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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: SEPTEMBER 9, 1993

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

Transmittal No.: WDOE-600

Dear Mr. Grantham:

TRANSMITTAL

We enclose * copy of the items listed below. These are issued per US-DOE request.
* = 2 SPECIFICATIONS

Response due to Fluor: N/A
Responds to: A170 PACKAGE

NUMBER	REV	DATE	TITLE
SEE TRANSMITTAL ATTACHMENT	-----	09/09/93	A170 - CONSTRUCTION POWER SPECIFICATIONS ONLY - REV. 5
			TWO NEW SPECS ADDED TO THE A170 PACKAGE.

Distribution:

Reference: FRP-1170, FUP-619
R. L. Long: DOE-RL, w/0
TWP/AME Corresp Cntrl Cntr, MSIN A5-10 (A170 PACKAGE), w/0
P. Felise, WHC-RL (MSIN G6-06), w/1 SPEC
Environmental Data Management Center (MSIN H6-08), w/1 SPEC
D. Duncan, US EPA, Region X, w/0

Very truly yours,

Rosalie Cadenas for
R. S. Poulter
Project Director

RSP:NJR:dw

CPA



TRANSMITTAL ATTACHMENT FOR PACKAGE SPECIFICATIONS

<u>SPEC NUMBER</u>	<u>PKG SIGN DATE</u>	<u>PKG REV</u>	<u>SECT REV</u>	<u>SECTION</u>	<u>SECTION TITLE</u>
B-595-C-A170	A170	5		CONSTRUCTION POWER	
			0	16111	CONDUIT/CABLE SCHEDULE
			0	16122	15 kV CABLE

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SPECIFICATIONS

9E13776 0012
CONSTRUCTION POWER

B-595-C-A170

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**

9513335.0013

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

CONSTRUCTION POWER
SPECIFICATION B-595-C-A170

APPROVED FOR CONSTRUCTION

REVISION 5 PER HWVP CR-0975
ISSUE DATE SEP 09 1993

APPROVED BY:

<u>M. H. Featherston</u>		<u>9/7/93</u>
M. H. Featherston	Procurement Package Engineer	Date
<u>Edward Jacobs</u>		<u>9-7-93</u>
E. R. Jacobs	Area Project Manager	Date
<u>Paul J. Speidel</u>		<u>9-7-93</u>
P. J. Speidel	Engineering Project Manager	Date
<u>Ward Helmer for J.S.</u>		<u>9-8-93</u>
J. L. Smets	Systems Manager	Date
<u>A. K. Yee</u>		<u>9-8-93</u>
A. K. Yee	Independent Safety Manager	Date
<u>Sam Ritten for JC-k</u>		<u>9-8-93</u>
J. G. Kelly	Quality Assurance Manager	Date
<u>Edward Jacobs FOR RSP</u>		<u>9-8-93</u>
R. S. Poulter	Project Director	Date

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. 5

CONSTRUCTION POWER
 B-595-C-A170

TABLE OF CONTENTS
 TECHNICAL SPECIFICATIONS

DIVISION 1 - GENERAL REQUIREMENTS		REV. NO.
Section	Title	
01730	Operation and Maintenance Data	0
DIVISION 2 - SITE WORK		
Section	Title	
02220	Excavation and Backfill	1
DIVISION 3 - CONCRETE		
Section	Title	
03300	Concrete Construction	2
DIVISION 16 - ELECTRICAL		
Section	Title	
16100	Electrical Installation	2
16110	Electrical Materials and Devices	3
16111	Conduit/Cable Schedule	0
16122	15 kV Cable	0
16320	Pad Mounted Transformer	0
16905	Electrical Testing	1

9513335.0015

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

FLUOR DANIEL, INC.
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Fluor Contract 8457

SECTION 16111
CONDUIT/CABLE SCHEDULE
B-595-C-A170-16111

APPROVED FOR CONSTRUCTION

REVISION 0 PER HWVP CR-0975
ISSUE DATE SEP 09 1993

WAPA YES NO
QUALITY LEVEL I II
SAFETY CLASS 1 2 3 4

ORIGINATOR:

CHECKER:

K. K. Srivastava 9/2/93
K. Srivastava, Electrical Engineer Date

M. Morrow 9/4/93
M. Morrow, Electrical Engineer Date

APPROVED BY:

K. A. Owrey
K. A. Owrey Lead Discipline Engineer

8-7-93
Date

U.S. DEPARTMENT OF ENERGY
Hanford Waste Vitrification Plant
Richland, Washington
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Rev. 0

