.7.1 Nameplates shall be made of 1/16 inch thick laminated plastic stock with white surface and black core except as noted on Drawing Number H-2-121699. They shall have beveled edges without burrs. They shall be engraved with sans serif (Gothic) style characters in accordance with ISA RP60.6 and shall be fastened with stainless steel Number 4-40 screws or 1/8 inch drive rivets.
- 2.7.2 All back-of-panel instruments shall have nameplates engraved with their tag numbers as shown on the Contract Drawings. The nameplates shall be 1 inch or less in height and shall have 1/8 inch high characters in accordance with ISA RP60.6.
- 2.7.3 All front-of-panel instruments shall be identified on the back side of the panel by means of nameplates engraved with their tag numbers. The nameplates shall be 1 inch or less in height and shall have 1/8 inch high characters in accordance with ISA RP60.6.
- 2.7.4 Panel equipment number and other front of panel nameplates shall be as shown on Drawing Number H-2-121699.

2.8 PANEL INSTRUMENTS

- 2.8.1 General - Panel mounted instrumentation shall be as specified herein and on panel layout Drawing H-2-121699.
- 2.8.2 The control panel shall house a programmable logic controller (PLC), a cathode ray tube (CRT), and an operations keyboard to control the Dry Frit Handling System.

- 2.8.3 The inputs to the PLC will be from the instruments furnished with the mechanical equipment specified in Specification Section 14500, Bulk Frit Handling System. A detailed description of the instruments and their functions is included in Paragraph 2.10 in this section.
- 2.8.3.1 The PLC will perform all functions necessary to generate the alarms, shutdowns and sequence steps, based upon the inputs from the field instruments. Setpoints for the PLC generated alarms must be accessible through the CRT display.
- 2.8.4 Provide the PLC manufacturer's software for programming the PLC logic and for configuring the control station using a general purpose personal computer, either the IBM model current at the time of the order/subcontract or a fully compatible computer by another manufacturer.
- The personal computer is not in the Seller's scope of supply.
- 2.8.5 Display Graphics - The CRT connected to the PLC provides the only visual man-machine interface for the control panel.
- 2.8.5.1 The detailed definition of the graphic screens shall be developed by the Seller, subject to the approval of the Buyer. As a minimum, the graphic shall display symbols representative of the mechanical equipment. Operable devices on the equipment shall change color to indicate their status. The color change shall be augmented by alpha numeric alarm messages, color coded for alarm and advisory conditions.
- 2.8.6 Narrative Display - Intermixed with the mechanical equipment based graphics will be additional "help" screens to prompt the operator through the control sequence. When creating the help screens the Seller shall take into account that this system is operated once every 4 or 5 days for 8 hours.
- 2.8.6.1 Typical instructions in this narrative display shall include manual functions by the operator, permissive interlocks that should appear, and annunciation of interlocks that fail.
- 2.8.7 The PLC shall be a Modicon Series 984 or equal. The control station shall consist of a CRT and a membrane covered keyboard and conform to NEMA Std 250, Type 12; Modicon PanelMate Plus III or equal.

- 2.8.8 Supply a two-way communication interface for the PLC that is equivalent to Allen-Bradley's (AB) Data Highway Plus, Manufacturing Automation Protocol (MAP), or the Modicon Modbus protocol. The PLC shall respond to valid instructions from the Buyer's DCS. Examples of valid instructions are:

Requests for data
Programmed process control instructions
Program and configuration modifications

- 2.8.9 Provide hardware and software to enable transfer of logic programs, control station configurations, and data to and from the Buyer's IBM or compatible computer by:

Serial or parallel cable
3-1/2 inch floppy disk

2.9 DRY FRIT RECEIPT AND HANDLING CONTROL SEQUENCES

- 2.9.1 The process control description (PCD), Attachment A, combined with the logic diagram, Drawing Number H-2-121795, describes the three control sequences to be implemented by the PLC. The systems to be controlled are:

Conveying System
Transfer System
Surplus Frit Disposal System

2.9.2 Conveying System

The purpose of the conveying system is to unload dry frit from bulk shipping bags, remove metal contaminants, break up lumps, screen out oversize pieces, and load the frit weigh bin with sufficient frit (several bags) to make a batch of frit slurry in another process unit. A dust collector is included to prevent atmospheric contamination.

- 2.9.2.1 The conveying system shall be provided with facilities for manual operation either locally, at each piece of mechanical equipment, or remotely, from local panel LP-580-002, or for automatic operation from a PLC on the local panel LP-580-002.

- 2.9.2.1.1 Each piece of mechanical equipment shall have a local switch station consisting of a selector switch (suffix A), a start pushbutton (suffix B), and a stop pushbutton (suffix C). The switch station tag numbers are:

HS-580-102 HD-580-002, Screw Conveyor
HS-580-104 HD-580-003, Bucket Elevator

HS-580-105 HD-580-005, Lump Breaker
HS-580-107 HD-580-006, Scalping Screen
HS-580-110 SE-580-001V, Dust Collector

Each selector switch (suffix A) shall have three positions:

MAINT, Shall override process shutdowns and permit unrestricted operation for maintenance testing only.

LOCAL, Shall permit starting of equipment by the local start pushbutton (suffix B) only.

REMOTE, Shall permit manual starting or fully automatic operation from the appropriate YIC (listed below) on LP-580-002.

Local and remote manual starts shall be subject to the same interlocks and permissives as automatic starts.

The stop pushbutton (suffix C) shall stop the equipment without regard to the position of the selector switch (suffix A).

2.9.2.1.2 The PLC controller tag numbers are:

YIC-580-102 Screw Conveyor
YIC-580-103 Bucket Elevator
YIC-580-105 Lump Breaker
YIC-580-107 Scalping Screen
YIC-580-110 Dust Collector

2.9.3 Transfer System

The purpose of the transfer system is to transfer a preset weight of dry frit from the weigh bin to the next process unit, the frit slurry makeup tank. The dust collector is operated during the transfer to prevent atmospheric contamination.

2.9.3.1 The transfer system shall be provided with facilities for manual operation either locally, at each piece of mechanical equipment, or remotely, from local panel LP-580-002; or for automatic operation from a PLC on local panel LP-580-002.

2.9.3.1.1 Each piece of mechanical equipment, except the weigh bin discharge valve, shall have a local switch station consisting of a selector switch (suffix A), a start pushbutton (suffix B), and a stop pushbutton (suffix C). The switch station tag numbers are:

HS-580-110 SE-580-001V, Dust Collector
HS-580-113 HD-580-007V, Frit Weigh Bin Activator
HS-580-115 HD-580-009, Transfer Screw Conveyor
HS-580-116 HD-580-010, Rotary Feeder

Each selector switch (suffix A) shall have three positions:

MAINT, Shall override process shutdowns and permit unrestricted operation for maintenance testing only.

LOCAL, Shall permit starting of equipment by the local start pushbutton (suffix B) only.

REMOTE, Shall permit manual starting or fully automatic operation from the appropriate YIC (listed below) on LP-580-002.

Local and remote manual starts shall be subject to the same interlocks and permissives as automatic starts.

The stop pushbutton (suffix C) shall stop the equipment without regard to the position of the selector switch (suffix A).

2.9.3.1.2 The PLC controller tag numbers are:

YIC-580-110 Dust Collector
YIC-580-113 Bin Activator
YIC-580-114 Bin Discharge Valve
YIC-580-115 Transfer Screw Conveyor
YIC-580-116 Rotary Feeder

2.9.4 Surplus Frit Disposal

The frit weigh bin is loaded by the conveying system in whole bulk bag increments. The weigh bin will always contain more frit than is required for a batch transfer to the FSMT. To prevent agglomeration of the frit remaining in the weigh bin after a batch transfer the frit may be removed to a recycle receptacle at the operator's discretion.

