

**DIVISION 22: PLUMBING**

**22 0500 COMMON WORK RESULTS FOR PLUMBING**

- 22 0501 Common Plumbing Requirements
- 22 0529 Hangers and Supports for Plumbing Piping and Equipment
- 22 0548 Vibration and Seismic Controls for Plumbing
- 22 0553 Identification for Plumbing Pipes and Equipment
- 22 0719 Plumbing Piping Insulation

**22 1000 PLUMBING PIPES AND PUMPS**

- 22 1116 Domestic Water Piping
- 22 1119 Domestic Water Piping Specialties
- 22 1313 Facility Sewers
- 22 1319 Facility Sanitary Sewer Specialties
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- 22 4700 Drinking Fountains and Water Coolers

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## SECTION 22 0501

### COMMON PLUMBING REQUIREMENTS

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Common requirements and procedures for plumbing systems.
  - 2. Responsibility for proper operation of electrically powered equipment furnished under this Division.
  - 3. Furnish and install sealants relating to installation of systems installed under this Division.
  - 4. Furnish and install Firestop Penetration Systems for plumbing systems penetrations as described in Contract Documents.
  
- B. Products Furnished But Not Installed Under This Section:
  - 1. Sleeves, inserts, supports, and equipment for plumbing systems installed under other Sections.
  
- C. Related Requirements:
  - 1. Section 03 3111: 'Cast-In-Place Structural Concrete' for exterior concrete pads and bases for mechanical equipment.
  - 2. Section 05 0523: 'Metal Fastening' for quality and requirements for welding.
  - 3. Section 07 8400: 'Firestopping' for quality of penetration firestop systems to be used on Project and submittal requirements.
  - 4. Section 07 9213: 'Elastomeric Joint Sealant' for quality at building exterior.
  - 5. Sections Under 09 9000 Heading: 'Paints And Coatings' for painting of plumbing items requiring field painting.
  - 6. Section 22 0548: 'Vibration And Seismic Control for Plumbing Piping and Equipment'.
  - 7. Division 26: 'Electrical' for raceway and conduit, unless specified otherwise, and line voltage wiring.
  - 8. Division 33: 'Utilities' for piped utilities.
  - 9. Slots and openings through floors, walls, ceilings, and roofs provided under other Divisions in their respective materials.

##### 1.2 SUBMITTALS

- A. Action Submittals:
  - 1. Product Data:
    - a. Manufacturer's catalog data for each manufactured item.
      - 1) Provide section in submittal for each type of item of equipment. Include Manufacturer's catalog data of each manufactured item and enough information to show compliance with Contract Document requirements. Literature shall show capacities and size of equipment used and be marked indicating each specific item with applicable data underlined.
      - 2) Include name, address, and phone number of each supplier.
  
- B. Informational Submittals:
  - 1. Qualification Statement:
    - a. Plumbing Subcontractor:
      - 1) Provide Qualification documentation if requested by Architect or Owner.
    - b. Installer:
      - 1) Provide Qualification documentation if requested by Architect or Owner.
  
- C. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Operations and Maintenance Data (Modify and add to requirements of Section 01 7800):

- 1) At beginning of PLUMBING section of Operations And Maintenance Manual, provide master index showing items included:
  - a) Provide name, address, and phone number of Architect, Architect's Mechanical Engineer, General Contractor, and Plumbing subcontractor.
  - b) Identify maintenance instructions by using same equipment identification used in Contract Drawings. Maintenance instructions shall include:
    - (1) List of plumbing equipment used indicating name, model, serial number, and nameplate data of each item together with number and name associated with each system item.
    - (2) Manufacturer's maintenance instructions for each piece of plumbing equipment installed in Project. Instructions shall include name of vendor, installation instructions, parts numbers and lists, operation instructions of equipment, and maintenance instructions.
  - c) Provide operating instructions to include:
    - (1) General description of fire protection system.
    - (2) Step by step procedure to follow for shutting down system or putting system into operation.
- b. Warranty Documentation:
  - 1) Include copies of warranties required in individual Sections of Division 22.

### 1.3 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  1. Perform work in accordance with applicable provisions of Plumbing Codes applicable to Project. Provide materials and labor necessary to comply with rules, regulations, and ordinances.
  2. In case of differences between building codes, laws, local ordinances, utility company regulations, and Contract Documents, the most stringent shall govern. Notify Architect in writing of such differences before performing work affected by such differences.
  3. Identification:
    - a. Motor and equipment name plates as well as applicable UL / ULC and AGA / CGA labels shall be in place when Project is turned over to Owner.
- B. Qualifications. Requirements of Section 01 4301 applies, but not limited to following:
  1. Plumbing Subcontractor:
    - a. Company specializing in performing work of this section.
      - 1) Minimum five (5) years experience in plumbing installations.
      - 2) Minimum five (5) satisfactorily completed installations in past three (3) years of projects similar in size, scope, and complexity required for this project before bidding.
    - b. Upon request, submit documentation.
  2. Installer:
    - a. Licensed for area of Project.
    - b. Designate one (1) individual as project foremen who shall be on site at all times during installation and experienced with installation procedures required for this project.
    - c. Upon request, submit documentation.

