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SECTION 15400 — PLUMBING BASIC REQUIREMENTS

PART 1 – GENERAL

1.01 EXTENT OF SECTION

- A. This section includes the basic requirements to provide materials, labor, tools, permits, incidentals, other services and make ready for the PROJECT COORDINATOR'S use of plumbing systems for the proposed project.
- B. The intent of the PCSB STANDARDS is for the DESIGN PROFESSIONAL (DP) to comply with the minimum general project requirements and the specific project specifications shall be generated and provided by the DP.

1.02 DEFINITIONS

- A. Provide: To furnish and install, complete and ready for intended use.
- B. Furnish: Supply and deliver to project site, ready for unpacking, assembly and installation.
- C. Install: Includes unloading, unpacking, assembling, erecting, installation, applying, finishing, protecting, cleaning and similar operations at project site as required to complete items of work furnished.
- D. Concealed / Exposed / Exterior: "Concealed" areas are those areas that cannot be seen by the building occupants. "Exposed" areas are all areas, which are exposed to view by the building occupants, including under counters, inside cabinets and closets, plus all mechanical/equipment rooms. "Exterior" areas are those that are outside the building exterior envelope and exposed to the outdoors.
- E. Approved or Approved Equal: To possess the same performance qualities and characteristics and fulfill the utilitarian function without any decrease in quality, durability or longevity. For equipment/products defined by the CONTRACTOR as "equivalent", substitution requests must be submitted and approved by the DP 10 days prior to submitting bids for the substituted items.
- F. Authority Having Jurisdiction (AHJ): Indicates reviewing authorities, including local fire marshal, PCSB insurance underwriter, PROJECT COORDINATOR, and other reviewing entity whose approval is required to obtain systems acceptance.

1.03 REFERENCES AND STANDARDS

- A. Codes to include latest adopted editions, including current amendments, supplements and local jurisdiction requirements in effect as of the date of the Contract Documents issued in the State of Florida.



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- B. General: Reference standards and guidelines include but are not limited to the latest adopted editions from:
1. Florida Building Code, All Volumes
 2. Florida Fire Prevention Code
 3. State requirements for Educational Facilities
 4. Florida Accessibility Act
 5. GAMA - Gas Appliance Manufacturers Association
 6. ISO - International Organization for Standardization
 7. LEED- Leadership in Energy and Environmental Design
 8. MSS - Manufacturers Standardization Society
 9. NEC - National Electric Code
 10. NFPA - National Fire Protection Association
 11. NSF - National Sanitation Foundation
 12. UL Underwriters Laboratories Inc.

1.04 REDUCTION OF LEAD IN DRINKING WATER

- A. All plumbing products whose wetted surfaces are anticipated or intended to come in contact with potable water shall be lead free in accordance with the US Senate Bill S.3874 Reduction of Lead in Drinking Water Act, Section 1417 of the Safe Drinking Water Act, NSF Standard 61, NSF/ANSI 61 Annex G and NSF 372. An accredited, independent third party certification is required and shall be attached to each product installed.
- B. Exemptions identified: Pipes, pipe fittings, plumbing fittings, or fixtures, including backflow preventers that are used exclusively for non-potable services such as manufacturing, industrial processing, irrigation, outdoor watering, or any other uses where the water is **not** anticipated to be used for human consumption and toilets, bidets, urinals, fill valves, flushometer valves, tub fillers, shower valves, service saddles, or water distribution main gate valves that are 2 inches in diameter or larger.

1.05 SUBMITTALS

- A. The CONTRACTOR shall submit product submittals and shop drawings in one copy in paper format with electronic backup. For electronic format, provide one zip file per specification division containing a separate file for each specification section. For paper format, provide one common binder per specification division, with tabbed dividers for each specification section. Individual submittals sent piecemeal per Specification Section method will be returned without review or comment.
- B. Product Data: Provide Manufacturer's descriptive literature for products that are specified in Division 15 Sections.
- C. Identify each submittal in detail. Note what differences, if any, exist between the submitted item and the specified item. Failure to identify the differences will be considered cause for disapproval. If differences are not identified and are not discovered



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during the submittal review process, the CONTRACTOR remains responsible for providing equipment and materials that meet the Specifications and Drawings.

1. Label submittal to match numbering/references as shown in Contract Documents and schedules. Highlight and label applicable information to individual equipment or cross out/remove extraneous data not applicable to submitted model. Clearly note options and accessories to be provided, including field installed items. Highlight connections by other trades.
 2. Include technical data, installation instructions and dimensioned drawings for products, fixtures, equipment and devices installed, furnished or provided. Reference Division 15 Specification sections for specific items required in product data submittal outside of these requirements.
 3. Provide pump curves, operation characteristics, capacities, ambient noise criteria, etc. for equipment.
 4. For vibration isolation of equipment, list make and model selected with operating load and deflection. Indicate frame type where required. Submit manufacturer's product data.
 5. Maximum of two reviews of complete submittal package. Arrange for additional reviews and/or early review of long-lead items; Bear costs of additional reviews at DP'S hourly rates. Incomplete submittal packages/submittals will be returned to CONTRACTOR without review.
- D. Provide weights, dimensions, mounting requirements and like information required for mounting, bracing, and support. Indicate manufacturer's installation and support requirements to meet requirements for non-structural components. Refer to structural for building occupancy, design category, and equipment importance factor.
- E. Include physical characteristics, electrical characteristics, device layout plans, wiring diagrams, and connections as required per Division 15 Coordination Documents. For equipment with electrical connections, furnish copy of approved submittal for inclusion in Division 16 submittals.
- F. Make provisions for openings in building for admittance of equipment prior to start of construction or ordering of equipment.
- G. Basis-of-Design system components and controls for equipment shall be selected and sized based on the equipment specified as the first-named manufacturer, model number and supplemental additional options as indicated in the Contract Documents. If substitutions and/or equivalent equipment and/or products are being proposed, it is the responsibility of parties concerned and furnishing the substitute and/or equivalent equipment to verify and compare the characteristics and requirements of that furnished to that specified and/or shown. If greater capacity and/or more materials and/or more labor is required for the rough-in, circuitry or connections than for the item specified and provided for, provide compensation for additional charges required for the proper rough-in, circuitry and connections for the equipment being furnished. No additional charges above the Base Bid will be allowed for such revisions. Coordinate with the requirements



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of "Submittals". For any product marked "or approved equivalent", a substitution request must be submitted to the DP for approval prior to purchase, delivery or installation.

- H. Provide coordinated Shop Drawings which include physical characteristics of all systems, equipment and piping layout plans, and control wiring diagrams.
 - 1. Provide Shop Drawings indicating sanitary floor, wall and/or exterior cleanout locations and type to DP for approval prior to installation.
 - 2. Provide Shop Drawings indicating access panel locations, size and elevation for approval prior to installation.
 - 3. Samples: Provide samples when requested by individual sections.
- I. Make any corrections or change in submittals when required. Provide submittals as specified. The DP will not be required to edit and/or interpret the CONTRACTOR's submittals. Indicate changes for the resubmittal in a cover letter with reference to page(s) changed and reference response to comment. Cloud changes in the submittals.
 - 1. Resubmit for review until review indicates "no exceptions taken" or "make corrections noted".
 - 2. When submitting drawings for the DP'S second review, clearly indicate changes on drawings and "cloud" any revisions. Submit a list describing each change.

1.06 QUALITY ASSURANCE

- A. Regulatory Requirements: Work and materials installed shall conform to all local, State, Federal and other applicable laws and regulations.
- B. Drawings are intended to be diagrammatic and reflect the Basis-of-Design manufacturer's equipment. They are not intended to show every item in its exact dimensions, or details of equipment or proposed systems layout.
- C. UL and FM Compliance: Provide products which are UL and/or FM listed.
- D. ASME Compliance: ASME listed water heaters and boilers with an input of 200,000 BTUH and higher, hot water storage tanks which exceed 120 gallons, and hot water expansion tanks which are connected to ASME rated equipment or required by local jurisdiction.
- E. Foreign made products are not acceptable.

1.07 WARRANTY

- A. Provide written warranty covering the work for a period of one year from date of Substantial Completion.
- B. Sections under this Division may require additional and/or extended warranties that apply beyond basic warranty.

1.08 COORDINATION DOCUMENTS



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- A. Advise DP in the event a conflict occurs in location or connection of equipment. Bear costs resulting from failure to properly coordinate installation or failure to advise DP of conflict.
- B. Verify in field exact size, location, invert, and clearances regarding existing material, equipment and apparatus, and advise the DP of discrepancies between that indicated on Drawings and that existing in field prior to installation related thereto.
- C. Submit final Coordination Drawings with changes as Record Drawings at completion of project.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

- A. Specify like items from one manufacturer, including but not limited to fixtures, pumps, drains and equipment.

2.02 MATERIALS

- A. Materials, equipment, and fixtures specified are to be the latest products as listed in manufacturer's printed catalog data and are to be UL approved or be acceptable by State, County, and City authorities having jurisdiction.
- B. Articles, fixtures, and equipment of a kind to be a standard product of one manufacturer.
- C. Manufacturer's names denote character and quality of equipment desired and are not to be construed as limiting competition.
- D. Comply with local, State and Federal regulations relating to hazardous materials. Do not specify any materials containing a hazardous substance.

2.03 ACCESS PANELS: Confirm Access Panel requirements in Division 01, Division 08 and individual Division 15 sections. In the absence of specific requirements, comply with the following:

- A. Show flush mounting access panels for service of systems and individual components requiring maintenance, service or inspection. Where access panels are located in fire-rated assemblies of building, rate access panels accordingly. Ceiling and wall access panels shall be a minimum 24-inch by 24-inch. Provide screwdriver operated cam lock.



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PART 3 – EXECUTION

3.01 ACCESSIBILITY AND INSTALLATION

- A. Show equipment requiring access (i.e., drain pans, drains, control operators, valves, motors, cleanouts and equipment) so that they may be serviced, reset, replaced or recalibrated by service people with normal service tools and equipment. Do not indicate equipment in obvious passageways, doorways, scuttles or crawlspaces which would impede or block intended usage.
- B. Obtain installation instructions from manufacturer prior to design of equipment connections and examine instructions thoroughly. Indicate equipment and products complete as directed by manufacturer's installation instructions.
- C. Earthwork:
 - 1. Specify excavation, dewatering, shoring, bedding, and backfill required for installation of work in this Division in accordance with the provisions of related earthwork. Contact utilities and locate existing utilities prior to design.
- D. Firestopping:
 - 1. Coordinate and show location and protection level of fire and/or smoke rated walls, ceilings, and floors. When these assemblies are penetrated, specify sealant around piping, etc. with approved firestopping material. Meet requirements of ASTM E814, Standard Test Method for Fire Tests of Through-Penetration Fire Stops.
- E. Pipe Installation:
 - 1. Coordinate work to account for expansion and contraction of piping materials and building as well as anticipated settlement or shrinkage of building. Install work to prevent damage to piping, equipment, and building and its contents. Indicate piping offsets, loops, expansion joints, sleeves, anchors or other means to control pipe movement and minimize forces on piping.
 - 2. Include provisions for servicing and removal of equipment without dismantling piping.
- F. Plenums:
 - 1. Specify plenum rated materials that meet the NFPA requirements for installation in plenums. PVC piping in plenums shall be wrapped with a listed pipe wrap specifically listed for the application. Immediately notify the DP of discrepancy.