SECTION 16111
CONDUIT/CABLE SCHEDULE
B-595-C-A170-16111

TABLE OF CONTENTS

<u>PART</u>	<u>PAGE</u>
PART 1 GENERAL	1
1.1 SUMMARY	1
1.2 RELATED REQUIREMENTS	1
PART 2 PRODUCTS	1
PART 3 EXECUTION	1
3.1 INSTALLATION	1
3.2 FIELD QUALITY CONTROL	1

ATTACHMENTS

<u>ATTACHMENT</u>	<u>TITLE</u>
A	CONDUIT SCHEDULE
B	CABLE SCHEDULE

**SECTION 16111
 CONDUIT/CABLE SCHEDULE**

PART 1 GENERAL

1.1 SUMMARY

This section includes the conduit and cable schedule for permanent electrical utility service to OAB/TOB.

1.2 RELATED REQUIREMENTS

Specification Section 16100	Electrical Installation
Specification Section 16110	Electrical Materials and Devices
Specification Section 16905	Electrical Testing

PART 2 PRODUCTS

2.1 MATERIAL AND EQUIPMENT

2.1.1 All material shall be supplied in accordance with Specification Section 16110.

2.1.2 Cable codes as designated on the electrical cable schedule are defined in Specification Section 16110.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Underground and aboveground conduits and cables shall be in accordance with Attachment A, Attachment B and Specification 16100, Electrical Installation.

3.2 FIELD QUALITY CONTROL

Electrical cables specified in Attachment B of this section shall be inspected and tested in accordance with Specification Section 16905.

END OF SECTION

Electrical Conduit Schedule for Package Number A170

REV NO.	BLDG NO.	RACEWAY NO.	FOR	FROM		TO		RACEWAY DATA			INCLUDED CABLE NOS.
				EQUIPMENT NUMBER OR LOCATION	PLAN DRAWING	EQUIPMENT NUMBER OR LOCATION	PLAN DRAWING	SIZE	TYPE	MATERIAL OF CONSTR	
0	00	P8300	POWER	DD-32A-099	DCN-0090	MH-P50	DCN-0090	4"	COND	PVC	P8300A,B,C
0	00	P8300A	POWER	MH-P50	DCN-0090	MH-P51	DCN-0090	4"	COND	PVC	P8300A,B,C
0	00	P8300B	POWER	MH-P51	DCN-0090	XT-32A-099	DCN-0090	4"	COND	PVC	P8300A,B,C
0	00	P8301	SPARE	POLE 105	DCN-0090	MH-P50	DCN-0090	4"	COND	PVC	
0	00	P8301A	SPARE	MH-P50	DCN-0090	MH-P51	DCN-0090	4"	COND	PVC	
0	00	P8301B	SPARE	MH-P51	DCN-0090	XT-32A-099	DCN-0090	4"	COND	PVC	
0	00	P8302	SPARE	POLE 105	DCN-0090	MH-P50	DCN-0090	4"	COND	PVC	
0	00	P8302A	SPARE	MH-P50	DCN-0090	MH-P51	DCN-0090	4"	COND	PVC	
0	00	P8302B	SPARE	MH-P51	DCN-0090	XT-32A-099	DCN-0090	4"	COND	PVC	
0	00	P8303	POWER	XT-32A-099	DCN-0090	SB-32A-099	DCN-0090	5"	COND	RGS	P8301A,B,C,G,N
0	00	P8304	POWER	XT-32A-099	DCN-0090	SB-32A-099	DCN-0090	5"	COND	RGS	P8302A,B,C,G,N
0	00	P8305	SPARE	XT-32A-099	DCN-0090	SB-32A-099	DCN-0090	5"	COND	RGS	
0	00	P8306	SPARE	XT-32A-099	DCN-0090	SB-32A-099	DCN-0090	5"	COND	RGS	
0	00	P8307	POWER	XT-32A-099	DCN-0090	SB-32A-099	DCN-0090	5"	COND	RGS	P8303A,B,C,G,N
0	00	P8308	SPARE	SB-32A-099	DCN-0090	STUB-OUT	DCN-0090	5"	COND	RGS	
0	00	P8309	SPARE	SB-32A-099	DCN-0090	STUB-OUT	DCN-0090	5"	COND	RGS	
0	00	P8310	SPARE	SB-32A-099	DCN-0090	STUB-OUT	DCN-0090	5"	COND	RGS	

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Electrical Conduit Schedule for Package Number A170