### 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Delivery And Acceptance Requirements:
  1. Accept valves on site in shipping containers with labeling in place.
  2. Provide temporary protective coating on cast iron and steel valves.
  3. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- B. Storage And Handling Requirements:
  1. In addition to requirements specified in Division 01, stored material shall be readily accessible for inspection by Architect until installed.
  2. Store items subject to moisture damage in dry, heated spaces.

## 1.5 WARRANTY

- A. Manufacturer Warranty:
  - 1. Provide certificates of warranty for each piece of equipment made out in favor of Owner.
- B. Special Warranty:
  - 1. Guarantee plumbing systems to be free from noise in operation that may develop from failure to construct system in accordance with Contract Documents.
  - 2. If plumbing sub-contractor with offices located more than 150 miles (240 km) from Project site is used, provide service / warranty work agreement for warranty period with local plumbing sub-contractor approved by Architect. Include copy of service / warranty agreement in warranty section of Operation And Maintenance Manual.

## PART 2 - PRODUCTS

### 2.1 COMPONENTS

- A. Components shall bear Manufacturer's name and trade name. Equipment and materials of same general type shall be of same make throughout work to provide uniform appearance, operation, and maintenance.
- B. Pipe And Pipe Fittings:
  - 1. Weld-O-Let and Screw-O-Let fittings are acceptable.
  - 2. Use domestic made pipe and pipe fittings on Project, except non-domestic made cast iron pipe and fittings by MATCO-NORCA are acceptable.
- C. Sleeves:
  - 1. General:
    - a. Two sizes larger than bare pipe or insulation on insulated pipe.
  - 2. In Concrete And Masonry:
    - a. Sleeves through outside walls, interior shear walls, and footings shall be schedule 80 black steel pipe with welded plate.
  - 3. In Framing And Suspended Floor Slabs:
    - a. Standard weight galvanized iron pipe, Schedule 40 PVC, or 14 ga (2 mm) galvanized sheet metal.
- D. Valves:
  - 1. Valves of same type shall be of same manufacturer.

## PART 3 - EXECUTION

### 3.1 INSTALLERS

- A. Approved Installers. See Section 01 4301:
  - 1. Meet Quality Assurance Installer Qualifications as specified in Part 1 of this specification.

### 3.2 EXAMINATION

- A. Drawings:
  - 1. Plumbing Drawings show general arrangement of piping, equipment, etc. Follow as closely as actual building construction and work of other trades will permit.
  - 2. Consider Architectural and Structural Drawings part of this work insofar as these drawings furnish information relating to design and construction of building. These drawings take precedence over Plumbing Drawings.

3. Because of small scale of Drawings, it is not possible to indicate all offsets, fittings, and accessories that may be required. Investigate structural and finish conditions affecting this work and arrange work accordingly, providing such fittings, valves, and accessories required to meet conditions.

B. Verification Of Conditions:

1. Examine premises to understand conditions that may affect performance of work of this Division before submitting proposals for this work. Examine adjoining work on which plumbing work is dependent for efficiency and report work that requires correction.
2. Ensure that items to be furnished fit space available. Make necessary field measurements to ascertain space requirements including those for connections and furnish and install equipment of size and shape so final installation shall suit true intent and meaning of Contract Documents. If approval is received by Addendum or Change Order to use other than originally specified items, be responsible for specified capacities and for ensuring that items to be furnished will fit space available.
3. Check that slots and openings provided under other Divisions through floors, walls, ceilings, and roofs are properly located. Perform cutting and patching caused by neglecting to coordinate with Divisions providing slots and openings at no additional cost to Owner.
4. No subsequent allowance for time or money will be considered for any consequence related to failure to examine site conditions.

### 3.3 PREPARATION

A. Changes Due To Equipment Selection:

1. Where equipment specified or otherwise approved requires different arrangement or connections from that shown in Contract Documents, submit drawings showing proposed installations.
2. If proposed changes are approved, install equipment to operate properly and in harmony with intent of Contract Documents. Make incidental changes in piping, supports, installation, wiring, heaters, panelboards, and as otherwise necessary.
3. Provide additional motors, valves, controllers, fittings, and other equipment required for proper operation of systems resulting from selection of equipment.
4. Be responsible for proper location of rough-in and connections provided under other Divisions.

### 3.4 INSTALLATION

A. Interface With Other Work:

1. Furnish exact location of electrical connections and complete information on motor controls to installer of electrical system.
2. Furnish sleeves, inserts, supports, and equipment that are to be installed by others in sufficient time to be incorporated into construction as work proceeds. Locate these items and confirm that they are properly installed.