3.02 CUTTING AND PATCHING

- A. Proposed floor cutting/core drilling/sleeve locations to be approved by Project Structural DP. Submit proposed locations to DP.

3.03 DELIVERY, STORAGE AND HANDLING



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- A. Specify how to handle materials delivered to project site to avoid damage. Specify that the CONTRACTOR shall store materials on site inside building or protected from weather, dirt and construction dust. Insulation and lining that becomes wet from improper storage and handling to be replaced before installation. Products and/or materials that become damaged due to water, dirt and/or dust as a result of improper storage to be replaced before installation. Close pipe openings with caps or plugs. Keep motors and bearings in watertight and dustproof covers during entire course of installation.

3.04 CLEANING

- A. Specify that upon completion of installation, CONTRACTOR shall thoroughly clean exposed portions of equipment, removing temporary labels and traces of foreign substances. Throughout construction, remove debris and surplus materials accumulated during work.

3.05 INSTALLATION

- A. Specify that the CONTRACTOR shall install equipment and fixtures in accordance with manufacturer's installation instructions, plumb and level and firmly anchored. Maintain manufacturer's recommended clearances. CONTRACTOR shall startup equipment in accordance with the manufacturer's start-up instructions, and in presence of manufacturer's representative. Test controls and demonstrate compliance with requirements. Replace damaged or malfunctioning controls and equipment.

3.06 PAINTING

- A. After completion of plumbing work, thoroughly clean and paint exposed supports constructed of ferrous metal surfaces, i.e., hangers, hanger rods, equipment stands, with one coat of black enamel for interior suitable for hot surfaces.
- B. In a mechanical room, on roof or other exposed areas, machinery and equipment not painted with enamel to receive two coats of primer and one coat of rustproof enamel, colors as selected by DP. See individual equipment Specifications for other painting.
- C. Clean, primer coat and paint exposed piping on roof or at other exterior locations with two coats paint suitable for metallic surfaces and exterior exposures.
- D. Covers such as manholes, drains, cleanouts and the like will be furnished with finishes which resist corrosion and rust. Cast iron lids for all in ground water valves shall be painted the appropriate industry standard color.
- E. Exposed fire lines shall be painted red.

- 3.07 ACCESS PANELS:** Label access panels with engraved nameplates indicating function of panel.

3.08 DEMOLITION



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- A. If it is the intent of the contract documents to show the necessary information and adjustments to plumbing system required to meet code, and accommodate installation of new work. Coordinate with PROJECT COORDINATOR so that work can be scheduled not to interrupt operations, normal activities, building access or access to different areas.
 - B. Indicate the location of existing utilities and equipment before commencing design. Unless otherwise directed, equipment, fixtures, and fittings being removed as part of demolition process are the PCSB'S property.
 - C. Indicate the removal of exposed, unused piping to behind finished surfaces (floor, walls, etc.). Cap piping and patch surfaces to match surrounding finish.
- 3.09 ACCEPTANCE:** The system cannot be considered for acceptance until work is completed and demonstrated to DP that installation is in strict compliance with Specifications, Drawings and manufacturer's installation instructions, particularly in reference to following:
- A. Testing and Balancing Reports
 - B. Cleaning
 - C. Operation and Maintenance Manuals
 - D. Training of Operating Personnel
 - E. Record Drawings
 - F. Warranty and Guaranty Certificates
 - G. Start-up/Test Document and Commissioning Reports
 - H. Health Department BAC-T Certificate
- 3.10 FIELD QUALITY CONTROL**
- A. Conduct tests of equipment and systems to demonstrate compliance with requirements specified. Reference individual Specification Sections for required tests. Document tests and include in operation and maintenance manuals.
 - B. During site evaluations by DP, provide a plumber with tools to remove and replace trims, covers, and devices so that proper evaluation of installation can be performed.
- 3.11 LETTER OF CONFORMANCE:** Specify that the CONTRACTOR shall provide a Letter of Conformance and copies of manufacturers' warranties and extended warranties with a statement that plumbing items were installed in accordance with manufacturer's recommendations, UL listings and/or FM approvals. Include Letter of Conformance and



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copies of manufacturers' warranties and extended warranties in Operation and Maintenance Manuals. Warranties to begin at date of substantial completion.

- 3.12 ELECTRICAL INTERLOCKS:** Where equipment motors are to be electrically interlocked with other equipment for simultaneous operation, utilize manufacturer's plumbing equipment wiring diagrams to coordinate with electrical systems so that proper wiring of equipment involved is affected. Coordinate with Division 16.

END OF SECTION



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SECTION 15404 — PIPES AND TUBES FOR PLUMBING PIPING AND EQUIPMENT

PART 1 – GENERAL

1.01 EXTENT OF SECTION

- A. Section includes Pipe and pipe fittings to a point approximately five feet outside the building for the following systems:
 - 1. Domestic water piping in or adjacent to the structure or premises.
 - 2. Sanitary sewer piping in or adjacent to the structure or premises.
 - 3. Chemical resistant sewer piping in or adjacent to the structure or premises.
 - 4. Storm water piping in or adjacent to the structure or premises.
 - 5. Equipment drains and overflows.
 - 6. Unions and flanges.
 - 7. Underground pipe markers.
- B. The intent of the PCSB STANDARDS is for the DESIGN PROFESSIONAL (DP) to comply with the minimum general project requirements and the specific project specifications shall be generated and provided by the DP.

PART 2 – PRODUCTS

2.01 DOMESTIC WATER PIPING, BELOW GRADE

- A. Copper Pipe: ASTM B88, Type K annealed.
 - 1. Fittings: ASME B16.18, cast copper, or ASME B16.22, wrought copper.
 - 2. Joints: Solder, lead free, 95-5 tin-antimony, or tin and silver, with melting range 430 to 535 degrees F. or Braze, AWS A5.8 BCuP silver/phosphorus/copper alloy with melting range 1190 to 1480 degrees F.

2.02 DOMESTIC WATER PIPING, ABOVE GRADE

- A. Copper Pipe: ASTM B88, Type L, hard drawn.
 - 1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
 - 2. Joints: Solder, lead free, 95-5 tin-antimony, or tin and silver, with melting range 430 to 535 degrees F. or Braze, AWS A5.8 BCuP silver/phosphorus/copper alloy with melting range 1190 to 1480 degrees F.
- B. Copper Pipe: ASTM B88, Type L, hard drawn, press Fitting.
 - 1. Fittings: Copper and copper alloy press fittings shall conform to material requirements of ASME B16.18 or ASME B16.22.
 - 2. Sealing elements for press fittings shall be EPDM. Sealing elements shall be factory installed or an alternative supplied by fitting manufacturer In ProPress ½” to 4” dimensions the Smart Connect Feature assures leakage of liquids and/or gases from inside the system past the sealing element of an unpressed connection. The function of this feature is to provide the installer quick and easy identification of connections which have not been pressed prior to putting the system into operation.



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SECTION 15404 — PIPES AND TUBES FOR PLUMBING PIPING AND EQUIPMENT

3. Threaded Fittings: Pipe Threads shall conform to ASME B1.20.1. Hanger Standard: Hangers and supports shall conform to MSS-SP-58.

2.03 SANITARY SEWER PIPING, BELOW GRADE

- A. Plastic Pipe: ASTM D2665, Schedule 40 Type 1 solid core polyvinyl chloride PVC-DWV material.
 1. Fittings: ASTM D2665 or ASTM D3034, PVC-DWV.
 2. Joints: ASTM D2855, solvent weld with ASTM D2564 low V.O.C. solvent cement.

2.04 SANITARY SEWER PIPING, ABOVE GRADE

- A. Plastic Pipe: ASTM D2665, Schedule 40 Type 1 solid core polyvinyl chloride PVC-DWV material.
 1. Fittings: ASTM D2665 or ASTM D3034, PVC-DWV.
 2. Joints: ASTM D2855, solvent weld with ASTM D2564 low V.O.C. solvent cement.

2.05 CHEMICAL RESISTANT SEWER PIPING

- A. PVC Pipe: ASTM D2729 or ASTM D2665, Schedule 40 polyvinyl chloride PVC-DWV material. Type 1 solid core.
 1. Fittings: PVC, ASTM D2729 or ASTM D2665.
 2. Joints: ASTM D2855, solvent weld with ASTM D2564 solvent cement.
- B. Glass Pipe: ASTM C1053, borosilicate glass material.
 1. Fittings: ASTM C1053, borosilicate glass.
 2. Joints: Stainless steel compression couplings with tetra-fluoroethylene seal ring.
- C. PPF Pipe: Polypropylene, flame retardant.
 1. Fittings: Polypropylene.
 2. Joints: Electrical resistance fusion.

2.06 STORM WATER PIPING, BELOW GRADE

- A. Plastic Pipe: ASTM D2665, Schedule 40 Type 1 solid core polyvinyl chloride PVC-DWV material.
 1. Fittings: ASTM D2665 or ASTM D3034, PVC-DWV.
 2. Joints: ASTM D2855, solvent weld with ASTM D2564 low V.O.C. solvent cement.

2.07 STORM WATER PIPING, ABOVE GRADE

- A. Plastic Pipe: ASTM D2665, Schedule 40 Type 1 solid core polyvinyl chloride PVC-DWV material.
 1. Fittings: ASTM D2665 or ASTM D3034, PVC-DWV.
 2. Joints: ASTM D2855, solvent weld with ASTM D2564 low V.O.C. solvent cement.



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2.08 EQUIPMENT DRAINS AND OVERFLOWS

- A. Copper Pipe: ASTM B88, Type L, hard drawn.
 - 1. Fittings: ASME B16.18, cast brass, or ASME B16.22 solder wrought copper.
 - 2. Joints: Solder, lead free, 95-5 tin-antimony, or tin and silver, with melting range 430 to 535 degrees F.

2.09 UNIONS AND FLANGES

- A. Unions for Pipe 2 inches and Smaller:
 - 1. Ferrous Piping: Class
 - 2. Copper Piping: Class 150, bronze unions with soldered or brazed joints.
 - 3. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.
 - 4. PVC Piping: PVC
- B. Flanges for Pipe 2-1/2 inches and Larger:
 - 1. Ferrous Piping: Class 250, forged steel, slip-on flanges
 - 2. Copper Piping: Class 150, slip-on bronze flanges
 - 3. PVC Piping: PVC flanges
 - 4. Gaskets: 1/16 inch thick preformed neoprene gaskets.