2.9.4.1 The conditions required for removal of surplus frit from the Frit Weigh Bin are:

2.9.4.1.1 IF:

The weigh bin weight is not low, *NOT* WAL-580-112;
and the batch weight has been transferred, WQAL-112; (BATCH COMPLETE)

and the diverter valve is open to the drum, ZSL-117;
and the rotary feeder is not running; (STOPPED)
and the transfer screw conveyor is not running; (STOPPED)
and YIC-580-114 is in MANUAL;
and YIC-580-114 is in OPEN;

THEN: The weigh bin discharge valve shall open. (OPEN)

2.9.4.1.2 IF:

2.9.4.1.1 above is true;
and the discharge valve is open, ZSH-580-114;

THEN: YIC-580-113 shall start the bin activator.

2.9.4.2 Surplus frit disposal system shutdowns

2.9.4.2.1 IF:

Any of the inputs in 2.9.4.1.1 changes state;

(Normally, weight bin weight low, WAL-580-112; or manual closure of the discharge valve, YIC-580-112.)

THEN: The discharge valve shall close, YIC-580-114.

2.9.4.2.2 IF:

The discharge valve closes, ZSL-580-114; (CLOSED)

THEN: YIC-580-113 shall stop the bin activator. (STOPPED)

2.10 INSTRUMENTATION FURNISHED WITH MECHANICAL EQUIPMENT

2.10.1 General - Logic and Control for the Frit System are dependant upon an interface with the instrumentation furnished with the mechanical equipment described in Section 14500. Therefore, the following paragraphs describe the minimum capabilities required of the instruments. These requirements are separate and additional to those needed for the local operation of the equipment.

2.10.2 Bag Unloader (HD-580-001V)

2.10.2.1 Discharge Clamp - The Discharge Clamp on the Bag Unloader shall be furnished with position switches to indicate that the clamp is either "closed" (ZSH-580-119) or "not closed" (ZSL-580-119) around the neck of the Bulk Bag. Switch contacts shall be voltage free, with a current rating of at least 2A, @120 Vac, resistive.

2.10.2.2 Empty Bag Indicator - As referenced in Paragraph 2.1.2.5 of Section 14500, the Bag Unloader shall be furnished with an instrument (WSL-580-121) to indicate when the Bulk Bag is empty, based on weight. This instrument serves a dual function, indicating both locally on LP-580-001 and remotely on LP-580-002. Separate voltage free contacts, rated at 2A @120 Vac, shall be provided for the PLC inputs.

2.10.3 Dust Collector (SE-580-001V)

Filter Differential Pressure - The Dust Collector shall be supplied with a differential pressure transmitter (PDIT-580-108) having a 4-20 mA output proportional to its calibrated span. The transmitter is to measure the differential pressure between the inlet to the filter section and the outlet of the filter section. Minimum full scale range for the transmitter shall not exceed 3 times the maximum anticipated differential across the filter section. The transmitter shall include a local indicator.

2.10.4 Frit Weigh Bin (HD-580-007V)

2.10.4.1 Load Cells - As specified in Paragraph 2.1.8 of Section 14500, the Frit Weigh Bin shall be equipped with electronic load cells (WE-580-112A, B, C, D). The Seller shall provide a signal conditioning module (WIT-580-112) to output a 4-20mA signal proportional to the load cell span.

2.10.4.2 Weight Controller - The Seller shall furnish the Frit Weigh Bin with a "Weight Controller" (WQC-580-112) that shall provide local indication and control of the weight of the bin contents. Input to the controller shall be the load cells referenced in the preceding paragraph.

The Weight Controller shall generate a contact closure when its setpoint is reached, based on the PLC selectable option of either "Loss in Weight" or "Gain in Weight" mode.

2.10.4.3 Discharge Valve (YV-580-114) - The Discharge Valve shall be furnished with a remotely controlled actuator and position indicating switches.

The actuator shall be furnished complete with all accessories required to operate the valve from the output of an "open-close" signal (presence or absence of voltage) generated by the PLC or local Hand Switches.

The position of the Discharge Valve shall be indicated by the contact states of mechanically operated limit switches. The limit switches shall change state when the valve reaches or leaves full open (ZSH-580-114) or reaches or leaves full closed position (ZSL-580-114). The switch contacts shall be rated 2A, @120 Vac, resistive.

2.10.4.4 Level Switch - The Seller shall furnish a Level Switch (LE/LSH-580-111) with the Frit Weigh Bin to provide a contact closure when the Frit level in the bin exceeds the recommended maximum level.

2.10.5 Diverter Valve (HD-580-008) - The Diverter Valve, specified in Paragraph 2.1.9 of Section 14500, shall be furnished with mechanically operated limit switches to indicate "Diverted," ZSL-580-117 (to drum) and "Through," ZSH-580-117 (to FSMT) positions of the valve.

2.11 LABELING

2.11.1 All instruments shall be provided with a stainless steel tag bearing the instrument tag number (stamped or engraved).

2.11.2 Tag shall be permanently affixed to the instrument using stainless steel wire where possible, otherwise the use of stainless steel screws or rivets is acceptable. This tag is in addition to any standard nameplate showing manufacturer, model number, range, etc.

2.12 CLEANING

All instrument shall be shipped in a thoroughly clean condition. No sand, oil, grit, grease (except where required for lubrication), weld spatter, or other foreign material shall be present. All openings shall be capped or otherwise sealed with a dust-tight enclosure.

2.13 INSPECTION AND SHOP TESTING

2.13.1 Prepare a Factory Acceptance Test (FAT) procedure and submit it for approval. Include: Inspection/tests to demonstrate that the function, fabrication, and assembly of the materials and equipment meet the requirements of the design drawings and specifications.

2.13.2 Inspect and test the instrument installations according to the Buyer approved FAT Procedure.

2.13.3 Submit a report confirming that the inspection and testing has been completed, and the results.

2.14 PACKAGING

Instruments shall be packed and/or protected by the manufacture's standard packing materials to ensure safe shipment and subsequent storage at the jobsite prior to actual installation. Packages shall be labeled sufficiently to alert handlers to special care requirements during shipping and storage. Each package shall be individually identified with the following information:

Seller's Name
Project Identification and Destination
Purchase Order Number
Specification Number

Manufacturer's Name Model, and Serial Number
Description of Instrument
Tag Number

Other detached component(s) which might be packed separately shall be provided with manufacturer's standard identification tag, with the main instrument tag number securely attached to the component(s) using stainless steel wire.

2.15 SHIPPING

All panel-mounted instrument chassis shall be shipped to the jobsite mounted in the control panel. The vendor shall ensure that all shipping stops, etc., are in place for proper shipping preparation of the devices.

Any other loose components shall be taped or tied down, and/or supported with polyurethane foam so as to provide a tight, vibration-free shipping unit.

The control panel shipping module shall be skid mounted.

The panel shall be packed in a manner to prevent damage during transport to the jobsite.

One set of marked-up "as built" drawings shall be shipped with the panel.

PART 3 EXECUTION

(Not Used)

END OF SECTION

ATTACHMENT A
SECTION 17853
DRY FRIT HANDLING SYSTEM CONTROL PANEL
AND ASSOCIATED INSTRUMENTS

FRIT RECEIPT AND MAKE-UP OPERATIONS

1.0 OPERATING DESCRIPTION NARRATIVE

1.1 Routine Operations

NOTE: The following paragraphs include descriptions of special operations, and interlocks and the manual operation of pumps, agitators and valves. These include infrequent conditions that may put the control program in a HOLD mode, requiring operator intervention to continue the sequence.

1.1.1 Dry Frit Receipt

Dry frit is received at the HWVP site in flexible bulk bags. The bags are emptied by placing them in a funnel-shaped Bag Unloader and opening the bag spout. Details of the Bag Unloader will depend on the particular vendor's design, which is TBD. In general, bags will be placed in the Bag Unloader HD-580-001V via a forklift truck or a furnished rail hoist. The bag spout will be pulled out and opened without releasing dust to the atmosphere. The Bag Unloader will be connected to the Dust Collection System to minimize discharge of dust. The Bag Unloader will be furnished with a clamp to insure a seal between the bag and the unloading tunnel. The clamp is remotely controlled via HIS-580-119. The Bag Unloader is also equipped with a vibrator or activator to prevent bridging. The vibrator or activator is controlled by HIS-580-120 and the time of vibration by KIS-580-120. The Bag Unloader includes load cells to indicate when the bag is emptied (WAL-580-121). All controls are mounted on a local panel (LP-580-001) furnished with the Bag Unloader.