B. Cut carefully to minimize necessity for repairs to previously installed or existing work. Do not cut beams, columns, or trusses.

C. Locating Equipment:

1. Arrange pipes and equipment to permit ready access to valves, cocks, unions, traps, and to clear openings of doors and access panels.
2. Adjust locations of pipes, equipment, and fixtures to accommodate work to interferences anticipated and encountered.
3. Install plumbing work to permit removal of equipment and parts of equipment requiring periodic replacement or maintenance without damage to or interference with other parts of equipment or structure.
4. Determine exact route and location of each pipe before fabrication.
  - a. Right-Of-Way:
    - 1) Lines that pitch shall have right-of-way over those that do not pitch. For example, plumbing drains shall normally have right-of-way.
    - 2) Lines whose elevations cannot be changed shall have right-of-way over lines whose elevations can be changed.

- b. Offsets, Transitions, and Changes in Direction:
  - 1) Make offsets, transitions, and changes in direction in pipes as required to maintain proper head room and pitch of sloping lines whether or not indicated on Drawings.
  - 2) Furnish and install all traps, air vents, sanitary vents, and devices as required to effect these offsets, transitions, and changes in direction.
  
- D. Penetration Firestops:
  - 1. Install Penetration Firestop System appropriate for penetration at plumbing systems penetrations through walls, ceilings, roofs, and top plates of walls.
  
- E. Sealants:
  - 1. Seal openings through building exterior caused by penetrations of elements of plumbing systems.
  - 2. Furnish and install acoustical sealant to seal penetrations through acoustically insulated walls and ceilings.
  
- F. Furnish and install complete system of piping, valved as indicated or as necessary to completely control entire apparatus:
  - 1. Pipe drawings are diagrammatic and indicate general location and connections. Piping may have to be offset, lowered, or raised as required or directed at site. This does not relieve this Division from responsibility for proper installation of plumbing systems.
  - 2. Arrange piping to not interfere with removal of other equipment, ducts, or devices, or block access to doors, windows, or access openings:
    - a. Arrange so as to facilitate removal of tube bundles.
    - b. Provide accessible flanges or ground joint unions, as applicable for type of piping specified, at connections to equipment and on bypasses.
      - 1) Make connections of dissimilar metals with di-electric unions.
      - 2) Install valves and unions ahead of traps and strainers. Provide unions on both sides of traps.
    - c. Do not use reducing bushings, bull head tees, close nipples, or running couplings. Street elbows are allowed only on potable water pipe **3/4 inch (19 mm)** in diameter and smaller.
    - d. Install piping systems so they may be easily drained
    - e. Install piping to insure noiseless circulation.
    - f. Place valves and specialties to permit easy operation and access. Valves shall be regulated, packed, and glands adjusted at completion of work before final acceptance.
  - 3. Do not install piping in shear walls.
  - 4. Cut piping accurately to measurements established at site. Remove burr and cutting slag from pipes.
  - 5. Work piping into place without springing or forcing. Make piping connections to pumps and other equipment without strain at piping connection. Remove bolts in flanged connections or disconnect piping to demonstrate that piping has been so connected, if requested.
  - 6. Make changes in direction with proper fittings.
  - 7. Expansion of Thermoplastic Pipe:
    - a. Provide for expansion in every **30 feet (9 meters)** of straight run.
    - b. Provide **12 inch (300 mm)** offset below roof line in each vent line penetrating roof.
  - 8. Expansion of PEX Pipe: Allow for expansion and contraction of PEX pipe as recommended by Pipe Manufacturer.
  
- G. Sleeves:
  - 1. Do not place sleeves around soil, waste, vent, or roof drain lines passing through concrete slabs on grade.
  - 2. Provide sleeves around pipes passing through concrete or masonry floors, walls, partitions, or structural members. Seal sleeves with specified sealants. Follow Pipe Manufacturer's recommendations for PEX pipe penetrations through studs and floor slabs.
  - 3. Sleeves through floors shall extend **1/4 inch (6 mm)** above floor finish in mechanical equipment rooms above basement floor. In other rooms, sleeves shall be flush with floor.
  - 4. Sleeves through floors and foundation walls shall be watertight.
  
- H. Escutcheons:
  - 1. Provide spring clamp plates where pipes run through walls, floors, or ceilings and are exposed in finished locations of building. Plates shall be chrome plated heavy brass of plain pattern and shall be set tight on pipe and to building surface.

### **3.5 REPAIR / RESTORATION**

- A. Each Section of this Division shall bear expense of cutting, patching, repairing, and replacing of work of other Sections required because of its fault, error, tardiness, or because of damage done by it:
  - 1. Patch and repair walls, floors, ceilings, and roofs with materials of same quality and appearance as adjacent surfaces unless otherwise shown.
  - 2. Surface finishes shall exactly match existing finishes of same materials.

