

SECTION 220500 – COMMON WORK RESULTS FOR PLUMBING

PART 1 - GENERAL

1.01 BUY AMERICAN REQUIREMENTS

- A. Provide certificates to show that all products meet the following requirements.
 - 1. American Iron and Steel (AIS)
 - 2. Build America, Buy America Act
- B. See Supplementary Conditions for details.

1.02 SUMMARY

- A. Section Includes:
 - 1. Motors.
 - 2. Sleeves without waterstop.
 - 3. Sleeves with waterstop.
 - 4. Sleeve-seal systems.
 - 5. Grout.
 - 6. Silicone sealants.
 - 7. Escutcheons.
 - 8. Thermometers, bimetallic actuated, lead free.
 - 9. Thermometers, filled system, lead free.
 - 10. Thermometers, liquid in glass, lead free.
 - 11. Thermometers, light activated, lead free.
 - 12. Thermowells, lead free.
 - 13. Pressure gauges, dial type, lead free.
 - 14. Gauge attachments, lead free.
 - 15. Test plugs, lead free.
 - 16. Test-plug kits, lead free.
 - 17. Sight flow indicators, lead free.

1.03 ACTION SUBMITTALS

- A. Product Data:
 - 1. For each type of product, excluding motors which are included in Part 1 of the plumbing equipment Sections.
 - a. Include construction details, material descriptions, and dimensions of individual components, and finishes.
 - b. Include operating characteristics and furnished accessories.
- B. Delegated Design Submittals: For each anchor and alignment guide, including analysis data, signed and sealed by the qualified professional engineer responsible for their preparation.

2. Design Calculations: Calculate requirements for thermal expansion of piping systems and for selecting and designing expansion joints, loops, and swing connections.
3. Anchor Details: Detail fabrication of each anchor indicated. Show dimensions and methods of assembly and attachment to building structure.
4. Alignment Guide Details: Detail field assembly and attachment to building structure.
5. Schedule: Indicate type, manufacturer's number, size, material, pressure rating, end connections, and location for each expansion joint.

1.04 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Field quality-control reports.

1.05 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For each type of gauge to include in operation and maintenance manuals.

1.06 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel in accordance with AWS D1.1/D1.1M.
- B. Pipe and Pressure-Vessel Welding Qualifications: Qualify procedures and operators in accordance with 2021 ASME Boiler and Pressure Vessel Code, Section IX.

1.07 COORDINATION

- A. Coordinate features of motors, installed units, and accessory devices to be compatible with the following:
 1. Motor controllers.
 2. Torque, speed, and horsepower requirements of the load.
 3. Ratings and characteristics of supply circuit and required control sequence.
 4. Ambient and environmental conditions of installation location.

PART 2 - PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Domestic water for plumbing piping intended to convey or dispense water for human consumption are to comply with the U.S. Safe Drinking Water Act, with requirements of authorities having jurisdiction, and with NSF 61 and NSF 372, or be certified in compliance with NSF 61 and NSF 372 by an ANSI-accredited third-party certification body, in that the weighted average lead content at wetted surfaces is less than or equal to 0.25 percent.

- B. Compatibility: Provide products suitable for piping service fluids, materials, working pressures, and temperatures.
- C. Capability: Provide products and installations to accommodate maximum axial movement as scheduled or indicated on Drawings.

2.02 MOTORS

A. Motor Requirements, General:

- 1. Content includes motors for use on alternating-current power systems of up to 600 V and installed at equipment manufacturer's factory or shipped separately by equipment manufacturer for field installation.
- 2. Comply with requirements in this Section except when stricter requirements are specified in equipment schedules or Sections.
- 3. Comply with NEMA MG 1 unless otherwise indicated.
- 4. Comply with IEEE 841 for severe-duty motors.

B. Motor Characteristics:

- 1. Duty: Continuous duty at ambient temperature of 40 deg C and at altitude of 3300 ft. above sea level.
- 2. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

C. Polyphase Motors:

- 1. Description: NEMA MG 1, Design B, medium induction motor.
- 2. Efficiency: Premium Efficient, as defined in NEMA MG 1.
- 3. Service Factor: 1.15.
- 4. Multispeed Motors: Variable torque.
 - a. For motors with 2:1 speed ratio, consequent pole, single winding.
 - b. For motors with other than 2:1 speed ratio, separate winding for each speed.
- 5. Multispeed Motors, Two Winding: Separate winding for each speed.
- 6. Rotor: Random-wound, squirrel cage.
- 7. Bearings: Regreasable, shielded, antifriction ball bearings suitable for radial and thrust loading.
- 8. Temperature Rise: Match insulation rating.
 - a. Motors 15 HP and Larger: NEMA starting Code F or Code G.
 - b. Motors Smaller Than 15 HP: Manufacturer's standard starting characteristic.
- 9. Enclosure Material: Cast iron for motor frame sizes 324T and larger; rolled steel for motor frame sizes smaller than 324T.