The dry frit discharges into a screw conveyor. The empty bag signal from WLS-580-121 is transmitted to the Dry Frit Receipt and Handling Control Program 580-010.

1.1.2 Dry Frit Conveying and Dust Collection

The frit conveying equipment transfers the dry frit from the Bulk Bags to the Weigh Bin (HD-580-007V). The frit is emptied from the Bulk Bags into a Screw Conveyor (HD-580-002) which feeds a Bucket Elevator (HD-580-003). The bucket Elevator lifts the frit to a level which allows the rest of the dry frit conveying operation to take place by gravity feed. The Bucket Elevator discharges the

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dry frit to a Magnetic Chute (HD-580-004) which removes any tramp metal. Next the frit passes through a Lump Breaker (HD-580-005) which pulverizes any agglomerates. A Scalping Screen (HD-580-006) removes any oversized particles prior to discharging frit to the Frit Weigh Bin. The oversized solids accumulated in the Scalping Screen are discharged to a portable drum. The Frit Weigh Bin is supported on four electronic load cells which monitor the frit weight.

During the conveying operation, all equipment is vented to a Dust Collector (SE-580-001V) to prevent release of frit dust to the environment. The collected dust is discharged from the Dust Collector to a portable drum for disposal. The Dust Collector is a baghouse filter which utilizes air pulse jet cleaning of the filter bags. The bag cleaning sequence begins automatically when the Dust Collector is started.

Control is provided at the Frit Conveying Local Panel (LP-580-002). DCS interface with this operation includes Dry Frit Operations General Transfer Alarm (UA-580-118) that alerts the CCR operator of any unexpected interruptions in the conveying operation. A Dry Frit Operations Permissive (HIS-580-103) must be enabled by the operator prior to conveying system start-up.

1.1.2.1 The conveying system is started by the field operator using the Dry Frit Receipt and Handling Control Program (YCP-580-010). The following conditions must exist for YCP-580-010 to start the transfer. The field operator is notified if any of the interlocks shown below are not met.

- 1) All the following conveying equipment logic controllers are set to AUTO:
 - YIC-580-102 Screw Conveyor Controller
 - YIC-580-103 Bucket Elevator Controller
 - YIC-580-105 Lump Breaker Controller
 - YIC-580-107 Scalping Screen Controller
 - YIC-580-110 Dust Collector Controller
- 2) The Frit Weigh Bin Level is below high (LAH-580-111).
- 3) The Bulk Bag Clamp Position (ZSH-580-119) indicates that the bag is correctly positioned.
- 4) The correct set point for Frit Weigh Bin Weight Totalizer (WQAH-580-112) is confirmed by field operator.
- 5) The CCR operator has enabled the Dry Frit Operations Permissive (HIS-580-103).

- 6) The operator pushes the CONVEYING SEQUENCE START switch HS-580-010A on panel LP-580-002.

1.1.2.2 YCP-580-010 starts the Dust Collector (SE-580-001V) through YIC-580-110 prior to any conveying equipment start-up.

Interlocks and Manual Control

- 1) The Dust Collector Differential Pressure Alarm High (PDAH-580-108) halts the Dust Collector operation.
- 2) The Dust Collector Differential Pressure Alarm Low (PDAL-580-108) halts the Dust Collector after a 30 second delay.
- 3) The field operator may stop or start the Dust Collector when YIC-580-110 is in the MANUAL mode.

1.1.2.3 YCP-580-010 then automatically starts the Scalping Screen (HD-580-006) through Scalping Screen Controller (YIC-580-107) after the Dust Collector starts.

Features and Manual Control

- 1) Oversize particles from the Scalping Screen are discharged to a drum for recycle.
- 2) The field operator may start or stop the Scalping Screen with YIC-580-107 in MANUAL mode.

2.1.2.4 YCP-580-010 automatically starts the Lump Breaker (HD-580-005) through YIC-580-105 after the Scalping Screen is running.

Manual Control

The field operator may start or stop the Lump Breaker with YIC-580-105 in MANUAL mode.

1.1.2.5 YCP-580-010 starts the Screw Feeder (HD-580-002) through YIC-580-102 after the Lump Breaker is running.

Manual Control

The field operator may start or stop the Screw Feeder with YIC-580-102 in the MANUAL mode.

1.1.2.6 All conveying equipment except the Dust Collector (SE-580-001) is automatically shut down by YCP-580-010 when the Bulk Bag is empty or the Frit Weigh Bin Weight Totalizer (WQAH-580-112) set point is reached.

Any one of the following conditions also causes YCP-580-010 to shut down conveying equipment and warn the field operator. Any abnormal interruption in the conveying process warns the CCR operator through the Dry Frit Operations General Transfer Alarm (UA-580-118).

- 1) The Frit Weigh Bin Weight becomes high (WAH-580-112).
- 2) The Frit Weigh Bin Level becomes high (LAH-580-111).
- 3) The Frit Weigh Bin weight does not increase 10 minutes after the conveying system started. The field operator is warned (WQAL-580-112) of frit failure to gain weight. Failure to gain weight is determined by YCP-580-010 using information supplied by weight totalizer WQI-580-112.
- 4) Any piece of conveying equipment is halted (YIC-580-102, 105, 107 and 110).

1.1.2.7 YCP-580-010 automatically shuts down the Dust Collector (SE-580-001V) through YIC-580-110 5 minutes after the rest of the conveying equipment is halted.

1.1.2.8 The conveying operation is repeated to fill the Frit Weigh Bin (HD-580-007V) until WQAH-580-112 is reached.

1.1.3 Dry Frit Transfer

The frit is transported from the Frit Weigh Bin (HD-580-007V) to the Frit Slurry Make-up Tank (TK-580-001) through the Frit Weigh Bin Discharge Valve (YV-580-114), Frit Weigh Bin Diverter Valve (HV-580-117), and Screw Conveyor (HD-580-009). The Diverter Valve may also be positioned to discharge the contents of the Frit Weigh Bin to a portable drum. This allows the contents of the Frit Weigh Bin to be disposed of if it is unacceptable for processing and to empty the bin between batches. The Frit Weigh Bin contains a Bin Activator to promote flow to the Screw Conveyor. The Frit Weigh Bin may be emptied between batches to prevent agglomeration.

Dry frit is transferred from the Frit Weigh Bin to the Frit Slurry Make-up Tank when called for by the Process Frit Batch Control Program YCP-580-013. The logic to control the dry frit transfer operation is programmed in the Dry Frit Receipt and Handling Control Program YCP-580-010.

1.1.3.1 The transfer starts when called for by the Process Frit Batch Control Program (YCP-580-010).

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1.1.3.2 The dry frit transfer starts only when the following conditions exist during operation. If any of these interlocks are not met, the transfer is placed on HOLD by YCP-580-010.

- 1) The following transfer equipment logic controllers are set to AUTO:

YIC-580-110	Dust Collector Controller
YIC-580-113	Bin Activator Controller
YIC-580-114	Frit Weigh Bin Discharge Valve Controller
YIC-580-115	Screw Conveyor Controller
YIC-580-116	Rotary Feeder Controller
- 2) Frit Weigh Bin (HD-580-007V) filling is not in progress (i.e., the conveying system is not running) as indicated by the Dry Frit Receipt and Handling Control Program (YCP-580-010).
- 3) The Frit Weigh Diverter Valve (HV-580-117) is in the frit feed position as shown on the Diverter Valve Position Indicator (ZI-580-117).

Manual Control

The field operator can manually open HV-580-117 to empty the Frit Weigh Bin to a spare Portable Bin through a bypass chute.

- 4) All FSMT make-up interlocks have been met.
- 5) The operator pushes the transfer SEQUENCE START switch HS-580-010B on panel LP-580-002.
- 6) YCP-580-010 starts the Dust Collector (SE-580-001V) through YIC-580-110 prior to any transfer equipment start-up.

Interlocks and Manual Control

- a) The Dust Collector Differential Pressure Alarm High (PDAH-580-108) halts the Dust Collector operation.
- b) The Dust Collector Differential Pressure Alarm Low (PDAL-580-108) halts the Dust Collector after a 30 second delay.
- c) The field operator may stop or start the Dust Collector when YIC-580-110 is in the MANUAL mode.