### **3.6 FIELD QUALITY CONTROL**

- A. Field Tests:
  - 1. Perform tests on plumbing piping systems. Furnish devices required for testing purposes.
- B. Non-Conforming Work:
  - 1. Replace material or workmanship proven defective with sound material at no additional cost to Owner.
  - 2. Repeat tests on new material, if requested.

### **3.7 CLEANING**

- A. Remove dirt, grease, and other foreign matter from each length of piping before installation:
  - 1. After each section of piping used for movement of water or steam is installed, flush with clean water, except where specified otherwise.
  - 2. Arrange temporary flushing connections for each section of piping and arrange for flushing total piping system.
  - 3. Provide temporary cross connections and water supply for flushing and drainage and remove after completion of work.
- B. Clean exposed piping, equipment, and fixtures. Remove stickers from fixtures and adjust flush valves.

### **3.8 CLOSEOUT ACTIVITIES**

- A. Instruction of Owner:
  - 1. Instruct building maintenance personnel and Facility Manager in operation and maintenance of plumbing systems utilizing Operation And Maintenance Manual when so doing.
  - 2. Conduct instruction period after Substantial Completion inspection when systems are properly working and before final payment is made.

### **3.9 PROTECTION**

- A. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system. Cap or plug open ends of pipes and equipment to keep dirt and other foreign materials out of system. Do not use plugs of rags, wool, cotton waste, or similar materials.

**END OF SECTION**

# HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

## PART 1 - GENERAL

### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Common hanger and support requirements and procedures for plumbing systems.
- B. Products Installed But Not Furnished Under This Section:
  - 1. Paint identification for gas piping used in HVAC equipment.
- C. Related Requirements:
  - 1. Section 05 0523: 'Metal Fastening' for quality and requirements for welding.
  - 2. Section 07 8400: 'Firestopping' for quality of Penetration Firestop Systems to be used on Project and submittal requirements.
  - 3. Sections Under 09 9000 Heading: Painting of mechanical items requiring field painting.
  - 4. Slots and openings through floors, walls, ceilings, and roofs provided under other Divisions in their respective materials.
  - 5. Section 23 0529: 'Hangers And Supports For HVAC Piping And Equipment' for gas piping used with HVAC equipment.
  - 6. Section 23 0553: 'Identification For HVAC Piping And Equipment' for paint identification of gas piping used with HVAC equipment.

### 1.2 SUBMITTALS

- A. Action Submittals:
  - 1. Product Data:
    - a. Manufacturer's catalog data for each manufactured item.

## PART 2 - PRODUCTS

### 2.1 ASSEMBLIES

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. Anvil International, Portsmouth, NH [www.anvilintl.com](http://www.anvilintl.com).
    - b. Cooper B-Line, Highland, IL [www.b-line.com](http://www.b-line.com).
    - c. Unistrut, Wayne, MI [www.tyco-unistrut.com](http://www.tyco-unistrut.com).
- B. Materials:
  - 1. Hangers, Rods, And Inserts
    - a. Galvanized and UL approved for service intended.
    - b. Support horizontal piping from hangers or on roller assemblies with channel supports, except where trapeze type hangers are explicitly shown on Drawings. Hangers shall have double nuts.
      - 1) Support insulated pipes **2 inches (50 mm)** in diameter and smaller with adjustable swivel ring hanger with insulation protection shield. Gauge and length of shield shall be in accordance with Anvil design data.
        - a) Type Two Acceptable Products:
          - (1) Swivel Ring Hanger: Anvil Fig. 69.
          - (2) Insulation Protection Shield: Anvil Fig. 167.
          - (3) Equals by Cooper B-Line.

- 2) Support insulated pipes **2-1/2 inches (64 mm)** in diameter and larger with clevis hanger or roller assembly with an insulation protection shield. Gauge and length of shield shall be according to Anvil design data.
  - a) Type Two Acceptable Products:
    - (1) Clevis Hanger: Anvil Fig. 260.
    - (2) Roller Assembly: Anvil Fig. 171.
    - (3) Insulation Protection Shield: Anvil Fig. 167.
    - (4) Equals by Cooper B-Line.
- 3) Support uninsulated copper pipe **2 inches (50 mm)** in diameter and smaller from swivel ring hanger, copper plated and otherwise fully suitable for use with copper tubing. Support non-copper uninsulated pipes from swivel ring hanger.
  - a) Type Two Acceptable Products:
    - (1) Swivel Ring Hanger For Copper Pipe: Anvil Fig. CT-69.
    - (2) Swivel Ring Hanger For Other Pipe: Anvil Fig. 69.
    - (3) Equals by Cooper B-Line.
- 4) Support uninsulated copper pipe **2-1/2 inches (64 mm)** in diameter and larger from clevis hanger, copper plated hangers and otherwise fully suitable for use with copper tubing. Support non-copper uninsulated pipes from clevis hanger.
  - a) Type Two Acceptable Products:
    - (1) Clevis Hanger For Copper Pipe: Anvil Fig. CT-65.
    - (2) Clevis Hanger For Other Pipe: Anvil Fig. 260.
    - (3) Equals by Cooper B-Line.

