

## SECTION 15000 – BASIC MECHANICAL REQUIREMENTS

Project Number        14-5006-39

Project Title            Kansas City Area Transportation Authority  
Service Line Reversal (FOR INFORMATION ONLY)

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to Work of this Section.
- B. This Section is a Division 15 Basic Mechanical Requirements Section, and is a part of each Division 15 section making reference to mechanical related Work specified herein.

## 1.2 DESCRIPTION OF WORK:

- A. Furnish all labor, equipment, supplies, and materials for complete mechanical, plumbing, and fire protection systems. All Work shall be in strict accordance with the specifications and drawings.
- B. Unless otherwise specified, provide wire, raceway systems, 24 volt DC and/or 24 volt AC power supplies, 120 volt AC power supplies, interlock wiring, and final connections to temperature control components provided by this contract.

## 1.3 WORK SPECIFIED IN OTHER SECTIONS:

- A. Concrete pads for mechanical Work.
- B. Excavation and backfill for mechanical Work.
- C. Painting for mechanical work, except as specified in this section.

## 1.4 COORDINATION OF WORK:

- A. Coordinate all Work with other trades and existing conditions to prevent conflicts. When conflicts arise, remove and relocate items causing such conflicts at no additional cost to the Owner.
- B. Provide a job site representative whenever necessary to coordinate Work with others.

- C. Refer to other discipline's drawings, relevant equipment drawings, and shop drawings to determine available clearances and possible obstructions. Make necessary offsets or transitions as required to clear structural members and existing equipment.
- D. Division 15 Contractors shall be responsible for all resultant costs incurred for changes required to accommodate actual equipment furnished when the equipment has characteristics differing from that specified or shown on the drawings.
- E. Electrical Work: Furnish all electrical devices in association with mechanical equipment including but not limited to motors, relays, pressure and temperature control devices, and all motor starters, controls, or protective devices factory wired and installed as an integral part of the equipment. Division 16 shall furnish and install all disconnect switches, start-stop stations and motor starters which are not furnished as an integral part of the equipment and which are not specified or indicated to be furnished by Division 15. Division 16 shall also install all power wiring, miscellaneous controls, control wiring, and interlock wiring when specifically shown on the electrical drawings.

#### 1.5 QUALITY ASSURANCE:

- A. All Work shall be performed by craftsman normally engaged in the respective craft required for each installation.
- B. Qualify welding and brazing processes and operators for piping systems in accordance with ASME Boiler and Pressure Vessel Code, Section IX "Welding & Brazing Qualification. Qualify welding processes and welding operators for miscellaneous supports in accordance with AWS D1.1 "Structural Welding Code-Steel". Each welder shall have satisfactorily passed AWS qualification test for welding processes involved and their certification shall be current.

#### 1.6 FEES, PERMITS, AND INSPECTIONS:

- A. Provide all fees and permits that are required in connection with this Work.
- B. Secure all inspections as required by the authorities having jurisdiction.
- C. Where applications are required for procuring of services for the building, prepare and file such application. Furnish all information required in connection with the application in the form required by the utility company and/or municipal department.

#### 1.7 APPLICABLE CODES AND STANDARDS:

- A. All Work shall comply with all applicable laws, codes, recommendations, regulations, and interim amendments of the governmental bodies having jurisdiction.
- B. All Work shall be performed in compliance with all applicable and governing regulations, including OSHA regulations.

- C. A reference to technical society, organization, or body in the specification is in accordance with the following abbreviations, and all Work shall be performed, as a minimum, in accordance with the latest edition of their publications:

1.	ADC	Air Diffusion Council
2.	AMCA	Air Moving and Conditioning Association, Inc.
3.	ANSI	American National Standards Institute
4.	ARI	American Refrigeration Institute
5.	ASTM	American Society for Testing and Materials
6.	ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc.
7.	ASME	American Society of Mechanical Engineers
8.	AABC	Associated Air Balance Council
9.	BOCA	Building Officials & Code Administrators International, Inc.
10.	CISPI	Cast Iron Soil Pipe Institute
11.	ETL	Environmental Testing Labs
12.	FIA	Factory Insurance Association
13.	FM	Factory Mutual Laboratories
14.	IAPMO	International Association of Plumbing and Mechanical Officials
15.	IEEE	Institute of Electrical and Electronics Engineers, Inc.
16.	MSS	Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.
17.	NEMA	National Electrical Manufacturer's Association
18.	NEBB	National Environmental Balancing Bureau
19.	NFPA	National Fire Protection Association
20.	NRCA	National Roofing Contractors Association
21.	NSF	National Sanitation Foundation
22.	OSHA	Occupational Safety & Health Administration
23.	SMACNA	Sheet Metal and Air Conditioning Contractors National Association, Inc.
24.	SSPMA	Sump and Sewage Pump Manufacturer's Association
25.	IBC	International Building Code
26.	UL	Underwriters' Laboratories, Inc.

- D. All Work shall comply with rules and regulations of utilities and/or municipal departments affected by connections of services.
- E. Should these specifications and/or drawings conflict with the building codes, standards, laws, ordinances, utility company rules and regulations, etc., the more stringent requirements shall take precedence. Notify the Architect/Engineer immediately with all conflicts.

#### 1.8 SUBSTITUTIONS:

- A. The materials, products, and equipment described in the specifications or on the drawings establish a standard of required function, dimension, appearance, and quality to be met by any proposed substitution.
- B. Reference to any article, device, product, material, fixture, form, or type of construction by name, make, or catalog number, shall be interpreted as having established a standard of quality and shall not be construed as limiting competition. Articles, fixtures, etc. of equal quality by manufacturers listed in this specification for the applicable use,

shall be acceptable, subject to spatial, structural and electrical constraints of the project design.

- C. No substitution will be considered unless written request for approval has been received by the Architect/Engineer at least five working days prior to the date for receipt of Bids. Each request shall include the name of the material or equipment for which it is to be substituted and complete description of the proposed substitute including shop drawings, performance and test data, and other information necessary for an evaluation. Include a statement setting forth changes in other materials, equipment, or Work that incorporation of the proposed substitute would require. The burden of proof of the merit of the proposed substitute is on the proposer. The Engineer's approval or disapproval of a proposed substitution shall be final.
- D. Approval of a proposed substitution prior to receipt of Bids shall be set forth in an Addendum. Approvals made in all other manner shall not be considered binding.

#### 1.9 SUBMITTALS:

- A. Submit shop drawings and product data as specified in Division 1. Engineer shall retain one copy of each submittal.
- B. Each submittal shall include a letter indicating all deviations from the drawings and specifications.
- C. Checking of shop drawings is a gratuitous assistance by the Engineer and shall not relieve the contractor of responsibility for deviations, errors, or omissions that may exist in the shop drawings. Shop drawings submitted and rejected more than two times due to incomplete data or unacceptable material shall be reviewed by the Engineer as an additional cost to Division 15 Contractors at \$75.00 per hour, two hours minimum.
- D. Shop drawing submittals shall include the following for each piece of equipment and material, as applicable:
  - 1. Product data listing manufacturer, model number, materials, accessories, and miscellaneous data as required to describe the equipment.
  - 2. Capacity, pressure drops, rpm, motor horsepower, and other miscellaneous data to quantify size of equipment.
  - 3. Dimensional drawings showing layout, connection points and sizes, weights, etc.
  - 4. Wiring diagrams, including power and control wiring. Distinguish between factory and field wiring.
  - 5. Parts list.
  - 6. Installation and maintenance manuals.
  - 7. Warranty statement.
- E. The following information shall be submitted in accordance with this section.
  - 1. Detailed drawings of fabrication and installation for metal fabrications, supports, and anchorage for mechanical materials and equipment.
  - 2. Coordination schedule for access door locations, sizes, and types.
  - 3. Welder certifications.