REV NO.	BLDG NO.	RACEWY NO.	FOR	FROM		TO		RACEWAY DATA			INCLUDED CABLE NOS.
				EQUIPMENT NUMBER OR LOCATION	PLAN DRAWING	EQUIPMENT NUMBER OR LOCATION	PLAN DRAWING	SIZE	TYPE	MATERIAL OF CONSTR	
0	00	P8311	SPARE	SB-32A-099	DCN-0090	STUB-OUT	DCN-0090	5"	COND	RGS	
0	00	P8312	SPARE	SB-32A-099	DCN-0090	STUB-OUT	DCN-0090	5"	COND	RGS	
0	00	P8313	SPARE	SB-32A-099	DCN-0090	STUB-OUT	DCN-0090	5"	COND	RGS	
0	00	P8314	SPARE	SB-32A-099	DCN-0090	STUB-OUT	DCN-0090	5"	COND	RGS	
0	00	P8315	SPARE	SB-32A-099	DCN-0090	STUB-OUT	DCN-0090	5"	COND	RGS	
0	00	P8316	SPARE	SB-32A-099	DCN-0090	STUB-OUT	DCN-0090	5"	COND	RGS	
0	00	P8317	SPARE	SB-32A-099	DCN-0090	STUB-OUT	DCN-0090	2"	COND	RGS	
0	00	P8318	SPARE	SB-32A-099	DCN-0090	STUB-OUT	DCN-0090	2"	COND	RGS	
0	00	P8319	SPARE	SB-32A-099	DCN-0090	STUB-OUT	DCN-0090	2"	COND	RGS	
0	00	G8320	SPARE	SB-32A-099	DCN-0090	STUB-OUT	DCN-0090	2"	COND	RGS	

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Electrical Cable Schedule for Package Number A170

9513335.0020

REV NO.	BLDG NO.	CABLE NO.	FROM		TO		CABLE DATA				ONE LINE DIAGRAM NO. H-2-	VIA
			EQUIPMENT NUMBER OR LOCATION	CONNECTION DRAWING	EQUIPMENT NUMBER OR LOCATION	CONNECTION DRAWING	SYS VOLT	NO. COND	SIZE	CABLE CODE		
0	00	P8300A	DD-32A-099		XT-32A-099		15 kV	1	1/0	FS03		P8300,P8300A,P8300B
0	00	P8300B	DD-32A-099		XT-32A-099		15 kV	1	1/0	FS03		P8300,P8300A,P8300B
0	00	P8300C	DD-32A-099		XT-32A-099		15 kV	1	1/0	FS03		P8300,P8300A,P8300B
0	00	P8301A	XT-32A-099		SB-32A-099		600V	1	750	AZ07		P8303
0	00	P8301B	XT-32A-099		SB-32A-099		600V	1	750	AZ08		P8303
0	00	P8301C	XT-32A-099		SB-32A-099		600V	1	750	AZ09		P8303
0	00	P8301N	XT-32A-099		SB-32A-099		600V	1	750	AZ06		P8303
0	00	P8301G	XT-32A-099		SB-32A-099		600V	1	4/0	AV02		P8303
0	00	P8302A	XT-32A-099		SB-32A-099		600V	1	750	AZ07		P8304
0	00	P8302B	XT-32A-099		SB-32A-099		600V	1	750	AZ08		P8304
0	00	P8302C	XT-32A-099		SB-32A-099		600V	1	750	AZ09		P8304
0	00	P8302N	XT-32A-099		SB-32A-099		600V	1	750	AZ06		P8304
0	00	P8302G	XT-32A-099		SB-32A-099		600V	1	4/0	AV02		P8304
0	00	P8303A	XT-32A-099		SB-32A-099		600V	1	750	AZ07		P8307
0	00	P8303B	XT-32A-099		SB-32A-099		600V	1	750	AZ08		P8307
0	00	P8303C	XT-32A-099		SB-32A-099		600V	1	750	AZ09		P8307
0	00	P8303N	XT-32A-099		SB-32A-099		600V	1	750	AZ06		P8307
0	00	P8303G	XT-32A-099		SB-32A-099		600V	1	4/0	AV02		P8307

9513335.0021

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

SECTION 16122
15 kV CABLE
B-595-C-A170-16122

APPROVED FOR CONSTRUCTION

REVISION 0 PER HWVP CR-0975
ISSUE DATE SEP 09 1993

WAPA YES NO
QUALITY LEVEL I II
SAFETY CLASS 1 2 3 4

ORIGINATOR:

CHECKER:

Abe Talebi 9-3-93
A. Talebi, Electrical Engineer Date

M. Morrow 9/7/93
M. Morrow, Electrical Engineer Date

APPROVED BY:

