

PLAINTIFF'S
EXHIBIT

ARO-233

BASIC OXYGEN SHOP
SPECIFICATION No. 7128(3-20)

MISCELLANEOUS STRUCTURES

FOR

MIDDLETOWN WORKS EXPANSION PROGRAM
ARMCO STEEL CORPORATION
MIDDLETOWN, OHIO

PROJECT No. 7128

APPROVED FOR
CONSTRUCTION

J. L. Wagner DATE 9-24-68

KAISER ENGINEERS, INC.
MIDDLETOWN, OHIO

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BASIC OXYGEN SHOP
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SECTION 1. - CONCRETE

1.1 SCOPE

- 1.1.1 The Work covered by this Section shall include all labor, supervision, tools and equipment required to construct cast-in-place concrete roof decks and equipment bases as shown on the drawings.
- 1.1.2 It is the intent of this Section to secure dense, well-cured concrete structures of the dimensions shown on the drawings. Any deviation resulting in unsatisfactory Work will be the responsibility of the Sub-Contractor, and all defective concrete shall be removed and replaced at the Sub-Contractor's expense.

1.2 GENERAL REQUIREMENTS

All concrete Work shall conform to the requirements of the "Concrete Manual, Project 7100, May 1965" as amended, and modified herein, published by the Armco Steel Corporation, Middletown, Ohio. The concrete shall be Class 4-M (Coarse Aggregate - 3/4" Maximum), (3000 PSI at 28 days) using Type II Portland Cement.

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SECTION 2. - MASONRY-CONCRETE BLOCK

2.1 SCOPE

- 2.1.1 The Work covered by this Section shall include all labor, materials, and equipment required to furnish and install the plain and glazed concrete masonry wall units as shown on the drawings and specified herein.
- 2.1.2 The Work shall be coordinated with that of other trades, and includes responsibility for making certain all built-in items such as dowels, anchor bolts, door frames, piping, plumbing, conduit, and outlet boxes are installed as the masonry work progresses.

2.2 CODES AND STANDARDS

The current issue of the following specifications, standards, and codes are hereby made a part of this Specification:

- 2.2.1 American Standard Building Code Requirements for Masonry (ASA).
- 2.2.2 National Concrete Masonry Association (NCMA).
- 2.2.3 American Society for Testing and Materials (ASTM).
- 2.2.4 Portland Cement Association.

2.3 MATERIALS

- 2.3.1 Plain Concrete Masonry Units - Solid load-bearing units and hollow load-bearing units shall conform to the latest revisions of ASTM Designations C-145 and C-90, respectively. All block in walls shall conform to Grade U-I of the ASTM Standard. All faces of block to be painted shall have a smooth surface.
- 2.3.2 Glazed Concrete Masonry Units - Glazed concrete masonry units shall conform to the requirements of ASTM Designation C-90 for hollow load-bearing units, and ASTM Designation C-129 for hollow non-load-bearing units. Special units implicit in the layout of the installation shall be furnished by Sub-Contractor; bullnose type units at external corners, base units with cover; caps for sill, etc. Sub-Contractor shall install special shapes where necessary. Units shall be "Spectra-Glaze" or approved equal. Facing material shall conform to ASTM Specification C-126, Grade G and shall have a flame spread index as indicated by test according to ASTM E-84-61. The facing shall return over ends and edges of the block, forming a lip at least 1/16" thick, resulting in a 1/4" exposed mortar joint. When tested for abrasion the facing shall have a wear factor not in excess of 130, as per Method 61.92 of Federal Standard 141, using a standard Taber Abraser Model with CS-17 calibrase wheel and a 1000 gram weight for 500 cycles. The glazed surface shall be free from chips, cracks, pinholes, and other imperfections, when viewed at 5 feet at a right angle.

- 2.3.3 Concrete - Concrete for filling hollow block serving a bearing function, and for other purposes incidental to the Work shall be 3000 PSI with 3/4" maximum coarse aggregate. Cement for concrete shall be in accordance with ASTM C-150 Type I or Type II and aggregate shall be in accordance with ASTM C-33, Size 67.
- 2.3.4 Masonry Cement - Masonry cement shall conform to ASTM Designation C-91.
- 2.3.5 Aggregate - Sand for masonry mortar shall conform to ASTM Designation C-114, except that sand for mortar in 1/4" wide joints shall pass a No. 16 sieve. Sand shall be light in color for mortar joints in walls designated to be light in color.
- 2.3.6 Water - Water for masonry mortar shall be clean and free from injurious amounts of oils, acids, alkalis, organic materials, and other deleterious substances.
- 2.3.7 Wire Cloth - Wire or hardware cloth, for retaining concrete in voids of block to be filled, shall be galvanized and the unit weight shall conform to normal trade practices.
- 2.3.8 Mortar - Masonry mortar shall conform to ASTM Designation C-270 Type N. A water repellent admixture shall be added to the mortar used in the toilet areas. Mixture shall be in accordance with manufacturer's instructions.
- 2.3.9 Joint Reinforcement - Steel reinforcement for use in horizontal bed joints of concrete masonry units shall be fabricated type formed of galvanized steel grids or trusses, with 3/16" deformed steel side rods and 9 gage cross rods, conforming to ASTM Designation A-82.
- 2.3.10 Anchors and Ties - Anchors and ties shall be of zinc coated steel. Except for steel wire, zinc coating shall conform to ASTM Designation A-153. Steel wire shall be zinc coated in accordance with ASTM Designation A-116 for Class 2 coating. The type, extent and location of anchors and ties shall be as indicated on the drawings, and as hereinafter specified.
- 2.3.11 Caulking - Caulking material shall conform to Federal Specification No. TT-C-598, Grade 1.
- 2.3.12 Sealant - Sealant shall be a single component Thiokol-based polysulfide compound, conforming to the applicable portions of American Standard A-116.1, in natural color.

2.4 SAMPLE MATERIALS AND PANELS

- 2.4.1 Samples of Materials - Prior to the installation, Sub-Contractor shall submit to the Contractor for approval two (2) samples each of steel reinforcement for masonry joints; metal anchors, ties and wire; caulking compound and sealant; and five (5) individual samples showing the extreme variations in each color and texture of glazed concrete masonry units. Sample for unglazed concrete masonry units shall not be required.
- 2.4.2 Sample Wall Panels - Before the installation of any masonry materials, erect at the job site a sample wall panel 8'-0" long by 5'-0" high of the glazed concrete masonry units. Panel shall show the proposed color range, texture, bond, mortar joints, and workmanship of masonry materials. No work shall be done until the Contractor has approved the sample panel of the work involved. The approved panel shall become the standard of comparison for all masonry work, and shall not be altered, moved, or destroyed until the Work is complete.

2.5 INSTALLATION

2.5.1 Precautions and General Requirements -

- (1) Freezing Weather - Do not lay masonry when the temperature of the outside air is below 40°F, or is likely to fall below 40°F, in a twenty-four (24) hour period after laying unless suitable means are provided to heat and maintain the temperature of the masonry materials and protect the completed work from freezing. Protection shall consist of heating and maintaining the temperature of the masonry materials to at least 40°F, maintaining this minimum temperature on both sides of the masonry for at least forty-eight (48) hours. Anti-freeze ingredient may be used in the mortar providing analysis of mixture is given to Contractor for approval prior to use.
- (2) Protection of Work - During erection, all walls shall be kept dry by covering at the end of each day or shutdown period with a strong, waterproof membrane. Partially completed walls not being worked on shall be similarly protected at all times. All covering shall overhang at least two (2) feet on each side of the wall and be securely anchored. When work is resumed, clean top surface of all loose mortar. Protect facing material against staining or damage from other trades.

- 2.5.2 Workmanship - All masonry walls shall be true and plumb and built to the dimensions shown on the drawings. The walls shall be laid in straight, uniform courses. Construction shall be stack bond. Where interior concrete masonry partitions meet other interior partitions or exterior walls, a firm bond shall be provided with approved metal ties.

- 2.5.3 Mortar Joints - Mortar joints shall be 3/8" thick or the equivalent of two (2) courses plus two (2) joints equals 16". Full mortar coverage shall be used on vertical and horizontal face shells. Vertical joints shall be shoved tight. Mortar joints shall be struck off flush with wall surface and when partially set shall be compressed with a rounded tool.
- 2.5.4 Mixing Mortar - All cementitious materials and aggregate shall be mixed for a minimum of five (5) minutes in a mechanical batch mixer. All mortar shall be used within 2-1/2 hours of initial mixing and shall not be used after it has begun to set. If the mortar begins to stiffen from evaporation or absorption of a part of the mixing water within 2-1/2 hours time limit, the mortar shall be retempered by adding water and remixed. Mortar that has started to set shall not be used.
- 2.5.5 Caulking - Where finished or embedded items are built into the masonry and caulking is required, the surfaces to receive caulking shall be dry and thoroughly cleaned of all loose particles, dirt, dust, oil, grease, and foreign matter. Where openings around embedded items are greater than 3/4" deep, they shall first be filled with an approved type of joint filler or be firmly packed with untarred oakum. Joints shall be neatly tooled.
- 2.5.6 Sealant - Install sealant according to manufacturer's directions at joints abutting exterior door frames, and other locations as dictated by location of masonry and function of room.
- 2.5.7 Pointing and Cleaning -
- (1) Pointing - Point all holes in exposed masonry. Cut out defective joints and repoint them.
- (2) Clean-Up - At the conclusion of masonry work, the walls shall be cleaned with a masonry cleaning compound, recommended by the manufacturer; all scaffolding and equipment used in the Work shall be removed from the premises, together with all debris, refuse, and surplus material.

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SECTION 3. - REFRACTORY

3.1 SCOPE

- 3.1.1 The Work covered by this Section shall include all labor, materials, and equipment required to install the refractory (firebrick) wall as shown on the drawings and specified herein.
- 3.1.2 The Sub-Contractor shall furnish the mortar materials, anchors and ties required for the installation of the wall.