- F. At Contractor's option, ductwork and hydronic piping shop drawings may be prepared electronically. Engineer shall prepare electronic background drawings for the Contractor at Contractor's request. A charge of \$50.00 per request shall be paid by Contractor prior to receiving electronic files. Contractor shall coordinate shop drawings with other trade's shop drawings, and indicate all required offsets or changes. On completion of the project, the Contractor shall furnish the edited electronic shop drawings to the Engineer.
- G. Refer to individual Division 15 sections for additional requirements.

#### 1.10 COORDINATION DRAWINGS

- A. A single set of coordination drawings shall be mutually prepared by all mechanical and electrical trades.
- B. The initiation of these drawings begins with the sheet metal subcontractor.
- C. The Sheetmetal Subcontractor shall prepare a complete set of background drawings at scale not less than  $\frac{1}{4}$ " equals 1'-0", showing structure and other information as needed for coordination. He shall show sheetmetal layout thereon. These will be the Coordination Drawings.
- D. Each of the mechanical, electrical and other specialty trades shall add its work to these background drawings with appropriate elevations and grid dimensions. Specialty trade information is required for fan rooms and mechanical rooms, horizontal exits from duct shafts, crossovers, and for spaces in and above ceilings where congestion of work may occur such as corridors, and even entire floors. Drawings shall indicate horizontal and vertical dimensions, to avoid interference with structural framing, ceilings, partitions, and other services.
- E. Each specialty trade shall sign and date each coordination drawing. Return drawings to the Sheetmetal Subcontractor, who shall route them sequentially to all specialty trades.
- F. Where conflicts occur with placement of materials of various trades, the Sheetmetal Subcontractor will be responsible to coordinate the available space to accommodate all trades. Any resulting adjustments shall be initialed and dated by the specialty trade. The Sheetmetal Subcontractor shall then final date and sign each drawing. If he cannot resolve conflicts, the decision of the General Contractor/Construction Manager shall be final.
- G. A Subcontractor who fails to promptly review and incorporate his work on the drawings shall assume full responsibility of any installation conflicts affecting his work and of any schedule ramifications.
- H. Sheetmetal Subcontractor shall assimilate all coordination drawings. Fabrication shall not start until the completed coordination drawings are received by the Architect/Engineer and have been reviewed.
- I. Review of coordination drawings shall not diminish responsibility under this Contract for final coordination of installation and maintenance clearances of all systems and equipment with Architectural, Structural, Mechanical, Electrical and other work.

J. After Review:

1. After review of coordination drawings, the method used to resolve interferences not previously identified shall be as in "MODIFICATIONS IN LAYOUT", this section of specification.
2. All changes to reviewed coordination drawings shall be in writing by the Architect/Engineer prior to start of work in affected area.

K. Distribution of Coordination Drawings:

1. The Sheetmetal Subcontractor shall provide the following distribution of documents:
  - a. One print of each Coordination Drawing to each specialty trade and affected Contractor for their use.
  - b. One print of each coordination drawing to General Contractor/Construction Manager.

L. All firewalls and smoke partitions must be highlighted on the coordination drawings for appropriate coordination.

M. The main paths of egress and for equipment removal, from main mechanical and electrical rooms must be clearly shown on the coordination drawings.

N. Coordination drawings shall include, but are not limited to:

1. Plumbing systems, piping and equipment.
2. HVAC piping, systems and equipment.
3. Control systems.
4. Electrical distribution, systems and equipment.
5. Lighting systems and fixtures.
6. Sheet metal work, components and accessories, costs, boxes in terminals, etc.
7. Fire protection and sprinkler system, piping and heads.
8. Structural.
9. Electrical Equipment Room layouts.
10. Environmental Rooms and Associated Refrigeration/Heating Systems.
11. Partition/room layout
12. Ceiling tile and grid.
13. Access panels.
14. Smoke and fire dampers.
15. Roof drain piping.
16. Major electrical conduit runs, panelboards, feeder conduit and racks of branch conduit.
17. Above ceiling miscellaneous metal.
18. Heat tracing of piping.