c. Support rods for single pipe shall be in accordance with following table:

Rod Diameter	Pipe Size	Rod Diameter	Pipe Size
3/8 inch	2 inches and smaller	10 mm	50 mm and smaller
1/2 inch	2-1/2 to 3-1/2 inches	13 mm	64 mm to 88 mm
5/8 inch	4 to 5 inches	16 mm	100 mm to 125 mm
3/4 inch	6 inches	19 mm	150 mm
7/8 inch	8 to 12 inches	22 mm	200 mm to 300 mm

d. Support rods for multiple pipe supported on steel angle trapeze hangers shall be in accordance with following table:

Rods		Number of Pipes per Hanger for Each Pipe Size						
Number	Diameter	2 Inch	2.5 Inch	3 Inch	4 Inch	5 Inch	6 Inch	8 Inch
2	3/8 Inch	Two	0	0	0	0	0	0
2	1/2 Inch	Three	Three	Two	0	0	0	0
2	5/8 Inch	Six	Four	Three	Two	0	0	0
2	5/8 Inch	Nine	Seven	Five	Three	Two	Two	0
2	5/8 Inch	Twelve	Nine	Seven	Five	Three	Two	Two

Rods		Number of Pipes per Hanger for Each Pipe Size						
Number	Diameter	50mm	64mm	75mm	100mm	125mm	150mm	200mm
2	10 mm	Two	0	0	0	0	0	0
2	13 mm	Three	Three	Two	0	0	0	0
2	16 mm	Six	Four	Three	Two	0	0	0
2	19 mm	Nine	Seven	Five	Three	Two	Two	0
2	22 mm	Twelve	Nine	Seven	Five	Three	Two	Two

- 1) Size trapeze angles so bending stress is less than **10,000 psi (69 MPa)**.
- e. Riser Clamps For Vertical Piping:
- 1) Type Two Acceptable Products:
    - a) Anvil Fig. 261.
    - b) Equals by Cooper B-Line.
- f. Concrete Inserts:
- 1) Individual Inserts:
    - a) Suitable for special nuts size **3/8 inch (9.5 mm)** through **7/8 inch (22 mm)** with yoke to receive concrete reinforcing rods, and with malleable iron lugs for attaching to forms.
    - b) Type Two Acceptable Products:
      - (1) Anvil Fig. 282.
      - (2) Equals by Cooper B-Line.

- 2) Continuous Inserts:
  - a) Class Two Quality Standard: Equal to Unistrut P-3200 series.
- g. Steel Deck Bracket:
  - 1) Class Two Quality Standard: Equal to Unistrut P1000 with clamp nut, minimum 6 inch (150 mm) length.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Piping:
  1. Properly support piping and make adequate provisions for expansion, contraction, slope, and anchorage.
    - a. Except for underground pipe, suspend piping from roof trusses or clamp to vertical walls using Unistrut and clamps. Do not hang pipe from other pipe, equipment. Laying of piping on any building element is not allowed.
    - b. Supports For Horizontal Piping:
      - 1) Support metal piping at 96 inches (2 400 mm) on center maximum for pipe 1-1/4 inches (32 mm) or larger and 72 inches (1 800 mm) on center maximum for pipe 1-1/8 inch (29 mm) or less.
      - 2) Support thermoplastic pipe at 48 inches (1 200 mm) on center maximum.
      - 3) Support PEX pipe at 32 inches (800 mm) minimum on center.
      - 4) Provide support at each elbow. Install additional support as required.
    - c. Supports for Vertical Piping:
      - 1) Place riser clamps at each floor or ceiling level.
      - 2) Securely support clamps by structural members, which in turn are supported directly from building structure.
      - 3) Provide clamps as necessary to brace pipe to wall.
    - d. Attach Unistrut to structural steel roof supporting structure. Spacing and support as described above.
    - e. Insulate hangers for copper pipe from piping by means of at least two layers of Scotch 33 plastic tape.
  2. Gas piping Identification:
    - a. Apply paint identification for gas piping used with HVAC equipment as specified in Section 23 0553.

**END OF SECTION**

## SECTION 22 0548

### VIBRATION AND SEISMIC CONTROL FOR PLUMBING PIPING AND EQUIPMENT

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Quality of and requirements for anchorage and seismic restraint systems and vibration isolation systems for plumbing piping and equipment.
- B. Related Requirements:
  - 1. Section 03 3053: 'Miscellaneous Exterior Cast-In-Place Concrete'.
  - 2. Furnishing and installing of seismic restraint and vibration isolation systems is by installer of equipment requiring such systems.
    - a. Manufacturers of equipment specified to receive seismic restraint shall provide product data needed for calculation of seismic restraint needs. This information shall include, but not be limited to, equipment dimensions, dimensioned anchor points, operating weight, and center of gravity dimension.