- 7) YCP-580-010 starts the Rotary Feeder (HD-580-010) through the Rotary Feeder Controller YIC-580-116.

Manual Control

The field operator may start or stop the rotary feeder with YIC-580-116 in MANUAL mode.

- 1.1.3.3 YCP-580-010 starts the Screw Conveyor (HD-580-009) through the Screw Conveyor Controller (YIC-580-115).

Manual Control

The field operator may start or stop the Screw Conveyor with YIC-580-115 in MANUAL mode.

- 1.1.3.4 YCP-580-010 automatically opens the Frit Weigh Bin Discharge Valve (YV-580-114).

Manual Control

The field operator may open or close the valve with YIC-580-114 in MANUAL mode.

- 1.1.3.5 The Bin Activator is started by the Bin Activator Controller (YIC-580-113) when the Frit Weigh Bin Discharge Valve (YV-580-114) is opened. The Bin Activator stops when the YV-580-114 closes to avoid packing.

Manual Control

The field operator may start or stop the Bin Activator with YIC-580-113 in MANUAL mode.

- 1.1.3.6 YCP-580-010 automatically stops the dry frit transfer when the required amount of frit has been added to the FSMT as shown on WQI-580-112. Actuation of WQAL-580-112 signals YCP-580-010 to stop the transfer equipment.

The following conditions also cause YCP-580-010 to stop the transfer:

- 1) Frit Weigh Bin (HD-580-007V) reaches its tare weight (WAL-580-112).
- 2) The Frit Weigh Bin Weight Totalizer (WQI-580-112) does not decrease 10 minutes after the transfer system is started.
- 3) FSMT make-up is halted due to YCP-580-010 interlocks.

- 4) The CCR operator places YCP-580-010 in the HOLD mode.
- 5) The field operator shuts down the transfer system with YCP-580-010.

1.1.3.7 When the transfer system is halted, YCP-580-010 automatically closes the valves and stops the equipment in the following order:

- 1) YIC-580-114 automatically closes the Frit Weigh Bin Discharge Valve (YV-580-114) which causes YIC-580-113 to shut down the Bin Activator.
- 2) YIC-580-115 stops the Screw Conveyor (HD-580-009) after a (TBD) delay to clear it of frit.
- 3) YIC-580-116 stops the Rotary Feeder (HD-580-010) after a (TBD) delay to clear it of frit.
- 4) YIC-580-110 stops the Dust Collector (SE-580-001V) after a 5 minute delay.

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SECTION 17858
INSTRUMENTS FURNISHED WITH MECHANICAL EQUIPMENT
DRY FRIT HANDLING SYSTEM

PART 1 GENERAL

1.1 SUMMARY

This section includes the technical requirements for the furnishing, inspecting, and testing of instruments furnished with mechanical equipment.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

- | | |
|--------------|--|
| ANSI B1.20.1 | 1983 Pipe Threads, General Purpose (Inch) |
| ANSI B16.5 | 1988 Pipe Flanges and Flanged Fittings;
Errata - October 1988 |

FACTORY MUTUAL (FM)

- | | |
|-----------|---------------------|
| Directory | 1991 Approval Guide |
|-----------|---------------------|

INSTRUMENT SOCIETY OF AMERICA (ISA)

- | | |
|----------|---|
| ISA S5.1 | 1984 Instrument Symbols and Identification |
| ISA S20 | 1981 Specification Forms for Process
Measurement and Control Instruments,
Primary Elements and Control Valves |

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

- | | |
|----------|--|
| NEMA 250 | 1985 Enclosures for Electrical Equipment
(1000 Volts maximum) Revision 2 - May 1988 |
|----------|--|

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

- | | |
|---------|-------------------------------|
| NFPA 70 | 1990 National Electrical Code |
|---------|-------------------------------|

UNDERWRITERS LABORATORIES INC. (UL)

Directory	1990 Electric Appliance and Utilization Equipment Directory
Directory	1991 Recognized Component Directory
UL 83	1983 Thermoplastic-Insulated Wires and Cables Ninth Edition; February 22, 1989

1.3 RELATED REQUIREMENTS

Specification Section 01730	Operation and Maintenance Data
Specification Section 14500	Bulk Frit Handling System
Specification Section 16610	Electrical Requirements for Packaged Equipment
Specification Section 17853	Dry Frit Handling System Control Panels

1.4 DEFINITIONS

dB	- Decibels (Sound Power Level)
DPDT	- Double Pole Double Throw
I/P	- Current-to-Pneumatic (Converter)
NC	- Normally Closed
NPT	- National Pipe Thread
PSIA	- Pounds per Square Inch Absolute

1.5 SYSTEM DESCRIPTION

(Not Used)

1.6 SUBMITTALS

Submit the following in accordance with the Vendor Drawing and Data Requirements section of the Order/Subcontract.

1.6.1 Catalog information: Including overall dimensions, weight, model number, and connection sizes.

- 1.6.2 Certified drawings: Fully dimensioned and detailed component, assembly, outline, and layout drawings pertinent to each instrument.
- 1.6.3 Manufacturer's installation, operating, and maintenance manuals in accordance with Section 01730, Operation and Maintenance Data.
- 1.6.4 Wiring diagrams including termination connections.
- 1.6.5 Data sheets: The Seller shall submit completed instrument data sheets similar to ISA S20.

The data sheets must include the following minimum information:

- A. Instrument tag number, as supplied by Buyer
- B. Service
- C. Manufacturer's name and complete model number
- D. Normal and maximum service conditions (operating temperature, pressure, type of fluid, etc.)
- E. Connection type and size for process sensing, electrical, or pneumatic connections
- F. Pressure and temperature ratings of instrument
- G. Materials of construction
- H. Mounting type
- I. Electric, pneumatic power source type and description
- J. Electrical classification of electrical enclosures
- K. Signal type and range
- L. Measurement type and range; controller settings
- M. Electrical loads and contact ratings in amperes for ac or dc voltages; switch form (e.g., DPDT)
- N. Settings for switch actuation and regulators
- O. Accuracy
- P. Accessories

- Q. Sizing data and calculations for all control valves and relief valves
 - R. Noise calculations for all control valves
 - S. All other specifications, notes, sketches, etc., required to properly describe the instrument
- 1.6.6 Detailed parts list including manufacturer's part numbers.
- 1.6.7 Recommended spare parts list for one year's performance.
- 1.6.8 Factory Acceptance Test (FAT) procedure in accordance with Paragraph 2.6.
- 1.6.9 Inspection test report in accordance with Paragraph 2.6.
- 1.6.10 Instrument air requirements (pressure range and consumption).
- 1.6.11 The Seller shall provide the following drawings showing instrumentation with tag numbers:
- A. Piping and instrument diagrams (P&IDs) with all instrumentation identified by tag number.
 - B. Written functional descriptions of control systems shall be submitted when the functioning of these systems is not evident from the manner in which they are symbolized on the P&ID or other documentation. The descriptions shall cover normal or emergency shutdowns, normal control, start-up, etc.
 - C. Plan and elevation drawings showing connections and dimensioned locations for all instrument and control devices, terminal boxes, instrument piping, and electrical connections to and from the equipment baseplate or panel.
 - D. Pneumatic tubing diagram showing all devices, signal lines, and supply lines with terminations identified.
 - E. Electrical schematic wiring diagram showing all devices, power wiring, and signal wiring with terminations identified.
 - F. Terminal box layout drawings showing location and identification of all terminals, conduit entrance location, and conduit sizes.

- G. Complete bills of material for all instrumentation.
- H. Instrument manufacturer's drawings, installation instructions, and operating instructions.

1.7 CLASSIFICATION OF SYSTEMS AND COMPONENTS

(Not Used)

1.8 PROJECT OR SITE ENVIRONMENTAL CONDITIONS

1.8.1 Climatic and Geographic Site Conditions

- A. Site Elevation 714 feet above sea level
- B. Barometric Pressure 14.3 psia
- C. Outside Design Temperature
 - 1) Maximum Design Temperature 110°F
 - 2) Minimum Design Temperature -20°F
 - 3) Wet Bulb Design Temperature 68°F

1.8.2 Operating Environment

- A. Normal Temperature 50° to 110°F
- B. Relative Humidity Not controlled

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

2.1.1 General Requirements

2.1.1.1 When two or more components of the same specifications are required the components shall be identical (same manufacturer and catalog number).