1.11 WARRANTIES:

- A. Materials and equipment furnished shall operate and perform as designed with respect to efficiencies, capacities and quietness, for one year from substantial completion. Provide all services required to repair or replace, at no additional cost, defective parts of the installation resulting from the supply of faulty workmanship or material. These

services shall be furnished within 24 hours of initial report of the defect. Lack of maintenance, accidents, or carelessness on the part of the Owner shall not be included in this warranty.

- B. Provide additional warranties and warranty extensions as identified in individual Division 15 Sections.

#### 1.12 RECORD DRAWINGS:

- A. Record drawings shall be kept and prepared in accordance with Division 1 and as specified herein.
  - 1. A complete "Record" set of blueline prints shall be kept at the project site and shall be corrected daily to show all changes in layout from the original drawings and specifications. This "Record" set shall be used for this purpose only. On completion of the project, two new sets of blueline prints shall be obtained and all changes noted on the field Record set shall be neatly transferred (in red pencil) to the two new sets of prints.
  - 2. At Contractor's option, record drawings may be prepared electronically. Engineer shall prepare electronic background drawings for the Contractor at Contractor's request. A charge of \$50.00 per request shall be paid by Contractor prior to receiving electronic files. Electronic record drawings shall be maintained at the project site and shall be updated daily to show all changes in layout from the original drawings. On completion of the project, the Contractor shall furnish the edited electronic record drawings to the Engineer.
- B. Indicate actual locations of installed equipment, and actual routing of ducts and piping.
- C. Indicate locations of all capped pipes by two dimensions and depth below grade.
- D. Indicate actual manufacturers and model numbers of installed equipment on equipment schedules.
- E. The Architect/Engineer will not certify the accuracy of the Record Drawings. This is the sole responsibility of the Contractor.

#### 1.13 OPERATION AND MAINTENANCE MANUALS:

- A. During the course of construction, collect and compile three (3) sets of operating instructions, wiring diagrams, catalog cuts, lubrication and preventive maintenance instructions, parts lists, etc. for all equipment furnished under this contract. All literature including warranties shall be included in the Operation and Maintenance Manuals.
- B. All literature and instructions shipped with the equipment shall be included in the Operation and Maintenance Manuals.
- C. At completion of Work, and prior to request for final inspection, submit Operation and Maintenance Manuals to Architect in accordance with Division 1 and as specified herein. Manuals shall be bound in heavy duty, three-ring, vinyl covered, hard-backed binder, with clear plastic pocket on spine and cover. Use pocket folders for folded sheet

information. Spine and cover of each binder shall have the following typewritten lettering inserted:

**OPERATION AND MAINTENANCE MANUAL  
FOR MECHANICAL SYSTEMS OF  
"KANSAS CITY AREA TRANSPORTATION AUTHORITY  
SERVICE LINE REVERSAL"**

- D. Operation and Maintenance Manuals shall include the following:
1. Provide a master index at beginning of Manual listing all items included. Use plastic tab indexes for each section of Manual.
  2. Provide a directory, listing the name, address, and phone number of Architect, Mechanical and Electrical Engineers, General Contractor, and all Subcontractors.
  3. Provide a directory, listing all equipment installed, and indicating the name, address, and phone number of each supplier.
  4. Provide a section for each system, which shall include the following:
    - a. General description of each system.
    - b. Schematic diagrams for each system. Each diagram shall indicate locations of starters, thermostats, thermometers, pressure gauges, valves, etc. Correct setting for each control instrument shall be indicated on these diagrams.
  5. Provide a section for each piece of equipment which shall include the following:
    - a. Manufacturer's catalog data indicating capacity, size, etc., by underlining the applicable data.
    - b. Manufacturer's installation and maintenance manuals.
    - c. Performance curves for fans, etc.
    - d. Lubrication schedule, indicating type and frequency of lubrication required.
    - e. Recommended list of spare parts to be stocked for preventive maintenance.
    - f. Equipment parts identification list for repair and replacement purposes.
    - g. Wiring diagram for the specific piece of equipment. Generalized wiring diagrams are not acceptable.
    - h. Copies of completed warranty certificates.
    - i. Temperature control system diagrams, identifying individual components and their location. Sequence of operation shall be included with diagram. Temperature control diagrams may be incorporated with system schematic diagrams.
  6. Provide a copy of the certified test and balance report.
  7. Provide a copy of each approved shop drawing.
  8. Provide a schedule of valves and dampers with their identification number, pertinent data, and location.