3.2 MATERIALS

- 3.2.1 Refractory (Firebrick) - Firebrick will be 9" ladle brick.
- 3.2.2 Mortar - Mortar shall be a dry, air-setting type which can develop a strong bond at atmospheric temperatures.
- 3.2.3 Water - Water shall be clean and free from injurious amounts of oils, acids, alkalis, organic materials, and other deleterious substances.
- 3.2.4 Anchors and Ties - Anchors and ties shall be of zinc coated steel. Except for steel wire, zinc coating shall conform to ASTM A-153. Steel wire shall be zinc coated in accordance with ASTM A-116 for Class 2 coating.

3.3 INSTALLATION

- 3.3.1 Precautions and General Requirements - The precautions and general requirements specified in SECTION 2. - MASONRY-CONCRETE BLOCK shall apply to the installation of the refractory wall.
- 3.3.2 Workmanship - The refractory wall shall be true, plumb and built to the dimensions shown on the drawings. The wall shall be laid in straight, uniform courses and anchored and tied to the vertical joints of the concrete block wall forming a firm bond.
- 3.3.3 Mortar Joints - Full mortar coverage shall be used on all but the exposed face of the wall. Mortar joints shall be struck off flush with the wall surface and when partially set compressed with a rounded tool.
- 3.3.4 Pointing and Cleaning - The pointing and cleaning requirements specified in SECTION 2. - MASONRY-CONCRETE BLOCK shall apply to the installation of the refractory wall.

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SECTION 4. - METAL BUILDINGS, SIDING AND ROOFING

4.1 SCOPE

4.1.1 The Work covered by this Section shall include all labor and materials required to install complete the metal buildings, siding, roofing and related Work, as shown on the drawings and specified herein.

4.1.2 The Work shall include the following:

(1) Install one (1) Armco building, Type S-2C, complete with "Steelox" ceiling, insulated metal liner panels, gutters and downspouts, aluminized roof panels, and painted sculptured wall panels (Grease Storage Building).

(2) Install three (3) Armco buildings, Type LS-1C, complete with "Steelox" ceiling, insulated metal liner panels, aluminized roof panels and painted sculptured wall panels (Motor Control Center Building, Toilet Enclosure No. 2, and Scale House).

(3) Install one (1) Armco building, modified Type LS-1C with frame, complete with "Steelox" ceiling, insulated metal liner panels, aluminized roof panels, and painted sculptured wall panels (Maintenance Office Complex).

(4) Install one (1) Armco building, Type LS-2C, complete with insulated metal liner panels, aluminized roof panels, painted sculptured wall panels, and standard window frame (Pit Foreman Office Complex).

(5) Install one (1) Armco building, Type S-2, complete with "Steelox" ceiling, insulated metal liner panels, gutters and downspouts, aluminized roof panels, painted sculptured wall panels, gable louvers, and standard window frames (Yard Worker's Lunch Room).

(6) Install Type "A" 20 gage metal roof deck with required cants and sump pans (under built-up roofing), flat "Steelox" panels and painted sculptured wall panels for the Furnace Control Pulpit, Mechanical Room and Toilet Room No. 6, with the following exception. The wall panels for the south and east walls of the pulpit, the soffit under the pulpit, and the entire walkway will be furnished and installed by Others.

(7) Install flat "Steelox" roof panels, roof joists complete with angle bridging, and monorail for the Booster Pump Enclosure.

(8) Install Armco 18 gage concrete form decking for Air Locks. Sub-Contractor shall furnish and install miscellaneous steel plates and steel angles for constructing dams and for support, where necessary, at ends of concrete forms.

METAL BUILDINGS, SIDING AND ROOFING

(9) Perform all field cutting and drilling of structural framing and necessary openings in panels required for the erection of the Work specified herein.

(10) Coordination with Work by other trades, including the responsibility for ascertaining that all built-in items scheduled to be installed are actually installed as the Work progresses.

4.2 MATERIALS

4.2.1 The materials furnished by the Owner will be delivered to the point of erection. All materials will be new, free from defects and imperfections, completely fabricated, knocked down for shipping and crated. The following will also be furnished by Owner:

(1) All necessary fasteners to attach the items furnished by the Owner. This includes self-tapping, stainless steel sheet metal screws, and required machine bolts, nuts, and tap bolts.

(2) All flashing materials which are in integral part of the wall construction, including the wall caps. Flashing will be of galvanized sheet metal.

(3) Butyl sealant for the vertical ribs.

4.2.2 Sub-Contractor shall furnish and install all caulking material where indicated on the drawings. Caulking shall be "Thiokol" type polysulphide, "Mono-lasto-meric".

4.3 ERECTION PROCEDURES

4.3.1 General - The Sub-Contractor shall receive, unload, protect for storage, unpack, prepare for erection, and erect the metal buildings, siding and roof components.

4.3.2 Inspection of Work by Others - Before proceeding with the Work, the Sub-Contractor shall carefully inspect all Work completed by Others, particularly the foundation walls and the structural steel frame, including girts. If any condition or aspect of workmanship is deemed unsuitable for the installation of the Work specified herein, the Contractor shall be notified immediately. In the absence of such notification, it shall be understood that all Work by Others has been properly installed.

METAL BUILDINGS, SIDING AND ROOFING

- 4.3.3 Side Walls and Roof - Walls and roof shall be constructed entirely of "Armco" components, complete with exterior and interior panels, roof panels, base channels, fasteners, clips, fillers, lintels, trim and flashing. The entire construction shall be water-tight. The interlocking ribs of wall panels, 16" o.c., shall be fastened at the base, at eave and/or rake, and to each intermediate girt by means of a positive bolt and nut. Through-wall fastenings shall not be permitted.
- 4.3.4 Flashing - At joints and openings where the demands for weather-tightness compel the installation of metal flashing, not otherwise indicated on the drawings, the Sub-Contractor shall fabricate such galvanized flashing as may be required, and install it into the Work.
- 4.3.5 Type A Steel Roof Deck - Roof deck shall be laid with flat plate or wide flutings at right angles to the purlins with end joints over purlins, and shall be arc-welded to each purlin at alternate flutes or ribs by plug welding, or with 1/8" x 1/2" fillet weld on both sides of ribs at each purlin. Edges and ends of sheets shall be tack-welded together on 12" centers. End joints of adjacent sheets shall be staggered where practical. Where the form of the side joint between sheets makes it impractical to tack-weld, a tight mechanical crimp may be substituted except at points of support where both sheets shall be welded to the support. Welding shall conform to "Standard Code for Arc and Gas Welding in Building Construction" (latest edition), published by the American Welding Society. All weld spots shall be touched up with a rust-inhibiting paint on the exposed surfaces of the decking, equivalent in quality to the manufacturer's standard primer.
- 4.3.6 Concrete Form Decking - Form decking shall be installed and welded in accordance with the drawings. Welding procedure shall conform to methods described in Item 4.3.5, above. Plug welds shall be as specified by the American Iron and Steel Institute's "Specification for the Design of Light Gage Cold Formed Steel Structural Members", Section 4.2.1.
- 4.3.7 Miscellaneous Steel Items - Cant plates shall be welded to steel decking and structural framing as indicated. Steel dams and angles for concrete forms shall be welded or bolted, as necessary. Flanges of sump pans shall be securely welded to roof deck to properly reinforce the opening. Opening to receive sump shall be field cut.
- 4.3.8 Instructions - All erection shall proceed in strict accordance with the manufacturer's printed instructions.

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SECTION 5. - BUILT-UP ROOFING AND INSULATION

5.1 SCOPE

- 5.1.1 The Work covered by this Section shall include all labor and materials required to furnish and install the composition roofing and roofer's base flashing over a vapor barrier and rigid insulation to complete the built-up roofing, all as shown on the drawings and specified herein.
- 5.1.2 The principal items of Work shall consist of the following:
- (1) A 2-ply asphalt roof with slag aggregate, comparable to Specification No. 402 published by The Philip Carey Mfg. Co., or approved equal, listed Class "A" by Underwriters' Laboratories.
 - (2) Roofer's base flashing.
 - (3) Insulation and vapor barrier conforming to the requirements for a Factory Mutual Class 1 roof.
 - (4) All Work shall be coordinated with separate trades to make certain that wood nailers and other built-in items are in place as the installation progresses.
 - (5) The completed roof shall meet all requirements for a twenty (20) year roof guarantee bond, and the Sub-Contractor shall be prepared to furnish such a bond, should the Owner decide to purchase it.

5.2 SAMPLES

- 5.2.1 The Sub-Contractor shall submit samples in duplicate of the following materials to the Contractor for approval. Approval shall be obtained prior to delivery of fabrication.
- (1) Non-flammable adhesive for vapor barrier.
 - (2) Vapor barrier sheet, at least 12" x 12".
 - (3) Fibrous glass insulation, at least 12" x 12".
 - (4) Insulation joint tape, at least 6" x 24".
 - (5) No. 40 double-coated organic felt.
 - (6) 90% mineral surfacing (for base flashing)
 - (7) Slag.