##### 1.2 REFERENCES

- A. Association Publications:
  - 1. Federal Emergency Management Agency (FEMA) / Vibration Isolation and Seismic Control Manufacturers Association (VISCMA) / American Society of Civil Engineers (ASCE):
    - a. FEMA 412, 'Installing Seismic Restraints For Mechanical Equipment' (December 2002).
  - 2. Vibration Isolation and Seismic Control Manufacturers Association (VISCMA):
    - a. VISCMA 101-12, 'Seismic Restraint Specification Guidelines for Mechanical, Electrical, and Plumbing Systems'.
    - b. VISCMA 102-12, 'Vibration Isolation Specification Guidelines for Mechanical, Electrical, and Plumbing Systems'.
- B. Definitions:
  - 1. Vibration Isolation: Vibration reduction in which an isolation system is placed between the source of unwanted vibration and an item which needs to be shielded from the vibration.
- C. Reference Standards:
  - 1. American National Standards Institute / Sheet Metal And Air Conditioning Contractors' National Association:
    - a. ANSI/SMACNA 001-2008, 'Seismic Restraint Manual: Guidelines For Mechanical Systems' (3rd Edition).
  - 2. American Society of Civil Engineers / Structural Engineering Institute:
    - a. ASCE/SEI 7-10, 'Minimum Design Loads for Buildings and Other Structures'.
      - 1) Chapter 13, 'Seismic Design Requirements For Nonstructural Components'.
  - 3. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE):
    - a. 2011 ASHRAE Handbook - HVAC Applications.
      - 1) Chapter 48, 'Noise and Vibration Control'.
      - 2) Chapter 55, 'Seismic- and Wind-Resistant Design'.
  - 4. ASTM International:
    - a. ASTM A615/A615M-12, 'Standard Specification for Deformed & Plain Billet-Steel Bars for Concrete Reinforcement'.

### 1.3 SUBMITTALS

- A. Action Submittals:
  - 1. Product Data:
    - a. Restraint system and anchorage method to be used for each piece of equipment.
    - b. Seismic restraints and calculations for all flexible mounted equipment.
    - c. Vibration isolators and flexible couplings.
    - d. Clearly outlined procedures for installing and adjusting isolators, seismic bracing anchors, and snubbers.
  - 2. Shop Drawings:
    - a. Show size, hanger length, and location of seismic restraints for piping.
    - b. Show details for each isolator and seismic brace with snubbers proposed for specified equipment.
    - c. Show details for proposed structural steel frames and rails and for anchors to be used in conjunction with isolation of equipment.
    - d. Show locations of piping restraints on installation and fabrication floor plans (not bid set of documents of floor plans), noting size and type of restraint to be used.
    - e. Show details of supports, hangers, anchorage, and bracing for isolated equipment as designed or proposed by professional engineer employed by Restraint Manufacturer and qualified with seismic experience in bracing for mechanical equipment. Shop drawings submitted for seismic bracing and anchors shall bear engineer's signed professional seal.
    - f. Include anchor bolt calculations, signed and stamped by registered engineer, showing adequacy of bolt sizing and type.
      - 1) Calculations shall include anchor embedment, minimum edge distance and minimum center distance.
      - 2) Design lateral forces shall be distributed in proportion to mass distribution of equipment.
      - 3) Furnish calculations for anchors on restraint devices, cable, isolators, and on rigidly mounted equipment.

### 1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. System design and installation shall meet seismic requirements as defined in ASCE/SEI 7-10, 'Minimum Design Loads for Buildings and Other Structures' and applicable state and local codes in accordance with minimum restraint capability of 1.0 g.

### 1.5 SYSTEMS

- A. Manufacturers:
  - 1. Type One Acceptable Manufacturers:
    - a. Amber / Booth Company, Houston, TX [www.amberbooth.com](http://www.amberbooth.com).
    - b. Mason Industries Inc, Hauppauge, NY [www.mason-ind.com](http://www.mason-ind.com).
    - c. Vibration Mountings and Control Inc, Bloomington, NJ (201) 838-1780.
    - d. Equal as approved by Architect before bidding. See Section 01 6200.
- B. Performance:
  - 1. Design Criteria:
    - a. Seismic Requirements: Mechanical equipment, piping, shall be braced, snubbed, or supported to withstand seismic disturbances and remain operational.
    - b. Vibration Isolation Requirements: Isolate equipment from structure by means of resilient vibration and noise isolators.
- C. Materials:
  - 1. Isolation And Seismic Equipment:
    - a. Piping:
      - 1) Restrain piping in accordance with ANSI/SMACNA 001 Seismic Restraint Manual, Chapter 4, Figures 4.11 to 4.19.