**1.14 SYSTEM DEMONSTRATIONS:**

- A. After systems have been tested, balanced, and placed in proper working order, but before final acceptance of the mechanical systems, demonstrate the systems to the Owner. All features and functions of all systems shall be explained and the Owner shall be instructed in proper operation and maintenance of the equipment and systems.



- B. Instruct Owner in the maintenance procedures to drain and protect water systems from freezing during winter conditions.
- C. Coordinate the dates and times for performing the demonstrations with the Owner.
- D. Upon completion of demonstrations, submit a certificate certifying the demonstrations have been completed. Certificate shall list each system demonstrated, dates demonstrations were performed, and names of personnel in attendance. Certificate shall be signed by the Contractor and the Owner.

#### 1.15 MAINTENANCE MATERIALS:

- A. All special tools provided by the manufacturer for installation or maintenance of the equipment shall be delivered to the Owner before final acceptance.

#### 1.16 TEMPORARY HEATING AND COOLING:

- A. Provide complete and frequent periodic maintenance of heating and cooling equipment and associated peripheral equipment, in accordance with the manufacturer's requirements, should it be used for heating or cooling purposes prior to substantial completion. This includes filter changes, water treatment chemicals, lubrication, etc.
- B. Any damage to the equipment, or damage to any part of the facility, resulting from temporary operation of the equipment shall be the responsibility of the Contractor.
- C. Use of the equipment for temporary heating and cooling shall not affect the starting date of the one-year warranty and service requirements specified elsewhere in the specifications. At substantial completion, all equipment shall be clean and in like new condition. Replace all filters with clean, unused filters as specified.

#### 1.17 DISCREPANCIES IN DOCUMENTS:

- A. Where drawings or specifications conflict or are unclear, advise Architect in writing before Award of Contract. Otherwise, the Architect/Engineer's interpretation of Contract Documents shall be final, and no additional compensation shall be permitted due to discrepancies or unclarities thus resolved.
- B. Where drawings or specifications do not coincide with manufacturer's installation instructions, or with applicable codes and standards, alert Architect/Engineer in writing before installation. Otherwise, make changes in installed work as Architect/Engineer requires within Contract Price.
- C. If the required material, installation, or work can be interpreted differently from drawing to drawing, or between drawings and specs, this contractor shall provide that material, installation, or work is of the higher standard.
- D. It is the requirement of these contract documents to have the contractor provide systems and components that are fully complete and operational and fully suitable for the intended use. There may be situations in the documents where insufficient information

exists to precisely describe a certain component or subsystem, or the routing of a component or its coordination with other building elements. In cases such as this, where the contractor has failed to notify the Architect/Engineer of the situation in accordance with Paragraph (A) above, the contractor shall provide the specific component or subsystem with all parts necessary for the intended use, fully complete and operational, and installed in workmanlike manner either concealed or exposed per the design intent.

- E. In cases covered by Paragraph (D) above, where the contractor believes he needs engineering guidance, he shall submit a sketch identifying his proposed solution and the Architect shall review, note if necessary, and approve the sketch.