D. Additional Requirements for Polyphase Motors:

10. Motors Used with Reduced-Voltage and Multispeed Controllers: Match wiring connection requirements for controller with required motor leads. Provide terminals in motor terminal box, suited to control method.
11. Motors Used with Variable-Frequency Controllers: Ratings, characteristics, and features coordinated with and approved by controller manufacturer.
 - a. Windings: Copper magnet wire with moisture-resistant insulation varnish, designed and tested to resist transient spikes, high frequencies, and short time-rise pulses produced by pulse-width-modulated inverters.
 - b. Premium-Efficient Motors: Class B temperature rise; Class F insulation.
 - c. Inverter-Duty Motors: Class F temperature rise; Class H insulation.
 - d. Thermal Protection: Comply with NEMA MG 1 requirements for thermally protected motors.
12. Severe-Duty Motors: Comply with IEEE 841, with 1.15 minimum service factor.

E. Single-Phase Motors:

1. Motors larger than 1/20 hp must be one of the following, to suit starting torque and requirements of specific motor application:
 - a. Permanent-split capacitor.
 - b. Split phase.
 - c. Capacitor start, inductor run.
 - d. Capacitor start, capacitor run.
2. Multispeed Motors: Variable-torque, permanent-split-capacitor type.
3. Bearings: Prelubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.
4. Motors 1/20 HP and Smaller: Shaded-pole type.
5. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device will automatically reset when motor temperature returns to normal range.

2.03 SLEEVES AND SLEEVE SEALS

A. Sleeves with Waterstop:

1. Description: Manufactured PVC/HDPE or steel, sleeve-type, waterstop assembly made for imbedding in concrete slab or wall.

B. Stack-Sleeve Fittings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Jay R. Smith Mfg Co; a division of Morris Group International.
 - b. Zurn Industries, LLC.

1. Description: Manufactured, Dura-coated or Duco-coated cast-iron sleeve with integral clamping flange for use in waterproof floors and roofs. Include clamping ring, bolts, and nuts for membrane flashing.

- c. Underdeck Clamp: Clamping ring with setscrews.

C. Sleeve-Seal Systems:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Metraflex Company (The).
2. Description: Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve.
 - b. Hydrostatic Seal: 20 psig minimum.
 - c. Sealing Elements: EPDM-rubber or Nitrile (Buna-N) interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
 - d. Pressure Plates: Carbon steel.
 - e. Connecting Bolts and Nuts: Carbon steel, with zinc coating, ASTM B633 of length required to secure pressure plates to sealing elements.

D. Grout:

1. Description: Nonshrink, for interior and exterior sealing openings in non-fire-rated walls or floors.
2. Standard: ASTM C1107/C1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
3. Design Mix: 5000 psi, 28-day compressive strength.
4. Packaging: Premixed and factory packaged.

E. Silicone Sealants:

1. Silicone Sealant, S, NS, 25, NT: Single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant.
 - a. Standard: ASTM C920, Type S, Grade NS, Class 25, Use NT.
2. Silicone Sealant, S, P, T, NT: Single-component, pourable, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, neutral-curing silicone joint sealant.
 - b. Standard: ASTM C920, Type S, Grade P, Class 100/50, Uses T and NT.
3. Silicone Foam Sealant: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

2.04 ESCUTCHEONS

A. Escutcheon Types:

1. One-Piece, Steel Type: With polished, chrome-plated finish and setscrew fastener.
 2. One-Piece, Stainless-Steel Type: With polished stainless-steel finish.
 3. One-Piece, Cast-Brass Type: With polished, chrome-plated finish and setscrew fastener.
 4. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped steel with polished, chrome-plated finish and spring-clip fasteners.
 5. One-Piece, Stamped-Steel Type: With polished, chrome-plated finish and spring-clip fasteners.
 6. Split-Plate, Stamped-Steel Type: With polished, chrome-plated finish; concealed hinge; and spring-clip fasteners.
- B. Floor Plates:
1. Split Floor Plates: Cast brass with concealed hinge.

PART 3 - EXECUTION

3.01 INSTALLATION OF SLEEVES - GENERAL

- A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.
- B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 1-inch annular clear space between piping and concrete slabs and walls.
- C. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.
1. Permanent sleeves are not required for holes in slabs formed by molded-PE or -PP sleeves.
 2. 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.
 3. Using grout or silicone sealant, seal the space outside of sleeves in floors/slabs/walls without sleeve-seal system. Select to maintain fire resistance of floor/slab/wall.
- D. Install sleeves for pipes passing through interior partitions.
1. Cut sleeves to length for mounting flush with both surfaces.
 2. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
 3. Seal annular space between sleeve and piping or piping insulation; use joint sealants that joint sealant manufacturer's literature indicates is appropriate for size, depth, and location of joint.

3.02 INSTALLATION OF SLEEVES WITH WATERSTOP

- A. Install sleeve with waterstop as new walls and slabs are constructed.
- B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange centered across width of concrete slab or wall.
- C. Secure nailing flanges to wooden concrete forms.
- D. Using grout or silicone sealant, seal space around outside of sleeves. Select to maintain fire resistance of floor/slab/wall.

