

DOW CHEMICAL, U.S.A.
TEXAS OPERATIONS
FREEPORT, TEXAS

JOB SPECIFICATIONS

M102-33324

B-1303 SWITCHROOM

BLOCK B-1300

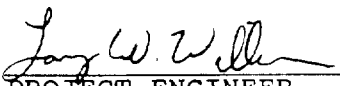
PLANT B

DECEMBER 11, 1989

INDEX

SECTION	TITLE
1	BID INFORMATION
2	SPECIAL CONDITIONS
3	CIVIL
4	PIPING (N/A)
5	EQUIPMENT (N/A)
6	INSTRUMENTATION
7	ELECTRICAL
8	INSULATION (N/A)
9	PAINTING (N/A)
10	DEMOLITION (N/A)

APPROVED:


PROJECT ENGINEER
MANUFACTURING REPRESENTATIVE

ST0406851

DECEMBER 11, 1989
JOB SPECIFICATIONS
M102-33324

L. W. WILLIAMS
DOW CHEMICAL, U.S.A.
FREEPORT, TEXAS

1. BID INFORMATION

1.1 Submit a lump-sum proposal to furnish all supervision, labor, materials (except Owner-furnished), tools and equipment to perform the work for the Plant B site of the U.S. area of The Dow Chemical Company, Freeport, Texas, ("Owner") as shown and noted on the drawings listed below and as specified herein.

1.1.1 The scope of work includes but is not limited to the following:

1.1.1.1 Transportation, installation and connection of two 5000 kVA and two 2500 kVA transformers on the north side of the new B-1303 switchroom.

1.1.1.2 Leveling and assembly of new 2.4 kV and 480 V switchgear in B-1303 which shall include connecting and torqueing of all bus splices and termination of all interconnection wiring. All switchgear is located inside B-1303 in approximately its final position.

1.1.1.3 Transportation, installation and connection of remote control panels and ground detection systems for the 2.4 kV and 480 V switchgear in B-1303. All equipment is located at B-10601.

1.1.1.4 Routing of 2.4 kV and 480 V main power feeders from the transformer secondaries to the 2.4 kV and 480 V switchgear.

1.1.1.5 Installation and connection of 125 VDC and 48 VDC battery systems in B-1303.

LWW/CRG

M102-33324

PAGE 1

12/11/89

ST0406852

ST0406852

1.1.1.6 Leveling and assembly of new 2.4 kV motor control centers (MCC) in B-1303 which shall include connecting and torquing of all bus splices and termination of all interconnection wiring. All 2.4 kV MCCs are located inside B-1303 in approximately their final position.

1.1.1.7 Transportation, leveling and assembly of new 480 V MCCs in B-1303 which shall include connecting and torquing of all bus splices and termination of all interconnection wiring. All 480 V MCCs are located at B-10601.

1.1.1.8 Routing of 2.4 kV and 480 V main power feeders from the switchgear to the 2.4 kV and 480 V MCCs.

1.1.1.9 Installation of Mod V MJBs in B-1303 and routing of Zetabon* cable from the MJBs to the control room.

*Trademark of the Dow Chemical Company.

1.1.1.10 Contractor shall provide his own temporary lighting in the B-1303 switchroom. Temporary power will be provided by Dow.

1.1.1.11 Contractor shall vacuum, wipe the bus and insulators, level and connect all interconnecting bus and wiring for the following owner furnished equipment.

EQUIPMENT -----	PURCHASE ORDER -----
2.4 kV switchgear	33324-7002-P73
480 V switchgear	33324-7003-P73
2.4 kV motor control centers	33324-7006-P73
480 V motor control centers	33324-7007-P73

LWW/CRG

M102-33324

PAGE 2

12/11/89

ST0406853

ST0406853

1.1.2 The work specifically covered includes but is not limited to the following:

- Concrete and Grouting
- Demolition
- Earthwork
- Electrical
- Equipment Installation
- Excavation
- Pole Line
- Grounding
- Hauling
- HVAC
- Scaffolding
- Instrumentation
- Structural Steel

1.1.3 The proposal shall be based on all work being performed on a straight-time basis.

1.1.3.1 Hours of work shall be 7:30 a.m. to 4:00 p.m. Monday through Friday (except for Dow holidays). Any exceptions must have prior approval of the Owner's Representative.