- b. Equipment with Fixed Anchor or Support:
  - 1) Restraint designed according to ASCE/SEI 7-10, Chapter 13, 'Seismic Design Requirements For Nonstructural Components'.
  - 2) Horizontal force factor for elements of structures:
    - a) In addition, vertical force restraint requirement shall be computed at 1/2 value of horizontal forces.
    - b) Restrain equipment not anchored directly to floors by cable system designed and furnished by Restraint Manufacturer.
- 2. Vibration Isolation Requirements:
  - a. Unless otherwise noted, isolate plumbing equipment one horsepower and over from structure by means of resilient vibration and noise isolators in accordance with ASHRAE 'Handbook - HVAC Applications', Chapter 48, Table 47, 'Selection Guide for Vibration Isolation'.
  - b. Design and install isolation equipment, hangers, connections, and other isolating devices to prevent transmission of vibration to structure from equipment and associated piping.
  - c. For floor-mounted equipment, use recommendations of Chapter 48, Table 47, 'Selection Guide for Vibration Isolation'.
  - d. For roofs and floors constructed with open web joints, thin long span slabs, wooden construction and unusual light weight construction, evaluate equipment weighing more than **300 lbs (136 kg)** to determine additional deflection of structure caused by equipment weight. Isolator deflection shall be 15 times additional deflection or deflection shown in Chapter 48, Table 47, 'Selection Guide for Vibration Isolation', whichever is greater.
  - e. Under-Equipment Spring Isolators:
    - 1) Equal to Mason SSLFH earthquake motion restrained spring mounts with freestanding stable steel springs, leveling bolts, corrosion resistant finish, motion limiting design, uplift restraining bolts, and **1/4 inch (6 mm)** ribbed neoprene noise stop pad.
    - 2) Isolators shall accept force in any direction up to 1.0 g without failure, and shall limit movement to **3/4 inch (19 mm)** in any direction.
    - 3) Springs shall have 50 percent overload capacity.
    - 4) Size as required to achieve specified static deflection.
    - 5) Outer diameter of spring proper shall not be less than **0.08 inch (2.032 mm)** of spring height when in loaded position.
  - f. Overhead Support Spring And Rubber Hangers:
    - 1) Combination spring and neoprene hangers.
    - 2) Hanger bracket shall have 500 percent overload capability and shall allow up to 15 degree hanger rod misalignment without short-circuiting.
    - 3) Springs shall have 50 percent overload capacity.
    - 4) Provide seismic bracing as required.
  - g. Isolate piping in mechanical equipment room and piping three supports away or **50 feet (15 meters)** from other mechanical equipment, whichever is greater, from structure by means of vibration and noise isolators:
    - 1) Isolate suspended piping with combination spring and fiberglass hangers in supporting rods.
    - 2) Support floor-mounted piping directly on spring mounts.
  - h. Isolate vertical pipe risers from structure using vibration and noise isolating expansion hangers having minimum rated deflection of four times anticipated pipe movement. Enclose in housing for fail-safe equipment.
  - i. Incorporate flexible connectors in piping adjacent to reciprocating equipment.
  - j. Elastomeric Isolator: Neoprene or high quality synthetic rubber with anti-ozone and anti-oxidant additives.
  - k. Nuts, Bolts, And Washers: Electroplated zinc.
  - l. Isolators Exposed To Weather: Cadmium plated and neoprene coated springs.
- 3. Seismic restraint equipment and resilient isolation devices shall be designed and furnished by single Manufacturer.

D. Finishes:

- 1. Clean and paint steel components:
  - a. Thoroughly clean structural steel bases of welding slag and prime with zinc-chromate or metal etching primer.
  - b. Etch and paint hot dipped galvanized steel components.

## PART 2 - EXECUTION

### 2.1 INSTALLATION

- A. Isolation Equipment:
  - 1. Mount vibration isolated equipment on rigid steel frames or concrete bases unless Equipment Manufacturer certifies direct attachment capability.
  - 2. Install snubbers with factory set clearances.
  - 3. Piping:
    - a. Protect isolated and non-isolated piping 2-1/2 inches (64 mm) inside diameter and larger in all planes by restraints to accommodate thermal movement as well as restrain seismic motions.
    - b. Locations shall be as scheduled and include, but not be limited to:
      - 1) At drops to equipment and at flexible connections.
      - 2) At 45 degree or greater changes in direction of pipe.
      - 3) At horizontal runs of pipe 30 feet (9.15 m) maximum on center spacing.
      - 4) Gas piping shall have additional restraints as scheduled.
- B. Vibration Isolation:
  - 1. Install piping to prevent transmission of noise and vibration into structure.

**END OF SECTION**

## SECTION 22 0553

### IDENTIFICATION FOR PLUMBING PIPES AND EQUIPMENT

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install identification of plumbing piping and equipment as described in Contract Documents.