#### 1.18 MODIFICATIONS IN LAYOUT:

- A. HVAC, Plumbing, Fire Protection, and Electrical drawings are diagrammatic. They indicate general arrangements of mechanical and electrical systems and other work. They do not show all offsets required for coordination nor do they show the exact routings and locations needed to coordinate with structural and other trades and to meet Architectural requirements.
- B. In order to obtain the Architect's desired esthetics in spaces used by building occupants, in all such spaces, prior to installation of visible material and equipment (including access panels) review Architectural drawings for desired locations and where not definitely indicated, request information from Architect.
- C. Check Contract Drawings as well as shop drawings of all subcontractors to verify and coordinate spaces in which work of this section will be installed.
- D. Maintain maximum headroom at all locations. All piping, duct, conduit, and associated components to be as tight to underside of structure as possible.
- E. Make reasonable modifications in layout and components needed to prevent conflict with work of other trades and to coordinate according to Paragraphs A, B, C, D above. Systems shall be run in a rectilinear fashion.
- F. Where conflicts or potential conflicts exist and engineering guidance is desired, submit sketch of proposed resolution to Architect/Engineer for review and approval.

#### 1.19 RFI'S

- A. If the RFI is a request to resolve a conflict or an unclarity, or a request for additional detail, Contractor's RFI shall include a sketch or equivalent description of Contractor's proposed solution, in accordance with Paragraphs 1.17 (E) and 1.18 (F) above.

#### 1.20 PRE-ORDERED PRODUCTS:

- A. General: The Owner may negotiate purchase orders with suppliers of material and equipment to be incorporated into the Work to facilitate the project schedule. The contractor shall include the cost of equipment to the Owner, profit, costs of receiving, off-loading, handling, storage off-site if necessary, installation, and warranty of these items.

The contractor shall be fully responsible for storage and protection of all pre-ordered products.

- B. The Contractor's responsibilities are the same as if the Contractor ordered these products, including warranty administration.
- C. A "Schedule of Pre-Ordered Products" is included at the end of this Section.

## PART 2 - PRODUCTS

### 2.1 MATERIALS:

- A. Unless otherwise approved in writing, all materials furnished under this specification shall be new and shall be standard products of manufacturers regularly engaged in the production of such equipment, and shall be the manufacturer's latest design.
- B. Equipment of any one type shall be by one manufacturer unless specifically indicated otherwise.
- C. All belt or chain drives, fan blades, coupling, and other moving or rotating parts shall be covered on all sides with safety guards as required by OSHA. Each guard shall be designed for easy installation and removal. All necessary supports and accessories shall be provided for each guard. Safety guards shall be designed to allow adequate ventilation of belts, etc. to prevent overheating.

### 2.2 MECHANICAL EQUIPMENT NAME PLATES:

- A. General: For each piece of mechanical equipment, provide a permanent operational data name plate indicating manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of testing agencies, and similar essential data.
- B. Location: Locate nameplates in an accessible location.

### 2.3 MISCELLANEOUS METALS:

- A. Steel plates, shapes, bars, and bar grating: ASTM A 36.
- B. Cold-Formed Steel Tubing: ASTM A 500.
- C. Hot-Rolled Steel Tubing: ASTM A 501.
- D. Steel Pipe: ASTM A 53, Schedule 40, welded.
- E. Fasteners: Zinc-coated or cadmium plated, type, grade, and class as required.

### 2.4 MISCELLANEOUS LUMBER:

- A. Framing Materials: Standard Grade, light-framing-size lumber of any species. Number 3 Common or Standard Grade boards complying with Western Wood Products Association (WWPA) or West Coast Lumber Inspection Bureau (WCLIB) rules. Lumber shall be preservative pressure treated in accordance with American Wood Preservers Bureau (AWPB) LP-2, and kiln dried to a moisture content of not more than 19 percent.

## 2.5 CONCRETE:

- A. Portland cement shall conform to ASTM C-150, Type I or II as specified in Division 3.
- B. Non-shrink, Nonmetallic Grout: Premixed, factory-packaged, non-staining, non-corrosive, nongaseous grout, recommended for interior and exterior applications, and as specified in Division 3.