2.1.1.2 The selection of all accessories, materials, and methods of fabrication not specifically covered by this specification, but which are necessary to complete the fabrication of the mechanical equipment instrumentation shall be the responsibility of the Seller.

2.1.1.3 This specification does not apply to local control panels.

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- 2.1.1.4 All instruments supplied by equipment Seller shall be mounted, wired, and piped.
- 2.1.1.5 All furnished instruments that are removed for shipment shall be packed in a separate box marked "Instruments" and shipped with the mechanical equipment.
- 2.1.1.6 The Seller shall be responsible for the selection and application of all instrumentation. This includes selection of proper range, pressure and temperature rating, materials of construction, piping classifications, and an electrical enclosure classification of NEMA 4 for instrument electrical enclosures per NEMA Standard 250.
- 2.1.1.7 Instrumentation mounted directly on the equipment, auxiliaries, or baseplate shall be limited to direct reading indicators (such as pressure gauges), sensors (such as RTDs, pressure transmitters, and directly actuated alarm and shutdown switches), and line mounted instruments (such as control valves).
- 2.1.1.8 Controllers, relays, signal converters, annunciators, monitors, shutdown systems, selector switches, etc., shall be located on a local control panel, which may be mounted remotely from the equipment baseplate. See Specification Section 17853, Dry Frit Handling System Control Panels, for the local control panel requirements.
- 2.1.1.9 Pneumatic systems shall operate on a 3 to 15 psig signal for all instruments. Electronic transmitters shall provide 4 to 20 mA_{dc} output signals. Exceptions are electric signals from vibration instruments, speed pickups, RTDs, thermocouples, and switches. In general, logic signals shall be 120 VAC.
- 2.1.1.10 Instrumentation shall be pneumatic or electronic. Pneumatic power shall be used to supply diaphragm and piston-operated control valves and valve accessories such as valve positioners. The Seller shall submit the instrument air requirements (e.g., operating pressure range and consumption).
- 2.1.1.11 All electrical and electronic instruments or control devices or components which operate at voltages higher than 30 volts shall be UL listed devices, UL recognized components, or FM approved devices (refer to FM and UL directories).
- 2.1.1.12 The Seller shall furnish all instrumentation and equipment that is required for shop testing.
- 2.1.1.13 When two or more components of the same specifications are required, the components shall be identical (same manufacturer and catalog number).

2.1.1.14 All wiring material and installation shall comply with Specification Section 16610, Electrical Requirements for Packaged Equipment.

2.2 OPERATING AND DESIGN CONDITIONS

2.2.1 General Requirements

2.2.1.1 Equipment mounted switches, such as position switches, shall have 1/2 inch NPT connection to their enclosures. All terminals shall be numbered and identified in the Seller's submitted wiring diagrams.

2.2.1.2 Instruments shall be mounted so that instrument adjustments are readily accessible and that replaceable components may be replaced without removing other equipment.

2.2.1.3 The units of measurement for charts, scales, displays, and calibration data shall be in the following English standard units of measurement:

- A. Temperature : °F
- B. Flow
 - Vapor and Gas : scfh (standard cubic feet per hour)
 - Liquid : gpm (U.S. gallons per minute)
- C. Pressure
 - Gauge Measurement : psig (pounds per square inch gauge)
 - Absolute : psia (pounds per square inch absolute)
 - Differential : psi (pounds per square inch)
 - for flow metering : inches of water
 - Vacuum : inches of mercury, inches of water
- D. Linear Measurement : feet and inches
- E. Power : kW (kilowatts)
- F. Heat : Btu (British thermal unit)
- G. Time : hours, minutes, seconds

H. Velocity

Rotational : rpm (revolutions per minute)
Linear : feet per minute, feet per
second

I. Vibration

Vibration : mils p-p (inches x .001 peak-
to-peak)
Position : mils (inches x .001)
Acceleration Vibration : g peak
Velocity Vibration . . : in/sec peak (inches per second
peak)

- 2.2.1.4 Switches for alarm and shutdown shall have one function per enclosure. If additional functions are needed, interposing relays shall be used. Switch action for alarm and shutdown systems shall be closed for normal operation and open for abnormal conditions. All electrical control circuits must be designed for fail-safe action on loss of power supply. Switches shall be mounted such that mechanical vibration does not cause malfunction or damage.
- 2.2.1.5 Alarm, electrical control and instrument power supplies shall be as specified in Specification Section 16610, Electrical Requirements for Packaged Equipment. Switch and relay contacts shall be rated for a minimum of 2 amps, resistive, at 120 Vac.
- 2.2.1.6 Wiring for shutdown circuits shall be kept completely separated from alarm and control circuits. Wiring for low level dc circuits (below 30 VDC) shall be physically separated from ac circuits.
- 2.2.1.7 All wiring between panel mounted devices shall be terminated on numbered terminal strips. No more than two wires or one wire and one jumper shall be terminated on any terminal. No uninsulated or exposed conductors shall extend beyond the sides of the terminal strip or its insulated barriers. Terminal blocks shall have a minimum of 25 percent spare terminals rounded up to an even number.
- 2.2.1.8 Terminals shall be located or insulated as required to minimize the shock hazard to personnel performing routine adjustments or maintenance.
- 2.2.1.9 Instrument pneumatic signal tubing shall be Type 316 stainless steel. Fittings shall be Type 316 stainless steel, "Swagelok" or equal. Teflon tape shall not be used to seal threads of pneumatic instrument piping.

2.3 SHOP COATING

Instruments shall be coated with manufacturer's standard shop coating. Stainless steel parts shall not be coated. Coating shall withstand the environmental conditions described in Paragraph 1.8.

2.4 LABELING

2.4.1 All instruments shall be provided with an 18 gauge (minimum) stainless steel tag bearing the instrument tag number (stamped or engraved).

2.4.2 The tag shall be permanently affixed to the instrument using stainless steel wire where possible, otherwise the use of stainless steel screws or rivets is acceptable. This tag is in addition to any standard nameplate showing manufacturer, model number, range, etc.

2.5 CLEANING

All instruments shall be provided in a thoroughly clean condition. No sand, oil, grit, grease (except where required for lubrication), weld spatter, or other foreign material shall be present. Dust caps shall be installed after cleaning.

2.6 INSPECTION AND SHOP TESTING

2.6.1 Prepare a Factory Acceptance Test (FAT) procedure and submit it for approval. Include:

A. Inspection/tests to demonstrate that the function, fabrication, and assembly of the materials and equipment meet the requirements of the design drawings and specifications.

2.6.2 Inspect and test the instrument installations according to the Buyer approved FAT Procedure.

2.6.3 Submit a report confirming that the inspection and testing has been completed and the results.

2.7 PACKAGING

Instruments which are removed from the mechanical equipment package prior to shipment shall be packed or protected by the manufacturer's standard packing materials to ensure safe shipment and subsequent storage at the jobsite prior to actual

installation. Packages shall be labeled sufficiently to alert handlers to special care requirements during shipping and storage. Each package shall be individually identified with the following information:

Seller's Name
Project Identification and Destination
Purchase Order Number
Specification Number
Manufacturer's Name, Model, and Serial Number
Description of Instrument
Tag Number

Other detached component(s) which might be packed separately shall be provided with manufacturer's standard identification tag, with the main instrument tag number securely attached to the component(s) using stainless steel wire.

PART 3 EXECUTION

(Not Used)

END OF SECTION

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ATTACHMENT A
FURNISHED INSTRUMENTS - BAG UNLOADER

DESCRIPTION	SENSOR	TAG NUMBER
Discharge Clamp Position Switch (Open)	ZSH	119
Discharge Clamp Position Switch (Closed)	ZSL	119
Discharge Clamp Solenoid Valve	HY	119
Weight Switch	WSL	121

NOTE: For complete instrument tag number, prefix loop sequence number with 580, e.g., ZSH-580-119.