5.3 MATERIALS

- 5.3.1 Roofing materials shall be delivered to the site in the original, sealed packages or containers of the manufacturer, and shall be labeled with his name and brand. Rolled roofing materials shall be wound tightly with ends of rolls adequately protected and labeled to indicate grade, weight, area of roll and type of saturant.
- 5.3.2 The vapor barrier shall consist of one (1) ply of a vapor barrier sheet applied with an adhesive compounded by the manufacturer of the sheet. The vapor barrier system shall meet all requirements for Underwriters' Laboratories "Construction No. 1", and Factory Mutual Laboratories "Class 1" rating for application over steel decks in conjunction with fibrous glass insulation.
- 5.3.3 Fibrous glass insulation shall be applied over the entire vapor barrier. Insulation shall be 1-1/2" thick for all roof decks, with square edges, and in sizes of approximately 3' x 4'. It shall conform to Federal Specification HH-I-00526b, (GSA-FSS). The material shall have a density of 12 pounds per cubic foot, be covered on one side with glass reinforced asphalt at the rate of 40 pounds per square, and also be covered on the same side and around all edges with a heavy kraft paper.
- 5.3.4 Adhesive for applying the insulation and the vapor barrier shall conform to Factory Mutual "Class 1" requirements as to type, method of application, and quantity required.
- 5.3.5 Insulation joint tape shall consist of two layers of kraft paper bonded together and reinforced in both directions by glass fiber (Owens-Corning Roof Tape or equal).
- 5.3.6 Asphalt primer shall conform to ASTM D 41-41.
- 5.3.7 Steep asphalt shall conform to ASTM D 312-64, Type III.
- 5.3.8 Coal tar pitch shall conform to ASTM D 450-41, Type A.
- 5.3.9 Organic felt shall be Philip Carey's double-coated, No. 40, or approved equal.
- 5.3.10 Asphalt-saturated felt shall conform to ASTM D 226-60, 15 lbs. perforated.
- 5.3.11 Mineral surfaced base flashing shall conform to ASTM D 249-60.
- 5.3.12 Aggregate shall be crushed, hard, blast furnace slag, and shall be clean, dry and free from sand, dirt, clay or other substances, with 100% passing a 3/4" mesh and 100% retained on a 1/4" mesh.

5.4 PROPER SURFACES

- 5.4.1 Prior to starting Work, the Sub-Contractor shall inspect all surfaces over which vapor barrier, insulation, and roofing are to be installed. The roof deck shall be reasonably smooth and free from projections which might puncture the membranes or holes through which bitumens might drop. All defects shall be reported to the Contractor in writing. Failure to report any defects before commencing the Work shall be considered an acceptance of the surface as satisfactory.
- 5.4.2 In addition to the foregoing, the Sub-Contractor shall make certain that the surface is thoroughly clean, dry, and free from all defects that might affect the application, before performing the Work.

5.5 INSTALLATION OF VAPOR BARRIER SYSTEM

- 5.5.1 The adhesive for the vapor barrier sheets shall be applied directly to the metal roof deck in strips at the rate of 0.25 - 0.40 gallons per square, in strict accordance with the manufacturer's printed instructions.
- 5.5.2 The vapor barrier sheets shall be carefully applied and completely sealed to the deck with all wrinkles smoothed out. All laps shall be thoroughly sealed with adhesive. Side lap shall be 2"; the end lap, 6". Where roof meets vertical surfaces, 6" of the sheet shall be left exposed.

5.6 INSTALLATION OF RIGID INSULATION

- 5.6.1 General - Insulation shall be completely protected while in storage and during application to keep it dry at all times. Installed insulation shall not be left exposed to the weather. It shall be covered and water-proofed at once. Installed insulation which has become wet shall be removed and replaced with dry material. Protect insulation from damage due to construction operations. Only as much insulation shall be laid as can be covered by roofing the same day. Water cut-offs shall be applied to seal off the insulation at the end of a day's work or other interruption. Cut-offs shall be removed before further insulation is installed.
- 5.6.2 Rigid insulation shall be applied over vapor barrier by means of adhesive at the rate of 0.7 gallons per square. The adhesive shall be applied in ribbons 6" apart, approximately 1/4" in width, and parallel to flutes. Immediately thereafter, embed the roof insulation board, making sure it is pressed down firmly. All insulation joints shall be continuous in both directions. All joints in the insulation shall be made on the bearing surface between flutes.

BUILT-UP ROOFING AND INSULATION

- 5.6.3 Lay all insulation with joints in moderate contact. All insulation joints shall be sealed by 6" wide tape. Insulation joint tape shall be centered over all insulation joints and edges, and embedded in hot steep asphalt applied at the rate of 15-20# per 100 square feet of tape. End laps shall be 4".

5.7 INSTALLATION OF BUILT-UP ROOFING

- 5.7.1 Roofing shall consist of two (2) double coated organic felts. All felts shall be laid without buckles or wrinkles. Felts over moppings shall be rolled over the mopping, not placed.
- 5.7.2 Coated felt shall be attached to insulation with a 40 lb. application of steep asphalt, solid mopped. Approximately 40 lbs. of steep asphalt shall be applied between plies, with a 65 lb. flood coat of coal tar pitch over the last ply, into which 300 lbs. of slag per 100 square feet shall be embedded. Asphalt shall not be applied below 400°F, nor heated above 475°F.
- 5.7.3 Built-up roofing shall be applied over insulation in accordance with Specification Diagram "D" in the Philip Carey Mfg. Co. catalog for January, 1968, excluding red rosin paper and "Feltex". The manufacturer's approved bitumen may be substituted for coal tar pitch.

5.8 INSTALLATION OF BASE FLASHING

- 5.8.1 The flashing shall be installed before the slag is applied to the roofing.
- 5.8.2 All plies of the roof shall be carried to the top of the cant block and cemented in place.
- 5.8.3 Where metal counter flashing is shown, prime the vertical surface from under the top of the counter-flashing down to the top of the cant block with asphalt primer and permit to dry.
- 5.8.4 Apply four (4) plies of perforated felt with hot steep asphalt or flashing cement allowing each ply to extend onto the roofing 2" beyond the ply beneath.
- 5.8.5 Over the preceding construction apply one ply of 90 lb. of mineral surfaced roofing with flashing cement.
- 5.8.6 Apply a 6" wide strip of 15# saturated felt set in hot steep asphalt to seal the edge of the mineral surfaced roofing.

BUILT-UP ROOFING AND INSULATION

5.8.7 All plies must be anchored by nailing into the nailing strips provided or by other methods approved by the Contractor.

5.9 GUARANTEE OF ROOFING

The Sub-Contractor for roofing shall furnish a written guarantee covering roofing and base flashing for a period of two (2) years, during which time any defects shall be repaired by him without expense to the Owner.

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SECTION 6. - METAL DOORS AND FRAMES

6.1 SCOPE

The Work covered by this Section shall include all labor and materials required to install all metal doors and frames as shown on the drawings, door schedules and specified herein.

6.2 STEEL DOORS AND FRAMES

- 6.2.1 Doors will be full flush as manufactured by the Steelcraft Manufacturing Company, or approved equal.
- 6.2.2 All door leaves, frames, astragals, and louvers where specified will be made from Armco ZINGRIP - PAINTGRIP Steel, bonderized and given a baked-on prime coat of paint, shop applied.
- 6.2.3 All door leaves will be provided with 3/16" thick steel hinge reinforcements and a 16 gage steel integral lock box securely welded to the faces. These reinforcements shall be drilled and tapped, by Sub-Contractor, to receive the finished hardware from templates furnished by Hardware Manufacturer.
- 6.2.4 Frames will be shipped knocked-down for field assembly by Sub-Contractor. The hinge jamb shall be mortised for hinges from templates furnished by Hardware Manufacturer. The strike jamb will be provided with a door strike protected by a dust guard and factory-applied rubber bumpers. All door frames will be provided with adequate wall anchors for the jambs and heads and rubber door bumpers.
- 6.2.5 Doors will be supplied with panels for glazing. Glass and glazing shall be as shown on the drawings and as specified in SECTION 7. - GLASS AND GLAZING.
- 6.2.6 Louvers for the lower portion of the doors will be supplied with doors.
- 6.2.7 Hardware shall be as specified under SECTION 8. - HARDWARE.

6.3 INSTALLATION

Frames shall be set plumb, square, level, and in alignment, and securely anchored in accordance with manufacturer's directions and approved shop drawings. Metal-to-metal joints between frame members shall be caulked and excess material removed. Caulking of joints between metal and masonry or concrete is included under SECTION 14. - CAULKING. Doors shall be accurately hung with proper clearances, and the hardware specified shall be installed. Hardware shall be adjusted after erection and glazing.

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SECTION 7. - GLASS AND GLAZING

7.1 SCOPE

The Work covered by this Section shall include all labor and materials required to furnish and install all glass for doors, windows, and pulpit as indicated on the drawings, door schedules and specified herein.

7.2 MATERIALS

7.2.1 Glass - Glass shall conform to Federal Specification DD-G-451a and shall be flat type as follows:

- (1) Clear Tempered Plate Glass - Clear tempered plate glass shall be 1/4" thick, glazing quality.
- (2) Grey Tempered Plate Glass - Grey tempered plate glass shall be 1/4" thick, glazing quality.
- (3) Polished Wire Glass - Polished wire glass shall be 1/4" thick, flat rolled glass, glazing quality with diamond pattern wire.

7.2.2 Glazing Compound - Glazing compound shall conform to Federal Specification TT-P-781a.

7.3 GLAZING

7.3.1 Glass shall not be installed in doors until doors are hung in place. All doors shall remain fixed in place until glazing compound has set.

7.3.2 Glazing compound shall not be applied to damp, dirty or icy surfaces, in temperatures below 40°F, or damp and rainy weather. All metal surfaces shall be primed prior to glazing.

7.3.3 Glass set in metal stops shall be installed so that an even and full coating of glazing compound occurs between the glass and frame, and between the glass and the stops. Metal stops shall be set and all excess glazing compound removed.

7.4 GENERAL

7.4.1 Sizes - Actual sizes of glass shall be determined by measuring the frames to receive the glass.

7.4.2 Transportation, Storage, and Responsibility - All glass shall be delivered in standard protective packages and stored in a safe location until installed. All breakage of stored glass and glass being transported shall be the responsibility of the Sub-Contractor.

GLASS AND GLAZING

- 7.4.3 Protection - All glass shall be factory labeled on each pane and labels shall not be removed until final approval by Contractor. Large sheets of glass shall be conspicuously marked with cemented paper strips to visibly indicate the glass.

7.5 WORKMANSHIP

All glass shall be of accurate size and set in place in a firm and secure manner; glass shall not rattle. The glazing operation shall provide a complete weather-tight, waterproof seal around the glass. Surfaces around the glass shall not be scratched, stained, or otherwise damaged in any manner.