## 2.6 ACCESS DOORS:

- A. Manufacturers: Subject to compliance with requirements, provide access doors by one of the following:
  - 1. J.L. Industries.
  - 2. Karp Associates, Inc.
  - 3. Milcor Div. Inryco, Inc.
- B. Steel Access Doors and Frames: Factory-fabricated and assembled units complete with attachment devices and fasteners ready for installation. Joints and seams shall be continuously welded steel, with welds ground smooth and flush with adjacent surfaces.
- C. Frames: 16-gage steel, with suitable means of anchoring frame to wall construction. Provide a 1" wide exposed perimeter flange for units installed in unit masonry, pre-cast concrete, cast-in-place concrete, ceramic tile, or wood paneling. Provide units with perforated flanges and wallboard bead for installation in gypsum wallboard or plaster.
- D. Doors: Flush panel, 14-gage sheet steel, with concealed spring hinges or concealed continuous piano hinge set to open 175 degrees. Provide screwdriver activated locking device. Finish shall be factory applied prime cost.
- E. Fire-Rated Units: Self-closing mechanism and UL rated for the installation encountered. Provide UL label on each fire-rated access door.

## 2.7 FIRE STOP MATERIALS

- A. Manufacturers: Subject to compliance with requirements, provide fire stop materials by one of the following:
  - 1. International Protective Coatings Corp.
  - 2. Specified Technologies, Inc.
  - 3. 3M Company, Inc.
  - 4. Rector Seal
  - 5. Hilti, Inc.

- B. Fire Resistant Sealants: One-part elastomeric sealant or two-part foamed-in-place silicone sealant, formulated for use in through-penetration fire-stopping around cables, conduit, pipes, and duct penetrations through fire-rated walls and floors. Sealants and accessories shall have fire resistance ratings as required for the installation. Fire ratings for the sealants shall be as established by testing identical assemblies in accordance with ASTM E 814, by UL, or other testing and inspection agency acceptable to authorities having jurisdiction.
- C. Fire Safing: Mineral wool or ceramic fiber material manufactured for the specific purpose of fire safing.
- D. Cast-in place firestop devices equivalent to Hilti CP680 may be used for vertical penetrations for piping and sleeves.

### PART 3 - EXECUTION

#### 3.1 WORKMANSHIP:

- A. All Work shall be performed by experienced mechanics in accordance with first class practice, and the Work shall be neat in appearance and complete to perform the intended function.

#### 3.2 INSPECTION:

- A. Examine areas and conditions under which the mechanical systems and equipment are to be installed. Do not proceed with Work until unsatisfactory conditions have been corrected.

#### 3.3 ROUGH-IN:

- A. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.
- B. Refer to equipment specifications in Divisions 2 through 16 for rough-in requirements.

#### 3.4 SAFETY:

- A. Provide warning lights, signs, and guards for safety as required.
- B. Safety of personnel on the project site shall be the responsibility of all divisions. Comply with all local, state, and federal regulations for safety.

#### 3.5 HOUSEKEEPING:

- A. The premises shall be kept broom clean at all times.

- B. Stocks of material and equipment stored on the premises shall be stored in a neat and orderly manner in their shipping containers. Material and equipment shall be protected as recommended by the manufacturer.
- C. Remove all waste material present as a result of mechanical Work from the premises.
- D. Exposed surfaces of ductwork, piping, and equipment shall be cleaned of all dirt, plaster, labels, fabrication marks, concrete, etc. before final acceptance of the Work.
- E. Finish and cleaning: At the completion of the Work, the following shall be completed:
  - 1. The entire system of ductwork, piping, and equipment shall be cleaned internally. For piping, open all dirt pockets and strainers, and clean strainer screens of all accumulated debris. For ductwork, open all access doors and remove all loose material. Replace all filters with new filters at time of final acceptance.
  - 2. All tanks, fixtures, and pumps shall be drained and proven free of sludge and accumulated matter.
  - 3. All temporary labels, stickers, etc., shall be removed from all fixtures and equipment. (Permanent name plates, equipment model numbers, ratings, etc. shall not be removed).
  - 4. Clean all material and equipment installed. Dirt, dust, plaster, stains, and foreign matter shall be removed from all surfaces. Damaged finishes shall be touched-up and restored to original condition.