1.1.3.2 The bidder shall state the number of days and hours that constitute his normal work week, if different from above.

1.1.4 The drawings and specifications are the property of the Owner and shall be returned to the Owner's Representative within 30 days after completion of the work.

1.1.5 The successful bidder shall submit a plan of construction showing, in useful detail and time scale, how he intends to perform the work within the time specified. The plan shall indicate restraints imposed by Contractor-furnished components, and Contractor activities, other Contractors and Dow-furnished components. The plan shall be delivered to the Owner's Representative within 20 days from date of contract.

LWW/CRG

M102-33324

PAGE 3

12/11/89

488904018

ST0406854

1.1.6 A job site visit for bidders will be held during the bid period, at which time the following will be discussed:

1.1.6.1 Location of the Contractor parking area, temporary construction office building location, storage area for material and equipment, location and availability of Owner-furnished utilities, and area where safe work permit is not required for cutting and welding operations.

1.1.6.2 The following utilities may be used by the Contractor and will be identified at the job site visit:

120V receptacles
Plant Air

1.1.6.2.1 The Contractor shall furnish and install, at his own expense, any necessary distribution facilities from the point of attachment to the Owner's existing facility. The Contractor shall also maintain in a safe operating condition, and remove at the completion of the contract, or earlier if so directed by the Owner's Representative.

1.1.7 It shall be the Contractor's responsibility to provide adequate storage facilities on the job site for all materials. This shall include weather protection where required, and necessary cribbing to keep materials out of mud and protect them against inclement weather. All handling, receiving and unloading shall be done by the Contractor. Material shall be stored in a neat and orderly manner.

1.1.8 The Contractor shall separate excess and/or unsuitable materials resulting from his operations into the following categories;

1.1.8.1 Stream No. 82 (Chemically treated wood -- railroad ties, utility poles, acid bar, lumbar).

- 1.1.8.2 Stream No. 53 (Metal).
- 1.1.8.3 Stream No. 51 (Lumber).
- 1.1.8.4 Stream No. 54 (Concrete, Brick, and Excavated Material).
- 1.1.8.5 Stream No. 58 (Other trash).
- 1.1.8.6 All metal shall be cut in lengths (max. of 20') to fit into a dempster.
- 1.1.8.7 The Contractor must acquire a permit no. from the Owner's Representative prior to dumping material.
- 1.1.8.8 Disposition of excess, salvageable items, and/or unsuitable material by the Contractor shall be as follows:

1.1.8.8.1 The metal shall be hauled to a dempster within B-1300 block.

1.1.8.8.2 Lumber shall be hauled to a dempster within B-1300 block.

1.1.8.8.3 Other trash shall be hauled to a dempster within B-1300 block.

1.1.8.8.4 Concrete, paint skimmings, solvents and excavated material shall be hauled to B-5100 Block and unloaded. This is approximately 2 miles from the job site.

1.1.8.8.5 All of the above material should not be unloaded until clearance and designated location is given by the Dow representative of that block.

1.1.8.8.6 Wood, trash and rubble shall be loaded and hauled by Contractor about 2 miles, to a dump area located in Plant B and unloaded at the dump as directed by the Dump Manager. All asbestos will be disposed of by Owner.

LWW/CRG

M102-33324

PAGE 5

12/11/89

ST0406856

ST0406856

1.1.8.8.7 All metal will become the property of the Contractor upon removal and will be disposed of at an approved reclamation facility.

1.1.8.9 The Contractor shall accumulate excess and/or unsuitable material on a daily basis so the job area is maintained in a clean orderly condition. Flammable material containers shall be covered at all times.

1.1.9 Should the Contractor, as a result of his operations, disturb any areas not included in his scope of work, he shall restore them to their original state insofar as is practical, at his own expense.

1.1.10 Photographs of the project or any part thereof shall not be taken without written permission of the Owner's Representative. The Contractor shall assist the Owner's Representative in preventing unauthorized photographs being taken.

1.2 Drawings & Specifications

1.2.1 The Dow Standards and/or Engineering Specifications referenced in these drawings and job specifications shall be the current edition in effect at the date of this specification.

1.2.2 Civil Drawing List:

B3-4-33324 Conc. Modifications & Transformer Pad Plan
B3-5-33324 Conc. Modifications & Transformer Pad Sections

1.2.3 Instrument Drawing List:

BCS-5100-33324 Mod V Grounding
B6 -1701-33324 B1303 Control Room Equipment Layout
B6-S100-33324 Cable Schedule
B6-65A1-33324 MJB-65A-TS 1&2
B6-65A2-33324 MJB-65A-TS 1&2
B6-65A3-33324 MJB-65A-TS 1&2
B6-65A4-33324 MJB-65A-TS 3&4
B6-65B1-33324 MJB-65B-TS 1&2

LWW/CRG

M102-33324

PAGE 6

12/11/89

ST0406857

ST0406857

B6-65B2-33324	MJB-65B-TS 1&2
B6-65B4-33324	MJB-65B-TS 3&4
B6-66A1-33324	MJB-66A-TS 1&2
B6-66A2-33324	MJB-66A-TS 1&2
B6-66A3-33324	MJB-66A-TS 1&2
B6-66A4-33324	MJB-66A-TS 3&4

1.2.4 Electrcial Drawing List:

B7-	01-33324	LEGEND & REFERENCE
B7-	2-33324	OVERALL PLOT PLAN
B7-	B1300- 2000	AREA CLASSIFICATION PLAN
B7-B1303AB-	1000	480 VOLT SWITCHGEAR
		METER & RELAY ONE LINE
B7-B1303A1-	1000	ONE-LINE DIAGRAM
B7-B1303A2-	1000	ONE-LINE DIAGRAM
B7-B1303A3-	1000	ONE-LINE DIAGRAM
B7-B1303A4-	1000	ONE-LINE DIAGRAM
B7-B1303A5-	1000	ONE-LINE DIAGRAM
B7-B1303B1-	1000	ONE-LINE DIAGRAM
B7-B1303B2-	1000	ONE-LINE DIAGRAM
B7-B1303B3-	1000	ONE-LINE DIAGRAM
B7-B1303B4-	1000	ONE-LINE DIAGRAM
B7-B1303B5-	1000	ONE-LINE DIAGRAM
B7-B1303CD-	1000	2.4 KV SWITCHGEAR
		METER & RELAY ONE-LINE DIAGRAM
B7- B1303C-	1000	2.4 KV MCC ONE-LINE DIAGRAM
B7- B1303D-	1000	2.4 KV MCC ONE-LINE DIAGRAM
B7-	39-33324	ENLARGED PLOT PLAN
B7-	39A-33324	SECTIONS
B7-	46-33324	ENLARGED PLOT PLAN
B7-B1303UA-	33324	BUILDING B1303 EQUIPMENT LOCATION
B7-B1303UB-	33324	BUILDING B1303 CABLE TRAY
B7-B1303UC-	33324	CABLE TRAY SECTIONS
B7-B1303UD-	33324	BUILDING B1303
		LIGHTING & RECEPTACLE PLAN
B7-B1303UE-	33324	GROUNDING PLAN
B7-	200-33324	ELECTRICAL DETAILS
B7-	201-33324	ELECTRICAL DETAILS
B7-	300A-33324	480V INTERCONNECTION DIAGRAM
B7-	300B-33324	480V INTERCONNECTION DIAGRAM
B7-	300C-33324	480V INTERCONNECTION DIAGRAM
B7-	300D-33324	480V INTERCONNECTION DIAGRAM
B7-	300E-33324	480V INTERCONNECTION DIAGRAM
B7-	300F-33324	480V INTERCONNECTION DIAGRAM
B7-	300H-33324	480V INTERCONNECTION DIAGRAM
B7-	300J-33324	480V INTERCONNECTION DIAGRAM

85890401

LWW/CRG

PAGE 7

M102-33324

12/11/89

ST0406858

B7-	300K-33324	480V INTERCONNECTION DIAGRAM
B7-	300L-33324	480V INTERCONNECTION DIAGRAM
B7-	300M-33324	480V INTERCONNECTION DIAGRAM
B7-	300N-33324	480V INTERCONNECTION DIAGRAM
B7-	301A-33324	2.4 KV INTERCONNECTION DIAGRAM
B7-	301B-33324	2.4 KV INTERCONNECTION DIAGRAM
B7-	301C-33324	2.4 KV INTERCONNECTION DIAGRAM
B7-	301D-33324	2.4 KV INTERCONNECTION DIAGRAM
B7-	301E-33324	2.4 KV INTERCONNECTION DIAGRAM
B7-	301F-33324	2.4 KV INTERCONNECTION DIAGRAM
B7-	301G-33324	2.4 KV INTERCONNECTION DIAGRAM
B7-	301H-33324	2.4 KV INTERCONNECTION DIAGRAM
B7-	301J-33324	2.4 KV INTERCONNECTION DIAGRAM
B7-	400-33324	CABLE SCHEDULE
B7-	500A-33324	480V SWITCHGEAR
B7-	500B-33324	480V SWITCHGEAR
B7-	500C-33324	480V SWITCHGEAR
B7-	501A-33324	2.4 KV SWITCHGEAR
B7-	501B-33324	2.4 KV SWITCHGEAR
B7-	501C-33324	2.4 KV SWITCHGEAR
B7-	1011- 7088	5 KV SHIELDED CABLE TERMINATION

1.3 Work Done By Others

1.3.1 The following work will be done by others and is not a part of this contract:

1.3.1.1 All electrical testing shall be done by Dow Acceptance Testing.

1.3.1.2 Rearrangement of starter/disconnect buckets in 480 V MCCs after MCCs are set by the contractor.

1.4 Owner-Furnished Material

1.4.1 Owner-furnished material will be available to the Contractor at B-10601 or within the plant. The Owner's Representative or his designated representative shall release the Owner-furnished material to the Contractor when required.

1.4.2 All required handling, loading, hauling and unloading of Owner-furnished material shall be done by the Contractor.

LWW/CRG

M102-33324

PAGE 8

12/11/89

ST0406859

ST0406859

1.4.3 Owner-furnished material lost or damaged after receipt of same by the Contractor shall be repaired or replaced by the Contractor.

1.4.4 The following material will be Owner-furnished:

EQUIPMENT -----	PURCHASE ORDER -----
2.4 kV switchgear	33324-7002-P73
480 V switchgear	33324-7003-P73
5000 kVa transformer	33324-7004-P73
2500 kVA transformer	33324-7005-P73
2.4 kV motor control centers	33324-7006-P73
480 V motor control centers	33324-7007-P73
2500 kVA transformer	33324-7015-P73
5000 kVa transformer	33324-7015-P73
FRP cable tray and trough	33324-7018-P05
125 VDC batteries and charger	33324-7019-P05
48 VDC batteries and charger	33324-7019-P05
MJB's per Instrument Schedule	33324-7022-P73
Multipair Zetabon* Cable per Instrument Schedule	33324-7023-P73
* Trademark of the Dow Chemical Company	

All tag items appearing on the Instrument Schedule .

1.4.5 Vendor drawings of Owner-furnished material will be made available to the bidders upon request.

LWW/CRG

M102-33324

PAGE 9

12/11/89

098907018

ST0406860

1.4.6 The weights of Owner-furnished material given in the specifications or on the drawings represent the Owner's best available information. It shall be the Contractor's responsibility to verify all weights and provide adequate rigging and hoisting equipment to safely handle all equipment. All weight evidence, such as shipping weights, scale weight tickets, calculated figures, or vendor weights will be made available for this purpose. Any extra work necessary to verify Owner-furnished equipment weights will be handled as an extra to the contract with prior authorization from the Owner's Representative.

198904018

LWW/CRG
M102-33324

PAGE 10
12/11/89

ST0406861

2. SPECIAL CONDITIONS

2.1 There will be a block or unit safety orientation prior to beginning work and will require approximately 30 minutes. The Owner's Representative will be given one day advanced notice when the orientation is required.

2.1.1 All Contractor and subcontractor personnel shall be familiar with and comply with the safety rules and policies of the block or unit. Copies of the safety rules and policies will be furnished during the bidding period.

2.1.2 A block sticker will be issued and must be affixed to the hard hats of Contractor personnel.

2.2 The job site is located in an area designated as hazardous. Daily Safe Work Permits will be required, and may be obtained from Process Foreman, B-1303 Building, phone 2207.

2.3 Separate safe work permits are required for:

- a) Hot work permits for open flame, welding, or any spark producing work can be obtained from the Process Foreman.
- b) Machine excavation permits can be obtained from the Process Foreman.
- c) Rig permits can be obtained from John Pitts, B-1304 Building, Phone 7230.

2.3.1 The Contractor shall return completed Safe Work Permits to the B-1303 Control Center at the end of work each day, or when job is complete.

2.4 Propane torches may be used for installing Raychem heat shrink termination kits and Sigmaform Aperseals around the new transformers at B-1303 with the following limitations.

2.4.1 A Seperate hot work permit will be required.

2.4.2 Twenty-four hour prior notice is required.

2.4.3 All required termination kits and Aperseals will be done at the same time.

2.5 Safety equipment required:

Hard Hat, Chemical Goggles, Side Shield Safety Glasses, Mouth Bit Respirator (American Optical R-97 with R-722 cartridge or other NIOSH approved).

2.5.1 When wearing chemical goggles, bands are not to be worn on or over hard hats and liners.

2.5.2 Respirator cartridge is to be dated with employee name and changed every 6 (six) months or after each use.

2.5.3 Contractor-furnished safety harness will be required when working in elevated positions more than 3' off the ground.

2.5.4 Eye protection for using cutting torch or acetylene welding will be required. No one should perform these operations without wearing cutting glasses with shaded lenses.

2.5.5 All cutting torches must be provided with back flow check valves on both the oxygen and acetylene hoses.

2.5.6 As a minimum, welders must wear side shield safety glasses under their welding helmets while welding or slagging. If helmets are raised for more than a quick inspection of the weld, monogoggles must be worn if work is in a designated monogoggle area.

2.6 Tools utilizing explosive charges shall not be used except with written permission of the Owner's Representative.

2.7 The use of electrical tools in hazardous areas is prohibited unless specifically excepted by the Owner's Representative. Air powered tools will be required instead.

2.8 Fire lanes, access roads, safety showers, stairways and ladders shall not be blocked by the Contractor's equipment after working hours. During working hours, the Contractor must be able to clear fire lanes, access roads, safety showers, stairways and ladders at any time. They shall not be modified during construction.

2.9 The Contractor is not, under any circumstances, to use firewater from fire hydrants and/or fire monitors except to put out fires or for other emergencies.

ST0406864

3. CIVIL

3.1 Site Development, Drainage & Piling

3.1.1 Earthwork shall be in accordance with Dow Specification 21-100.

3.2 Concrete and Structural Steel

3.2.1 Concrete and embedded items shall be in accordance with Dow Engineering Specification 32-010.

3.2.1.1 The concrete shall be Class 1 mix.

3.2.1.2 Contractor shall remove laitance.

3.2.2 Grouting shall be in accordance with Dow Engineering Specification 32-410.

3.2.2.1 The type grout shall be type A.

LWW/CRG

M102-33324

PAGE 14

12/11/89

170406065

ST0406865

6. INSTRUMENTATION

6.1 Scope of Work

6.1.1 The instrument schedule and drawings describes the scope of work and contains all necessary reference information to determine the exact work required for each tag item listed.

6.1.2 Labels will be provided by Dow for instrument cables. Cables are to be labeled with their cable number at both ends of the cable using a tie-wrap with shrink-fit label. Individual pairs are to be labeled at the field device, both sides of the Field Junction Box (FJB) terminal strips, and the Zetabon* side of the Control Room Junction Box (CRJB) terminations. Connected spare pairs are to be labeled 'spare'. Connected spare cables (see the cable schedule) are to be terminated at the field end only, and left long enough to be terminated in the designated CRJB's.

*Trademark of the Dow Chemical Company

6.1.3 Contractor to furnish all single pair cable from the FJB to the instrument and single pair jumpers from terminal strip to relays as shown on the FJB drawings. Cable spec is shown on individual wire as IC1, E2, etc.

6.1.4 Dow to furnish all Zetabon* cable.

*Trademark of the Dow Chemical Company

6.1.5 All instrument field cable from the FJB to the instrument to be in conduit.

6.2 Field Instrument Location and Installation

6.2.1 The general location of instruments, shall be as shown on the instrument location drawings. These locations are approximate and the exact location shall be confirmed by the Owner's Representative. Should the designated location or elevation of an instrument be found impractical, or interfere with other equipment, the Owner's Representative shall be promptly advised for the purpose of selecting an alternate arrangement.

LWW/CRG

M102-33324

PAGE 15

12/11/89

ST0406866

ST0406866

6.2.2 The Contractor shall determine the exact location of instruments, in conformance with the following:

6.2.2.1 Junction boxes and instrument cases shall be positioned so doors may be fully opened, covers are fully removable, vent holes are not blocked, and adjustment screws, valves, wiring and piping connections are accessible.

6.2.2.2 Instrument cases shall not be mounted adjacent to hot or vibrating equipment and shall not be mounted under drain points nor immediately above vent points.

6.2.2.3 Instruments shall not be located in walkways or in areas required for maintenance of other equipment.

6.2.2.4 Instruments shall not be located more than 8 feet above grade or operating platform without approval from the Owner's Representative.

6.2.2.5 Instruments shall be located so they are not tripping hazards or 'head knockers'.

6.2.3 All materials and instruments shall be protected and maintained to preserve a like-new condition, both before and after installation, and until such time as the work is complete and accepted by the Owner's Representative.

6.2.4 The Contractor will provide all nuts, bolts, gaskets, valves, wire, conduit, and support hardware not listed in the instrument schedule as designated Owner-furnished or specified Owner-furnished in the specifications and drawings.

6.2.5 For Zetabon* wire pulls, use Zetabon* cable recommendations per Dow CS-5100 page 46 of 54 for guidelines.

*Trademark of the Dow Chemical Company

LWW/CRG

M102-33324

PAGE 16

12/11/89

ST0406867

ST0406867

6.2.6 The Zetabon* jacket shall not be removed except inside the terminal enclosure (ie CRJB or FJB). The Zetabon* jacket shall be grounded at this location as shown on spec. CS-5100-04.

*Trademark of the Dow Chemical Company

6.3 Wire and Cable-wiring Method

6.3.1 Instrument cable schedule contains information on cable tag number, origination and destination of cable, wire size, number of conductors or pairs and Dow wire specification code multipair wire and cable.

6.3.2 Control, thermocouple and alarm wires terminating at junction boxes and relay panels shall be installed so as to break out of the bundle adjacent to the terminal to which it is attached.

6.3.3 Conductors must be single continuous lengths from junction box to junction box or from junction box to instrument. Splices will not be permitted in wireways, cable trays or conduit fittings unless approved for splicing service.

6.3.4 Field wire connections to devices providing screws for electrical terminal connections shall be made by use of T&B nylon insulated STA-KON or Burndy nylon Hylugs.

6.3.5 Maintain the wire insulation to within 1/8 inch of clamp type terminal or box type connector.

6.3.6 Not more than two wires shall be installed to one screw terminal or terminal block connection.

6.4 Conduit

6.4.1 For nonhazardous areas, plastic coated conduit and fittings shall be in accordance with the latest revision of Dow Engineering Practice T7C-0304, unless otherwise noted herein or on the drawings.

LWW/CRG

M102-33324

PAGE 17

12/11/89

898904018

ST0406868

6.4.2 Flexible steel and liquid-tite flexible metal conduit shall be in accordance with the latest revision of Dow Engineering Practice T7C-0307. Flexible conduit and fittings shall be LIQUI-TITE metallic conduit and metal fittings with fittings taped with 3M-88 tape.

6.4.3 Zetabon* shielded cable shall be supported in the same manner as 3/4" schedule 40 PVC conduit as indicated in the latest revision of Dow Engineering Practices T7C-0303-01 and T7C-0303-02, and by methods shown on the drawings.

*Trademark of the Dow Chemical Company

6.4.4 The Contractor shall provide insulated conduit bushings or T&B Insuliners for each conduit one inch or larger entering junction boxes or equipment.

6.4.5 All conduit shall be run parallel or perpendicular to walls, ceilings, or structural members. Conduit shall not interfere with the use of aisles, passageways, doorways, overhead cranes, monorails, equipment removal areas, or working areas, and in no case shall routing present a safety hazard or interfere with normal plant operating procedures. A minimum overhead clearance of 8-feet shall be maintained in aisles or passageways.

6.4.6 All conduit shall be so run as to avoid proximity to high temperatures such as steam or other hot lines. The Contractor shall locate conduit to avoid areas where unusual hazardous such as flares, exhausts, safety relief valves, spillage, excessive corrosion, etc. exist.

6.4.7 Exposed field cut threads on galvanized conduit shall be coated with ZRC (The Sealube Company) or Galvonox Type 1 (Subox, Inc.) on the same day the conduit is installed.

6.4.8 Conduit must not be supported from process piping.

6.5 Installation of Electrical Devices

LWW/CRG

M102-33324

PAGE 18

12/11/89

ST0406869

ST0406869

6.5.1 Electrical work shall be in accordance with Dow Engineering Practice T7A-0009-00 and this specification.

6.5.2 The electrical installation and materials shall conform to the current issue of the following standards and codes, unless amended by the drawings or these specifications:

6.5.2.1 American National Standards Institute.

6.5.2.2 National Electrical Code.

6.5.2.3 National Electrical Manufacturers Association.

6.5.2.4 State and Local Electrical Codes.

6.5.3 Area of instrument work is classified as NON-HAZARDOUS. Adjacent areas are Class 1, Division 2.

6.5.4 All material shall be new and free of defects. Where several approved manufacturers are listed for one type of material, all material of that type shall be from the same manufacturer.

6.6 Testing and Checkout - Instrument

6.6.1 Verify that computer and instrument DC systems grounds are separate from the plant grounding grid.

6.6.2 Individual wires shall be disconnected before testing.

6.6.3 Continuity and identification of all single and multiconductor cables and thermocouple wires shall be checked by means of a DC test device using a bell or buzzer to "ring out" the wires.

6.6.4 Polarity, point-to-point continuity, and identification checks of instrument and electronic cable and shield drains shall be made.

6.6.5 Phones may be used for communication only
between the testers.

ST0406871

LWW/CRG
M102-33324

PAGE 20
12/11/89

ST0406871

7. ELECTRICAL

7.1 General

7.1.1 Electrical work shall be in accordance with Dow Engineering Practice T7A-0009-00 and this specification.

7.1.2 The Contractor shall coordinate with the Owner's Representative to ensure any field changes are documented on a master set of drawings. A copy of this set shall be forwarded to the project engineer.

7.2 Materials And Workmanship

7.2.1 All material shall be new and free of defects. Where several approved manufacturers are listed for one type of material, all material of that type shall be from the same manufacturer.

7.2.2 All Contractor-furnished materials and equipment shall be from a manufacturer listed on the approved electrical Vendor lists, Dow Engineering Practices T7C-0001-00 and T7D-0001-00.

7.2.3 Lighting fixtures shall be installed so as to avoid conflicts with ductwork or other interferences which would prevent proper utilization of light or cause deep shadow areas. The fixture locations shown on the drawings may be altered to accomplish this result, with approval from the Owner's Representative.

7.3 Classification Of Areas

7.3.1 Area of electrical work is classified as Class I, Division 2, Group D outside of buildings and Nonhazardous inside. See drawing B7-B1300-2000.

7.4 Wire and Cable-Wiring Method

7.4.1 Wire and Cable Specifications shall be in accordance with Dow Engineering Practices as specified on the drawings.

LWW/CRG

M102-33324

PAGE 21

12/11/89

ST0406872

ST0406872

7.4.2 For the purpose of standardizing and simplifying the procurement of cable and conductors, the Contractor may, at his option, increase the number of conductors or the size of wires in control and power cable with the approval from the Owner's Representative. The Contractor shall increase the conduit size to accommodate any changes he makes for the purpose of standardization and shall reduce the maximum allowable load current of each conductor in accordance with the National Electrical Code.

7.4.3 All cables entering buildings shall form adequate drip loops.

7.4.4 Wire insulation shall be maintained to within 1/8 inch of clamp type terminals or box type connectors.

7.4.5 Not more than two wires shall be installed to one screw terminal or terminal block connection.

7.4.6 Electrical wiring terminating in terminal blocks provided with mechanical clamp connectors shall not be lugged. All other electrical wiring terminations shall be with crimp type compression connectors and lugs. Split bolt connectors and wire nuts shall not be used.

7.4.7 Field wire connections to electrical devices providing screws for electrical terminal connections shall be made using T&B nylon insulated Sta-Kon or Burndy nylon hylugs.

7.4.8 Only crimp compression type connectors and lugs shall be used. Crimp type compression connectors shall be crimped with the proper tool using the connector manufacturer's recommended die size.

7.4.9 Splices and terminations shall be made in accordance with the details shown on the drawings. If no details are shown, the manufacturer's instructions shall be used.

7.4.10 Shielded power cable shall have a continuous shield through all splices and shall be grounded to the equipment ground at each splice and termination point unless otherwise specified.

7.4.11 Continuity and identification of all circuits shall be checked by the Contractor.

7.5 Grounding

7.5.1 All installed equipment and metallic structures shall be grounded to the equipment ground system in accordance with Dow Engineering Practice T7C-0101, unless otherwise specified on the drawings.

7.5.2 Equipment grounds shall not be connected to the instrument or computer ground system, nor shall instrument or computer grounds be connected to the equipment ground system.

7.5.3 All galvanized rigid steel and plastic coated rigid steel conduits, either entering cable trays or located underground, shall be grounded in accordance with Dow Engineering Practice T7C-0101.

7.5.4 All galvanized rigid steel and plastic coated rigid steel conduits entering a non-metallic junction box shall be grounded together and connected to the back plate with a ground wire, sized in according to Dow Engineering Practice T7C-0102-02 for all cases unless otherwise specified on the drawings.

7.6 Cable Trays

7.6.1 The cable tray system shall be in accordance with Dow Engineering Practice T7D-0303.

7.7 Conduit

7.7.1 For nonhazardous areas, plastic coated rigid conduit and enclosures shall be installed in accordance with Dow Engineering Practice T7C-0304, unless otherwise noted herein or on the drawings.

7.7.2 Electrical metallic tubing (EMT) shall be installed in accordance with Dow Engineering Practice T7C-0306. EMT shall be used only for indoor lighting and receptacle circuits.

7.7.3 Flexible conduit and fittings shall be non-metallic type such as Carlon Carflex.

7.7.4 Conduit bushings shall be installed for each conduit entering cable trays, junction boxes, or equipment.

7.7.5 The Contractor shall provide insulated conduit bushings or T&B Insuliners for each conduit one inch or larger entering cable trays, junction boxes, or equipment.

7.8 Motor Control, Switchgear, And Power Panels

7.8.1 Installation of 480 volt motor control centers shall be in accordance with Dow Engineering Practice T7C-0716.

7.8.2 All bus bar connection joints and splices shall be torqued in accordance with Dow Engineering Practice T7C-0471-01.

7.8.3 After cables are installed in a power panel, the Contractor shall legibly fill in the branch circuit directory card inside the panel door.

7.8.4 Testing of Equipment

7.8.4.1 All electrical testing shall be done by Dow.

7.8.4.2 All electrical equipment and cable shall be tested and/or checked prior to energizing.

7.8.4.3 All failures during testing due to poor workmanship by the Contractor shall be corrected by the Contractor, at his own expense. The Contractor shall have the respective vendors correct any defective Contractor-furnished materials. Notice of such failures shall be furnished to the Owner's Representative.

7.8.4.4 Results of all tests shall be furnished to the Owner's Representative.

ST0406876

LWW/CRG

M102-33324

PAGE 25

12/11/89

ST0406876