2.10 UNDERGROUND PIPE MARKERS

- A. Plastic Ribbon Tape: Reference Division 02, Section 02500 Utility Piping Materials.
- B. Trace Wire: Reference Division 02, Section 02500 Utility Piping Materials.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls. Install piping to maintain headroom without interfering with use of space or taking more space than necessary. Group piping whenever practical at common elevations.
- B. Sleeve pipe passing through partitions, walls and floors. Allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- C. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings. Provide access where valves and fittings are not accessible. Install non-conducting dielectric connections wherever jointing dissimilar metals.
- D. Establish invert elevations, slopes for drainage to 1/8 inch per foot minimum. Maintain gradients. Slope piping and arrange systems to drain at low points.



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SECTION 15404 — PIPES AND TUBES FOR PLUMBING PIPING AND EQUIPMENT

- E. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the Work, and isolating parts of completed system.
- F. Install piping penetrating roofed areas to maintain integrity of roof assembly.

END OF SECTION



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SECTION 15406 — HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 – GENERAL

1.01 EXTENT OF SECTION

- A. Section includes:
 - 1. Pipe hangers and supports
 - 2. Hanger rods
 - 3. Inserts
 - 4. Flashing
 - 5. Sleeves
 - 6. Mechanical sleeve seals
 - 7. Formed steel channel
 - 8. Firestopping
 - 9. Firestopping accessories

- B. The intent of the PCSB STANDARDS is for the DESIGN PROFESSIONAL (DP) to comply with the minimum general project requirements and the specific project specifications shall be generated and provided by the DP.

1.02 DEFINITIONS

- A. Firestopping (Through-Penetration Protection System): Sealing or stuffing material or assembly placed in spaces between and penetrations through building materials to arrest movement of fire, smoke, heat, and hot gases through fire rated construction.

1.03 ENVIRONMENTAL REQUIREMENTS

- A. Do not apply firestopping materials when temperature of substrate material and ambient air is below 60 degrees F.

- B. Maintain this minimum temperature before, during, and for minimum 3 days after installation of firestopping materials.

- C. Provide ventilation in areas to receive solvent cured materials.

PART 2 – PRODUCTS

2.01 PIPE HANGERS AND SUPPORTS

- A. Plumbing Piping - DWV:
 - 1. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Carbon steel, galvanized, adjustable swivel, split ring.
 - 2. Hangers for Pipe Sizes 2 inches and Larger: Carbon steel, galvanized, adjustable, clevis.
 - 3. Multiple or Trapeze Hangers: Galvanized steel channels with welded spacers and hanger rods.
 - 4. Wall Support for Pipe Sizes 3 inches and Smaller: Cast iron hook.

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5. Wall Support for Pipe Sizes 4 inches and Larger: Welded steel bracket and wrought steel clamp.
 6. Vertical Support: Galvanized steel riser clamp.
 7. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
 8. Copper Pipe Support: Plastic coated, carbon-steel adjustable, ring.
- B. Plumbing Piping - Water:
1. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Plastic coated carbon steel, adjustable swivel, split ring.
 2. Hangers for Cold Pipe Sizes 2 inches and Larger: Plastic coated carbon steel, adjustable, clevis.
 3. Hangers for Insulated Hot Pipe Sizes 2 to 4 inches: Galvanized carbon steel, adjustable, clevis.
 4. Hangers for Insulated Hot Pipe Sizes 6 inches and Larger: Adjustable steel yoke, cast iron roll, double hanger.
 5. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
 6. Multiple or Trapeze Hangers for Hot Pipe Sizes 6 inches and Larger: Steel channels with welded spacers and hanger rods, cast iron roll.
 7. Vertical Support: Plastic coated steel riser clamp.
 8. Floor Support for Cold Pipe: Plastic coated cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
 9. Floor Support for Hot Pipe Sizes 4 inches and Smaller: Plastic coated cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
 10. Floor Support for Hot Pipe Sizes 6 inches and Larger: Adjustable cast iron roll and stand, steel screws, and concrete pier or steel support.
 11. Copper Pipe Support: Plastic coated, Carbon-steel ring.

2.02 ACCESSORIES

- A. Hanger Rods: Hot dipped galvanized or Stainless steel, all thread.

2.03 INSERTS

- A. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

2.04 FLASHING

- A. Metal Flashing: 26 gage thick galvanized steel.
- B. Metal Counter flashing: 22 gage thick galvanized steel.

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- C. Lead Flashing:
 - 1. Waterproofing: 5 lb./sq. ft sheet lead.
 - 2. Soundproofing: 1 lb./sq. ft sheet lead.
- D. Flexible Flashing: 47 mil thick sheet butyl; compatible with roofing.

2.05 SLEEVES

- A. Sleeves for Pipes Through Non-fire Rated Floors: 18 gage thick galvanized steel.
- B. Sleeves for Pipes Through Non-fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Schedule 40 Steel pipe or 18 gage thick galvanized steel.

2.06 MECHANICAL SLEEVE SEALS

- A. Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between object and sleeve, connected with bolts and pressure plates causing rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.

2.07 FORMED STEEL CHANNEL

- A. Galvanized 12 gage thick galvanized steel. With holes 1-1/2 inches on center.

2.08 FIRESTOPPING

- A. Different types of products by multiple manufacturers are acceptable as required to meet specified system description and performance requirements; provide only one type for each similar application.
 - 1. Silicone Firestopping Elastomeric Firestopping: Single or Multiple component silicone elastomeric compound and compatible silicone sealant.
 - 2. Foam Firestopping Compounds: Single component foam compound.
 - 3. Formulated Firestopping Compound of Incombustible Fibers: Formulated compound mixed with incombustible non-asbestos fibers.
 - 4. Fiber Stuffing and Sealant Firestopping: Composite of mineral or ceramic fiber stuffing insulation with silicone elastomer for smoke stopping.
 - 5. Mechanical Firestopping Device with Fillers: Mechanical device with incombustible fillers and silicone elastomer, covered with sheet stainless steel jacket, joined with collars, penetration sealed with flanged stops.
 - 6. Intumescent Firestopping: Intumescent putty compound which expands on exposure to surface heat gain.
- B. Color: As selected from manufacturer's full range of colors.

2.09 FIRESTOPPING ACCESSORIES

- A. Primer: Type recommended by firestopping manufacturer for specific substrate surfaces and suitable for required fire ratings.

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- B. Dam Material: Permanent:
 - 1. Mineral fiberboard.
 - 2. Mineral fiber matting.
 - 3. Sheet metal.
 - 4. Alumina silicate fire board.
- C. Installation Accessories: Provide clips, collars, fasteners, temporary stops or dams, and other devices required to position and retain materials in place.
- D. General:
 - 1. Furnish UL listed products or products tested by an independent testing laboratory.
 - 2. Select products with rating not less than rating of wall or floor being penetrated.
- E. Non-Rated Surfaces:
 - 1. Stamped steel, chrome plated, hinged, split ring escutcheons or floor plates or ceiling plates for covering openings in occupied areas where piping is exposed.
 - 2. For exterior wall openings below grade, furnish mechanical sealing device to continuously fill annular space between piping and cored opening or water-stop type wall sleeve.

PART 3 – EXECUTION

3.01 PREPARATION

- A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter affecting bond of firestopping material. Remove incompatible materials affecting bond.
- B. Obtain permission from DP before using powder-actuated anchors. Do not drill or cut structural members.

3.02 FLASHING INSTALLATION

- A. Provide flexible flashing and metal counter flashing where piping penetrates weather or waterproofed walls, floors, and roofs.
- B. Flash vent and soil pipes projecting above finished roof surface with lead worked 1 inch minimum into hub, 8 inches minimum clear on sides with 24 x 24 inches sheet size. For pipes through outside walls, turn flanges back into wall and caulk, metal counter-flash, and seal.
- C. Flash floor drains in floors with topping over finished areas with lead, 10 inches clear on sides with minimum 36 x 36 inch sheet size. Fasten flashing to drain clamp device. If the floors are wood or located above the 1st level, provide a pan under drains.
- D. Seal floor and shower drains watertight to adjacent materials.

DIVISION 15

SECTION 15406 — HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

3.03 SCHEDULES

| PIPE HANGER SPACING | | | |
|---------------------------------------|------------------------|------------------|-------------------------------|
| PIPE MATERIAL | MAXIMUM HANGER SPACING | | HANGER ROD DIAMETER Inches |
| | Horizontal Feet | Vertical Feet | |
| Brass | 10 | 10 | 1/2 |
| Copper Tube, 1-1/4 inches and smaller | 6 | 10 | 1/2 |
| Copper Tube, 1-1/2 inches and larger | 10 | 10 | 1/2 |
| Polypropylene or Glass | 4 | 10* | 3/8 |
| PVC | 4 | 10* | 3/8 |

*Provide midstory guide.

END OF SECTION



DIVISION 15

SECTION 15408 — IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 – GENERAL

1.01 EXTENT OF SECTION

- A. Section includes:
 - 1. Nameplates
 - 2. Tags
 - 3. Stencils
 - 4. Pipe markers
 - 5. Ceiling tacks
 - 6. Labels
 - 7. Lockout devices
- B. Shop Drawings: Specify the contractor to submit list of wording, symbols, letter size, and color coding for mechanical identification and valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.
- C. Reference Division 2, Section 02500 Utility Piping Materials for color schemes.
- D. The intent of the PCSB STANDARDS is for the DESIGN PROFESSIONAL (DP) to comply with the minimum general project requirements and the specific project specifications shall be generated and provided by the DP.

PART 2 – PRODUCTS

2.01 NAMEPLATES

- A. Product Description: Laminated three-layer plastic with engraved white letters on black contrasting background color or the reverse color scheme.

2.02 TAGS

- A. Plastic Tags:
 - 1. Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inches diameter or square.
- B. Metal Tags:
 - 1. Brass or Aluminum or Stainless Steel with stamped letters; tag size minimum 1-1/2 inches diameter or square with finished edges.
- C. Information Tags:
 - 1. Clear plastic with printed "Danger," "Caution," or "Warning" and message; size 3-1/4 x 5-5/8 inches with grommet and self-locking nylon ties.
- D. Tag Chart: Typewritten letter size list of applied tags and location in anodized aluminum frame with plastic laminated glazing.