K. A. Owrey
K. A. Owrey Lead Discipline Engineer

9-7-93
Date

U.S. DEPARTMENT OF ENERGY
 Hanford Waste Vitrification Plant
 Richland, Washington
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FLUOR DANIEL, INC.
 Advanced Technology Division
 Fluor Contract 8457

Rev. 0

SECTION 16122
 15 kV CABLE
 B-595-C-A170-16122

TABLE OF CONTENTS

<u>PART</u>	<u>PAGE</u>
PART 1 GENERAL	1
1.1 SUMMARY	1
1.2 REFERENCES	1
1.3 RELATED REQUIREMENTS	2
1.4 DEFINITIONS	2
1.5 SYSTEM DESCRIPTION	2
1.6 SUBMITTALS	2
1.7 CLASSIFICATION OF SYSTEM AND COMPONENTS	3
1.8 PROJECT OR SITE ENVIRONMENTAL CONDITIONS	3
PART 2 PRODUCTS	4
2.1 MATERIALS AND EQUIPMENT	4
2.2 FABRICATION AND MANUFACTURE	4
2.3 FACTORY ACCEPTANCE TEST	6
2.4 PREPARATION FOR SHIPMENT	6
PART 3 EXECUTION	7

SECTION 16122
15 kV CABLE

PART 1 GENERAL

1.1 SUMMARY

This Specification Section covers the technical requirements for furnishing and delivering of single conductor, 15 kV, shielded, flame retardant, heat- and moisture-resistant insulated copper cable.

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 SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM B8 1986 Standard Specification for
Concentric-Lay-Stranded Copper Conductors,
Hard, Medium-Hard, or Soft

ASSOCIATION OF EDISON ILLUMINATING COMPANIES

AEIC CS5 1987 Specifications for Cross-Linked
Polyethylene Insulated Shielded Cables

AEIC CS6 1987 Specifications for Ethylene Propylene
Rubber Insulated Shielded Cables

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA WC7 1988 Cross-Linked-Thermosetting-
Polyethylene-Insulated Wire and Cable for
the Transmission and Distribution of
Electrical Energy

NEMA WC8 1988 Ethylene-Propylene-Rubber-Insulated
Wire and Cable for the Transmission and
Distribution of Electrical Energy

UNDERWRITER'S LABORATORIES (UL)

UL 1072 1986 Medium Voltage Power Cables

1.3 RELATED REQUIREMENTS

(Not Used)

1.4 DEFINITIONS

Certified Test
Reports

- Test reports signed and dated by Factory Quality Assurance
- EPR - Ethylene Propylene Rubber
- PVC - Polyvinyl Chloride
- XLPE - Cross-Linked Polyethylene

1.5 SYSTEM DESCRIPTION

Power Cable shall be suitable for above ground and underground conduit installation and outdoor installation exposed to sunlight. The power cable shall be used for a 13.8 kV, 3 phase, 3 wire, 60 Hertz low-resistance grounded system.

1.6 SUBMITTALS

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

1.6.1 Product Data

- A. Diameter of conductor
- B. Stranding and diameter of the strands of conductor
- C. Thickness and type of conductor shield
- D. Thickness and type of insulation
- E. Diameter over insulation of conductor
- F. Thickness of metallic shield
- G. Thickness of overall jacket
- H. Overall diameter of the cable
- I. Weight per unit length of cable
- J. AC resistance of the cable per unit length at 25°C
- K. Reactance of the cable per unit length
- L. Current carrying capacity of cable with applicable derating factors

- M. Technical literature describing the cable
- N. Maximum allowable pulling tension, both for pulling eye and cable grip, and side wall pressure
- O. Minimum allowable bending radii for cable
- P. Splicing and terminating instructions
- Q. Recommended list of suppliers of splicing and terminating kit and fittings for general use
- R. Recommended list of cable pulling lubricants for PVC and steel conduit installations
- S. Maximum shipping length on largest standard reel

1.6.2 Test Reports

- A. Submit Factory Certified Test Reports as required in the "Factory Acceptance Test" Paragraph 2.3 of this specification section.
- B. Submit Factory Production Test procedures for approval as required for the tests specified in the "Factory Acceptance Test" paragraph of this specification.

1.6.3 Installation Instructions

Submit manufacturer's installation instructions including application conditions and limitations.

1.6.4 Details of the preparation for shipment provisions.

1.7 CLASSIFICATION OF SYSTEM 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

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

2.1.1 General

Cable shall be composed of a stranded copper single conductor with conductor shield, insulation, insulation screen, metallic shield and an overall jacket.