7.6 CLEANING AND REPLACEMENT

Both sides of all glass, walls, floors, and other surfaces shall be cleaned of all glazing compound droppings or other blemishes resulting from the glazing. After approval of the glazing any labels, paint smears, and other spots shall be removed from the glass and the glass washed clean. Damaged, broken, or improperly glazed glass shall be removed and replaced by the Sub-Contractor at no additional cost to the Contractor.

* * * * *

SECTION 8. - HARDWARE

8.1 SCOPE

The Work covered by this Section shall include all labor and materials required to install finish door hardware, all as indicated on the drawings and specified herein.

8.2 CODES AND STANDARDS

The current issue of the following codes and standards, where applicable, are hereby made a part of this Specification:

8.2.1 Federal Specifications -

- | | |
|-----------------------|-----------|
| (1) Locks and Latches | FF-H-106A |
| (2) Bolting Devices | FF-H-111A |
| (3) Hinges | FF-H-116C |
| (4) Door Closers | FF-H-121C |

8.2.2 Underwriters' Laboratories, Inc.

8.2.3 Steel Door Institute

8.2.4 Commercial Standards

8.3 GENERAL REQUIREMENTS

8.3.1 Door Schedule - Hardware Sets - The door schedule shown on the drawing lists the various classes of doors and the combination of finish hardware items required for each. Each door shall be fitted with principal items of hardware as listed under the set numbers.

8.3.2 Template Hardware - Except as otherwise approved by the Contractor, all hardware applied to metal doors or jambs shall be made to template and secured by machine screws. Reinforcing units will be furnished for hollow metal doors where cylindrical locks are specified.

8.3.3 Fastenings - Finish hardware will be furnished with all necessary screws, bolts, or other fastenings of suitable size and type to anchor the hardware in position.

8.4 DESCRIPTION OF HARDWARE ITEMS FURNISHED

Item 1. Latch, Heavy-Duty, Anti-Friction, Full Mortised. Latch bolt operated by key from outside at all times, and by knobs from either side except when outside knob is locked by stop in face. Corbin 840-7531, Sargent-GA-77-05, or Yale-BR-8656.

HARDWARE

- Item 2. Latch, Heavy-Duty, Anti-Friction, Full Mortised. Latch bolt operated by knob from either side at all times. Corbin 840-7510, Sargent-GA-77-15, or Yale-BR-8000.
- Item 4. Exit Fixture, Heavy-Duty, Rim-Type. Latch bolt operated by key from outside except when knob is deadlocked from inside by master key. Corbin 3727x27x840, Sargent 9804-878-32D, or Yale 10AC-PM810.
- Item 13. Hinges, Full Mortise, ball-bearing, extra heavy, wrought steel, bonderized and prime-coated - 4-1/2" x 4-1/2". Stanley FBB 168 or Hager SLBB 1168.
- Item 14. Hinges, Full Mortise, ball-bearing, extra-heavy, wrought stainless steel, satin finish - 4-1/2" x 4-1/2". Stanley FBB - 199 STSD or Hager SLBB 1199 US32D.
- Item 28. Size D Door Closer)
Item 30. Size F Door Closer) 90° to 135° hold-open arm, prime
Norton "Regular" or LCN "Traditional"
- Item 35. Size F Door Closer - 90° to 180° parallel hold-open arm
Norton "Regular" or LCN "Traditional"
- Item 42. Door Stops -
 With Threshold - Corbin 373-12 US32
 Without Threshold - Corbin 384-12 US32
 Exterior - Corbin 363-12 US32
- Item 44. Thresholds -
 Interior - Wooster Ferrogrit #115
 Exterior - Wooster Ferrogrit #115-S
 Note - Thresholds will be 4" wide unless shown otherwise
 on the drawings.
- Item 45. Kickplates - Corbin - 2318 - 10" high x 4" less than door
width - two (2) per leaf.
- Item 46. Door Bolts -
 Top Glenraven - 1632 - 8"
 Bottom Glenraven - 1631 - 8"

Item 47. Push Plates and Pull Plates -

Push - Corbin - 2342 - 4" x 16" - US32

Pull - Corbin - 4462 - US32

8.5 SPECIAL REQUIREMENTS

8.5.1 All locks will be furnished with interchangeable 7-pin cores, manufactured by "Best Universal Lock Company, Inc." All locks will be furnished with construction cores. Permanent cores and keys will be delivered to the Owner, keyed in accordance with the Owner's masterkey system.

8.5.2 Install three (3) hinges per door leaf unless noted otherwise.

8.6 INSTALLATION

Finish hardware shall be installed on all doors in accordance with the directions of the manufacturers thereof and shall be adjusted, where necessary, to provide easy, accurate, and certain operation of the devices served by the hardware. Doors and hardware showing visible evidence of damage resulting from the work of installation shall be replaced in kind without cost to the Contractor. All bolt and screw heads shall match the finish of the hardware they support.

* * * * *

SECTION 9. - CEILING INSULATION

9.1 SCOPE

The Work covered by this Section shall include all labor and materials required to furnish and install ceiling insulation over suspended ceilings, and wire mesh all as indicated on the drawings and specified herein.

9.2 MATERIALS

The insulation shall be fiberglass, 3 inch batt - 24 inches wide (over suspended ceilings), and 1-1/2 inch blanket (over wire mesh), as manufactured by Owens Corning, or approved equal.

* * * * *

SECTION 10. - SUSPENDED ACOUSTICAL CEILINGS

10.1 SCOPE

The Work covered by this Section shall include all labor and materials required to furnish and install suspended ceilings consisting of acoustical panels and vinyl faced acoustical panels, all as indicated on the drawings and specified herein.

10.2 MATERIALS

- 10.2.1 Acoustical Panels - Mineral fiber lay-in type shall meet the requirements of Federal Specification SS-A-118b, and shall be Class A, incombustible. The material shall also be listed and labeled by Underwriters' Laboratories, Inc., under Hazard Classification for flame spread of 0-25. Material shall have a noise reduction coefficient of not less than .75, and a light reflectance 'a' of over 75%. Panels shall be 24" x 48", 5/8" thick, with square edges, of a color and texture as selected by the Contractor. Panels shall be equal to those manufactured by The Celotex Corporation or The Armstrong Cork Co.
- 10.2.2 Vinyl Film Face Acoustical Panels - Mineral fiber lay-in type shall meet the requirements of Federal Specification SS-A-118b, Class A, incombustible. Material shall have a noise reduction coefficient of .70 and a sound attenuation value of 40 as reported in the Acoustical Materials Association Bulletin. The material shall have a washable vinyl film factory laminated to the exposed surface having a light reflection value of .77. Panels shall be 24" x 48", 3/4" thick, comparable to "Acoustiform Boucle, Pin-Perforated", as manufactured by The Celotex Corporation, or approved equal.
- 10.2.3 Suspension System - The suspension system for supporting the lay-in type panels shall be a T and T system. T runners and T splines shall be heavy-duty type with exposed surfaces finished with factory applied white baked-on enamel.

10.3 INSTALLATION

- 10.3.1 Suspension system shall be installed as shown on the drawings or directed by the manufacturer on approved shop drawings, and shall be leveled before panels are installed.
- 10.3.2 T runners shall be installed on 48" centers by means of wire or steel strap hangers. T splines shall be supported off the T runners on 24" centers. All T runners and T splines shall be straight in alignment and flush at all intersections. A metal edge moulding (same finish as T shapes) shall be installed wherever the suspended grid abuts walls, columns or any other vertical surface.

* * * * *

SECTION 11. - SEAMLESS RESILIENT FLOORING

11.1 SCOPE

The Work covered by this Section shall include all labor and materials required to furnish and install slip-proof seamless resilient flooring and curbs in areas shown on the drawings and specified herein.

11.2 MATERIALS

Seamless covering (two component polyurethane liquid binder) shall be Torginol Interior Duresque" as manufactured by Torginol of America, Inc., Montebello, California or "Poly-Flec" as manufactured by Co-Polymer Chemicals, Inc., Livonia, Michigan. Material for slip-proofing, and the application thereof, shall be as recommended by manufacturer of seamless covering.

11.3 SAMPLE AND COLOR

Sub-Contractor shall submit a 12" by 12" sample of Torginol Duresque 80% "Patio Red" and 20% "Black" or equal for approval by Contractor. Color and finish of installation will be selected by the Contractor.

11.4 GENERAL

11.4.1 Cleaning Subfloors - Sub-Contractor shall clean subfloor of all foreign material, dirt, grease, bond breakers, paint, mortar, and any sealers, hardeners, waxes, and curing compounds.

11.4.2 Subfloor Testing - Sub-Contractor shall perform moisture and adhesion tests to insure satisfaction of subfloor.

11.5 INSTALLATION

11.5.1 Manufacturer's Instructions - All installation, including prime coats, shall be in strict conformance with the instructions of the manufacturer.

11.5.2 Thickness - Seamless covering shall have a minimum of four finish coats of the urethane polymer (after sanding). Minimum thickness of seamless covering shall be 1/16".

11.6 WORKMANSHIP

Finished flooring and curbs shall have an even finish with no defects (holes, scratches, foreign matter, etc.) which may affect the appearance, the amount of wear from the flooring, or the adhesion to the subfloor. All areas such as walls, doors, trim equipment, etc., shall be protected from damage during installation of flooring.

11.7 PROTECTION

After installation, Sub-Contractor shall protect from damage the seamless covering for at least 12 hours and permit only light traffic for 48 hours thereafter. Protection shall consist of signs, ropes, and any other required warnings. Sub-Contractor shall be responsible for damage to finished surfaces due to lack of adequate protection.

11.8 GUARANTEE

Sub-Contractor shall guarantee the Work performed under this Specification against defects in material or workmanship for a period of two years after completion of Work. Sub-Contractor shall guarantee that the covering will perform satisfactorily for the application shown on the drawings.

* * * * *

SECTION 12. - RESILIENT FLOOR TILE

12.1 SCOPE

The Work covered by this Section shall include all labor, materials, and equipment required to furnish and install vinyl asbestos tile as shown on the drawings, including vinyl base.