DIVISION 15

SECTION 15408 — IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

2.03 STENCILS

- A. Stencils: With clean cut symbols and letters of following size:
 - 1. Up to 2 inches Outside Diameter of Insulation or Pipe: 1/2 inch high letters.
 - 2. 2-1/2 to 6 inches Outside Diameter of Insulation or Pipe: 1-inch high letters.
 - 3. Over 6 inches Outside Diameter of Insulation or Pipe: 2-3/4 inches high letters.
 - 4. Equipment: 1-3/4 inches high letters.
- B. Stencil Paint: As specified in Section 09 90 00, semi-gloss enamel, colors and lettering size conform to ASME A13.1.

2.04 PIPE MARKERS

- A. Color and Lettering: Conform to ASME A13.1.
 - 1. Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering. Larger sizes may have maximum sheet size with spring fastener.
- B. Plastic Tape Pipe Markers:
 - 1. Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.
- C. Plastic Underground Pipe Markers:
 - 1. Bright colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.

2.05 CEILING TACKS

- A. Steel with 3/4 inch diameter color-coded head.
- B. Color code as follows: Plumbing valves - Green.

2.06 LABELS

- A. Description: Polyester or Laminated Mylar, size 1.9 x 0.75 inches, adhesive backed with printed identification and bar code.

2.07 LOCKOUT DEVICES

- A. Lockout Hasps:
 - 1. Anodized aluminum or Reinforced nylon hasp with erasable label surface; size minimum 7-1/4 x 3 inches.
- B. Valve Lockout Devices:
 - 1. Steel device preventing access to valve operator, accepting lock shackle.



DIVISION 15

SECTION 15408 — IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Specify plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive. Install labels with sufficient adhesive for permanent adhesion and seal with clear lacquer. For unfinished canvas covering, apply paint primer before applying labels.
- B. Tags shall include a corrosion resistant chain and be numbered consecutively by location.
- C. Identify water heaters, pumps, tanks, and water treatment devices with plastic nameplates. Identify in-line pumps and other small devices with tags. Identify control panels and major control components outside panels with plastic nameplates.
- D. Identify valves in main and branch piping with tags.
- E. Identify piping, concealed or exposed, with plastic tape pipe markers. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including at risers and drops, adjacent to each valve and tee, at each side of penetration of structure or enclosure, and at each obstruction.
- F. Show location of ceiling tacks to locate valves above T-bar type panel ceilings or through access panels. Locate in the corner of the panel closest to valve or equipment.

END OF SECTION



DIVISION 15

SECTION 15410 — FACILITY WATER DISTRIBUTION

PART 1 – GENERAL

1.01 EXTENT OF SECTION

- A. This Section specifies the basic requirements for plumbing installations and includes requirements common to more than one section of Division 15 Section including:
 - 1. Domestic water piping, buried,
 - 2. Domestic water piping, above grade,
 - 3. Unions and flanges,
 - 4. Valves,
 - 5. Pipe hangers and supports,
 - 6. Pressure gages,
 - 7. Pressure gage taps,
 - 8. Thermometers,
 - 9. Flow control valves,
 - 10. Water pressure reducing valves,
 - 11. Relief valves,
 - 12. Strainers,
 - 13. Hose bibs,
 - 14. Hydrants,
 - 15. Recessed valve box,
 - 16. Backflow preventers,
 - 17. Water hammer arrestors,
 - 18. In-line circulator pumps.
- B. Provide direction for the CONTRACTOR to provide a list of wording, symbols, letter size, and color coding for mechanical identification, valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.
- C. Foreign made valves and products are not acceptable.
- D. The intent of the PCSB STANDARDS is for the DESIGN PROFESSIONAL (DP) to comply with the minimum general project requirements and the specific project specifications shall be generated and provided by the DP.

1.02 REDUCTION OF LEAD IN DRINKING WATER

- A. All plumbing products whose wetted surfaces are anticipated or intended to come in contact with potable water shall be lead free in accordance with the US Senate Bill S.3874 Reduction of Lead in Drinking Water Act, Section 1417 of the Safe Drinking Water Act, NSF Standard 61, NSF/ANSI 61 Annex G and NSF 372. An accredited, independent third party certification is required and shall be attached to each product installed.
- B. Exemptions identified: Pipes, pipe fittings, plumbing fittings, or fixtures, including backflow preventers that are used exclusively for non-potable services such as manufacturing, industrial processing, irrigation, outdoor watering, or any other uses where the water is



DIVISION 15

SECTION 15410 — FACILITY WATER DISTRIBUTION

not anticipated to be used for human consumption and toilets, bidets, urinals, fill valves, flushometer valves, tub fillers, service saddles, or water distribution main gate valves that are 2 inches in diameter or larger.

PART 2 – PRODUCTS

2.01 DOMESTIC WATER PIPING, BURIED

- A. Copper Pipe: ASTM B88, Type K, annealed.
 - 1. Fittings: ASME B16.18, cast copper, or ASME B16.22, wrought copper.
 - 2. Joints: Solder, lead free, ASTM B32, silver, with melting range 430 to 535 degrees F. or Brazed, AWS A5.8 BCuP silver/phosphorus/copper alloy with melting range 1190 to 1480 degrees F.

2.02 DOMESTIC WATER PIPING, ABOVE GRADE

- A. Copper Pipe: ASTM B88, Type L, hard drawn.
 - 1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
 - 2. Joints: Solder, lead free, ASTM B32, 95-5 tin-antimony, or tin and silver, with melting range 430 to 535 degrees F. or Braze, AWS A5.8 BCuP. silver/phosphorus/copper alloy with melting range 1190 to 1480 degrees F
- B. Copper Pipe: ASTM B88, Type L, hard drawn, rolled grooved ends.
 - 1. Fittings: ASME B16.18 cast copper alloy or ASME B16.22 wrought copper and bronze, grooved ends.
 - 2. Joints: Grooved mechanical couplings meeting ASTM F1476.
 - a. Housing Clamps: ASTM A395/A395M and ASTM A536 ductile iron, enamel coated, compatible with copper tubing sizes, to engage and lock designed to permit some angular deflection, contraction, and expansion.
 - b. Gasket: Elastomer composition for operating temperature range from 86 degrees F to 230 degrees F.
 - c. Accessories: Stainless steel bolts, nuts, and washers.

2.03 BALL VALVES

- A. 2 1/2 inches and larger: MSS SP 110 600 psi WOG two piece bronze body, stainless steel trim, chrome plated brass ball, full port, PTFE or TFE seats, blow-out proof stem, threaded ends with union, lever handle. Provide locking lever handle or extended lever handle as required by installation.
- B. 2 inches and Smaller: MSS SP 110, Class 150, bronze, two piece body, stainless steel trim, chrome plated bronze ball, full port, PTFE or TFE seats, blow-out proof stem, threaded ends with union, lever handle. Provide locking lever handle or extended lever handle as required by installation.



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SECTION 15410 — FACILITY WATER DISTRIBUTION

2.04 CHECK VALVES

- A. Horizontal Swing Check Valves:
 - 1. 2 inches and Smaller: MSS SP 80, Class 150, bronze body and cap, bronze seat, Buna-N disc, threaded ends.
 - 2. 2-1/2 inches and Larger: MSS SP 71, Class 125, cast iron body, bolted cap, bronze or cast iron disc, renewable disc seal and seat, flanged ends.
- B. Spring Loaded Check Valves:
 - 1. 2 inches and Smaller: MSS SP 80, Class 250, bronze body, in-line spring lift check, silent closing, Buna-N disc, integral seat, threaded ends.
 - 2. 2-1/2 inches and Larger: MSS SP 71, Class 125, wafer style, cast iron body, bronze seat, center guided bronze disc, stainless steel spring and screws, flanged ends.

2.05 PRESSURE GAGES

- A. Gage: ASME B40.1, with bourdon tube, rotary brass movement, brass socket, front calibration adjustment, black scale on white background.
 - 1. Case: Cast aluminum or Stainless steel.
 - 2. Bourdon Tube: Brass or Type 316 stainless steel.
 - 3. Dial Size: 4 inch diameter.
 - 4. Mid-Scale Accuracy: One percent.
 - 5. Scale: Both psi and kPa.

2.06 WATER PRESSURE REDUCING VALVES

- A. 2 inches and Smaller: MSS SP 80, bronze body, stainless steel and thermoplastic internal parts, fabric reinforced diaphragm, strainer, threaded and double union ends.
- B. 2 1/2 inches and Larger: MSS SP 85, cast iron body, bronze fitted, elastomeric diaphragm and seat disc, flanged.

2.07 RELIEF VALVES

- A. Pressure Relief:
 - 1. ANSI Z21.22 certified, bronze body, teflon seat, steel stem and springs, automatic, direct pressure actuated.
- B. Temperature and Pressure Relief:
 - 1. ANSI Z21.22 certified, bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, temperature relief maximum 210 degrees F, capacity ASME certified and labeled.

2.08 STRAINERS

- A. 2 inch and Smaller: Threaded brass body for 175 psi CWP Class 150, threaded bronze body 300 psi CWP, Y pattern with 1/32 inch stainless steel perforated screen.



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SECTION 15410 — FACILITY WATER DISTRIBUTION

- B. 1-1/2 inch to 4 inch: Class 125, flanged iron body, Y pattern with 1/16-inch stainless steel perforated screen.
- C. 5 inch and Larger: Class 125, flanged iron body, basket pattern with 1/8 inch stainless steel perforated screen.

2.09 HOSE BIBBS

- A. Mechanical and Toilet Rooms: Bronze or brass with integral mounting flange, replaceable hexagonal disc, hose thread spout, chrome-plated where exposed in finished areas. Provide with lock shield and removable key and integral vacuum breaker in conformance with ASSE 1011.

2.10 HYDRANTS

- A. Wall Hydrant: ASSE 1019; non-freeze, self-draining type with chrome plated or stainless steel lockable recessed box, hose thread spout, locks shield and removable key, and integral vacuum breaker.

2.11 RECESSED VALVE BOX

- A. Washing Machine Box: Stainless steel preformed rough-in box, brass valves with single lever handle, socket for 2 inch waste, slip in finishing cover, water hammer arrestors.
- B. Water Supply Box: Plastic preformed rough-in box with brass valves with lever handle finishing cover, water hammer arrestor.

2.12 BACKFLOW PREVENTERS

- A. Reduced Pressure Backflow Preventers:
 - 1. Comply with ASSE 1013.
 - 2. Bronze body, with bronze internal parts and stainless steel springs.
 - 3. Two independently operating, spring loaded check valves; diaphragm type differential pressure relief valve located between check valves; third check valve opening under back pressure in case of diaphragm failure; non-threaded vent outlet; assembled with two gate valves, strainer, and four test cocks.

2.13 WATER HAMMER ARRESTORS

- A. ASSE 1010; stainless steel or copper construction, bellows or piston type.
- B. Type sized in accordance with PDI WH-201.
- C. Pre-charged suitable for operation in temperature range 34 to 250 degrees F and maximum 250 psi working pressure.