### 3.6 SCAFFOLDING AND HOISTING:

- A. Furnish all scaffolding and hoisting required for the Work of Division 15.

### 3.7 CUTTING AND PATCHING:

- A. Cutting and patching shall be performed in accordance with Division 1 and as specified herein.
- B. No structural members shall be cut, drilled, or penetrated without prior approval from the Architect.
- C. Coordinate the placing of the openings in new structures as required for the installation of mechanical Work.
- D. Furnish accurate locations and sizes of required openings for the mechanical systems to the appropriate personnel. This shall not relieve the Division 15 Contractor of the responsibility of checking to assure that proper size openings are provided. When additional patching is required due to failure to inspect this Work, the Division 15 Contractor shall be responsible for the patching required to properly close the openings.
- E. When cutting and patching of the structure is made necessary due to failure to install piping, sleeves, or equipment on schedule, or due to the failure to furnish, on schedule, the information required for the leaving of openings, then the Division 15 Contractor shall be responsible for the cutting and patching required.

- F. All roofing Work in new structures shall be performed under Division 7. Coordinate as required.

### 3.8 PROTECTION OF WORK:

- A. All pipe and duct openings shall be kept closed by means of plugs or caps to prevent the entrance of foreign matter.
- B. Special care shall be taken for the protection of equipment. All equipment and material shall be completely protected from weather, moisture, dust, paint, plaster, etc. until the project is completed. Damage from rust, paint, scratches, etc. shall be repaired as required to restore equipment to original condition.
- C. Protection of equipment during plastering and painting shall be the responsibility of others, but this shall not relieve Division 15 from the responsibility of checking to assure that adequate protection is provided.
- D. Where the installation or connection of equipment requires Work in areas previously finished, Division 15 shall be responsible that such areas are protected and are not marred, soiled, or otherwise damaged. Repairing and refinishing damaged areas shall be the responsibility of Division 15 and shall be approved by the Architect.
- E. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent finished areas.
- F. All trenches and pits shall be maintained on a continuous basis, free of water for protection of Work.
- G. Protect floor drains during construction and cleaning to avoid clogging with dirt and debris.

### 3.9 ERECTION OF SUPPORTS AND ANCHORAGE:

- A. Metal: Cut, fit, and place miscellaneous metal fabrications accurately in location, alignment, and elevation as required to support and anchor mechanical materials and equipment.
  - 1. Field Welding: Comply with AWS "Structural Welding Code."
  - 2. Select fastener sizes that will not penetrate members where opposite side will be exposed to view, will receive finish materials, or may damage other surfaces, such as roofing. Make tight connections between members.
- B. Wood: Cut, fit, and place wood supports, nailers, and blocking accurately in location, alignment, and elevation where indicated on the drawings to support and anchor mechanical materials and equipment.
  - 1. Select fastener sizes that will not penetrate members where opposite side will be exposed to view, will receive finish materials, or may damage other surfaces, such as roofing.
  - 2. Make tight connections between members.

- 3. Install fasteners without splitting wood members.
- C. Attach anchors and fasteners to building structure as required to support applied loads.

### 3.10 APPLICATION OF SEALANTS:

- A. Install sealant as required by manufacturer's printed instructions.
- B. Installation of Fire-Stopping Sealant: Install sealant, including forming, packing, and other accessory materials, to fill openings around mechanical services penetrating floors and walls, to provide fire-stops with fire-resistance ratings indicated for floor or wall assembly in which penetration occurs. Comply with installation requirements established by testing and inspecting agency.

### 3.11 INSTALLATION OF ACCESS DOORS:

- A. Furnish access doors as required for access to concealed equipment, valves, dampers, controls, etc.
- B. Equipment above lay-in ceilings shall not require an access door in the ceiling.

### 3.12 PAINTING:

- A. Equipment with damaged finishes shall be repainted to match the original factory finish.
- B. All exposed ferrous metal including exposed threads on pipe, and welds furnished by Division 15, such as hangers, struts, structural steel, etc., shall be primed as specified in Division 9.

END OF SECTION 15000