SECTION 15050 - BASIC MECHANICAL MATERIALS AND METHODS

PART 1 - GENERAL

SUMMARY

This Section includes the following:

- Piping materials and installation instructions common to most piping systems.
- Dielectric fittings.
- Mechanical sleeve seals.
- Sleeves.
- Escutcheons.
- Grout.
- Mechanical demolition.
- Equipment installation requirements common to equipment sections.
- Supports and anchorages.

DEFINITIONS

Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.

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.

QUALITY ASSURANCE

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

Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

- Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
- Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

Electrical Characteristics for Mechanical 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.

PART 2 - PRODUCTS

PIPE, TUBE, AND FITTINGS

Refer to individual Division 15 piping Sections for pipe, tube, and fitting materials and joining methods.

Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

JOINING MATERIALS

Refer to individual Division 15 piping Sections for special joining materials not listed below.

Pipe-Flange Gasket Materials: ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch (3.2-mm) maximum thickness unless thickness or specific material is indicated.

Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

Brazing Filler Metals: AWS A5.8, BCuP Series or BAg1, unless otherwise indicated.

Welding Filler Metals: Comply with AWS D10.12.

Solvent Cements for Joining Plastic Piping:

ABS Piping: ASTM D 2235.
CPVC Piping: ASTM F 493.
PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
PVC to ABS Piping Transition: ASTM D 3138.

DIELECTRIC FITTINGS

Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.

Insulating Material: Suitable for system fluid, pressure, and temperature.

Dielectric Unions: Factory-fabricated, union assembly, for 250-psig (1725-kPa) minimum working pressure at 180 deg F (82 deg C).

Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig (1035- or 2070-kPa) minimum working pressure as required to suit system pressures.

Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig (2070-kPa) minimum working pressure at 225 deg F (107 deg C).

Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig (2070-kPa) minimum working pressure at 225 deg F (107 deg C).

MECHANICAL SLEEVE SEALS

Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.

Sealing Elements: EPDM interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.

Pressure Plates: Carbon steel. Include two for each sealing element.

Connecting Bolts and Nuts: Carabon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

SLEEVES

Galvanized-Steel Sheet: 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint.

Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.

Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

Molded PVC: Permanent, with nailing flange for attaching to wooden forms.

PVC Pipe: ASTM D 1785, Schedule 40.

Molded PE: Reusable, PE, tapered-cup shaped, and smooth-outer surface with nailing flange for attaching to wooden forms.

ESCUTCHEONS

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.

One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.

One-Piece, Cast-Brass Type: With set screw.

Finish: [Polished chrome-plated] [Rough brass] [Polished chrome-plated and rough brass].

Split-Casting, Cast-Brass Type: With concealed hinge and set screw.

Finish: [Polished chrome-plated] [Rough brass] [Polished chrome-plated and rough brass].

GROUT

Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.

Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.
Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

MECHANICAL DEMOLITION

Refer to Division 1 Sections "Cutting and Patching" and "Selective Demolition" for general demolition requirements and procedures.

Disconnect, demolish, and remove mechanical systems, equipment, and components indicated to be removed.

Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material.
Equipment to Be Removed: Disconnect and cap services and remove equipment.
Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.

If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

PIPING SYSTEMS - COMMON REQUIREMENTS

Install piping according to the following requirements and Division 15 Sections specifying piping systems.

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.

Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

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.

Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

Install piping to permit valve servicing.

Install piping at indicated slopes.

Install piping free of sags and bends.

Install fittings for changes in direction and branch connections.

Install piping to allow application of insulation.

Select system components with pressure rating equal to or greater than system operating pressure.

Install escutcheons for penetrations of walls, ceilings, and floors.

Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.

Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.

Install steel pipe for sleeves smaller than 6 inches (150 mm) in diameter.
Install cast-iron "wall pipes" for sleeves 6 inches (150 mm) and larger in diameter.
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.

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 (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.

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.

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 7 Section "Through-Penetration Firestop Systems" for materials.

Verify final equipment locations for roughing-in.

Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

PIPING JOINT CONSTRUCTION

Join pipe and fittings according to the following requirements and Division 15 Sections specifying piping systems.

Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

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.

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:

Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
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.

Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.

Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

Comply with ASTM F 402, for safe-handling practice of cleaners, primers, and solvent cements.
ABS Piping: Join according to ASTM D 2235 and ASTM D 2661 Appendixes.
CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
PVC Nonpressure Piping: Join according to ASTM D 2855.
PVC to ABS Nonpressure Transition Fittings: Join according to ASTM D 3138 Appendix.

Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.

Plastic Nonpressure Piping Gasketed Joints: Join according to ASTM D 3212.

PE Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.

Plain-End Pipe and Fittings: Use butt fusion.
Plain-End Pipe and Socket Fittings: Use socket fusion.

Fiberglass Bonded Joints: Prepare pipe ends and fittings, apply adhesive, and join according to pipe manufacturer's written instructions.

PIPING CONNECTIONS

Make connections according to the following, unless otherwise indicated:

Install unions, in piping NPS 2 (DN 50) and smaller, adjacent to each valve and at final connection to each piece of equipment.
Install flanges, in piping NPS 2-1/2 (DN 65) and larger, adjacent to flanged valves and at final connection to each piece of equipment.
Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.

Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.

Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

Install mechanical 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.

Install equipment to allow right of way for piping installed at required slope.

ERECTION OF WOOD SUPPORTS AND ANCHORAGES

Cut, fit, and place wood grounds, nailers, blocking, and anchorages to support, and anchor mechanical materials and equipment.

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.

Attach to substrates as required to support applied loads.

END OF SECTION 15050