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SECTION 15410 — FACILITY WATER DISTRIBUTION

2.14 THERMOSTATIC MIXING VALVES

- A. Chrome plated cast brass body, stainless steel or copper alloy bellows, integral temperature adjustment.
- B. Accessories:
 - 1. Check valve on inlets.
 - 2. Volume control shut-off valve on outlet.
 - 3. Stem thermometer on outlet.
 - 4. Strainer stop checks on inlets.
- C. Cabinet: 16 gage stainless steel, for recessed mounting with keyed lock.

2.15 IN-LINE CIRCULATOR PUMPS

- A. Casing: Bronze rated for 125 psig working pressure with stainless steel rotor assembly.
- B. Impeller: Bronze or stainless steel.
- C. Shaft: Alloy steel with integral thrust collar and two, oil lubricated bronze sleeve bearings.
- D. Seal: Carbon rotating against stationary ceramic seat.
- E. Drive: Flexible coupling.

END OF SECTION



DIVISION 15

SECTION 15420 — FACILITY SANITARY SEWERAGE

PART 1 – GENERAL

1.01 EXTENT OF SECTION

- A. Section includes:
 - 1. Sanitary sewer piping buried
 - 2. Sanitary sewer piping above grade
 - 3. Chemical resistant sewer piping
 - 4. Unions and flanges
 - 5. Valves
 - 6. Pipe hangers and supports
 - 7. Floor drains
 - 8. Floor sinks
 - 9. Planter drains

- B. The intent of the PCSB STANDARDS is for the DESIGN PROFESSIONAL (DP) to comply with the minimum general project requirements and the specific project specifications shall be generated and provided by the DP.

PART 2 – PRODUCTS

2.01 SANITARY SEWER PIPING, BURIED

- A. Plastic Pipe: ASTM D2665, Schedule 40, Type 1 solid core polyvinyl chloride PVC-DWV material.
 - 1. Fittings: PVC, ASTM D2665.
 - 2. Joints: ASTM D2855, solvent weld with ASTM D2564 low V.O.C. solvent cement.

2.02 SANITARY SEWER PIPING, ABOVE GRADE

- A. For Air Plenums: Cast Iron Pipe, CISPI 301, hub-less, service weight.
 - 1. Fittings: Cast iron, CISPI 301.
 - 2. Joints: CISPI 310, Neoprene gasket and type 304 stainless steel heavy duty, wide body clamp and shield assemblies.

- B. Copper Tube: ASTM B306, DWV
 - 1. Fittings: ASME B16.23, cast bronze, or ASME B16.29, wrought copper.
 - 2. Joints: Solder, lead free, 95-5 tin-antimony, or tin and silver, with melting range 430 to 535 degrees F.

2.03 CHEMICAL RESISTANT SEWER PIPING

- A. PPR Pipe: Polypropylene, flame retardant.
 - 1. Fittings: Polypropylene.
 - 2. Joints: Electrical resistance fusion below slab and mechanical joint above slab.



DIVISION 15

SECTION 15420 — FACILITY SANITARY SEWERAGE

2.04 FLOOR DRAINS

- A. Floor Drain in finished areas: lacquered cast iron or PVC two piece body with double drainage flange, weep holes, reversible clamping collar, adjustable round or square nickel-bronze strainer.
- B. Floor Drain in mechanical rooms: lacquered cast iron or PVC two piece body with double drainage flange, weep holes, reversible clamping collar, and round, adjustable strainer with raised anti-splash rim.

2.05 FLOOR SINKS

- A. Floor Sink: Square lacquered cast iron or stainless steel body with integral seepage pan, epoxy coated interior, aluminum dome strainer, clamp collar, sediment bucket, epoxy coated and stainless steel full or half grate as required for installation.

2.06 CLEANOUTS

- A. Exterior Areas: Round cast iron or nickel bronze access frame and heavy-duty non-skid cover.
- B. Interior Finished Floor Areas: Lacquered cast iron body with anchor flange, reversible clamping collar, adjustable top assembly, and round scored cover with gasket in service areas and round depressed cover with gasket to accept floor finish in finished floor areas.
- C. Interior Finished Wall Areas: Line type with lacquered cast iron or PVC body and round epoxy coated cover with gasket, and round stainless steel access cover secured with machine screw.
- D. Interior Unfinished Accessible Areas: Calked or threaded type. Provide bolted stack cleanouts on vertical rainwater leaders.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Establish invert elevations, slopes for drainage to 1/8 inch per foot minimum. Maintain gradients per code.
- B. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Provide clearances at cleanout for snaking drainage system. Encase exterior cleanouts in concrete flush with grade. Install floor cleanouts at elevation to accommodate finished floor.
- C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls. Group piping whenever practical at common elevations.
- D. Provide access where valves and fittings are not accessible.



DIVISION 15

SECTION 15420 — FACILITY SANITARY SEWERAGE

- E. Where pipe support members are welded to structural building framing specify to scrape, brush clean, and apply one coat of zinc rich primer to welding.
- F. Sleeve pipes passing through partitions, walls and floors. Indicate firestopping at fire rated construction perimeters and openings containing penetrating sleeves and piping.

END OF SECTION



DIVISION 15

SECTION 15430 — FACILITY STORM DRAINAGE

PART 1 – GENERAL

1.01 EXTENT OF SECTION

- A. Section includes:
 - 1. Storm water piping buried
 - 2. Storm water piping above grade
 - 3. Unions and flanges
 - 4. Valves
 - 5. Pipe hangers and supports
 - 6. Roof drains
 - 7. Parapet drains
 - 8. Area drains
 - 9. Cleanouts

- B. The intent of the PCSB STANDARDS is for the DESIGN PROFESSIONAL (DP) to comply with the minimum general project requirements and the specific project specifications shall be generated and provided by the DP.

PART 2 – PRODUCTS

2.01 STORM WATER PIPING, BURIED

- A. Plastic Pipe: ASTM D2665, Type 1 solid core polyvinyl chloride PVC-DWV material.
 - 1. Fittings: ASTM D2665 or ASTM D3034, PVC-DWV.
 - 2. Joints: ASTM D2855, solvent weld with ASTM D2564 low V.O.C. solvent cement.

2.02 STORM WATER PIPING, ABOVE GRADE

- A. Plastic Pipe: ASTM D2665, Type 1 solid core polyvinyl chloride PVC-DWV material.
 - 1. Fittings: ASTM D2665 or ASTM D3034, PVC-DWV.
 - 2. Joints: ASTM D2855, solvent weld with ASTM D2564 low V.O.C. solvent cement.

- B. For Air Plenums: Cast Iron Pipe, CISPI 301, hub-less, service weight.
 - 1. Fittings: Cast iron, CISPI 301.
 - 2. Joints: CISPI 310, Neoprene gasket and type 304 stainless steel heavy duty, wide body clamp and shield assemblies.

2.03 UNIONS AND FLANGES

- A. Flanges for Pipe 2-1/2 inches and Larger:
 - 1. PVC Piping: PVC flanges.

- B. PVC Pipe Materials: For connections to equipment and valves with threaded connections, furnish solvent-weld socket to screwed joint adapters and unions.



DIVISION 15

SECTION 15430 — FACILITY STORM DRAINAGE

2.04 ROOF DRAINS

- A. Roof Drain - Primary:
 - 1. Body: Lacquered cast iron with sump.
 - 2. Strainer: Removable cast aluminum, cast bronze or cast iron dome with vandal proof screws.
 - 3. Accessories: Coordinate with roofing type:
 - a. Membrane flange and membrane clamp with integral gravel stop.
 - b. Adjustable under deck clamp.
 - c. Roof sump receiver.
 - d. Waterproofing flange.
 - e. Leveling frame.
 - f. Adjustable extension sleeve for roof insulation.
 - g. Perforated or slotted ballast guard extension for inverted roof.

- B. Overflow Roof Drain - Secondary:
 - 1. Body: Lacquered cast iron with sump.
 - 2. Strainer: Removable cast aluminum, cast bronze or cast iron dome with vandal proof screws.
 - 3. Pipe inlet to two inches above flood elevation.
 - 4. Accessories: Coordinate with roofing type:
 - a. Membrane flange and membrane clamp with integral gravel stop.
 - b. Adjustable under deck clamp.
 - c. Roof sump receiver.
 - d. Waterproofing flange.
 - e. Controlled flow weir.
 - f. Leveling frame.
 - g. Adjustable extension sleeve for roof insulation.
 - h. Perforated or slotted ballast guard extension for inverted roof.
 - i. Perforated stainless steel ballast guard extension.

- C. Scuppers through parapet wall only. Provided under another Division.

2.05 AREA DRAINS

- A. Galvanized cast iron two piece body with double drainage flange, weep holes, reversible clamping collar, backwater valve and round or square adjustable nickel-bronze strainer.

2.06 CLEANOUTS

- A. Exterior Surfaced Areas: Round cast iron access frame and heavy-duty non-skid cover.

- B. Exterior Landscaped Areas: Line type with PVC body and round epoxy coated cover with gasket.



DIVISION 15

SECTION 15430 — FACILITY STORM DRAINAGE

- C. Interior Finished Floor Area: PVC with anchor flange, threaded top assembly, and round scored cover with gasket in service areas and round depressed cover with gasket to accept floor finish in finished floor areas.
- D. Interior Finished Wall Areas: Line type with PVC body and round epoxy coated cover with gasket, and round or square stainless steel access cover secured with machine screw.
- E. Interior Unfinished Accessible Areas: Caulked or threaded type. Provide bolted stack cleanouts on vertical rainwater leaders.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Establish invert elevations, slopes for drainage to 1/8 inch per foot minimum. Maintain gradients.
- B. Extend cleanouts to finished floor or wall surface. Provide clearances at cleanout for snaking drainage system. Encase exterior cleanouts in concrete pad flush with grade. Install floor cleanouts at elevation to accommodate finished floor.
- C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls. Install piping to maintain headroom. Group piping to conserve space. Group piping whenever practical at common elevations.
- D. Provide clearance in hangers and from structure and other equipment for installation of insulation.
- E. Where pipe support members are welded to structural building framing, indicate CONTRACTOR to scrape, brush clean, and apply one coat of zinc rich primer to welding.
- F. Sleeve pipes passing through partitions, walls and floors. Install fire-stopping at fire rated construction perimeters and openings containing penetrating sleeves and piping.



DIVISION 15

SECTION 15430 — FACILITY STORM DRAINAGE

3.02 SCHEDULES

| PIPE MATERIAL | MAXIMUM HANGER SPACING | | HANGER ROD DIAMETER |
|---|------------------------|---------------|---------------------|
| | Horizontal Feet | Vertical Feet | Inches |
| Cast Iron (All Sizes) | 5 | 15 | 5/8 |
| Cast Iron (All Sizes) with 10 foot length of pipe | 10 | 15 | 5/8 |
| PVC (All Sizes) | 4 | 10* | 3/8 |

*Provide midstory guide.

END OF SECTION



DIVISION 15

SECTION 15440 — PLUMBING FIXTURES

PART 1 – GENERAL

1.01 EXTENT OF SECTION

- A. The intent of these guidelines is to include minimum general project requirements that DESIGN PROFESSIONALS must comply with. Specific project book specifications shall be generated by the DESIGN PROFESSIONALS.

- B. Section includes:
 - 1. Water closets
 - 2. Urinals
 - 3. Lavatories
 - 4. Sinks
 - 5. Mop Basins
 - 6. Electric water coolers
 - 7. Bathtubs
 - 8. Showers

- B. Acceptable Manufacturers:
 - 1. Stainless Steel Sinks: Elkay, Just, Kindred, Advance Tabco, Acorn
 - 2. Mop Sinks: Crane-Fiat, Stern Williams, Mustee
 - 3. Drinking Fountains (Vandal-Resistant,VR): Oasis, Elkay, Halsey Taylor
 - 4. Vitreous China Water Closets: American Standard, Kohler, Zurn, Toto
 - 5. Vitreous China Urinals: American Standard, Kohler, Zurn, Toto
 - 6. Cast Iron Lavatories: American Standard, Kohler
 - 7. Cast Iron Bathtubs: American Standard, Kohler, Crane, Eljer
 - 8. Manual Lav/Sink Faucets: Chicago, T & S Brass, Sloan, Speakman, Symmons
 - 9. Manual Laboratory Sink Faucets: Chicago, WaterSaver, T & S Brass
 - 10. Electronic Lavatory/Sink Faucets (AC Powered): Chicago, Zurn, Toto
 - 11. Manual Flush Valves: Sloan, Zurn
 - 12. Electronic Flush Valves (DC): Sloan or Zurn
 - 13. Electronic Flush Valves (AC): Sloan or Zurn
 - 14. Shower/Bathtub Mixing Valves: Chicago, Powers, Symmons
 - 15. Shower Heads/Hand Sprayer: Chicago, Powers, Speakman, Symmons
 - 16. Fixture Stops & Supplies: McGuire, Watts, Chicago, EBC, Brasscraft
 - 17. Fixture Traps: McGuire, Chicago, Watts, EBC, Brasscraft
 - 18. Toilet Seats: Church, Bemis, Olsonite, Centoco, Beneke
 - 19. Fixture Carriers: Wade, Josam, Zurn, Smith
 - 20. A.D.A. Molded Insulation Kits: McGuire, Truebro, Plumberex, Buckaroos
 - 21. Emergency Fixtures: Haws, Bradley, Guardian.



DIVISION 15

SECTION 15440 — PLUMBING FIXTURES

PART 2 – PRODUCTS

2.01 FLUSH VALVE WATER CLOSETS

- A. Floor mounted bowl – K to Adult: Siphon jet, 1.6 GPF, vitreous china closet bowl, with elongated rim, 15 to 16-1/2 inch bowl height, 1-1/2 inch top spud, vandal resistant bolt caps.
- B. Accessible floor mounted bowl – 6th grade to Adult: 16-1/2 to 17 inch bowl height, 1.6 GPF siphon jet, vitreous china closet bowl with elongated rim, 1-1/2 inch top spud, vandal resistant bolt caps, ASME A112.19.2M.
- C. Floor mounted bowl – Preschool: 110 to 12 inch bowl height, 1.6 GPF siphon jet, vitreous china closet bowl with elongated rim, 1-1/2 inch top spud, vandal resistant bolt caps, ASME A112.19.2M.
- D. Exposed Flush Valve: ASME A112.18.1; 11.5”– 24” high exposed chrome plated, diaphragm type with oscillating handle, escutcheon, seat bumper, solid pipe support, vandal resistant integral screwdriver stop and vacuum breaker; maximum 1.6 gallon per flush.
- E. Sensor Operated Flush Valve: Exposed, quiet diaphragm-type, chrome plated, maximum 1.6 gallon per flush flushometer valve with a polished exterior. Complete with a chloramine resistant, dual seal diaphragm with a clog resistant by-pass. The valve incorporates a 6 VDC motorized actuator, an integral infrared convergence-type proximity sensor and a manual push-button override into an all metal, polished chrome plated housing. The valve is complete with high back pressure vacuum breaker, one piece hex coupling nut, adjustable tailpiece, spud coupling and flange for top spud connection. Control stop has internal siphon guard protection. Furnished with a sweat solder kit, solid pipe support, vandal resistant stop cap, and cast wall flange with set screw. Internal seals are made of chloramine. Electrical box by others.
- F. Seat: Solid white heavy-duty plastic, open front, extended back, self-sustaining hinge, stainless steel bolts, without cover.

2.02 WALL HUNG URINALS

- A. Urinal: Water Sense, vitreous china, wall hung 0.1525 GPF washout urinal with shields, integral trap, removable stainless steel strainer, 3/4 inch top spud, steel supporting hanger.
- B. Exposed Flush Valve: exposed chrome plated, diaphragm type with oscillating handle, escutcheon, integral screwdriver stop, vacuum breaker; 0.125-1.0 gallons per flush.
- C. Sensor Operated Flush Valve: Exposed, quiet diaphragm-type, chrome plated, flushometer valve with a polished exterior. Complete with a chloramine resistant, dual seal diaphragm with a clog resistant by-pass. The valve incorporates a 6 VDC motorized



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actuator, an integral infrared convergence-type proximity sensor and a manual push-button override into an all metal, polished chrome plated housing. The valve is complete with high back pressure vacuum breaker, one piece hex coupling nut, adjustable tailpiece, spud coupling and flange for top spud connection. Control stop has internal siphon guard protection. Furnished with a sweat solder kit, vandal resistant stop cap, and cast wall flange with set screw. Internal seals are made of chloramine. Electrical box by others.

2.03 LAVATORIES

- A. Wall Hung Basin: ASME A112.19.2M; cast iron or vitreous china wall hung lavatory 20 x 18 inch minimum, with 4 inch high back, drillings on 4 inch or single hole drilling, rectangular basin with splash lip, front overflow, and soap depression.

OR

Acorn Penal-Ware #1652-FA-LRB-1-BC-MVC2 -SW-FMT-TF, 18" x 20" x 18-1/2" high, rectangular, 14 GA. type 304 stainless steel, seamless weld construction, satin finish, 4-1/4" high backsplash, includes mounting hardware, standard P-trap waste outlet is 1-1/2" O.D. Plain end. Fire-resistant and sound-deadened cabinet, fast drain, self-draining soap dish, off-floor, wall outlet, necessary fasteners for proper installation, carrier.

- B. Counter Top Basin: ASME A112.19.2M; stainless steel, cast iron or vitreous china self-rimming counter top lavatory, 20 x 17 inches with drillings on 4 inch or single hole drilling, front overflow, seal of putty, caulking, or concealed vinyl gasket.

OR

Franke Commercial #V1619/6, with overflow, 18-1/2" x 16-3/8" x 6" high, mirror finished rim satin finished bowl, self-rimming / drop-in, undercoated to reduce condensation and resonance, positive hold down clamping. Provide basin rim sealant.

Undercounter Lavatory: stainless steel, cast iron or vitreous china, unglazed rim for under counter mount with rear overflow, 20 x 17 inches, with countertop drillings on 4 inch or single hole drilling.

OR

Acorn Meridian #4390-048-001 basin, round, grade 18-10, 16 GA. type 304 stainless steel, satin finished bowl, undercounter, with overflow, mounting kit. Provide basin rim sealant.

- C. Supply Fitting: single lever or push type metering faucet, chrome plated supply fitting with open grid strainer, aerator or laminar flow outlet at 0.5 gpm, accessible.
- D. Accessories:
 - 1. Chrome plated 17 gage brass P-trap with cleanout plug and arm with escutcheon.
 - 2. Offset waste with perforated open strainer plug and strainer.
 - 3. Screwdriver stops.
 - 4. Flexible supplies.



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5. Trap and waste insulated and offset to meet ADA compliance.

- E. Wall Mounted Lavatory Carrier: ASME A112.6.1; cast iron and steel frame with tubular legs, lugs for floor and wall attachment, concealed arm supports, bearing plate and studs.

2.04 SINKS

- A. Single Compartment Bowl: minimum 20 x 17 x 6 inch outside dimensions, 18 GA. Type 304 stainless steel, self-rimming and undercoated, with 1-1/2 inch chromed brass drain, 3-1/2 inch crumb cup and tailpiece or grid drain, ledge back drilled for trim.
- B. Double Compartment Bowl: minimum 33 x 21 x 6 inch outside dimensions 18 gage thick, Type 304 stainless steel. Self-rimming and undercoated, with 1-1/2 inch chromed brass drains, 3-1/2 inch crumb cups and tailpieces, ledge back drilled for trim.
- C. Trim: ASME A112.18.1; chrome plated brass supply with gooseneck rigid / swing spout, water economy aerator with maximum 2.2 gpm flow, indexed wrist blade lever handles or single lever handle.
- D. Accessories: Chrome plated 17 gage brass P-trap with clean-out plug and arm with escutcheon, screwdriver] stop, flexible supplies.
- E. Provide shallow sink bowl depths, lever handle trim and drain with offset tailpiece where required for accessibility.

2.05 BATHTUBS

- A. Bathtub: enameled cast iron bathtub with slip resistant surface, contoured front apron, 60 x 30 inches, white color.
- B. Bathtub: ANSI Z124.1; molded glass fiber reinforced polyester, with slip-resistant bottom surface, contoured shape, 60 x 30 inches, white color.
- C. Bath Trim: ASME A112.18.1; concealed over rim supply with spout and indexed handles, lever operated pop-up waste and overflow.
- D. Bath and Shower Trim: ASME A112.18.1; concealed shower and over rim supply with diverter spout, pressure balanced, thermostatic mixing valve, bent shower arm with flow control and adjustable spray showerhead with maximum 1.75 gpm flow and escutcheon, lever operated pop-up waste and overflow.

2.06 SHOWERS

- A. Trim: concealed shower supply with pressure balanced thermostatic mixing valves, integral service stops, bent shower arm with flow control and adjustable spray ball joint shower head with maximum 1.75 gpm flow, and escutcheon.



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- B. Accessible Trim: hand held shower with 60 inch metal clad or white reinforced vinyl] hose and 36 inch grab/slide bar, female inlet.
- C. Shower compartments may be prefabricated acrylic or ceramic tile enclosure and basin.

2.07 ELECTRIC WATER COOLERS

- A. Surface mounted accessible, vandal-resistant, high-low electric water cooler with stainless steel top, stainless steel body, elevated anti-squirt bubbler with stream guard, automatic stream regulator, push button, mounting bracket, refrigerated with integral air cooled condenser and stainless steel grille.
- B. Capacity: 8.0 gpm of 50 degrees F water with inlet at 80 degrees F and room temperature of 90 degrees F.
- C. Electrical: Maximum 1/5 hp compressor, cord and plug for connection to electric wiring system including grounding connector.
- D. Support: Watts #CA-431, double carrier, mounted on concrete floor, universal steel hangar support plates with integral mounting brackets, heavy gauge steel uprights with integral welded feet to fit into finished masonry or metal stud wall space.

OR

Acorn Aqua #A112408B-FG-VR water cooler wall hung bi-level, self-contained, 14 GA. 304 stainless steel top, apron and one-piece bottom wrapper. Louvers will have a stainless steel protective screen, 100% lead-free waterways, unit shall be activated by a flush mounted brass push button using less than 5 pounds of force, bubbler shall be forged polished chrome plated brass, anti-rotation non-squirt bubbler with flexible guard and operate on water pressure range of 20 - 105 psig, vandal-resistant integral waste strainer, 1-1/4" P-traps provided, R-134a refrigeration system delivers a minimum of 8 gph of water at 50 F cooled from 80 F inlet water at 90 F ambient. An adjustable thermostat with an off position shall control the refrigeration system. Electrical: 1/4HP @ 115V 4.6A three-prong plug. Provide electrical duplex box with GFI.

2.08 MOP BASINS

- A. Basin: Minimum 24 x 24 x 10 inch high, 16 gage type 304 stainless steel, floor mounted, with 2 inch wide shoulders, seamless welded construction, sound deadened, removable flat grid strainer. Provide tiling flange where required by room finish.
- B. Trim: exposed wall type supply with cross or lever handles, spout wall brace, vacuum breaker, hose end spout, strainers, eccentric adjustable inlets, integral screwdriver stops with covering caps and adjustable threaded wall flanges.
- C. Accessories:
 - 1. 36" plain end reinforced rubber hose.
 - 2. Hose clamp hanger.



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3. Mop hanger.
4. Wall splash guards.

2.09 EMERGENCY EYE AND FACE WASH

- A. ANSI Z358.1; wall mounted, stainless steel bowl with elbow, instant action stay open valve actuated by push flag, twin spray heads with face spray ring, dust cover assembly, wall mount bracket, and tailpiece and chrome plated brass P-trap. Furnish universal emergency sign.

2.10 EMERGENCY COMBINATION SHOWER WITH EYE AND FACE WASH

- A. Shower: ANSI Z358.1; free standing, self-cleaning, non-clogging 8 inch diameter stainless steel deluge shower head, instant action stay open valve actuated by rigid stainless steel pull rod.
- B. Eyewash: ANSI Z358.1; stainless steel bowl with elbow, 1-1/4 inch galvanized steel pipe pedestal with floor flange, instant action stay open valve actuated by push flag, twin spray heads with face spray ring, dust cover assembly, wall mount bracket, and tailpiece and chrome plated brass P-trap.
- C. Supply and Waste Piping: 1-1/2 inch galvanized steel pipe pedestal with floor flange.
- D. Furnish universal emergency sign.

2.11 LAVATORY ADA INSULATION KIT

- A. Product Description: Safety Covers conforming to ANSI A177.1 and consisting of insulation kit of molded closed cell vinyl construction, 3/16 inch thick, white color, for insulating offset tailpiece, P-trap, valves, and supply piping. Furnish with weep hole and angle valve access covers.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Fixture Mounting Heights:
 1. Water Closet:
 - a. Pre K: 10-12 inches to top of seat.
 - b. K-5: 15 inches to top of seat standard and accessible.
 - c. 6-12 & Adult: 15 inches to top of seat standard. 17-19 inches top of seat for accessibility.
 2. Water Closet Flush Valves:
 - a. Standard: 11.5 inches min. above bowl rim. Coordinate with grab bars
 3. Urinal:
 - a. K-5: 17 inches to top of rim.
 - b. 6-8: 20 inches to top of rim. 17 inches to top of rim for accessibility.



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- c. 9-12 & Adult: 24 inches to top of bowl rim. 17 inches to top of rim for accessibility.
 - 4. Lavatory:
 - a. Pre K: 23 inches to top of basin.
 - b. K-5: 27 inches to top of basin. 30 inches to top of basin for accessibility.
 - c. 6-12 & Adult: 31 inches to top of basin. 34 inches to top of basin for accessibility.
 - 5. Drinking Fountain:
 - a. Pre K-3: 24 inches to top of basin. 30 inches to top of basin rim.
 - b. 4-5: 28 inches to top of basin. 30 inches to top of basin for accessibility.
 - c. 6-12 & adult: 40 inches to top of basin. 34 inches to top of basin for accessibility.
 - d. Standard Adult: 40 inches to top of basin rim.
 - 6. Shower Heads:
 - a. 6-8 Male: 78 inches to bottom of head.
 - b. 6-8 Female: 72 inches to bottom of head.
 - 7. Emergency Eye and Face Wash: 38 inches to receptor rim.
 - 8. Emergency Shower: 84 inches to bottom of head.
- B. Minimum Fixture Rough-In:

| Fixture | Hot inches | Cold inches | Waste inches | Vent inches | Trap inches |
|----------------------------|------------|-------------|--------------|-------------|-------------|
| Water Closet (Flush Valve) | - | 1-1/4 | 4 | 2 | integral |
| Urinal (Flush Valve) | - | 3/4 | 2 | 2 | integral |
| Lavatory | 1/2 | 1/2 | 2 | 2 | 1-1/4 |
| Sink | 1/2 | 1/2 | 2 | 2 | 1-1/2 |
| Mop Basin | 3/4 | 3/4 | 3 | 2 | 3 |
| Water Cooler | - | 1/2 | 2 | 2 | 1-1/2 |
| Bathtub | 1/2 | 1/2 | 2 | 2 | 2 |
| Shower | 1/2 | 1/2 | 2 | 2 | 2 |

END OF SECTION.



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SECTION 15440 — PLUMBING FIXTURES

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DIVISION 15

SECTION 15450 — COMMERCIAL WATER HEATERS

PART 1 – GENERAL

1.01 EXTENT OF SECTION

- A. Section includes:
 - 1. Commercial electric water heaters
 - 2. Commercial gas-fired water heaters
 - 3. Packaged water heating systems
 - 4. Domestic hot water storage tanks
- B. The intent of the PCSB STANDARDS is for the DESIGN PROFESSIONAL (DP) to comply with the minimum general project requirements and the specific project specifications shall be generated and provided by the DP.

1.02 QUALITY ASSURANCE

- A. Conform to ASME Section VIII for construction of water heaters and heat exchangers. Provide boilers registered with National Board of Boiler and Pressure Vessel Inspectors.
- B. Water Heater Performance Requirements: Equipment efficiency not less than prescribed by ASHRAE 90.

1.03 COMMERCIAL ELECTRIC WATER HEATERS

- A. Heaters shall have an actual storage and recover capacity as scheduled on drawings. Tanks shall be glass, stainless steel or epoxy-phenolic lined. Tanks shall be insulated to comply with ASHRAE Standard 90.1 and sheet metal jacketed.
- B. Heater shall include the following: magnesium anode rod, manual reset, high limit control, brass drain valve, low water cut-off, ASME temperature and pressure relief valve, vacuum relief valve, separate dial pressure and temperature gauges, time delay sequencer, ASME code stamp for 125 psi working pressure.
- C. Heaters shall have a three year limited warranty.

1.04 COMMERCIAL GAS FIRED WATER HEATERS

- A. Type: Automatic, natural gas-fired, vertical storage.
- B. Tank: Glass lined, Copper lined or Nickel (nickel/phosphorus) coating on welded steel ASME labeled; multiple flue passages, 4 inch diameter inspection port, thermally insulated with minimum 2 inches glass fiber or polyurethane, encased in corrosion-resistant steel jacket; baked-on enamel finish; floor shield and legs.
- C. Accessories: Brass water connections and dip tube, drain valve, magnesium anode, and ASME rated temperature and pressure relief valve.



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SECTION 15450 — COMMERCIAL WATER HEATERS

- D. Approval by AGA as automatic storage water heater and automatic circulating tank water heater for operation at 180 degrees F operation on combustible floors.
- E. Controls: Automatic water thermostat with adjustable temperature range from 120 to 180 degrees F Automatic reset high temperature limiting thermostat factory set at 195 degrees F, gas pressure regulator, multi-ribbon or tubular burner, 100 percent safety shut-off pilot and thermocouple, flue baffle and draft hood.

1.05 PACKAGED WATER HEATING SYSTEMS

- A. System: Gas-fired direct heating boiler, indirect water heating boiler, circulating pump, controls, piping and valves all mounted on structural steel skid.
- B. Boiler:
 - 1. Type: natural gas-fired water tube boiler, with copper finned tube heat exchanger, one inch diameter, 13 gage steel boiler tubes and copper tube heat exchanger with bronze heads,] steel jacket with glass fiber insulation.
 - 2. Boiler Trim: Gas burner, thermometer and pressure gauge. Immersion thermostats for operating and high limit protection, 100 percent safety shut-off. Electric gas valve with transformer, electronic safety pilot and pilot burner, gas pressure regulator. Manual gas shut-off, low water cut off, ASME rated temperature and pressure relief valve, coil relief valve, automatic boiler fill and expansion tank, draft inverter.
- C. Vertical or Horizontal storage tank:
 - 1. Working pressure: 150 psi ASME labeled.
 - 2. Lining: 15 mils thick epoxy lining extended through flanges and couplings.
 - 3. Support: Two welded tank saddles not less than 4 inches wide by 1/4 inch thick, mounted on 2 inch pipe stand with minimum four cross braced legs; sheet teflon isolation strip between tank and saddle; dielectric unions between tank and piping system.
 - 4. Insulation: 3 inch glass fiber insulation with steel or aluminum jacket.
- D. Pump:
 - 1. Type: All bronze, in-line circulation pump mounted on between heater and storage tank, controlled by tank mounted immersion thermostat set at 140 degrees F or 180 degrees F mixed down to 120 degrees F for delivery to user.
- E. Thermostatic Valve: Three-way, self-contained, full line size, bronze body 1/2 to 2 inches size, iron body 2-1/2 inches and over, set at 140 degrees F.

1.06 DOMESTIC HOT WATER STORAGE TANKS

- A. Tank: Welded steel, ASME labeled for working pressure of 150 psig, steel support saddles, taps for accessories, threaded connections of stainless steel, access manhole.
- B. Lining:
 - 1. 0.024 inches self-priming polymer epoxy, continued into flanged connections.



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SECTION 15450 — COMMERCIAL WATER HEATERS

- C. Openings: Up to 3 inches, copper-silicone threaded; over 4 inches, flanged ; flanged collar for heat exchanger; man-way fitting.
- D. Accessories: Tank drain, water inlet and outlet, thermometer range of 40 to 200 degrees F, ASME pressure relief valve suitable for maximum working pressure.
- E. Vertical or Horizontal storage tank:
 - 1. Support: Two welded tank saddles not less than 4 inches wide by 1/4 inch thick, mounted on 2 inch pipe stand with minimum four cross braced legs; sheet teflon isolation strip between tank and saddle; dielectric unions between tank and piping system.
- F. Insulation: Factory furnished 3 inch glass fiber insulation with steel or aluminum jacket.

1.07 ELECTRICAL CHARACTERISTICS AND COMPONENTS

- A. Factory mount disconnect switch in control panel on equipment.

PART 2 – PRODUCTS

2.01 COMMERCIAL ELECTRIC AND GAS-FIRED WATER HEATER

- A. A.O. Smith
- B. Lochinvar
- C. State Industries

2.02 COMMERCIAL ELECTRIC AND GAS-FIRED WATER HEATER

- A. Lochinvar

2.03 COMMERCIAL ELECTRIC AND GAS-FIRED WATER HEATER

- A. A.O. Smith
- B. Lochinvar
- C. State Industries

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Maintain manufacturer's recommended clearances around and over water heaters. Install water heater on concrete housekeeping pad.



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SECTION 15450 — COMMERCIAL WATER HEATERS

- B. Connect natural gas piping to water heater, full size of water heater gas train inlet. Arrange piping with clearances for burner removal and service.
- C. Connect propane piping to water heater, full size of water heater gas train inlet. Arrange piping with clearances for burner removal and service.
- D. Connect fuel oil piping to water heater, full size of water heater gas train inlet. Arrange piping with clearances for burner removal and service.
- E. Specify the following piping accessories.
 - 1. On supply:
 - a. Thermometer well and thermometer.
 - b. Strainer.
 - c. Pressure gage.
 - d. Shutoff valve.
 - 2. On return:
 - a. Thermometer well and thermometer.
 - b. Pressure gage.
 - c. Shutoff valve.
- F. Specify the following piping accessories on natural gas piping connections
 - 1. Strainer.
 - 2. Pressure gage.
 - 3. Shutoff valve.
 - 4. Pressure reducing valve.
- G. Specify the following piping accessories on propane piping connections
 - 1. Strainer.
 - 2. Pressure gage.
 - 3. Shutoff valve.
 - 4. Pressure reducing valve.
- H. Specify the following piping accessories on fuel oil piping connections.
 - 1. Strainer.
 - 2. Shutoff valve.
 - 3. Check valve.
- I. Domestic Hot Water Storage Tanks:
 - 1. Provide steel pipe support, independent of building structural framing members.
 - 2. Clean and flush prior to delivery to site and after installation. Seal until pipe connections are made.

END OF SECTION



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SECTION 15460 — PLUMBING INSULATION

PART 1 – GENERAL

1.01 EXTENT OF SECTION

- A. Section includes:
 - 1. Plumbing piping insulation, jackets and accessories.
 - 2. Plumbing equipment insulation, jackets and accessories.
- B. The intent of the PCSB STANDARDS is for the DESIGN PROFESSIONAL (DP) to comply with the minimum general project requirements and the specific project specifications shall be generated and provided by the DP.

PART 2 – PRODUCTS

2.01 PIPE INSULATION

- A. Domestic Cold, Hot and Hot Water Return and Storm Piping:
 - 1. ASTM C547, molded glass fiber pipe insulation.
 - 2. Thermal Conductivity: 0.23 at 75 degrees F.
 - 3. Operating Temperature Range: 0 to 850 degrees F.
 - 4. Vapor Barrier Jacket: ASTM C1136, Type I, factory applied reinforced foil kraft with self-sealing adhesive joints.
 - 5. Jacket Temperature Limit: minus 20 to 150 degrees F.
- B. Condensate and Cold Drain Piping:
 - 1. ASTM C534, Type I, flexible, closed cell elastomeric insulation, tubular.
 - 2. Thermal Conductivity: 0.30 at 75 degrees F.
 - 3. Maximum Service Temperature: 300 degrees F.
 - 4. Operating Temperature Range: Range: Minus 58 to 300 degrees F.

2.02 PIPE INSULATION JACKETS

- A. Vapor Retarder Jacket:
 - 1. White Kraft paper with glass fiber yarn, bonded to aluminized film.
 - 2. Moisture vapor transmission: ASTM E96; 0.02 perm-inches.
- B. PVC Plastic Pipe Jacket:
 - 1. Product Description: One piece molded type fitting covers and sheet material, off-white color.
 - 2. Thickness: 15 mil.
 - 3. Connections: Brush on welding adhesive or Pressure sensitive color matching vinyl tape.
- C. Aluminum Pipe Jacket:
 - 1. Thickness: 0.020 inch thick sheet.
 - 2. Finish: Smooth or Embossed.
 - 3. Joining: Longitudinal slip joints and 2 inch laps.



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SECTION 15460 — PLUMBING INSULATION

4. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.
 5. Metal Jacket Bands: 1/2 inch wide; 0.015 inch thick aluminum or 0.010 inch thick stainless steel.
- D. Stainless Steel Pipe Jacket:
1. Type 304 stainless steel.
 2. Thickness: 0.016 inch thick.
 3. Finish: Smooth or Corrugated.
 4. Metal Jacket Bands: 1/2 inch wide; 0.020 inch thick stainless steel.
- E. Field Applied Glass Fiber Fabric Jacket System:
1. Insulating Cement/Mastic: ASTM C195; hydraulic setting on mineral wool.
 2. Glass Fiber Fabric:
 - a. Cloth: Untreated; 9 oz/sq yd weight.
 - b. Blanket: 1.0 lb/cu ft density.
 - c. Weave: 10 x 10.

2.03 PIPE INSULATION ACCESSORIES

- A. Vapor Retarder Lap Adhesive: Compatible with insulation.
- B. Covering Adhesive Mastic: Compatible with insulation.
- C. Piping 1-1/2 inches diameter and smaller: Galvanized steel insulation protection shield. MSS SP-69, Type 40. Length: Based on pipe size and insulation thickness.
- D. Piping 2 inches diameter and larger: Wood insulation saddle. Inserts length: not less than 6 inches long, matching thickness and contour of adjoining insulation.
- E. Closed Cell Elastomeric Insulation Pipe Hanger: Polyurethane insert with aluminum or stainless steel jacket single piece construction with self-adhesive closure. Thickness to match pipe insulation.

2.04 EQUIPMENT INSULATION

- A. Glass fiber, flexible or semi-rigid, noncombustible.
 1. Thermal Conductivity: 0.24 at 75 degrees F.
 2. Operating Temperature Range: 0 to 450 degrees F.
 3. Density: 1.65 pound per cubic foot.
- B. Semi-rigid, fibrous glass board noncombustible, end grain adhered to jacket.
 1. Thermal Conductivity: 0.27 at 75 degrees F.
 2. Operating Temperature Range: 0 to 650 degrees F.
 3. Vapor Barrier Jacket: ASTM C1136, Type II, factory applied reinforced foil kraft with self-sealing adhesive joints.
 4. Jacket Temperature Limit: minus 20 to 150 degrees F.



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SECTION 15460 — PLUMBING INSULATION

2.05 EQUIPMENT INSULATION JACKETS

- A. PVC Plastic Equipment Jacket:
 - 1. Product Description: ASTM D1784, sheet material, off-white color.
 - 2. Minimum Service Temperature: -40 degrees F.
 - 3. Maximum Service Temperature: 150 degrees F.
 - 4. Moisture Vapor Transmission: ASTM E96; 0.002 perm-inches.
 - 5. Thickness: 15 mil.
 - 6. Connections: Brush on welding adhesive or Pressure sensitive color matching vinyl tape.

2.06 EQUIPMENT INSULATION ACCESSORIES

- A. Vapor Retarder Lap Adhesive: Compatible with insulation.
- B. Covering Adhesive Mastic: Compatible with insulation.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Piping Exposed to View in Finished Spaces: Locate insulation and cover seams in least visible locations.
- B. Continue insulation through penetrations of building assemblies or portions of assemblies having fire resistance rating of one hour or less. Provide intumescent firestopping when continuing insulation through assembly. Finish at supports, protrusions, and interruptions.
- C. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces: Finish with PVC jacket and fitting covers or aluminum jacket.
- D. Piping Exterior to Building: Provide vapor retarder jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor retarder cement. Cover with aluminum jacket with seams located on side of horizontal piping with overlap facing down to shed water or on bottom side of horizontal piping.
- E. Buried Piping: Insulate only where insulation manufacturer recommends insulation product may be installed in trench, tunnel or direct buried. Install factory fabricated assembly with inner all-purpose service jacket with self-sealing lap, and asphalt impregnated open mesh glass fabric, with 1 mil thick aluminum foil sandwiched between three layers of bituminous compound; outer surface faced with polyester film.
- F. Prepare pipe insulation for finish painting.



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SECTION 15460 — PLUMBING INSULATION

3.02 SCHEDULES

A. Water Supply Services Piping Insulation Schedule:

| PIPING SYSTEM | PIPE SIZE | INSULATION THICKNESS inches |
|---|--------------------------|-----------------------------|
| Domestic Hot Water Supply and Recirculation | 1-1/4 inches and smaller | 1.0 |
| | 1-1/2 inches and larger | 1.0 |
| Domestic Hot Water Supply and Recirculation systems with domestic water temperature maintenance cable | 1 inch and smaller | 1.0 |
| | 1-1/4 inches to 2 inches | 1.5 |
| | 2-1/2 inches and larger | 2.0 |
| Domestic Cold Water | 1-1/4 inches and smaller | 0.5 |
| | 1-1/2 inches and larger | 0.5 |
| Deionized Water | All sizes | 1.0 |

B. Drainage Services Piping Insulation Schedule:

| PIPING SYSTEM | PIPE SIZE | INSULATION THICKNESS inches |
|---|-----------|-----------------------------|
| Storm Piping (horizontal above ground within building) | All sizes | 1.0 |
| Storm Piping (vertical above ground within building) | All sizes | 1.0 |
| Sanitary Sewer Piping (horizontal and vertical above ground when receiving chilled water waste) | All sizes | 1.0 |



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SECTION 15460 — PLUMBING INSULATION

C. Equipment Insulation Schedule:

| EQUIPMENT | INSULATION THICKNESS inches |
|--|--------------------------------|
| Roof Drain Bodies | 1.0 |
| Domestic Water Heaters & Hot Water Storage Tanks | 1.5 |

END OF SECTION