3.03 INSTALLATION OF STACK-SLEEVE FITTINGS

- A. Install stack-sleeve fittings in new slabs as slabs are constructed.
 - 1. Install fittings that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
 - 2. Secure flashing between clamping flanges for pipes penetrating floors with membrane waterproofing. Comply with requirements for flashing specified in Section 076200 "Sheet Metal Flashing and Trim."
 - 3. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level.
- B. Fire-Resistance-Rated Penetrations, Horizontal Assembly Penetrations, and Smoke Barrier Penetrations: Maintain indicated fire or smoke rating of floors at pipe penetrations. Seal pipe penetrations with fire- and smoke-stop materials. Comply with requirements for firestopping specified in Section 078413 "Penetration Firestopping."

3.04 INSTALLATION OF SLEEVE-SEAL SYSTEMS

- A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at service piping entries into building, and passing through exterior walls.
- B. Select type, size, and number of sealing elements required for piping material and size and for sleeve ID or hole size. Assemble sleeve-seal system components, and install in annular space between piping and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make a watertight seal.

3.05 INSTALLATION OF ESCUTCHEONS

- A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.
- B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of insulated piping and with OD that completely covers opening.

3.06 INSTALLATION OF METERS AND GAUGES

- A. Install thermometer with thermowell at each required thermometer location.
- B. Install thermowells in vertical position in piping tees.
- C. Install thermowells of sizes required to match thermometer connectors. Include bushings if required to match sizes.
- D. Install thermowells with extension on insulated piping.
- E. Fill thermowells with heat-transfer medium.
- F. Install direct-mounted thermometers in thermowells and adjust vertical and tilted positions.
- G. Install remote-mounted thermometer bulbs in thermowells and install cases on panels; connect cases with tubing and support tubing to prevent kinks.
- H. Install direct-mounted pressure gauges in piping tees with pressure gauge located on pipe at most readable position.
- I. Install remote-mounted pressure gauges on panel.
- J. Install valve and snubber in piping for each pressure gauge for fluids.
- K. Install test plugs in piping tees.
- L. Install thermometers in the following locations:
 - 1. Inlet and outlet of each water heater.

3.07 CONNECTIONS

- A. Install meters and gauges adjacent to machines and equipment to allow space for service and maintenance of meters, gauges, machines, and equipment.

3.08 ADJUSTING

- A. After installation, calibrate meters according to manufacturer's written instructions.
- B. Adjust faces of meters and gauges to proper angle for best visibility.

3.09 FIELD QUALITY CONTROL

- A. Sleeves and Sleeve Seals:
 - 1. Perform the following tests and inspections:

- a. Leak Test: After allowing for a full cure, test sleeves and sleeve seals for leaks. Repair leaks and retest until no leaks exist.
- b. Sleeves and sleeve seals will be considered defective if they do not pass tests and inspections.

2. Prepare test and inspection reports.

B. Escutcheons:

1. Using new materials, replace broken and damaged escutcheons and floor plates.

3.10 SLEEVES APPLICATION

A. Use sleeves and sleeve seals for the following piping-penetration applications:

1. Concrete Slabs-on-Grade:
 - a. Sleeves with waterstops.
 - 1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

3.11 ESCUTCHEONS APPLICATION

A. Escutcheons for New Piping and Relocated Existing Piping:

1. Piping with Fitting or Sleeve Protruding from Wall: One piece, deep pattern.
2. Chrome-Plated Piping: One piece, steel or cast brass with polished, chrome-plated finish.
3. Insulated Piping:
 - a. One piece, steel with polished, chrome-plated finish.
4. Bare Piping at Wall and Floor Penetrations in Finished Spaces:
 - b. One piece, steel with polished, chrome-plated finish.
5. Bare Piping at Ceiling Penetrations in Finished Spaces:
 - c. One piece, steel with polished, chrome-plated finish.
6. Bare Piping in Unfinished Service Spaces:
 - d. One piece, steel with polished, chrome-plated finish.

B. Install floor plates for piping penetrations of equipment-room floors.

C. Install floor plates with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.

1. New Piping and Relocated Existing Piping: One piece, floor plate.

3.12 THERMOMETER, LEAD FREE, APPLICATION

- A. Thermometers at inlet and outlet of each domestic water heater are to be the following:
 - 1. Direct-mounted, metal-case, vapor-actuated type.
- B. Thermometer stems are to be of length to match thermowell insertion length.

3.13 THERMOMETER, LEAD FREE, SCALE-RANGE APPLICATION

- A. Scale Range for Domestic Cold-Water Piping:
 - 1. 0 to 100 deg F.
- B. Scale Range for Domestic Hot-Water Piping:
 - 1. 0 to 250 deg F.

3.14 PRESSURE-GAUGE APPLICATION

- A. Pressure gauges at inlet and outlet of each water pressure-reducing valve are to be the following:
 - 1. Sealed, direct mounted, metal case.

END OF SECTION