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ATTACHMENT B
FURNISHED INSTRUMENTS - DUST COLLECTOR

DESCRIPTION	SENSOR	TAG NUMBER
Indicating Differential Pressure Transmitter	PDIT	108

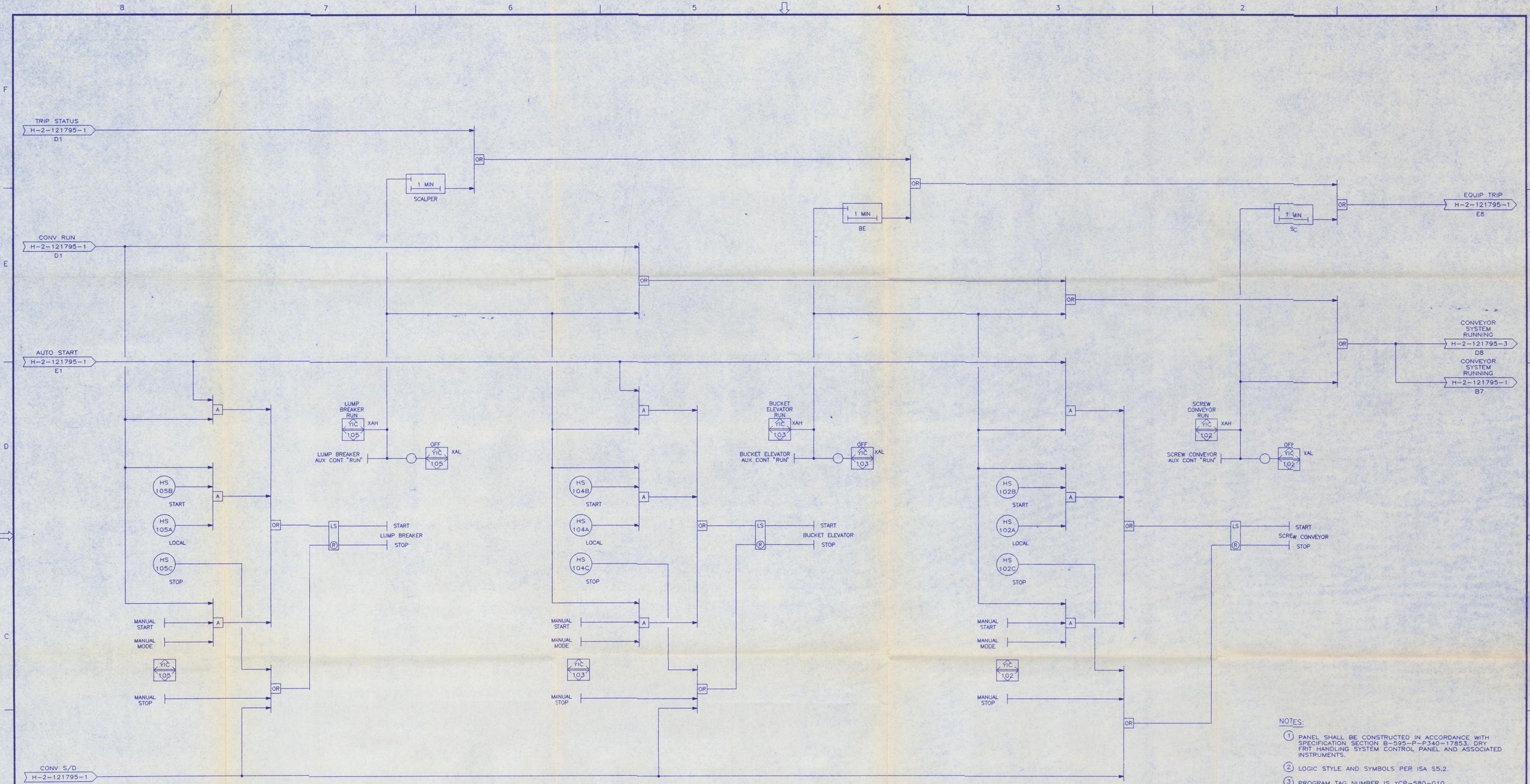
NOTE: For complete instrument tag number, prefix loop sequence number with 580, e.g., PDIT-580-108.

600-580-108

ATTACHMENT C
FURNISHED INSTRUMENTS - FRIT WEIGH BIN

DESCRIPTION	SENSOR	TAG NUMBER
Level Switch	LSH	111
Level Switch Sensing Element	LE	111
Discharge Valve	V	114
Discharge Valve Position Switch (Open)	ZSH	114
Discharge Valve Position Switch (Closed)	ZSL	114
Discharge Valve Solenoid	YY	114
Load Cell(s)	WE	112A, B, C, D
Weight Transmitter	WIT	112
Weight Controller	WC	112
Diverter Valve Position Switch (Open)	ZSH	117
Diverter Valve Position Switch (Closed)	ZSL	117

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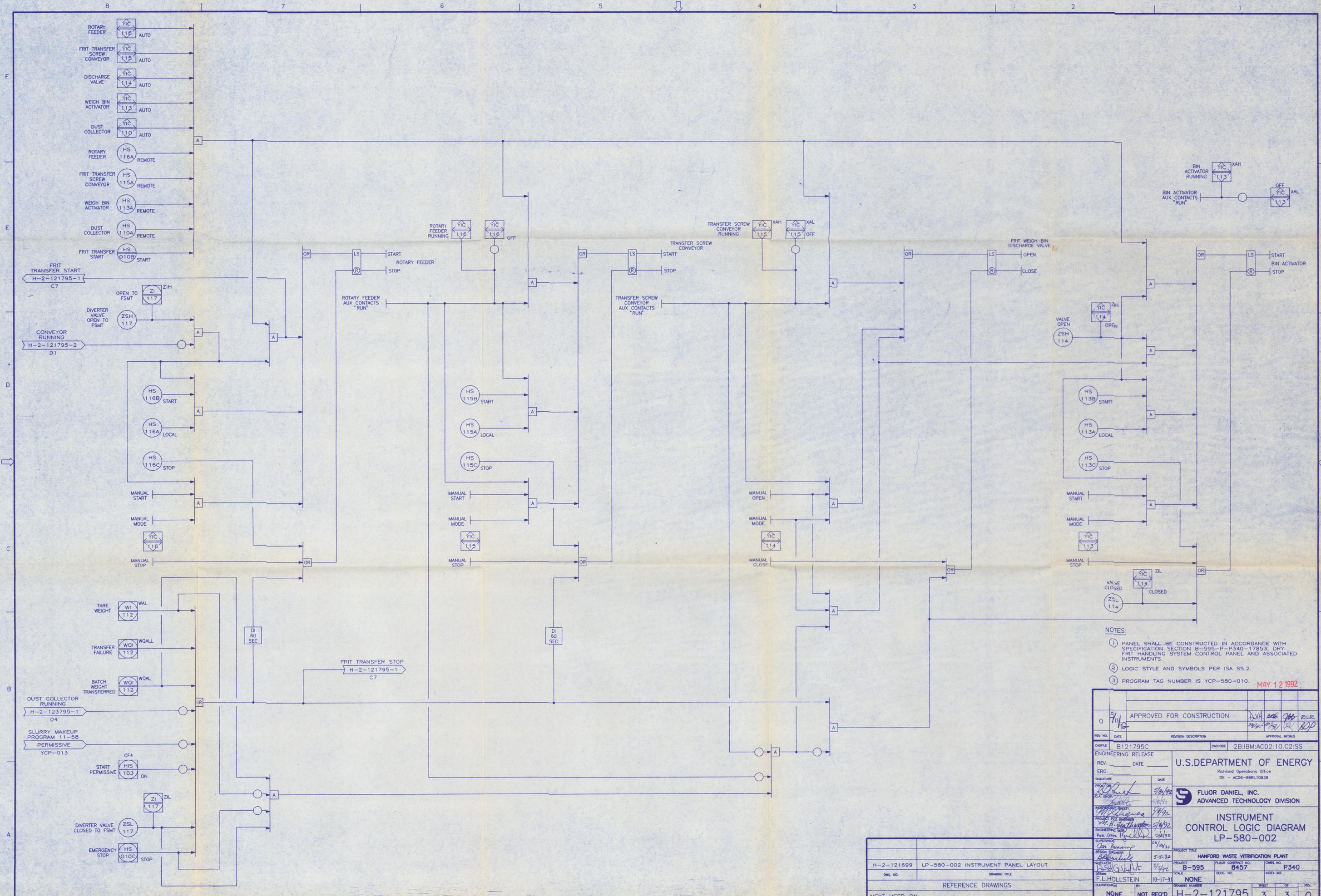


- NOTES:
- 1 PANEL SHALL BE CONSTRUCTED IN ACCORDANCE WITH SPECIFICATION SECTION B-595-P-340-17853. DRY FRIT HANDLING SYSTEM CONTROL PANEL AND ASSOCIATED INSTRUMENTS.
 - 2 LOGIC STYLE AND SYMBOLS PER ISA S5.2.
 - 3 PROGRAM TAG NUMBER IS YCP-580-010.