#### PART 2 - PRODUCTS

##### 2.1 SYSTEM

- A. Materials:
  - 1. Labels:
    - a. Equipment Identification:
      - 1) Black formica, with white reveal when engraved.
      - 2) Lettering to be **3/16 inch (5 mm)** high minimum.
  - 2. Paint:
    - a. One Coat Primer:
      - 1) 6-2 Quick Drying Latex Primer Sealer over fabric covers.
      - 2) 6-205 Metal Primer under dark color paint.
      - 3) 6-6 Metal Primer under light color paint.
    - b. Finish Coats: Two coats 53 Line Acrylic Enamel.
    - c. Performance Standard: Paints specified are from Pittsburgh Paint & Glass (PPG), Pittsburgh, PA [www.pittsburghpaints.com](http://www.pittsburghpaints.com) or PPG Canada Inc, Mississauga, ON (800) 263-4350 or (905) 238-6441.
    - d. Type Two Acceptable Products. See Section 01 6200.
      - 1) Paint of equal quality from following Manufacturers may be submitted for Architect's approval before use. Maintain specified colors, shades, and contrasts.
        - a) Benjamin Moore, Montvale, NJ [www.benjaminmoore.com](http://www.benjaminmoore.com) or Toronto, ON (800) 304-0304 or (416) 766-1176.
        - b) ICI Dulux, Cleveland, OH or ICI Paints Canada Inc, Concord, ON [www.dulux.com](http://www.dulux.com).
        - c) Sherwin Williams, Cleveland, OH [www.sherwin-williams.com](http://www.sherwin-williams.com).
  - 3. Tags:
    - a. Regardless of size, each valve shall have brass tag **1-1/2 inches (38 mm)** by **3 inches (76 mm)** minimum in size and **0.051 inch (1.30 mm)** thick.

#### PART 3 - EXECUTION

##### 3.1 APPLICATION

- A. Labels:
  - 1. Identify following items with specified labels fastened to equipment with screws (unless noted otherwise):
    - a. Water Heaters.
  - 2. Engrave following data from Equipment Schedules on Drawings onto labels:
    - a. Equipment mark.
    - b. Room(s) served.

- c. Panel and breaker from which unit is powered.
- B. Painting:
1. Only painted legends, directional arrows, and color bands are acceptable.
  2. Locate identifying legends, directional arrows, and color bands at following points on exposed piping of each piping system:
    - a. Adjacent to each item of equipment.
    - b. At point of entry and exit where piping goes through wall.
    - c. On each riser and junction.
    - d. Every 25 feet (7.6 m) on long continuous lines.
    - e. Stenciled symbols shall be one inch high and black.

### 3.2 ATTACHMENTS

- A. Schedules:
1. Pipe Identification Schedule:
    - a. Apply stenciled symbols and color banding as follows. Extend color band 2 inches 50 mm minimum beyond each side of stenciled symbols.

Pipe Use	Abbreviation	Band Color
Domestic Cold Water	CW	Light Blue
Domestic Hot Water	HW	Light Green
Recirculating Domestic Hot Water	HW RECIRC	Medium Green
Roof Drains	RD	Off-White

**END OF SECTION**

SECTION 22 0719

PLUMBING PIPING INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Includes But Not Limited To:
  1. Furnish and install insulation on hot and cold water lines, fittings, valves, and accessories as described in Contract Documents.
  2. Furnish and install insulation on roof drain piping as described in Contract Documents.
- B. Related Requirements:
  1. Section 22 1116: 'Domestic Water Piping'.
  2. Section 22 1400: 'Facility Storm Drainage'.

1.2 SUBMITTALS

- A. Informational Submittals:
  1. Sustainable Design Submittals:
    - a. Product Data for Credit EQ 4.1:
      - 1) For adhesives and sealants, including printed statement of VOC content.

PART 2 - PRODUCTS

2.1 COMPONENTS

- A. Manufacturers:
  1. Manufacturer Contact List:
    - a. Armacell, Mebane, NC [www.armacell.com](http://www.armacell.com).
    - b. Childers Products Co, Eastlake, OH [www.fosterproducts.com](http://www.fosterproducts.com).
    - c. IMCOA, Youngsville, NC [www.nomacokflex.com](http://www.nomacokflex.com).
    - d. Johns-Manville, Denver, CO [www.jm.com](http://www.jm.com).
    - e. Knauf, Shelbyville, IN [www.knauffiberglass.com](http://www.knauffiberglass.com).
    - f. Manson, Brossard, PQ, Canada [www.isolationmanson.com](http://www.isolationmanson.com).
    - g. Nomaco Inc, Yopungsville, NC [www.nomacokflex.com](http://www.nomacokflex.com).
    - h. Owens-Corning, Toledo, OH [www.owenscorning.com](http://www.owenscorning.com).
    - i. Speedline Corp, Solon, OH [www.speedlinepvc.com](http://www.speedlinepvc.com).
- B. Materials:
  1. Above Grade Metal Piping:
    - a. