

RFP# 20 - 003

STAFFORD MUNICIPAL SCHOOL DISTRICT
REQUEST FOR COMPETITIVE SEALED PROPOSALS FOR
HIGH SCHOOL & STEM MAGNET SCHOOL RENOVATION

ADDENDUM 3

4/7/2020

Please note that there are Modifications to the Bidding Procedures

A. Part 1 of the Bid is now due at 2 PM.

- **Thursday April 9, 2020 @ 2:00 PM CST** – Part 1 Sealed Price Proposal and Required Forms Due.

B. Issue Answers to Questions by Addendum will be available on Tuesday April 7, 2020.

Revisions included in this Addendum:

Please refer to drawings and specifications for more information. These specifications and drawings supersede any previously issued versions of the same spec or drawings. Please replace and refer to the most current drawings in your set. Please refer to specifications for more information.

Specifications Issued:

- 01 10 00 – Summary
- 07 11 00 – Damproofing and Waterproofing
- 23 05 00 – Common Work Results in HVAC

Questions and Answers:

1. Sheet A2.20, 06 Keyed Notes, notes 306 and 307. Will need specifications and further details for the new library stacks and for the new furniture referenced in these notes.
 - a. **RESPONSE:**
 - i. Furniture referenced by Note A307 is for reference only.
 - ii. Furniture referenced by Note A306, Library Stacks basis of design is Tesco, Versa Series Model Number: 758353642 with industrial casters, or acceptable substitution.
2. There are many electrical and data outlets going on existing walls. In the drawings (another project), the drawing had notes to provide ¼" drywall layering or there were notes for a furred wall. That took care of it. I don't see notes for that in this job so everything would have to be run exposed over the wall surface. Also, I do not see notes that specifically state for us to cut

and patch the wall for electrical. We can use MC cable at drywall instead of exposed, but that would not work for masonry walls.

- a. **RESPONSE:** Avoid exposed and surface mounted conduit/boxes. Where there are CMU walls, the furring needs to be *1 5/8" minimum studs; 2 1/2" studs preferred.* (7/8" hat channels don't provide the depth for power outlet and data jack back boxes.)
3. What Direct Digital Controls will be used so we can bid the HVAC portion.
- a. **RESPONSE:** Existing BAS system to remain. New equipment (couple of new Fan Powered VAV Terminals) to come with its own controller and they need to be tied back into existing BAS. Contractor to update controls front end as necessary,

END OF ADDENDUM #3

01 10 00

SUMMARY

PART 1 GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Project information.
 - 2. Work covered by the Contract Documents.
 - 3. Contractor duties.
 - 4. Work by Owner.
 - 5. Work under separate contracts.
 - 6. Owner-furnished products.
 - 7. Access to site.
 - 8. Protection of work and property.
 - 9. Owner's occupancy requirements.
 - 10. Specification formats and conventions.
 - 11. Provisions for electronic media.
- B. Related Sections include the following:
 - 1. Division 01 Section "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.2 PROJECT INFORMATION

- A. Project Identification: Renovations to Existing Stafford High School and Adaptation of Old Stafford Middle School to serve as a Magnet School.
 - 1. Project Location: Stafford, Texas
- B. Owner Identification: Stafford Municipal School District (Stafford MSD)
- C. Architect Identification: The Contract Documents were prepared for the Project by AUTOARCH Architects, LLC, 6200 Savoy, Suite 100, Houston, TX 77036.
 - 1. Contact: Lina Sabouni
 - a. Telephone: (713) 952 – 3366.
 - b. Email: lina@autoarch.net

1.3 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of the Project is defined by the Contract Documents and consists of the following:
 - 1. Interior renovations to existing Stafford High School and Adaptation of Old Stafford Middle School to serve as a Magnet School.
 - 2. Shall conform to and coordinate with Uniform General, Supplemental and Special Conditions.
 - 3. Drawings will be available to Contractor in PDF format for Contractor's use and distribution to subcontractors and suppliers.
- B. Project will be constructed under a single general construction contract

1.4 CONTRACTOR DUTIES

- A. VOC Compliance: Ensure that all assemblies, components, and systems comply with all

VOC (Volatile Organic Components) requirements and regulations of the Environmental Protection Agency (EPA) Occupational Safety Health Administration (OSHA), State, County, City, and Local Air Control District.

- B. Except as specifically noted, provide and pay for:
 - 1. Labor, materials, and equipment.
 - 2. Tools, construction equipment and machinery.
 - 3. Water, heat, and utilities required for construction.
 - 4. Other facilities and services necessary for proper execution and completion of work.
- C. Secure and pay for, as necessary for proper execution and completion of Work, and as applicable at time of receipt of bids:
 - 1. Building Permit.
 - 2. Licenses.
 - 3. Bonds
- D. Give required notices.
- E. Comply with all applicable local Building Codes, ordinances, rules, regulations, orders and other legal requirements of public authorities which bear on performance of Work.
- F. Promptly submit written notice to Architect of observed variance of Contract Documents from requirements of authorities having jurisdiction. Assume responsibility for Work performed without such notice known to be contrary to code or regulatory requirements.

1.5 WORK BY OWNER

- A. General: Cooperate fully with Owner so work may be carried out smoothly, without interfering with or delaying work under this Contract or work by Owner. Coordinate the Work of this Contract with work performed by Owner.
- B. Preceding Work: Owner will not perform any construction operations at Project site. Those operations are scheduled to be substantially complete before work under this Contract begins.
 - 1. Data Switches, and Security System Cabling and Security Equipment Installation. [Project Director and/or Architect may attach as appropriate detailed Equipment Responsibility Matrix.]
 - 2. Interior and exterior signage and water leak testing.
- C. Concurrent Work: Owner will perform the following construction operations at Project site. Those operations will be conducted simultaneously with work under this Contract.
 - 1. Telephone Equipment, Audio Visual, Surveying, Geotechnical Study, Materials Testing, Test and Balance of HVAC System. Furniture and OPOI, FFE. [Project Director and/or Architect may attach as appropriate detailed Equipment Responsibility Matrix.]
- D. Subsequent Work: Owner will perform the following additional work at site after Substantial Completion. Completion of that work will depend on successful completion of preparatory work under this Contract.
 - 1. Materials testing, install interior and exterior signage and water leak testing.

1.6 WORK UNDER SEPARATE CONTRACTS

- A. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract. Coordinate the Work of this Contract with work performed under separate contracts.

1.7 OWNER-FURNISHED, CONTRACTOR-INSTALLED PRODUCTS (REFER TO ARCHITECT PROGRAM AND DRAWINGS)

- A. Owner's and Contractor's Responsibilities:
1. Contractor shall provide support systems to receive Owner's equipment as well as plumbing, HVAC, and electrical connections.
 2. Owner will arrange for and deliver Shop Drawings, Product Data, and Samples to Contractor.
 3. Owner will arrange and pay for delivery of Owner-furnished items according to Contractor's Construction Schedule.
 4. After delivery, Owner will inspect delivered items for damage. Contractor shall be present for and assist in Owner's inspection.
 5. If Owner-furnished items are damaged, defective, or missing, Owner will arrange for replacement.
 6. Owner will arrange for manufacturer's field services and for delivery of manufacturer's warranties to Contractor.
 7. Owner will furnish Contractor the earliest possible delivery date for Owner-furnished products. Using Owner-furnished earliest possible delivery dates, Contractor shall designate delivery dates of Owner-furnished items in Contractor's Construction Schedule.
 8. Contractor shall review Shop Drawings, Product Data, and Samples and return them to Architect noting discrepancies or anticipated problems in use of product.
 9. Contractor is responsible for receiving, unloading, handling, and storing Owner-furnished items at Project site.
 10. Contractor is responsible for protecting Owner-furnished items from damage during storage and handling, including damage from exposure to the elements.
 11. If Owner-furnished items are damaged as a result of Contractor's operations, Contractor shall repair or replace them with new items.
 12. Contractor shall install and otherwise incorporate Owner-furnished items into the Work, including making building services connections.

1.8 ACCESS TO SITE

- A. Contractor shall have full use of Project site for construction operations during construction period. Contractor's use of Project site is limited only by Owner's right to perform work or to retain other contractors on portions of Project. Make each entity engaged in work on the project aware that the adjacent buildings house operating facilities that must continue in operation during the construction period, except as the Architect and Owner may otherwise direct.
- B. Confine operations at site to areas permitted by Law, Ordinances, Permits, and Contract Documents.
- C. Do not unreasonably encumber site with materials or equipment.
- D. Assume full responsibility for protection and safekeeping of products stored on premises.
- E. Move any stored products which interfere with operations of Owner or other contractors.
- F. Obtain and pay for use of additional storage or work areas needed for operations.
- G. Limit use of site for work and storage as follows:
1. Do not use completed paving areas for storage without Owner's approval.
 2. Do not store materials where trees are located.
 3. Restrict Work and storage to areas indicated on Drawings or approved by Owner.

4. Access site in areas approved by Owner.
 5. Restrict parking to areas approved by Owner.
 6. Do not perform operations that would interrupt or delay Owner's daily operations.
- H. Driveways and Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.

1.9 PROTECTION OF WORK AND PROPERTY

- A. The Contractor shall maintain adequate protection of the Work from damage and shall protect the Owner's and adjacent property from injury or loss arising from the Work. Contractor shall provide and maintain at all times any OSHA-required danger signs, guards, and obstructions necessary to protect the public and construction personnel from any dangers inherent with or created by the Work in progress.
1. All federal, state, and city rules and requirements pertaining to safety, and all EPA standards, OSHA standards, and NESHAP regulations pertaining to asbestos as required shall be complied with.
- B. Twenty-four (24) Hour Call: The Contractor shall have personnel on call 24 hours per day, for emergencies during the course of the Project. The Owner shall be provided with a 24-hour emergency contact number of Contractor's personnel. Contractor shall be able to respond to any emergency call and have personnel on-site within two (2) hours after contact. Numbers to be made available to the Owner shall include home, office and mobile numbers for the following:
1. Contractor's project manager.
 2. Contractor's field superintendent.
 3. Owner or company officer of Contractor.

1.10 OWNER'S OCCUPANCY REQUIREMENTS

- A. Owner Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed areas of building, before Substantial Completion, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and partial occupancy shall not constitute acceptance of the total Work.
- B. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of building.

1.11 SPECIFICATION FORMATS AND CONVENTIONS

- A. General: Specification requirements are to be performed by Contractor unless specifically stated otherwise.
1. The Specifications do not:
 - a. Establish trade jurisdictions or divisions of responsibility.
 - b. Do not define Subcontract scopes of work.
- B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to and govern the Work of all Sections in the Specifications.
- C. Specification Format: The Specifications are organized into Divisions and Sections using the current version of CSI/CSC's "MasterFormat" 50-Division format and numbering system.
1. Section Identification: The Specifications use section numbers and titles to help cross-referencing in the Contract Documents. Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete. Consult the Table of Contents at the

- beginning of the Project Manual to determine numbers and names of sections in the Contract Documents.
2. The order of articles, paragraphs, subparagraphs, and sub-subparagraphs within the text any Specification section is defined by a sequence of indentations.
 - a. Article, paragraph and subparagraph titles, and other identifications of subject matter in the Specifications, are intended as an aid in locating and recognizing various requirements in the beginning words of a sentence.
 - b. Specification text shall govern over titling, and shall be understood to be and interpreted as a whole. Where a title establishes the subject, the titles are subordinate to and do not define, limit, or otherwise restrict the Specification text.
 3. The captions and headings of various subdivisions of the Contract Documents are intended only as a matter of reference and convenience for describing the Work and in no way define, prescribe or limit the scope or intent of the Contract Documents or any subdivision thereof.
- D. Specification Style: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.
 2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.
 - a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
 - b. Contract Documents may omit modifying words such as "all" or "any", and articles such as "the" or "an". The absence of a modifier or article from one statement that appears in another is not intended to affect the interpretation of either statement.
- E. Specification Content: Drawings and general provisions of the Contract, including the Uniform General Supplemental and Special Conditions and Division 01 specification Sections, apply to the execution of the Work of subsequent specification sections, and vice versa.
1. Work specified in any one Section is related to, and dependent upon, Work specified in other Sections, whether or not specific reference is made to the Work of other Sections. Cross-references in the Specifications are general references intended as a matter of convenience for aiding in the location general information, and are not all-inclusive.
 2. Names, telephone numbers, and web-site addresses and other contact information listed in the Contract Documents are for convenience only, are subject to change, and are believed to be accurate and up-to-date as of the printing of the Contract Documents.
 3. Use of the word "including", when following any general statement, shall not be construed to limit such statement to specific items or matters listed, whether or not non-limiting language (such as "without limitation", "but not limited to", or other words of similar import) is used with reference thereto; but rather, shall be deemed to refer to all other items or matters that could reasonably fall within the broadest possible scope of such general statement.

1.12 PROVISIONS FOR ELECTRONIC MEDIA

- A. Project Website:
1. Construction Administration will be utilized through a Web-based Project Management System, Projectmates. This Owner-oriented management information system will provide a project participant the ability to track and manage the entire project. Projectmates will track communication between the Owner, Program Manager, Architect/Engineer, Design Consultants, Contractor and Subcontractors.
 2. The Architect/Engineer shall manage and coordinate the on-going electronic Construction Documents, tracking changes and incorporating same and maintaining current Construction Documents. The Architect/Engineer shall make these available to the Contractor and Owner as required.
 3. Projectmates key features that will be utilized are included but not limited to:
 4. Advanced reporting capabilities for the Owner
 5. Online RFIs and Submittals for the Contractor & Architect
 6. Online Field Reports for field inspectors
 7. Online Change Orders & contracts for the contract Manager
 8. Project Detail tracking:
 9. Notes
 10. Tasks
 11. Schedule
 12. Meetings
 13. Permits
 14. Storm water (SWPPP)
 15. Architect Field Observations
 16. Payment applications
 17. Constructability
 18. Online Project Directory
 19. Email-based alerts
 20. Task Management
 21. Site Photographs / Image Gallery
 22. Multi-tiered User Access
 23. Role-based security & permissions
 24. Advanced error tracking
 25. Final Project Archive
- B. Electronic Drawing Documents:
1. Electronic file copies of the Contract Drawings in latest AutoCAD in electronic format approved by LSC format may be obtained from the Architect. Contact Architect to determine availability of CAD documents and costs.
 2. Liability release and transfer agreement shall be executed and submitted by Contractor prior to turn-over of electronic files. Refer to Agreement Form included at end of Section 01 33 00.

PART 2 PRODUCTS - Not applicable to this Section

PART 3 EXECUTION - Not applicable to this Section

END OF SECTION

07 11 00

DAMPPROOFING AND WATERPROOFING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes furnishing and installing the following.
 - 1. Bentonite waterproofing at exterior of elevator pit walls and floors, and at below-grade areas indicated by geotechnical report to have standing water or higher-than-usual static water pressures.
 - 2. Molded-sheet drainage panels.
 - 3. Cold-Applied asphalt emulsion dampproofing compound for exterior face of other below grade walls.
- B. Related Sections include the following:
 - 1. Section 03 30 00 "Cast-In-Place Concrete."
 - 2. Section 31 23 00 "Earth Moving" for excavating and backfilling.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include product specifications and manufacturer's written installation instructions.
- B. Shop Drawings: Show installation details for interface with other work.
- C. Samples: For each of the following products, in sizes indicated:
 - 1. Waterproofing: 6 inches square.
 - 2. Drainage Panels: 6 inches square.
 - 3. Damp Proofin: 6 inches square.

1.4 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For each type of bentonite waterproofing, and each type of asphalt emulsion dampproofing, from manufacturer.
- B. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for bentonite waterproofing and asphalt emulsion dampproofing.
- C. Field quality-control reports.
- D. Warranty: Sample of special warranty for each type of product indicated.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain bentonite waterproofing system from single source from single

manufacturer. Obtain accessory products used with bentonite waterproofing from sources acceptable to bentonite waterproofing manufacturer.

- B. Mockups: Build mockups to verify selections made under sample submittals and to set quality standards for fabrication and installation.
 - 1. Approval of mockups is also for other material and construction qualities specifically approved by Architect in writing.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in manufacturer's original unopened and undamaged containers.
- B. Store materials in a dry, well-ventilated space.
- C. Remove and replace bentonite materials that have been prematurely exposed to moisture.

1.7 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit approved dampproofing and waterproofing materials to be installed according to manufacturers' written instructions and warranty requirements.
 - 1. Do not apply dampproofing or waterproofing materials to surfaces where ice or frost is visible. Do not apply dampproofing or waterproofing materials in areas with standing water.
 - 2. Placing bentonite clay products in panel or composite form on damp surfaces is allowed if approved in writing by manufacturer.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer and Installer agree(s) to repair or replace components of bentonite waterproofing system that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 GEOTEXTILE/BENTONITE SHEETS

- A. Bentonite Panels: 3/16-inch- thick, corrugated kraft-paper panels with a minimum of 1.0 lb/sq. ft. of bentonite confined in corrugations of boards.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Carlisle Coatings & Waterproofing; CCW MiraCLAY.
 - b. CETCO; Voltex.
 - c. Volclay

2.2 MOLDED-SHEET DRAINAGE PANELS

- A. Nonwoven-Geotextile-Faced Molded-Sheet Drainage Panel: Composite subsurface drainage panel consisting of studded, nonbiodegradable, molded-plastic-sheet drainage core; with a nonwoven, needle-punched geotextile facing with an apparent opening size not exceeding

No. 70 sieve laminated to one side of the core, with a polymeric film bonded to the other side; and with a vertical flow rate of 9 to 18 gpm per ft.

2.3 COLD-APPLIED ASPHALT EMULSION DAMPPROOFING

- A. Asphalt-based, clay emulsion with non-asbestos fibers.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Henry 789 Fibered Asphalt Emulsion Dampproofing
 - b. Chem Masters Masterguard 400
 - c. W.R. Meadows Sealmastic Type II Emulsion
 - d. Karnak 220 Fibered Emulsion Dampproofing

2.4 ACCESSORIES

- A. General: Manufacturer's standard accessories recommended for intended use and compatible with specified Dampproofing and Waterproofing.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrate preparations affecting performance of specified dampproofing and waterproofing.
- B. Verify that substrate is complete and that work that will penetrate dampproofing and waterproofing is complete and rigidly installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Coordinate work in the vicinity of dampproofing and waterproofing to ensure proper conditions for installing the dampproofing and waterproofing systems and to prevent damage to dampproofing and waterproofing after installation.
- B. Formed Concrete Surfaces: Remove fins and projections. Fill voids, rock pockets, form-tie holes, and other defects with cement grout patching material according to manufacturer's written instructions.
 - 1. Where requirements for dampproofing material and waterproofing material are in conflict, the more stringent requirements shall be used for the extent of the formed concrete surfaces.
- C. Horizontal Concrete Surfaces: Remove debris, standing water, oily substances, mud, and similar substances that could impair the bonding ability of concrete or the effectiveness of dampproofing and waterproofing. Fill voids, cracks greater than 1/8 inch, honeycomb areas, and other defects with cement grout patching material according to manufacturer's written instructions.
 - 1. Where requirements for dampproofing material and waterproofing material are in conflict, the more stringent requirements shall be used for the extent of the horizontal concrete surfaces.

3.3 INSTALLATION, GENERAL

- A. Install dampproofing, waterproofing, and accessories according to manufacturer's written

instructions.

- B. Protect dampproofing and waterproofing from damage and wetting before and during subsequent construction operations. Repair punctures, tears, and cuts according to manufacturer's written instructions.
- C. Install protection course before backfilling or placing overburden when recommended by dampproofing and/or waterproofing manufacturer
 - 1. Where requirements for dampproofing and waterproofing are in conflict, the more stringent requirements shall be used for the extent of the Work.

3.4 BENTONITE WATERPROOFING INSTALLATION

- A. Apply granular bentonite around penetrations in horizontal surfaces and changes in plane according to manufacturer's details in preparation for granular bentonite tubes and mastic.
- B. Apply granular bentonite tubes, bentonite mastic, or both at changes of plane, construction joints in substrate, projections, and penetrations.
- C. Apply granular bentonite tubes continuously on footing against base of wall to be waterproofed according to manufacturer's written instructions.

3.5 GEOTEXTILE/BENTONITE SHEET INSTALLATION

- A. General: Install a continuous layer of waterproofing sheets directly against concrete to be waterproofed. Lap ends and edges a minimum of 4 inches on horizontal and vertical substrates. Stagger end joints between sheets a minimum of 24 inches. Fasten seams by stapling to adjacent sheet or nailing to substrate.
- B. Below Structural Slabs-on-Grade: Place waterproofing sheets on compacted substrate with ends and edges lapped and stapled.
 - 1. Install a layer of waterproofing sheets under footings, grade beams, and pile caps; or continue waterproofing through key joints between footings and foundation walls, and extend a minimum of 8 inches up or beyond perimeter slab forms.
- C. Concrete Walls: Starting at bottom of wall, apply waterproofing sheets horizontally with primary backing side against wall. Secure with masonry fasteners spaced according to manufacturer's written instructions. Extend to bottom of footing, grade beam, or wall, and secure.
 - 1. Termination at Grade: Extend waterproofing sheets to within 2 inches of finish grade unless otherwise indicated. Secure top edge with termination bar. Apply sealant to top edge of termination bar.

3.6 COLD APPLIED ASPHALT EMULSION DAMPPROOFING INSTALLTION

- A. Apply in two-coats, allowing first coat to become tacky or dry to touch prior to applying second coat.
 - 1. Dilute first coat by 20% to 25% with cool, clean water. Apply second coat undiluted.
- B. Ensure that coating is free of breaks or pinholes.
- C. Ensure that coating continues over top edges of footings, and into all joints, grooves, slots, chases, corners, and reveals.
- D. Backfill shall be placed against finished walls no sooner than 48 hours, and no later than 7 days after application.

1. Ensure that backfill placement does not damage, rupture, or tear the film, or cause the coating or membrane to be displaced or dislocated on the wall.

3.7 FIELD QUALITY CONTROL

- A. Inspection: Arrange for manufacturer's representatives to inspect completed dampproofing and waterproofing installation before covering with other construction (including backfilling,) and provide written report that installation complies with manufacturer's written instructions.
 1. Remove and replace applications of dampproofing and waterproofing where inspection indicates that it does not comply with specified requirements.

END OF SECTION

23 05 00

COMMON WORK RESULTS IN HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Coordinate with Commissioning Requirements indicated in Section 019113. This Contractor is responsible to comply with all requirements for the above section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Piping materials and installation instructions common to most piping systems.
 - 2. Transition fittings.
 - 3. Dielectric fittings.
 - 4. Mechanical sleeve seals.
 - 5. Sleeves.
 - 6. Escutcheons.
 - 7. Grout.
 - 8. HVAC demolition.
 - 9. Equipment installation requirements common to equipment sections.
 - 10. Painting and finishing.
 - 11. Concrete bases.
 - 12. Supports and anchorages.

1.3 DEFINITIONS

- A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
- D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and chases.
- E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.
- F. The following are industry abbreviations for plastic materials:
 - 1. CPVC: Chlorinated polyvinyl chloride plastic.
 - 2. PE: Polyethylene plastic.

3. PVC: Polyvinyl chloride plastic.

- G. The following are industry abbreviations for rubber materials:
1. EPDM: Ethylene-propylene-diene terpolymer rubber.
 2. NBR: Acrylonitrile-butadiene rubber.

1.4 SUBMITTALS

- A. Product Data: Include Products specified in the following Sections:
1. Section 23 05 13 – Motors
 2. Section 23 05 16 – Expansion Compensation
 3. Section 23 05 19 – Meters & and Gauges
 4. Section 23 05 23 – Valves
 5. Section 23 05 39 – Sleeves, Flashings, Supports and Anchors
 6. Section 23 05 48 – Vibration Isolation and Wind Controls for HVAC Piping and Equipment
 7. Section 23 05 53 – Mechanical Identification
 8. Section 23 05 93 – Testing, Adjusting and balancing
 9. Section 23 07 13 – HVAC Insulation
 10. Section 23 08 00 – Commissioning of HVAC
 11. Section 23 31 13 – Metal Ducts
 12. Section 23 33 00 – Ductwork Accessories
 13. Section 23 34 16 – Fans
 14. Section 23 36 00 – Air Terminal Units
 15. Section 23 37 00 – Air Inlets and Outlets
 16. Section 23 41 00 – Filters
 17. Section 23 48 00 – Sound Attenuators
 18. Section 23 81 33 – Unitary Split–System Air–Conditioners
 19. Section 23 74 16.13 – Packaged, Large-Capacity, Rooftop Air-Conditioning Units
- B. Submit shop drawings and product data grouped to include complete submittals of related systems, products, and accessories in a single submittal.
- C. Mark dimensions and values in units to match those specified.
- D. Submit Fabrication Drawings whenever (1) equipment proposed varies in physical size and arrangement from that indicated on the Drawings, thus causing rearrangement of equipment space, (2) where tight spaces require extreme coordination between ductwork, piping, conduit, and other equipment, (3) where called for elsewhere in these Specifications; and (4) where specifically requested by the Architect/Engineer. Fabrication Drawings shall be made at no additional charge to the Owner or the Architect/Engineer.
- E. All required Fabrication Drawings, except as noted otherwise, shall be prepared at a scale of not less than 1/4" = 1'-0". Fabrication Drawings for ductwork, air handling units, and sections in Mechanical Rooms shall be drawn at a minimum scale of 3/8" = 1'-0". Submit three blue-line prints of each Fabrication Drawing to the Architect/Engineer for review. Reproduction and submittal of the Construction Documents is not acceptable. The Architect/Engineer will review the drawing and return one print with comments.

1.5 QUALITY ASSURANCE

- A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."

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- B. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
 - 1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
 - 2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.
 - C. Electrical Characteristics for HVAC Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.
 - D. All equipment and materials shall be new, unused and of United States Domestic manufacture.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.
- B. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.7 COORDINATION

- A. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for HVAC installations.
- B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.
- C. Coordinate requirements for access panels and doors for HVAC items requiring access that are concealed behind finished surfaces. Access panels and doors are specified in Division 08 Section "Access Doors and Frames."
- D. Prepare Coordination / Installation Shop drawings to a scale of 1/4"=1'0" or larger; detailing major elements, components, and systems of mechanical equipment and materials in relationship with other systems, installations, and building components. Indicate locations where space is limited for installation and access and where sequencing and coordination of installations are of importance to the efficient flow of the Work, including (but not necessarily limited to) the following:
 - 1. Structural floor, wall and roof opening sizes and details
 - 2. Clearances for installing and maintaining insulation.
 - 3. Locations of light fixtures and sprinkler heads.
 - 4. Clearances for servicing and maintaining equipment, including tube removal, filter removal, and space for equipment disassembly required for periodic maintenance.
 - 5. Equipment connections and support details.
 - 6. Exterior wall and foundation penetrations.
 - 7. Routing of piping and ductwork.
 - 8. Fire rated wall and floor penetrations.
 - 9. Sizes and location of required concrete pads and bases.

1.8 APPLICABLE CODES AND STANDARDS

- A. Obtain all required permits and inspections for all work required by the Contract Documents and pay all required fees in connection thereof.

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- B. Arrange with the serving utility companies for the connection of all required utilities and pay all charges, meter charges, connection fees and inspection fees, if required.
 - C. Comply with all applicable codes, specifications, local ordinances, industry standards, utility company regulations and the applicable requirements of the following nationally accepted codes and standards:
 - 1. Underwriters' Laboratories, Inc., UL.
 - 2. Air Moving & Conditioning Association, AMCA.
 - 3. American Standards Association, ASA.
 - 4. American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc., ASHRAE.
 - 5. American Society of Mechanical Engineers, ASME.
 - 6. American Society of Testing Materials, ASTM.
 - 7. American Water Works Association, AWWA.
 - 8. International Energy Conservation, Mechanical and Fuel Gas Codes, 2015 edition with City of Stafford, Texas amendments.
 - 9. National Bureau of Standards, NBS.
 - 10. National Fire Protection Association, NFPA.
 - a. NFPA 70, National Electrical Code, 2017 edition with City of Stafford, Texas amendments.
 - 11. Sheet Metal & Air Conditioning Contractors' National Association, SMACNA.
 - 12. 2012 Texas Accessibility Standards, effective March 15, 2012.
 - D. Where differences existing between the Contract Documents and applicable state or city building codes, state and local ordinances, industry standards, utility company regulations and the applicable requirements of the above listed nationally accepted codes and standards, the more stringent or costly application shall govern. Promptly notify the Engineer in writing of all differences.
 - E. When directed in writing by the Engineer, remove all work installed that does not comply with the Contract Documents and applicable state or city building codes, state and local ordinances, industry standards, utility company regulations and the applicable requirements of the above listed nationally accepted codes and standards, correct the deficiencies, and complete the work at no additional cost to the Owner.

1.9 DRAWINGS & SPECIFICATIONS

- A. These Specifications are intended to supplement the Drawings and it will not be the province of the Specifications to mention any part of the work which the Drawings are competent to fully explain in every particular and such omission is not to relieve the Contractor from carrying out portions indicated on the Drawings only.
- B. Should items be required by these Specifications and not indicated on the Drawings, they are to be supplied even if of such nature that they could have been indicated thereon. In case of disagreement between Drawings and Specifications, or within either Drawings or Specifications, the better quality or greater quantity of work shall be estimated and the matter referred to the Architect or Engineer for review with a request for information and clarification at least 7 working days prior to bid opening date for issuance of an addendum.
- C. The listing of product manufacturers, materials and methods in the various sections of the Specifications, and indicated on the Drawings, is intended to establish a standard of quality only. It is not the intention of the Owner or Engineer to discriminate against any product, material or method that is equal to the standards as indicated and/or specified, nor is it intended to preclude open, competitive bidding. The fact that a specific manufacturer is listed as an acceptable manufacturer should not be interpreted to mean that the manufacturers' standard

product will meet the requirements of the project design, Drawings, Specifications and space constraints.

- D. The Architect or Engineer and Owner shall be the sole judge of quality and equivalence of equipment, materials and methods.
- E. Products by other reliable manufacturers, other materials, and other methods, will be accepted as outlined, provided they have equal capacity, construction, and performance. However, under no circumstances shall any substitution be made without the written permission of the Architect or Engineer and Owner. Request for prior approval must be made in writing 10 days prior to the bid date without fail.
- F. Wherever a definite product, material or method is specified and there is not a statement that another product, material or method will be acceptable, it is the intention of the Owner or Engineer that the specified product, material or method is the only one that shall be used without prior approval.
- G. Wherever a definite material or manufacturer's product is specified and the Specification states that products of similar design and equal construction from the specified list of manufacturers may be substituted, it is the intention of the Owner or Engineer that products of manufacturers that are specified are the only products that will be acceptable and that products of other manufacturers will not be considered for substitution without approval.
- H. Wherever a definite product, material or method is specified and there is a statement that "OR EQUAL" product, material or method will be acceptable, it is the intention of the Owner or Engineer that the specified product, material or method or an "OR EQUAL" product, material or method may be used if it complies with the specifications and is submitted for review to the Engineer as outline herein. Where permission to use substituted or alternative equipment on the project is granted by the Owner or Engineer in writing, it shall be the responsibility of the Contractor or Subcontractor involved to verify that the equipment will fit in the space available which includes allowances for all required Code and maintenance clearances, and to coordinate all equipment structural support, plumbing and electrical requirements and provisions with the Mechanical (HVAC) and Plumbing Design Documents and all other trades.
- I. Coordinate with Division 01 requirements for substitution, unless noted otherwise the Contractors wishing to substitute products, materials or methods from those indicated or specified, shall submit such requests to the Owner or Engineer in writing and within THIRTY (30) WORKING DAYS OF NOTIFICATION OF CONTRACT AWARD. Requests for permission to utilize alternates or substitutions will not be considered after that time, unless the Specified item is unavailable or will adversely affect the completion of the Project. Claims submitted for consideration will require notarized letters from all parties involved and will be considered only if the Contractor has been timely in his delivery for review of all required equipment and material submittals. Owner or Engineer will investigate such requests for substitution and if acceptable will issue a letter allowing the substitution.
- J. If any request for a substitution of product, material or method is rejected, the Contractor will automatically be required to furnish the product, material or method named in the Specifications. Repetitive requests for substitutions will not be considered.
- K. Requests shall be bound and shall consist of three (3) sets of descriptive literature and performance data covering each item of equipment or material. The submittal shall include the following:
 - 1. Manufacturer's name and phone number
 - 2. Name of the person submitting the product
 - 3. Model number

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4. Performance
 5. Statement of compliance with specification.
 6. Name of the individuals or company originating the submittal.
 7. Name of the project for which the submittal is made.
 8. An index page of the items submitted.
 9. A written list of variations between the specified product and the submitted product.
 10. Sufficient information, including scaled drawing of area and equipment involved at a scale of 1/4" = 1'-0" minimum, as required to demonstrate that the alternate or substituted product will fit in the space available.
 11. Identification of each item of material or equipment matching that indicated on the Drawings. All applicable industry or national Listings, Labels, Approvals and Standards shall be clearly indicated.
 12. Sufficient pictorial, descriptive and diagrammatic data on each item to show its conformance with the Drawings and Specifications. Any options or special requirements shall be so indicated. All non-applicable information shall be crossed out.
 13. Provide upon request of the Owner or Engineer, samples of materials and/or equipment as may be required.
- L. The Owner or Engineer will investigate all requests for substitutions when submitted in accordance with above and if accepted, will issue a letter allowing the substitutions. The Engineer shall be the sole authority to approve or disapprove any and all substitutions.
- M. Where equipment other than that used in the design as specified or shown on the Drawings is substituted (either from an approved manufacturers list or by submittal review), it shall be the responsibility of the substituting Contractor to coordinate space requirements, building provisions and connection requirements with his trades and all other trades and pay all additional costs to other trades, the Owner, the Architect or Engineer, if any, due to the substitutions.

1.10 RECORD DOCUMENTS

- A. Prepare Record Documents in accordance with the requirements in Special Project Requirements, in addition to the requirements specified in Division 23, indicate the following installed conditions.
1. Duct mains and branches, size and location, for both exterior and interior; locations of dampers, fire dampers, duct access panels, and other control devices; filters, fuel fired heaters, fan coils, condensing units, and roof-top A/C units requiring periodic maintenance or repair.
 2. Mains and branches of piping systems, with valves and control devices located and numbered, concealed unions located, and with items requiring maintenance located (i.e., traps, strainers, expansion compensators, tanks, etc.). Valve location diagrams, complete with valve tag chart. Indicate actual inverts and horizontal locations of underground piping.
 3. Equipment locations (exposed and concealed), dimensioned from prominent building lines.
 4. Approved substitutions, Contract Modifications, and actual equipment and materials installed.
 5. Contract Modifications, actual equipment and materials installed.
- B. The Contractor shall maintain a set of clearly marked black line record "AS-BUILT" prints on the job site on which he shall mark all work details, alterations to meet site conditions and changes made by "Change Order" notices. These shall be kept available for inspection by the Owner, Architect or Engineer at all times.

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- C. Contractor Startup and Commissioning Verification - the system will provide a secure page for each integrated system allowing the contractor responsible for each phase to sign on and certify the status of each piece of equipment.
 - D. Refer to Division 01 for additional requirements concerning record drawings. If the Contractor does not keep an accurate set of as-built drawings, the pay request may be altered or delayed at the request of the Architect. Mark the drawings with a colored pencil. Delivery of as built prints and re-producible is a condition of final acceptance.
 - E. The record prints shall be updated on a daily basis and shall indicate accurate dimensions for all buried or concealed work, precise locations of all concealed pipe or duct, locations of all concealed valves, controls and devices and any deviations from the work shown on the Construction Documents which are required for coordination. All dimensions shall include at least two dimensions to permanent structure points.
 - F. At the Engineer's option, the Contractor shall transfer all data from the record "AS-BUILT" prints to an electronic media such as AutoCAD latest release, in order to plot the reproducible media "AS-BUILT" drawings. Since data stored on electronic media can deteriorate undetected or be modified without the Engineer's knowledge, the AutoCAD electronic drawing files are provided without warranty or obligation on the part of the Engineer as to accuracy or information contained in the files. All information in the files shall be independently verified by the user. Any user shall agree to indemnify and hold the Engineer harmless from any and all claims, damages, losses, and expenses including but not limited to Attorney's fees arising out of the use of the AutoCAD drawing files. Engineer shall furnish to the Contractor electronic media files of Contract Documents for the Contractor to use for inputting of the data from the record "AS-BUILT" prints and the Contractor shall return the revised electronic files on CD ROM properly labeled to the Engineer and shall submit the plotted reproducible drawings and three (3) sets of black line prints to the Architect or Engineer for review prior to scheduling the final inspection at the completion of the work. The reproducible record "AS-BUILT" drawings shall have the Engineers Name and Seal removed or blanked out and shall be clearly marked and signed on each sheet as described in paragraph G. below.
 - G. Contractor shall transfer all marks from record drawings and submit a set of clear concise set of reproducible record "AS-BUILT" drawings and shall submit the reproducible drawings with corrections made by a competent draftsman and three (3) sets of black line prints to the Architect or Engineer for review prior to scheduling the final inspection at the completion of the work. The reproducible record "AS-BUILT" drawings shall have the Engineer's Name and Seal removed or blanked out and shall be clearly marked and signed on each sheet.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 PIPE, TUBE, AND FITTINGS

- A. Refer to individual Division 23 piping Sections for pipe, tube, and fitting materials and joining methods.
- B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.3 JOINING MATERIALS

- A. Refer to individual Division 23 piping Sections for special joining materials not listed below.
- B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
 - 1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated.
 - a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
 - b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.
 - 2. AWWA C110, rubber, flat face, 1/8 inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.
- C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.
- D. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.
- E. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
- F. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8, BAg1, silver alloy for refrigerant piping, unless otherwise indicated.
- G. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

2.4 TRANSITION FITTINGS

- A. Plastic-to-Metal Transition Fittings: PVC one-piece fitting with manufacturer's Schedule 80 equivalent dimensions; one (1) end with threaded brass insert, and one (1) solvent-cement-joint end.
 - 1. Manufacturers:
 - a. Eslon Thermoplastics.
- B. Plastic-to-Metal Transition Adaptors: One-piece fitting with manufacturer's SDR 11 equivalent dimensions; one end with threaded brass insert, and one solvent-cement-joint end.
 - 1. Manufacturers:
 - a. Thompson Plastics, Inc.
- C. Plastic-to-Metal Transition Unions: MSS SP-107, PVC four-part union. Include brass end, solvent-cement-joint end, rubber O-ring, and union nut.
 - 1. Manufacturers:
 - a. NIBCO INC.
 - b. NIBCO, Inc.; Chemtrol Div.

2.5 DIELECTRIC FITTINGS

- A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.
- B. Insulating Material: Suitable for system fluid, pressure, and temperature.

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- C. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 deg F.
1. Manufacturers:
 - a. Capitol Manufacturing Co.
 - b. Central Plastics Company.
 - c. Eclipse, Inc.
 - d. Epco Sales, Inc.
 - e. Hart Industries, International, Inc.
 - f. Watts Industries, Inc.; Water Products Div.
 - g. Zurn Industries, Inc.; Wilkins Div.
- D. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig minimum working pressure as required to suit system pressures.
1. Manufacturers:
 - a. Capitol Manufacturing Co.
 - b. Central Plastics Company.
 - c. Epco Sales, Inc.
 - d. Watts Industries, Inc.; Water Products Div.
- E. Dielectric-Flange Kits: Companion-flange assembly for field assembly. Include flanges, full-face- or ring-type neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.
1. Manufacturers:
 - a. Advance Products & Systems, Inc.
 - b. Calpico, Inc.
 - c. Central Plastics Company.
 - d. Pipeline Seal and Insulator, Inc.
 2. Separate companion flanges and steel bolts and nuts shall have 150- or 300-psig minimum working pressure where required to suit system pressures.
- F. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 deg F.
1. Manufacturers:
 - a. Calpico, Inc.
 - b. Lochinvar Corp.
- G. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225 deg F.
1. Manufacturers:
 - a. Perfection Corp.
 - b. Precision Plumbing Products, Inc.
 - c. Sioux Chief Manufacturing Co., Inc.
 - d. Victaulic Co. of America.

2.6 MECHANICAL SLEEVE SEALS

- A. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.
1. Manufacturers:
 - a. Advance Products & Systems, Inc.
 - b. Calpico, Inc.
 - c. Metraflex Co.
 - d. Pipeline Seal and Insulator, Inc.
 2. Sealing Elements: EPDM interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.

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3. Pressure Plates: Plastic Carbon steel Stainless steel. Include two (2) for each sealing element.
 4. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one (1) for each sealing element.

2.7 SLEEVES

- A. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.
- B. Steel Pipe: ASTM A53, Type E, Grade B, Schedule 40, galvanized, plain ends.
- C. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
- E. Underdeck Clamp: Clamping ring with set screws.
- F. Molded PVC: Permanent, with nailing flange for attaching to wooden forms.
- G. PVC Pipe: ASTM D1785, Schedule 40.
- H. Molded PE: Reusable, PE, tapered-cup shaped, and smooth-outer surface with nailing flange for attaching to wooden forms.

2.8 ESCUTCHEONS

- A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.
- B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.
- C. One-Piece, Cast-Brass Type: With set screw.
- D. Finish: Polished chrome-plated.
- E. Split-Casting, Cast-Brass Type: With concealed hinge and set screw.
- F. Finish: Polished chrome-plated.
- G. One-Piece, Stamped-Steel Type: With set screw and chrome-plated finish.
- H. Split-Plate, Stamped-Steel Type: With concealed set screw or spring clips, and chrome-plated finish.
- I. One-Piece, Floor-Plate Type: Cast-iron floor plate.
- J. Split-Casting, Floor-Plate Type: Cast brass with concealed hinge and set screw.

2.9 GROUT & FOUNDATION

- A. Description: ASTM C1107, Grade B, non-shrink and nonmetallic, dry hydraulic-cement grout.
 - 1. Characteristics: Post-hardening, volume-adjusting, non-staining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
 - 2. Design Mix: 5000-psi, 28-day compressive strength.
 - 3. Packaging: Premixed and factory packaged.
- B. Foundations and pads shall be constructed of reinforced concrete and shall be sized and reinforced as noted or detailed on the Drawings. As a minimum, pads shall be 6" thick, by width and length as required by item it is under, reinforced with 6 x 6 W2.9 x W2.9 Welded Wire mesh.
- C. Support attachments, unless otherwise noted on shown, shall be securely attached to the item's foundation, pad or building structure, per manufacturers recommendations and shall be approved by the Architect.

PART 3 - EXECUTION

3.1 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. Install piping according to the following requirements and Division 23 Sections specifying piping systems.
- B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
- C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.
- D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- F. Install piping to permit valve servicing.
- G. Install piping at indicated slopes.
- H. Install piping free of sags and bends.
- I. Install fittings for changes in direction and branch connections.
- J. Install piping to allow application of insulation.
- K. Select system components with pressure rating equal to or greater than system operating pressure.
- L. Install escutcheons for penetrations of walls, ceilings, and floors according to the following:
 - 1. New Piping:
 - a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.

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- b. Chrome-Plated Piping: One-piece, cast-brass type with polished chrome-plated finish.
 - c. Insulated Piping: One-piece, stamped-steel type with spring clips.
 - d. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass type with polished chrome-plated finish.
 - e. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, stamped-steel type.
 - f. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece or split-casting, cast-brass type with polished chrome-plated finish.
 - g. Bare Piping at Ceiling Penetrations in Finished Spaces: Split-plate, stamped-steel type with concealed hinge and set screw.
 - h. Bare Piping in Unfinished Service Spaces: One-piece, cast-brass type with polished chrome-plated finish.
 - i. Bare Piping in Unfinished Service Spaces: One-piece, stamped-steel type with concealed or exposed-rivet hinge and set screw or spring clips.
 - j. Bare Piping in Equipment Rooms: One-piece, cast-brass type.
 - k. Bare Piping in Equipment Rooms: One-piece, stamped-steel type with set screw.
 - l. Bare Piping at Floor Penetrations in Equipment Rooms: One-piece, floor-plate type.
- M. Sleeves are not required for core-drilled holes.
- N. Permanent sleeves are not required for holes formed by removable PE sleeves.
- O. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs.
- P. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.
- 1. Cut sleeves to length for mounting flush with both surfaces.
 - a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
 - 2. Install sleeves in new walls and slabs as new walls and slabs are constructed.
 - 3. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:
 - a. Steel Pipe Sleeves: For pipes smaller than NPS 6.
 - b. Steel Sheet Sleeves: For pipes NPS 6 and larger, penetrating gypsum-board partitions.
 - c. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level. Refer to Division 07 Section "Sheet Metal Flashing and Trim" for flashing.
 - d. Seal space outside of sleeve fittings with grout.
 - 4. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint. Refer to Division 07 Section "Joint Sealants" for materials and installation.
- Q. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- 1. Install steel pipe for sleeves smaller than 6 inches in diameter.
 - 2. Install cast-iron "wall pipes" for sleeves 6 inches and larger in diameter.
 - 3. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble

mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

- R. Underground, Exterior-Wall Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
 - 1. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
- S. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Refer to Division 07 Section "Penetration Firestopping" for materials.
- T. Verify final equipment locations for roughing-in.
- U. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

3.2 PIPING JOINT CONSTRUCTION

- A. Join pipe and fittings according to the following requirements and Division 23 Sections specifying piping systems.
- B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- D. Soldered Joints: Apply ASTM B813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B32.
- E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.
- F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - 1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
 - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- G. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.
- H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

3.3 PIPING CONNECTIONS

- A. Make connections according to the following, unless otherwise indicated:
 - 1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
 - 2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.
 - 3. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.
 - 4. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.4 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

- A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.
- B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
- C. Install HVAC equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.
- D. Install equipment to allow right of way for piping installed at required slope.
- E. Coordinate setting of equipment with the requirements of other trades so as to avoid conflicts and to insure compatibility. Equipment shall not block access for installation of other equipment.
- F. Set base mounted equipment on permanent and finished supports. Temporary support, if any, shall be removed prior to making final pipe, duct, or electrical connections to equipment.
- G. Adjust suspended equipment to final elevation prior to making pipe, duct or electrical connections.
- H. Exercise caution during equipment placing operations to ensure that structure is not overloaded.
- I. Do not move heavy equipment across floor or roof of insufficient load bearing capacity to support such equipment. Provide bracing or shoring as required, or use crane to place equipment directly on permanent and finished support.
- J. All exterior mechanical appliances and equipment that are exposed to wind, including package units, condensing units, fans, equipment casings, rooftop units, hold-downs, curbs, etc., (whether integral or loose), shall be designed and installed to resist wind pressures in accordance with the IBC wind load zone designated for the project. Provide calculations signed and sealed by a Texas licensed professional engineer establishing wind velocity pressure values for the specific project in accordance with ASCE-7 adopted by the IBC applicable to the project.
 - 1. Ultimate Wind Speed: 147 mph, 3-second gust.
 - 2. Exposure: B.
 - 3. Risk Category: III.

3.5 PAINTING

- A. Painting of HVAC systems, equipment, and components is specified in Division 09 Sections "Interior Painting" and "Exterior Painting."
- B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.6 CONCRETE BASES

- A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions.
 - 1. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit.
 - 2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of the base.
 - 3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
 - 4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 5. Install anchor bolts to elevations required for proper attachment to supported equipment.
 - 6. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
 - 7. Use 3000-psi, 28-day compressive-strength concrete and reinforcement as specified in Division 03 Section "Cast-in-Place Concrete Miscellaneous Cast-in-Place Concrete."

3.7 ERECTION OF METAL SUPPORTS AND ANCHORAGES

- A. Refer to Division 05 Section "Metal Fabrications" for structural steel.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor HVAC materials and equipment.
- C. Field Welding: Comply with AWS D1.1.

3.8 ERECTION OF WOOD SUPPORTS AND ANCHORAGES

- A. Cut, fit, and place wood grounds, nailers, blocking, and anchorages to support, and anchor HVAC materials and equipment.
- B. Select fastener sizes that will not penetrate members if opposite side will be exposed to view or will receive finish materials. Tighten connections between members. Install fasteners without splitting wood members.
- C. Attach to substrates as required to support applied loads.

3.9 GROUTING

- A. Mix and install grout for HVAC equipment base bearing surfaces, pump and other equipment base plates, and anchors.
- B. Clean surfaces that will come into contact with grout.
- C. Provide forms as required for placement of grout.

- D. Avoid air entrapment during placement of grout.
- E. Place grout, completely filling equipment bases.
- F. Place grout on concrete bases and provide smooth bearing surface for equipment.
- G. Place grout around anchors.
- H. Cure placed grout.

END OF SECTION 23 05 00