12.2 MATERIALS

12.2.1 Samples of tile and cove base shall be submitted to the Contractor and must be approved before work is started. Samples shall bear labels stating the color, gage, the location in which they are to be used, and manufacturer's name.

12.2.2 Vinyl asbestos tile shall be first quality material. Tile shall meet the requirements of Federal Specification SS-T-312, Section IV. All tile shall be 9" x 9" x 1/8".

12.2.3 Cove base shall be vinyl, 4" wall height, 1/8" thick, with molded set-on type cove, preformed end stops, internal and external corners. Color of base shall be as indicated on the drawings and/or as approved after submission of samples.

12.2.4 Adhesive and cements shall be as recommended by the manufacturer of the tile.

12.2.5 Crack filler for holes, rough spots, cracks, and expansion joints in concrete subfloors and primer for concrete subfloors shall be as recommended by the manufacturer of the tile.

12.2.6 Metal molding strips shall be of stainless steel.

12.3 INSPECTION

Prior to starting work, the surface of the subfloor upon which the tile is to be laid shall be inspected by the Contractor, and any defects found in the surface shall be corrected by the Sub-Contractor.

12.4 INSTALLATION

12.4.1 General - Resilient tile shall be stored at a minimum temperature of 75°F for at least 24 hours before installation, and the temperature of the materials and room shall be not less than 70°F during installation of the tile. Tile shall lie flat at least one (1) hour before being adhered.

12.4.2 Preparation of Subfloor - The subfloor shall be broom cleaned, thoroughly dry, and free of paint, wax, grease, or oil. Holes, rough spots, cracks or joints in concrete subfloor shall be filled with crack filler. All concrete subfloors shall be primed. Primer shall be thoroughly brushed in at the rate recommended by the manufacturer of the primer. Primer shall be allowed to dry completely before application of adhesive.

RESILIENT FLOOR TILE

12.4.3 Adhesive shall be applied as recommended by the manufacturer.

12.4.4 Tile shall be laid true, level and even. Tile shall be laid from the center of the room to the walls. After it has adhered, the resilient tile shall be rolled in two directions with a roller weighing not less than 150 pounds. Tile shall be fitted to and around all permanent fixtures. Borders, where required shall be fitted accurately.

12.4.5 Exposed edges of tile at door sills, etc., shall be protected with metal molding.

12.4.6 Cove base shall be firmly cemented to the walls and accurately scribed to trim and plinth.

12.5 CLEANING

All flooring shall be thoroughly cleaned of surplus adhesive, plastic mortar and grout. All scraps, packing materials, debris, and other extraneous matter shall be removed.

12.6 ACCEPTANCE

Improper application of the adhesive or imperfect embedment of tile in the adhesive, as evidenced by ridges in the surface, by lack of even and uniform bearing, by loose bond or by curled loose edges, will be cause for rejection. All such defects shall be remedied to the satisfaction of the Contractor prior to acceptance.

* * * * *

SECTION 13. - METAL TOILET COMPARTMENTS

13.1 SCOPE

The Work covered by this Section shall include all labor and materials required to furnish and install all metal toilet compartments including urinal screens. It is the intent of this Specification to include all required appurtenances so as to result in a totally complete installation of metal toilet compartments and screens as shown on the drawings and as specified herein. Furnishing and installing the overhead steel tubes for support of toilet compartments is included in this Section.

13.2 CODES AND STANDARDS

The current issue of the American Iron and Steel Institute (AISI) Standard is hereby made a part of this Specification.

13.3 TYPE MOUNTING

13.3.1 Metal Toilet Compartments - Metal toilet compartments shall be ceiling hung.

13.3.2 Urinal Screens - Urinal screen shall be wall hung.

13.4 MATERIALS

13.4.1 Metal Toilet Compartments --

(1) Partitions and Pilasters - Panel sheets shall be stainless steel having a minimum thickness of 20 gage. Sheets shall conform to AISI Type 430 with Armco "Softone" finish.

(2) Headrails - Headrails shall be 1" x 1-1/2" rectangular shape, lock seamed tubular stainless steel having a minimum thickness of 18 gage.

13.4.2 Urinal Screens - Panel sheets shall be stainless steel having a minimum thickness of 20 gage. Sheets shall conform to AISI Type 430 with Armco "Softone" finish.

13.4.3 Fittings -

(1) The device for attaching compartment panels or screens to pilasters or walls shall be heat treated, polished and anodized extruded aluminum alloy stirrup brackets or approved stainless steel brackets.

(2) Each connection of a pilaster to the ceiling or steel tube shall be concealed with a one (1) piece, 3" high, polished Type 302 stainless steel vandalproof trim shoe.

METAL TOILET COMPARTMENTS

13.4.4 Door Hardware - All door hardware shall be as manufactured by the Milwaukee-Ferrometal Stamping Corporation for ceiling hung compartments, or approved equal. Doors shall be provided with concealed gravity hinges adjustable from outside to provide universal rest location. Hinges shall be 18/8 Type 302 stainless steel. Include inset top pivot assembly, latch, strike, keeper, hinge brackets, coat hook and bumper. Latch shall be solid forged brass, chrome, having a solid Type 302 stainless steel slide. Strike and keeper shall be one piece 16 gage Type 302 stainless steel with live rubber. Bumper hook to be solid forged brass, chrome plated with live rubber fastened by means of a ferrule. Coat hook shall be applied with theft-proof screws. Finish of hardware shall be comparable to Armco "Softone".

13.5 CONSTRUCTION

13.5.1 Screen, Pilaster, and Compartment Panels -

- (1) The panels shall be fabricated of two (2) outer stainless steel sheets, assembled over, cemented and directly laminated under pressure to a dense sound-deadening insulation.
- (2) The outer panel sheets shall have preformed edges which shall be electrically welded together around the entire perimeter with welds spaced not over 18" apart.
- (3) After panel sheets have been welded, exposed welds shall be ground smooth and then polished.
- (4) The panel edges shall be securely locked together with a spring tension metal molding which shall be mitered, welded, and finished at all corners.
- (5) Face to Face Panel Thickness -
 - (a) For screens and compartments -- 1"
 - (b) For pilasters -- 1-1/4"

13.6 INSTALLATION

- 13.6.1 All compartments shall be erected so as to form a neat and rigid installation with approved anchoring methods as indicated on the drawings. Screens shall be installed in concrete block walls with approved fasteners.
- 13.6.2 All vertical and horizontal alignments shall be plumb and level.
- 13.6.3 An interval of one (1) inch shall be maintained where edges of panels intersect walls.

METAL TOILET COMPARTMENTS

- 13.6.4 The panels shall be free of warps with all fittings properly adjusted for perfect alignment.
- 13.6.5 Hex bolts and machine screws shall be tamper-proof and of stainless steel. Bolts and screws used to secure to masonry construction shall be cadmium plated. The use of self-tapping sheet metal screws is prohibited.
- 13.6.6 All evidence of drilling, cutting and fitting to room finish shall be concealed in the finished work.
- 13.6.7 All finished surfaces shall be cleaned and left free of imperfections.

* * * * *

SECTION 14. - CAULKING

14.1 SCOPE

The Work covered by this Section shall include all labor, materials, and equipment required to furnish and apply the caulking and sealant compounds as indicated on the drawings, or as required by the conditions of the work during the progress thereof.

14.2 MATERIALS

14.2.1 Caulking - Compound shall conform to Federal Specification TT-C-598b, in color to match adjoining material, and shall be delivered to the building site in the manufacturer's original sealed packages.

12.2.2 Sealant - Compound shall be a silicone type as manufactured by General Electric Corporation or approved equal, in a color to match adjoining material, and shall be delivered to the building site in the manufacturer's original sealed packages.

14.3 SURFACE PREPARATION AND APPLICATION

Joint preparation and application shall be in accordance with manufacturer's recommendation.

* * * * *

SECTION 15. - MISCELLANEOUS ITEMS

15.1 SCOPE

15.1.1 The Work covered by this Section shall include all labor and materials required to furnish and install the miscellaneous items shown on the drawings and specified herein.

15.1.2 The miscellaneous items are as follows:

- (1) Stainless steel mirrors.
- (2) Wall louver.
- (3) Structural wall panels.

15.2 GENERAL

15.2.1 Stainless Steel Mirrors - Mirrors for Toilet Rooms shall be stainless steel having a No. 8 mirror polish finish, with a stainless steel frame, and of the size indicated on the drawings.

15.2.2 Wall Louver - Wall louver in the north wall of the Booster Pump Enclosure shall be heavy duty, stationary type, and fabricated of 16 gage cold rolled steel. Louver shall be bonderized, primed, and receive a dark grey baked-on enamel finish coat of paint. Louver shall have 1/2 inch square mesh 16 gage steel (galvanized after weaving) bird screening.

15.2.3 Structural Wall Panels - Structural wall panels for Pulpit wall shall be 1 inch thick asbestos "Transitop" as manufactured by Johns-Manville. Panels shall have a "Fescore" core with primed "Flexboard" facings.

15.3 INSTALLATION

15.3.1 Stainless steel mirrors and frames shall be attached to concrete masonry with theft-proof anchorage.

15.3.2 Wall louver shall be installed with masonry strap anchors. Bird screening shall be attached to the interior of the louver.

15.3.3 Structural wall panels shall be cut to fit the dimensions of the furnished pressed metal framing units.

* * * * *

SECTION 16. - PAINTING

16.1 SCOPE

The Work covered by this Section shall include all labor, materials, supervision, tools, and equipment required to paint all materials and equipment specified herein.

16.2 GENERAL

The color scheme shall be as selected by the Contractor. Where specified, paint shall conform to Armco Paint Standards. Formulation and manufacturers data sheets attached hereto shall form part of this Specification.

16.3 MATERIALS

All paint shall be delivered to site in manufacturer's unbroken sealed containers. Each container shall be labeled by the manufacturer; labels shall give manufacturers' name, type of paint, label analysis showing all of the important constituents of the paint such as alkyd, titanium, zinc, acrylate esters, etc., color of paint and instructions for reducing. Thinning shall be done only in accordance with directions of manufacturer. Sub-Contractor shall submit to the Contractor, a list of paint (manufacturers) he intends to use, for approval.

16.4 SURFACE PREPARATION

16.4.1 General - Hardware, hardware accessories, machined surfaces, plates, lighting fixtures, and similar items in place but not to be painted shall be removed prior to surface preparation and painting operations or otherwise protected. Following the complete painting of each space, removed items shall be reinstalled. Such removal and reinstallation shall be done by workmen skilled in the trades involved. Particular care shall be taken to remove dirt, dust, oil, grease, rust, scale or any interfering substance from the surface to be painted. No surface shall be prepared that cannot be painted the same day.

(1) Dirt and Dust - Dirt and dust shall be removed by hand, by vacuum, bristle brush or by washing with detergent and water.

(2) Previously Painted Surfaces - Previously painted surfaces shall be sanded, wire brushed, or scraped to remove all loose scaling or peeling paint and to reduce gloss.

(3) Mildew - Mildew shall be removed by scraping or by washing thoroughly with a solution of 1-1/2 ounces of trisodium phosphate per gallon of water followed by a clean water rinse.

(4) Mill Scale - Mill scale, loose, shall be removed by Aarand machine, air or power driven chisels or by allowing to weather and then cleaning.

PAINTING

(5) Mill Scale - Mill scale, tight, shall be removed by scalers, shot or sandblasting or by weathering and then cleaning.

(6) Oil and Grease - Oil and grease shall be removed by a solvent wash or alkaline cleaning guns, except when sandblasting is used. The solvent shall be oil free, low toxicity and shall have a flash point in excess of 100°F.

(7) Old Paint - Old paint shall be removed when necessary by blow torch, paint remover, or scraper.

(8) Rust - Rust shall be removed by hand or power driven wire brushes or sandblasting.

(9) Rust Scale - Rust scale shall be removed by scalers or chisels followed by sand or shot blasting where practical or by wire brushing.

(10) Spillage of Acid - Spillage of acid shall be removed by washing with a standard neutralizing solution such as 1 pound of sodium bicarbonate per gallon of water followed by a clean water rinse.

(11) Weld Splatter, Burrs on Cut Edges and Sharp Points - Weld splatter, burrs on cut edges and sharp points shall be removed where practical.

16.4.2 Aluminized Surfaces - All aluminized surfaces, and all aluminum surfaces (regardless of location) shall not be painted.

16.4.3 Ferrous Surfaces, Not Aluminized - All surfaces shall be smooth, dry, free from dust, grit, or frost. Remove all grease and rust scale. Where surface has a heavy coating of scale, it shall be removed as specified above to the degree necessary to produce a satisfactory surface for painting. The blast cleaned surface shall be primed as soon as possible, preferably within 2 or 3 hours. Touch up any chipped or abraded places on items that have been prime coated by sanding smooth. Reprime immediately with one (1) coat of the same material used for the original primer. Unprimed galvanized metal shall be washed with a solution of chemical phosphoric metal etch, and allow to dry. Heavy white rust on galvanized metal shall be removed by hand wire brush or steel wool with Lithoform #2 made by Amchen Products, Inc., Ambler, Pennsylvania.

16.4.4 Concrete and Masonry Surfaces - Concrete and masonry surfaces shall be aged and dried for a period of 60 to 90 days and shall be wire brushed clean. Surface cracks shall be filled with a good, stiff mortar grout using a minimum amount of water to reduce shrinkage, and allow to dry for 3 days prior to painting. Concrete surfaces, which are highly glazed, or where traces of form oil or parting compound are present, shall be treated

with a preparation of acid detergent concentration and dilute muriatic acid. For this treatment, mix one part concentrated muriatic acid, 4 parts water, and then add one part of acid detergent. The acid shall then be removed with water. Concrete stains resulting from the weathering of corroded metals shall be removed with a solution of 2 ounces of sodium metasilicate in 1 gallon of water. Stained areas on weathered surfaces should be thoroughly wetted with water before application of solution.

16.5 PAINT APPLICATION

16.5.1 Application -

(1) The finished surfaces shall be free from runs, drops, ridges, waves, laps, brush marks and variations in color, texture, and finish. All coats shall be applied so as to produce a film of uniform thickness. Special attention shall be given to insure that edges, corners, crevices, welds, and rivets receive a film thickness equivalent to adjacent painted surfaces.

(2) At time of application, paint shall show no signs of deterioration. Paint shall be thoroughly stirred, strained, and kept at a uniform consistency during application. Paints of different manufacturers shall not be mixed together. Where necessary to suit conditions of surface, temperature, weather, and method of application, the packaged paint may be thinned immediately prior to application in accordance with the manufacturer's directions, but not in excess of 1 pint of suitable thinner per gallon.

(3) The coating shall be an even uniform film thickness at a square foot coverage rate recommended by the manufacturer.

(4) Piping shall not be painted until piping has been tested and approved. Sub-Contractor will be notified by the Contractor when such tests have been completed.

(5) Adjacent areas and installations shall be protected by use of drop cloths or other approved precautionary measures.

16.5.2 Methods of Application - Depending on type of surface, size of job and type of coating material used, paint shall be applied by brush, roller or sprayer.

(1) Brush - The brush shall be clean and designed for the specific surface to be painted. The coating shall be brushed in an even, uniform film thickness.

(2) Roller - The roller and its accessories shall be clean. The cover shall be best suited to the specific surface to be painted. A hand brush shall be used in conjunction with the roller for coating trim, sash and other areas difficult to handle with a roller.

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(3) Sprayer - Equipment shall be kept clean and in good working order. An agitator type pot shall be used to maintain the coating in a well-mixed condition. Effective traps shall be provided to keep air lines free from oil and moisture. The spray stroke shall be made with a free arm motion keeping the path parallel and the gun nozzle direction perpendicular to the surface at all points of the stroke. For thin film coatings, the ends of the stroke shall be feathered out by triggering the gun, which means beginning the stroke before pulling the trigger and releasing the trigger just before ending the stroke. Respirators shall be worn by persons engaged or assisting in spray painting.

16.5.3 Application Conditions -

(1) Temperature - The optimum temperature range for painting is 60° to 90°F. Painting shall not be applied at temperatures below 40°F.

(2) Atmosphere -

(a) Application of paint shall be avoided when the humidity is high enough to cause condensation, or when frost is on the surface.

(b) Exterior painting shall not be performed in the rain or when winds are of such velocity as to carry dust and dirt, or interfere with spray painting.

16.6 TOUCH-UP AND RE-PAINTING

16.6.1 At completion, all painting work shall be touched-up and properly restored where damaged or defaced, and the entire work left free from any blemishes.

16.6.2 Any equipment or material surfaces, painted by Others, which do not conform to the Painting Schedule and color scheme shall be re-painted under the terms of this Specification. Sub-Contractor shall notify the Contractor in writing of any proposed re-painting and obtain his approval, prior to starting any work. The Contractor will maintain a record of all re-painting work.

16.7 STORAGE OF MATERIALS

All painting materials shall be stored and prepared in locations designated by the Contractor. All such locations shall be kept clean and orderly, and all necessary precautions shall be maintained to prevent fires.

16.8 CLEAN UP

All cloths and cotton waste that might constitute a fire hazard shall be placed in closed metal containers or destroyed at the end of each day. Upon completion of the Work, all staging, scaffolding, and containers shall be removed from the site or destroyed in an approved manner. Paint spots, oil, or stains upon adjacent surfaces shall be removed and the entire job left clean and acceptable.

PAINTING SCHEDULE

SURFACE	FIRST COAT*	FINISH COAT*
	OR FIRST COAT AND UNDERCOAT*	
<u>Exterior Ferrous Surfaces</u>	Armco Std. No. 3 (If not pre-primed)	Armco Std. No. 21
<u>Masonry (Unglazed Concrete Block)</u>	Armco Std. No. 51	Armco Std. No. 52
<u>Interior Ferrous Surfaces (Where not concealed)</u>	Armco Std. No. 3 (If not pre-primed) or Armco Std. No. 1 (If galvanized)	Armco Std. No. 31
<u>Interior Doors and Frames</u>	Manufacturer's Std. Primer	Armco Std. No. 12 (2 Coats)
<u>HVA/C Equipment</u>	Manufacturer's Std. Primer or Armco Std. No. 3	Manufacturer's Std. Finish or Armco Std. No. 52
<u>Electrical Equipment</u>	Manufacturer's Std. Primer	Manufacturer's Std. Finish
<u>Piping</u>	Armco Std. No. 3 (Ungalvanized) Armco Std. No. 1 (If galvanized)	Armco Std. No. 31

GENERAL NOTES:

*Represents paint type (manufacturer).

Pipe code banding not included in this specification.

FORMULATION AND MFG. DATA SHEET

1 - GALVANIZED IRON PRIMER

This paint formulation must meet the Federal Specification for a "Primer Coating; Zinc Dust-Zinc Oxide" for Galvanized Surface - TT-P-641d.