2.2 FABRICATION AND MANUFACTURE

2.2.1 General

2.2.1.1 The power cables shall be suitable for indoor or outdoor installation in underground duct bank and abovegrade conduit. Outdoors, the cable will be exposed to sunlight, rain, snow and blowing dust.

2.2.1.2 Cables shall be listed by UL 1072 as meeting the requirements for the use described in this specification.

2.2.1.3 The cable insulation level shall be 133 percent. The insulation shall be suitable for conductor temperature not exceeding 90°C for continuous operation, 130°C for emergency operation and 250°C for short-circuit conditions.

2.2.1.4 The cable shall be designed to operate satisfactorily in wet and dry locations.

2.2.2 Basic Construction

2.2.2.1 Conductor

2.2.2.1.1 Conductor shall be annealed uncoated copper, with Class B stranding. Stranding shall conform to ASTM B8 standard. Cable sizes shall be as specified in the Conduit/Cable Schedule Specification Section 16111.

2.2.2.1.2 The conductor shall be unbroken for the full length of the shipping reels. Reels with a spliced conductor shall be rejected.

2.2.2.2 Conductor Shield

2.2.2.2.1 A semiconducting material shall be extruded directly over the surface of the conductor before the insulation is applied. The shielding material shall be compatible with the insulation.

2.2.3 Insulation

2.2.3.1 The insulation shall be EPR or XLPE.

- 2.2.3.2 Insulation shall adhere tightly to the conductor but shall be "free stripping" to allow removal without scraping.
- 2.2.3.3 The average thickness of insulation shall be in accordance with NEMA Standard WC7 or WC8 as applicable. Minimum insulation thickness at any point shall not be less than 90 percent of the listed thickness.
- 2.2.4 Insulation Screen
- 2.2.4.1 A semi-conducting material shall be extruded directly over the insulation. The tension required to remove the extruded insulation screen shall be a minimum of 3 pounds and a maximum of 12 pounds.
- 2.2.5 Metallic Shield
- A bare copper tape of 5 mils minimum average thickness shall be helically applied over the insulation screen with a minimum overlap of 12.5 percent. The copper tape shall be applied in such a manner that electrical continuity of the tape will not be distorted or disrupted during normal installation and bending of the cable.
- 2.2.6 Overall Jacket
- 2.2.6.1 Overall jacket shall be moisture, heat, oil, sunlight, and abrasion resistant black PVC. The minimum thickness at any point shall not be less than 80 percent of the average value in accordance with NEMA standard WC7 or WC8 as applicable.
- 2.2.7 Identification
- 2.2.7.1 The following minimum information shall be printed on the surface of the jacket at regular intervals not exceeding 24 inches over the entire length of the cable:
- A. Conductor size
 - B. Voltage class
 - C. Type of insulation
 - D. Manufacturer's name
 - E. Marking to indicate UL listing
 - F. Temperature rating
 - G. Marking to indicate sunlight resistant

2.3 FACTORY ACCEPTANCE TEST

- 2.3.1 Cables shall be factory tested to ensure that they have been manufactured in accordance with this specification, NEMA Standard WC7 or WC8 as applicable and AEIC CS5 or CS6 as applicable.
- 2.3.2 Copies of the Certified Design Qualification Test Reports shall be submitted as required by NEMA Standard WC7 or WC8 as applicable.
- 2.3.3 Copies of the Certified Production Test Reports per AEIC CS6 Appendix 3 and NEMA WC8, Part 6 for EPR insulated cable, AEIC CS5 Appendix 3 and NEMA WC7, Section 6 for XLPE insulated cable shall be submitted.

2.4 PREPARATION FOR SHIPMENT

- 2.4.1 Preparation for shipment shall be in accordance with Seller's standard practice.
- 2.4.2 Cable shall be furnished in one continuous length per reel.
- 2.4.3 Each end of the cable shall be provided with a water tight seal and firmly secured to the reel.
- 2.4.4 The inner end of the cable shall be allowed to project through the reel so that the cable can be tested while on the reel at the job site.
- 2.4.5 The reels shall be lagged or covered with suitable material and strapped to protect the cable from damage during transit, outdoor storage, and handling.
- 2.4.6 A metal weatherproof tag shall be firmly fixed to each side of the reel indicating the following information:
 - A. Purchase Order Number
 - B. Reel number assigned by Buyer
 - C. Name of Manufacturer
 - D. Voltage class
 - E. Type of insulation
 - F. Conductor size
 - G. Length of cable on the reel

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U.S. DEPARTMENT OF ENERGY
Hanford Waste Vitrification Plant
Richland, Washington
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Rev. 0

PART 3 EXECUTION

(Not Used)

END OF SECTION