MAY 12 1992

0	APPROVED FOR CONSTRUCTION	DVH	5/12/92
REV. NO.	DATE	REVISION DESCRIPTION	APPROVAL INITIALS
CADFILE: B121795B		XACODE: 2B:BM:ACD2:10.C2:SS	
ENGINEERING RELEASE		U.S. DEPARTMENT OF ENERGY	
SIGNATURE		Richland Operations Office	
DATE		DE - AC06-86R110838	
PROJECT		FLUOR DANIEL, INC.	
DATE		ADVANCED TECHNOLOGY DIVISION	
PROJECT P.C. NUMBER		INSTRUMENT	
DATE		CONTROL LOGIC DIAGRAM	
ENGINEERING		LP-580-002	
SUPERVISOR		PROJECT TITLE	
DATE		HANFORD WASTE VITRIFICATION PLANT	
DESIGN ENGINEER		PROJECT NO.	
DATE		B-595	
CHECKED		FLUOR CONTRACT NO.	
DATE		8457	
DRAWN		ORDER NO.	
DATE		P340	
SCALE		BLDG. NO.	
NONE		INDEX NO.	
F.L. HOLLSTEIN		DRAWING NUMBER	
10-19-91		H-2-121795	
CLASSIFICATION		SHEET	
NONE		2	
NOT REQ'D		3	
		0	

H-2-121699	INSTRUMENT PANEL LAYOUT LP-580-002
DWG. NO.	DRAWING TITLE
REFERENCE DRAWINGS	
NEXT-USED ON	

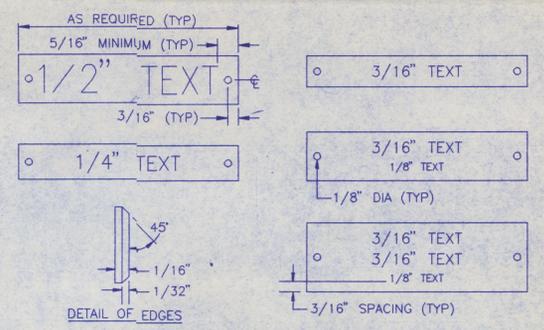
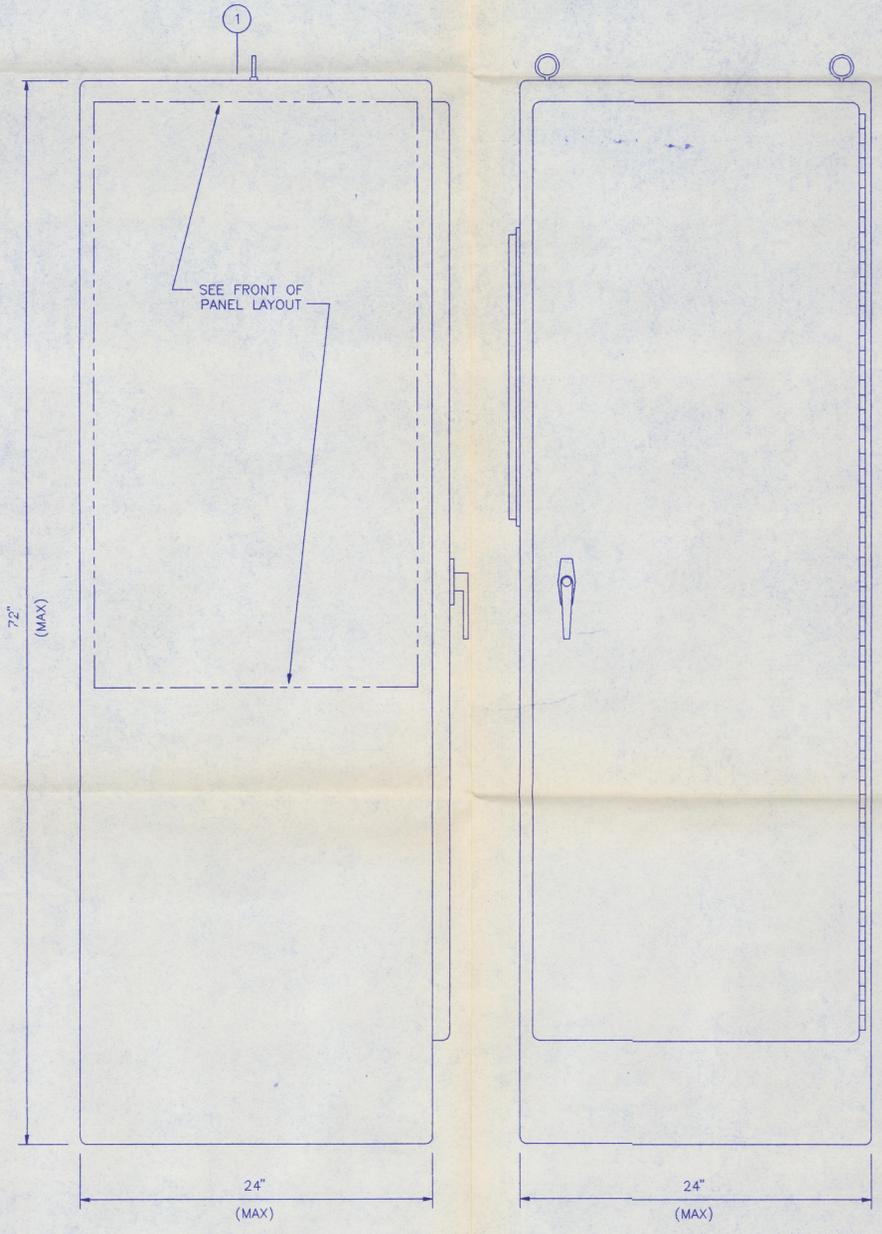
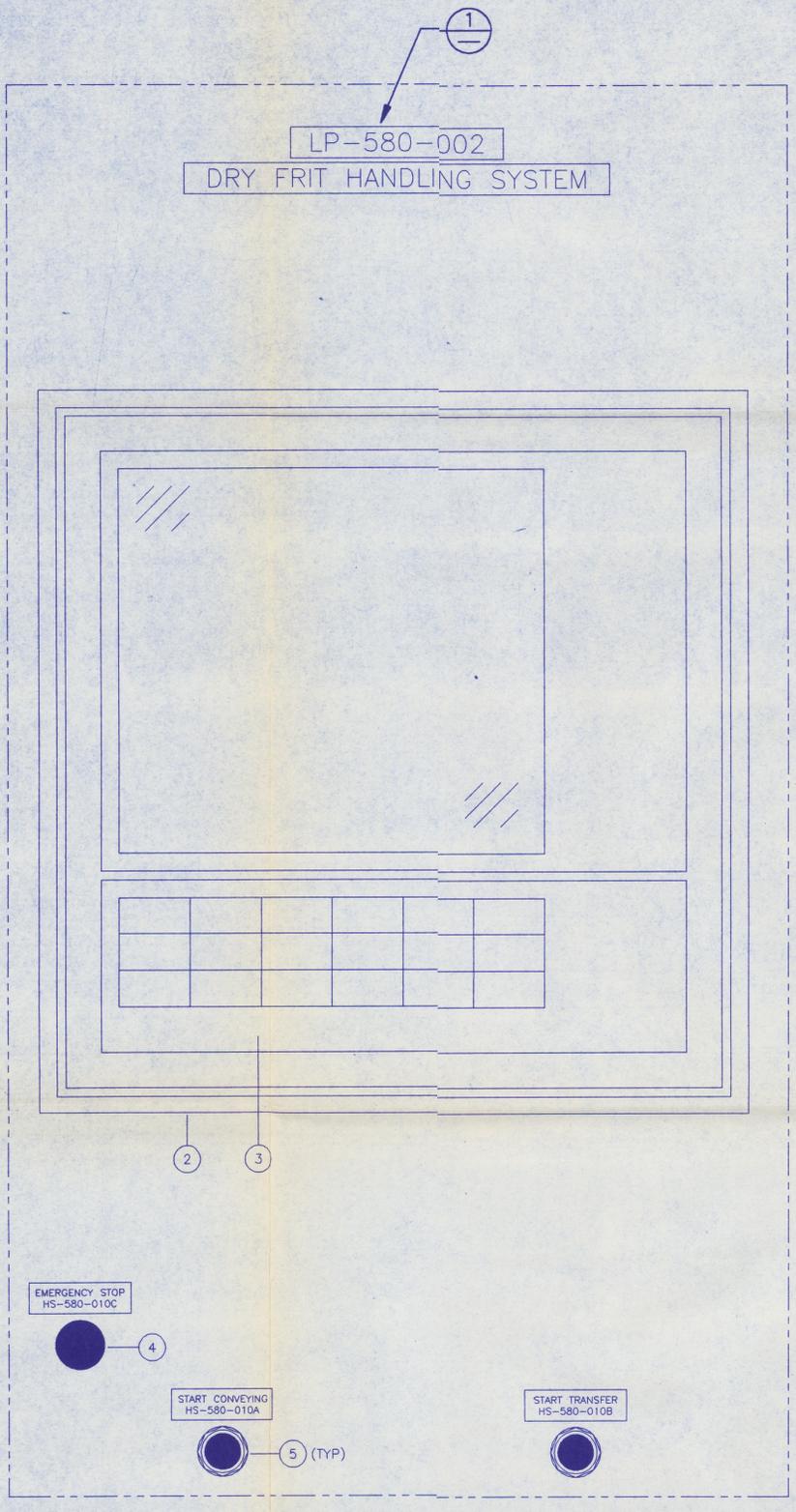


- NOTES:
- 1) PANEL SHALL BE CONSTRUCTED IN ACCORDANCE WITH SPECIFICATION SECTION B-595-P-P340-17853, DRY FRIT HANDLING SYSTEM CONTROL PANEL AND ASSOCIATED INSTRUMENTS.
 - 2) LOGIC STYLE AND SYMBOLS PER ISA S5.2.
 - 3) PROGRAM TAG NUMBER IS YCP-580-010.

APPROVED FOR CONSTRUCTION		DATE: 5/10/92	
REV. NO.	DATE	REVISION DESCRIPTION	APPROVAL INITIALS
0	5/10/92		
CADFILE: B121795C		D400000: 2B:1BM:ACD2:10.C2:SS	
ENGINEERING RELEASE			
REV. _____ DATE _____		U.S. DEPARTMENT OF ENERGY	
ERO. _____		Richard Operations Office	
SIGNATURE: _____		DE - AC06-86RL10838	
DATE: 5/10/92		FLUOR DANIEL, INC.	
DATE: 5/10/92		ADVANCED TECHNOLOGY DIVISION	
INSTRUMENT CONTROL LOGIC DIAGRAM LP-580-002			
PROJECT TITLE: HANFORD WASTE VITRIFICATION PLANT		PROJECT NO. B-595	
SHEET NO. 3		FLUOR CONTRACT NO. 8457	
DRAWING NO. H-2-121795		SCALE: NONE	
BY: F. L. HOLLSTEIN		INDEX NO. P340	
DATE: 10-17-91		SHEET 3 OF 3	
CLASSIFICATION: NONE		REV. 0	

DWG. NO.	H-2-121699	DRAWING TITLE	LP-580-002 INSTRUMENT PANEL LAYOUT
REFERENCE DRAWINGS			
NEXT USED ON			

ITEM LIST		DESCRIPTION
1	1	NEMA 12 ENCLOSURE 72" X 24" X 24"
2	1	OPERATOR INTERFACE BEZELS, HOFFMAN, (TO SUIT CRT) OR EQUAL
3	1	CRT, MODICON PANELMATE PLUS 3 OR EQUAL
4	1	HEAVY DUTY OILTIGHT, RED MUSHROOM HEAD PUSHBUTTON SWITCH, HONEYWELL MICRO SWITCH PTMW23* OR EQUAL. * = CONTACT BLOCK AS REQUIRED BY SELLER
5	2	HEAVY DUTY OILTIGHT, FULL GUARD BLACK PUSHBUTTON, HONEYWELL MICRO SWITCH PTPW42* OR EQUAL. * = CONTACT BLOCK AS REQUIRED BY SELLER



- FOR NAMEPLATE INSCRIPTIONS AND LOCATIONS SEE PANEL LAYOUT.
- WHERE SPACE ALLOWS, ABBREVIATIONS SHALL NOT BE USED. IF THEY ARE NEEDED, THEY SHALL BE IN ACCORDANCE WITH ISA-RP60.6, NAMEPLATES, LABELS AND TAGS FOR CONTROL CENTERS, APPENDIX B.
- THE ONE LINE (1/2" TEXT) NAMEPLATE SHALL BE USED FOR PANEL NUMBERS AND PANEL TITLES.
- THE ONE LINE (1/4" TEXT) NAMEPLATES SHALL BE USED FOR GROUP DESCRIPTION OF TWO OR MORE INSTRUMENTS.
- THE TWO AND THREE LINE NAMEPLATE SHALL BE USED FOR LABELING AND TAGGING INSTRUMENTS ON THE FRONT OF THE PANELS. THE TOP LINE (LINES) SHALL HAVE A SHORT DESCRIPTION OF THE INSTRUMENT AND THE BOTTOM LINE SHALL BE THE INSTRUMENT TAG NUMBER.
- EMERGENCY STOP NAMEPLATE SHALL BE A YELLOW BACKGROUND WITH BLACK LETTERS. ALL OTHER NAMEPLATES SHALL BE WHITE BACKGROUND WITH BLACK LETTERS.

NOTES:

- PANEL SHALL BE CONSTRUCTED IN ACCORDANCE WITH SPECIFICATION SECTION B-595-P-P340-17853, DRY FRIT HANDLING SYSTEM CONTROL PANEL AND ASSOCIATED INSTRUMENTS

SAFETY CLASS 3 MAY 12 1992

APPROVED FOR CONSTRUCTION	DATE	INITIALS
REVISIONS	DATE	DESCRIPTION
DATE	DESCRIPTION	APPROVAL INITIALS
DRAWING NO. H-2-121699A		ENCLOSURE 2B:IBM:ACD2:10.C2:SS
ENGINEERING RELEASE		
REV.	DATE	
SIGNATURE		
PROJ. DIR.	DATE	
C.A. DESK	DATE	
PROJECT ENGINEER	DATE	
ENGINEERING INSP.	DATE	
SUPERVISOR	DATE	
DESIGN ENGINEER	DATE	
PROJECT TITLE: HANFORD WASTE VITRIFICATION PLANT		
CHECKED	DATE	
DRAWN	DATE	
CLASSIFICATION	BY	
U.S. DEPARTMENT OF ENERGY		FLUOR DANIEL, INC. ADVANCED TECHNOLOGY DIVISION
LP-580-002 INSTRUMENT LAYOUT		
DWG. NO.	DRAWING TITLE	PROJECT NO.
H-2-121699A	INSTRUMENT CONTROL LOGIC DIAGRAM LP-580-002	B-595
REFERENCE DRAWINGS		SCALE
NONE		SCALE
NEXT USED ON		INDEX NO.
NONE		INDEX NO.
DRAWING NUMBER		SHEET
H-2-121699		1
BY		REV.
NOT REQ'D		1
DATE		0