Manufacturers:

Devco 14000

DuPont "Dulux" 67-744

Enjay 6011

Farmland Ind. H936 C42-3602

Glidden Type 1 - RGL-24761

Type 2 - RGL-26414

Type 3 - RGL-24718

Hooker 163-30-0022 (525-43)

Mobil Type 1 - 13-F-804

Type 2 - 13-F-805

Sherwin-Williams B50-A-1

Vita-Var 17966

FORMULATION AND MFG. DATA SHEET

3 - GENERAL PURPOSE ZINC
CHROMATE-IRON OXIDE PRIMER FOR STEEL

Pigment: 43.1%

Red Iron Oxide	54.8%
Zinc Chromate	22.8%
Silicates	22.4%

Vehicle: 56.9%

Linseed Alkyd Resin	45.5%
Petroleum Thinner	54.4%
Driers	0.1%

Manufacturers:

Devoe 41838
DuPont "Dulux" 67-746
Enjay Rust-Ban AK6274
Farmland Ind. H935 Ch2-6302
Glidden 585
Hooker 165-50-00 MS
Mobil 13-R-53
PPG 17-6
Sherwin-Williams Kromik E41-N-1
Vita-Var 17968

FORMULATION AND MFG. DATA SHEET

12 - INTERIOR SEMI-GLOSS (ALKYD)

Pigment:	50.0%
Titanium Dioxide	27.1%
Titanium Calcium	48.9%
Calcium Carbonate	13.7%
Silica and Silicates	10.3%

Vehicle:	50.0%	
Alkyd Resin		47.4%
Petroleum Thinner		52.1%
Driers (Metallic)		0.5%

Manufacturers:

Devoe 2600 Series

DuPont 75 "Dulux" Series

Enjay 6630

Farmland Ind. H7FW/WB/DB - C42-0743

- C42-0433

- C42-0423

Glidden 4600 Series

Hooker Toco 319-10-00

Mobil 31 Series - White 31-W-9

PPG Speedhide 6-90

Sherwin-Williams A36 Series

Vita-Var 17975

FORMULATION AND MFG. DATA SHEET

21 - EXTERIOR GLOSS - NON CHALKING

Composition by Weight:	Titanium Dioxide	18.89%
	Silicates	21.12%
	Polyester Resin	37.18%
	Pine Oil	1.38%
	Petroleum Thinner	20.79%
	Driers (Metallic)	0.50%
	Phenyl Mercuric Acetate	0.14%

Manufacturers:

Devoe 107 Series
DuPont 28-5101 Hi Build
Enjay Rust-Ban AK6403
Glidden 1818 Endurance Series
Mobil 12 Series White 12-W-9
PPG Speedhide 6-20
Sherwin-Williams SWP Trim A2-W-8
Vita-Var 17979

FORMULATION AND MFG. DATA SHEET

31 - PIPE IDENTIFICATION AND MACHINERY ENAMEL

Pigment:	30.8%	
	Titanium Dioxide	100.0%
Vehicle:	69.2%	
	Ester Gum Modified Phenolic Ether Resin	29.08%
	Fatty Acid Esters	14.20%
	Petroleum Thinner	56.70%
	Metallic Driers	0.02%

Manufacturers:

Devco 41400 Series Speed Rex
DuPont 81 Series "Dulux"
Enjay Rust-Ban AK6460
Farmland Ind. H830-H839 42-0
H8WB/DB
Glidden Speedenamel 4550
Mobil 20 Series
PPG 23 Series Lavax
Sherwin-Williams Kem Lustral F65 Series
Vita-Var 17989

FORMULATION AND MFG. DATA SHEET

51 - EPON MODIFIED GENERAL PURPOSE PRIMER

Pigment:

51.5%	
Titanium Dioxide	44.0%
Zinc Oxide	13.1%
Strontium Chromate	4.6%
Silicates	38.3%

Vehicle:

48.5%	
Processed Linseed Oil	9.4%
Processed Soya Oil	7.4%
Phenolic Ether Resin	21.7%
Aromatic Hydrocarbon	3.2%
Petroleum Thinner	58.2%
Driers (Metallic)	0.1%

Manufacturers:

Devco AML 906-2
PPG UC 8172
Vita-Var 17997

FORMULATION AND MFG. DATA SHEET

52 - EPON MODIFIED GENERAL PURPOSE FINISH

Pigment: 33.1%

Titanium Dioxide	86.5%
Silicates	13.5%

Vehicle: 66.9%

Processed Linseed Oil	10.5%
Processed Soya Oil	5.4%
Processed Tung Oil	1.6%
Phenolic Ether Resin	22.4%
Chlorinated Resin	11.0%
Aromatic Hydrocarbon	8.2%
Petroleum Thinner	40.7%
Driers (Metallic)	0.2%

Manufacturers:

Devco AML 957-1
Enjay Rust-Ban EE6590
Glidden GL-70876-A
GL-70875-A
Mobil 30 Series
PPG NC8900
Sherwin-Williams Kem A & A B69 Series
Vita-Var 17998

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SECTION 17. - HEATING, VENTILATING & AIR CONDITIONING SYSTEMS

17.1 SCOPE

17.1.1 The Work covered by this Section shall include all materials, labor, supervision, tools, and equipment required to furnish, install, paint, and test the heating, ventilating and air conditioning systems, complete as shown on the drawings and as specified herein.

17.1.2 The systems included are for the following areas:

(1) Charging Side Control Stations as shown on Drawing No. 659838.

(2) Furnace Pulpit and Toilet No. 6 as shown on Drawing No. 659785.

(3) Maintenance Office as shown on Drawing No. 659788.

(4) Hot Metal Scale Pulpit as shown on Drawing No. 659789.

17.2 CODES AND STANDARDS

The applicable requirements of the current issue of the following codes and standards are hereby made a part of this Specification.

17.2.1 American Society of Heating, Refrigeration and Air Conditioning Engineers.

17.2.2 All State of Ohio and local codes.

17.3 GENERAL

All equipment and accessories shown on the drawings, or as listed in the Partial Bills of Material for HVA/C, shall be furnished (except where specified as "Items to be Furnished by Contractor"), installed, and completely connected by the Sub-Contractor. Each major component of the equipment shall have the manufacturer's name and address, and the component catalog number on a nameplate securely affixed in a conspicuous place. The nameplate of a distributing agent only will not be acceptable. In lieu of a nameplate, the manufacturer's name or trademark may be cast integrally with, stamped on, or otherwise permanently marked on the items of equipment.

17.4 DUCTWORK

17.4.1 Materials - All ductwork shall be fabricated from Armco ZINGRIP as manufactured by Armco Steel Corporation.

17.4.2 Longitudinal Seams - All ducts shall be made with double lock longitudinal seams properly hammered down.

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- 17.4.3 Transverse Joints - Slip joints, attached to the duct in the shop, shall be made in the direction of air flow. External standing seam construction shall be utilized wherever possible.
- 17.4.4 Sealant - Sufficient sealant shall be utilized to allow the complete sealing of corners and slip joints.
- 17.4.5 Supports - Horizontal ducts shall be supported from overhead and spaced on 10'-0" centers for ducts through 60", unless shown otherwise on the drawings.
- 17.4.6 Through-Wall Connections - All ducts connected to concrete openings shall be installed with gasketed, flanged connections.
- 17.4.7 Cross Breaking - Cross breaking shall be used on all ducts not supplied with stiffener angles.
- 17.4.8 Fasteners - Bolts, nuts, and sheet metal screws for attaching sheet to sheet or sheet to steel framing shall be cadmium-plated steel.
- 17.4.9 Gage of Ductwork - On rectangular ducts, the longest side shall determine the gage to be used. Gage shall be in accordance with Table I.

TABLE I

<u>Size</u>	<u>Gage</u>	<u>Slip Size</u>	<u>Stiffeners</u>		<u>Location</u>
			<u>Size</u>		
Up to 18"	22	1"	-		-
19" to 30"	20	1"	-		-
31" to 48"	20	1½"	1½" x 1½" x 3/16"		4'-0" oc
49" to 60"	20	1½"	1½" x 1½" x 3/16"		4'-0" oc

17.4.10 Turning Vanes -

(1) Provide turning vanes as shown on the drawings. Vanes shall be Tuttle and Bailey "Ducturn", Barber-Coleman "Air Turns", Titus Type Y or Z, or approved equal.

(2) Shop fabricated vanes are not acceptable.

17.4.11 Flexible Connection -

(1) Where ducts connect to mechanical equipment a flexible connection consisting of neoprene-coated glass fabric (sealed with self-vulcanizing adhesive tape) shall be installed. Fabric shall be of sufficient width to provide a minimum space of 4" between connected items and 3" wider than the distance between the metal edges of the opening plus an approximate allowance of 1" for slack.

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(2) Flexible connections shall be secured at both ends with sheet metal bands or straps placed around the fabric ends, drawn tight, and securely clamped and sealed with self-vulcanizing adhesive tape. On rectangular openings, the bands or straps shall be secured to any side greater than 16" in width with sheet metal screws no more than 8" on centers.

17.5 TESTS AND ADJUSTMENTS OF AIR VOLUME

After completion of the installation of ductwork and ventilating apparatus, the Sub-Contractor shall test operate the systems and shall make all required adjustments to deliver air quantities shown on the drawings, within $\pm 5\%$, at each supply and exhaust register. The Sub-Contractor shall adjust ventilating equipment in the systems so that each will operate in a noiseless and mechanically satisfactory manner. After all adjustments have been completed, a final test shall be made as recommended in "The ASHRAE Guide and Data Book". This final test of air volume shall be tabulated by the Sub-Contractor and six (6) copies shall be submitted to the Contractor for approval.

17.6 PIPING

Steam, condensate, and air piping shall be as specified in SECTION 18. - SERVICE PIPING SYSTEMS.

17.7 ELECTRICAL

All electrical work shall conform to the applicable requirements specified in SECTION 19. - ELECTRICAL.

17.8 PAINTING

Surface preparation and painting of materials and equipment (except factory finished registers, diffusers, etc.) shall be as specified in SECTION 16. - PAINTING.

17.9 TEMPERATURE CONTROLS

- 17.9.1 Sub-Contractor shall furnish and install complete systems of temperature controls as delineated on the drawings (except where specified as "Items to be Furnished by Contractor").
- 17.9.2 The systems and their components shall be chosen for their best field of application consistent with the duties to be performed and the results to be attained.
- 17.9.3 In general, operation of valves, damper motor and other devices requiring power shall be electric or pneumatic.

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- 17.9.4 The control systems shall be as manufactured by Minneapolis-Honeywell, Barber-Coleman, Johnson Service or Powers Regulator Company. Sub-Contractor shall stipulate in his bid the name of the manufacturer of the temperature control systems. If Sub-Contractor fails to stipulate a name, the Owner shall exercise the right to choose a manufacturer from among those specified herein.
- 17.9.5 The control system shall include all piping, interconnecting wiring, valves, switches, sub-bases, relays, transformers, thermostats, safety devices and other necessary elements and components to accomplish the specified performance with the manufacturer's proprietary system of controls.
- 17.9.6 Instrument air piping shall consist of Type L hard temper copper tubing with forged or cast copper fittings, and sweat type soldered joints. All supports and clamps in contact with copper tubing shall have non-ferrous metal or non-metal at the point of contact.
- 17.9.7 The instrument air piping shall be tested under an air pressure of 30 psi for 24 hours during which time the pressure drop shall not exceed 10 psi.
- 17.9.8 Each thermostat shall have an indicating thermometer in its cover and, unless otherwise specified, a concealed adjustment.
- 17.9.9 All pneumatic controllers, except room thermostats, shall be provided with indicating pressure gages in each main and branch line.
- 17.9.10 Sub-Contractor shall provide a qualified, authorized engineer to test, start, adjust, set and calibrate all devices and place the systems in successful operation. In addition, the Sub-Contractor shall train the Owner's designated personnel in the proper care and operation of the systems.
- 17.9.11 Sub-Contractor shall also furnish and install, above control panel on furnace pulpit wall, a 110 Volt 4" alarm bell. Bell will be connected to a thermostat located in the electrical control room by Others.

17.10 SYSTEM TESTS

Upon completion, and prior to acceptance of the installations, the Sub-Contractor shall subject the systems to such operating tests as may be required by the Contractor to demonstrate satisfactory functional and operating efficiency. Control devices shall be set to control at the points indicated or directed. Bearings shall be lubricated, and the speed and direction of rotation of each fan shall be checked. The running current of each motor shall be checked for proper fuse and overload protection.

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If tests do not demonstrate satisfactory operation of the systems, deficiencies shall be corrected to the satisfaction of the Contractor. All instruments, facilities, and labor required to properly conduct the tests shall be provided by the Sub-Contractor. He shall make all necessary tests required by local authorities having legal jurisdiction, at no additional cost to the Contractor or Owner.

17.11 RESPONSIBILITY OF SUB-CONTRACTOR

After completion of the installation, the Sub-Contractor shall regulate and adjust, or cause to have regulated and adjusted, all temperature control equipment. The systems, including controls, shall be free from defects in workmanship and material under normal use in service for the guarantee period. The Sub-Contractor shall have sole and undivided responsibility for the proper functioning of the systems, and he shall replace or repair defective equipment at no cost to the Owner.

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SECTION 18. - SERVICE PIPING SYSTEMS

18.1 SCOPE

- 18.1.1 The Work covered by this Section shall include the furnishing of all materials, labor, supervision, tools and equipment required to install all steam and air service piping systems and equipment complete as shown on the drawings, and as specified herein.
- 18.1.2 Sub-Contractor shall furnish the required pipe insulation, pipe supports and hangers, and pipe guides and anchors for fin-tube heaters.

18.2 CODES AND STANDARDS

The current issue of the following specifications, standards, and codes are hereby made a part of this Specification.

18.2.1 Armco Standard Construction Specifications:

- (1) ACS-400-01 PIPING - GENERAL
- (2) ACS-400-04 PIPING - STEAM SUPERHEATED - 425 P.S.I.G. AT 750°F
- (3) ACS-400-12 PIPING - AIR COMPRESSED
- (4) ACS-400-34 PIPING - PICKLING AND CLEANING
- (5) ACS-400-37 PIPING - COLOR CODE
- (6) Project Deviation No. 16

18.2.2 All applicable Ohio State and/or local codes.

18.3 GENERAL

- 18.3.1 All pipe, valves, fittings, accessories and equipment shown on the drawings and described in the Partial Bills of Material shall be installed, and completely connected by the Sub-Contractor. All materials and equipment, except as specified in Item 18.1.2, will be furnished by the Contractor.
- 18.3.2 Connection to existing plant services shall be made by the Sub-Contractor at the locations indicated on the drawings.
- 18.3.3 All piping work shall be in strict accordance with the applicable requirements (except where modified herein) of the Armco Steel Corporation, Standard Construction Specifications and Project Deviations designated in Item 18.2.1.

18.4 MODIFICATIONS TO STANDARD SPECIFICATIONS

- 18.4.1 Pipe Hangers - Table No. 2, on Page 8 of 10, in Standard Specification No. ACS-400-01 PIPING - GENERAL, shall be modified to read - "Suggested Maximum Spacing Between Hangers". Spacing other than that suggested, shall be established in accordance with Section 6 of ASA B31.1 Code for Pressure Piping.
- 18.4.2 Cleaning of Air Piping - All air piping, other than air intake piping, shall be cleaned in accordance with (Method) Item 4.3 of Standard Specification No. ACS-400-34 PIPING - PICKLING AND CLEANING. See Item 2.1.6 for air intake piping.
- 18.4.3 Pipe Insulation - Standard Specification No. ACS-400-35 PIPING AND EQUIPMENT INSULATION referenced on the drawings and in the Standard Specifications shall not apply (see Item 18.6).

18.5 PIPE ANCHORS AND GUIDES

Pipe anchors and guides for "fin-tube" heaters shall be fabricated and installed as shown on the drawings.

18.6 INSULATION

- 18.6.1 General - All steam and condensate piping and flash tanks shall be insulated with calcium silicate or expanded silica bonded with inorganic fibers with factory applied canvas or factory applied presized glass cloth. On all steam and condensate piping where mechanical abuse is possible, the insulation shall be furnished with a factory applied galvanized steel jacket.
- 18.6.2 Insulation Thickness - Insulation thickness shall be as indicated on the drawings.
- 18.6.3 Layers - All insulation over two inches in thickness shall be applied in layers. With double layer insulation, lateral and longitudinal joints of second layer shall be staggered with those of the first layer.
- 18.6.4 Tolerances - Pipe covering shall fit snugly on the pipe, and shall conform to allowable tolerances outlined in Specification MIL-1-2781.
- 18.6.5 Sectional Covering - Sectional covering shall be used for pipe up to the largest size commercially available; and where not available, blocks or segments shall be used. Segments shall be curved to fit the surface to which they are applied, and shall be cut radially to fit against each other. All joints between blocks and sections of pipe covering, both butt and longitudinal, shall be pointed with insulating cement.

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- 18.6.6 Wire Binding - Each layer of pipe covering shall be tightly bound to the pipe with independent loops of wire for pipe sizes 1/2" to 6" inclusive, space not to exceed 12" on centers; for sizes larger than 6" nominal diameter, wire loops of 16 gage annealed galvanized wire shall be used and spaced not to exceed 9" centers. (On insulation with jacketing, the wire binding applies only to interior layers.
- 18.6.7 Pipe Fittings - Pre-molded pipe fittings of the same insulation material as the rest of the line, shall be utilized wherever practicable.
- 18.6.8 Steam Trap - Steam lines shall be insulated up to the steam trap. (Trap shall not be insulated unless trap is within seven (7) feet of floor).

18.7 FIN-TUBE ENCLOSURES

Fin-tube enclosures shall be installed as detailed on the drawings.

18.8 PAINTING AND IDENTIFICATION

Painting of service piping systems shall be in accordance with SECTION 16. - PAINTING and ACS-400-37 PIPING - COLOR CODE. Identification of service piping systems (valve tagging and pipe banding tape) shall be in accordance with Project Deviation No. 16.

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SECTION 19. - ELECTRICAL

19.1 SCOPE

- 19.1.1 The Work covered by this Section shall include the furnishing of all materials, supervision, labor, tools, equipment, and the necessary incidental engineering services required to install, inspect, and test the complete electrical wiring and lighting systems, as shown on the drawings and specified herein.
- 19.1.2 The Work shall include the installation of all devices and equipment required for lighting systems and heating, ventilating and air conditioning systems.
- 19.1.3 The Work shall include the installation of all conduit and wiring with the exception of the incoming building feeder cables, which will be installed by Others.
- 19.1.4 The installation of conduit shall be understood to include the furnishing and installation of all junction boxes, pull boxes, outlet boxes, conduit fittings and conduit supports in conformance with MWS-500-01, MWS-500-02, and MWS-500-11.
- 19.1.5 The installation of wiring shall be understood to include the termination of the wiring, the furnishing and installation of all termination materials, and the furnishing and installation of wire and cable supports and identification all in compliance with MWS-500-01.

19.2 APPLICABLE STANDARDS

- 19.2.1 All Work, equipment and materials not specified on the drawings shall be in accordance with the applicable requirements of the following Armco Standard Construction-Material and Equipment-Purchase Specifications:
 - (1) MWS-500-01 INSTALLATION OF ELECTRICAL EQUIPMENT AND MATERIALS
 - (2) MWS-500-02 CONDUIT
 - (3) MWS-500-04 PLUGS AND RECEPTACLES
 - (4) MWS-500-05 LIGHTING
 - (5) MWS-500-11 JUNCTION BOXES, PULL BOXES, AND OUTLET BOXES
- 19.2.2 The "Suggested Vendor List" in the above referenced Standards shall be understood to be the "Approved Vendor List".

19.3 GENERAL

- 19.3.1 All materials, devices and equipment shown on the drawings, or as listed in the Partial Bills of Material for electrical work shall be installed and completely connected by the Sub-Contractor. All items not specified as "Items to be Furnished by Contractor", and required to complete the electrical wiring and lighting systems shall be furnished and installed by the Sub-Contractor.
- 19.3.2 The extent of Work or interconnection of lighting systems shall be as indicated on the drawings. The incoming feeders for connection to the heating, ventilating and air conditioning equipment will be installed, in the vicinity of the equipment, by the Contractor.
- 19.3.3 Installation shall be performed in strict accordance with the applicable Armco Standard Specifications, local, State and National Electrical Codes.

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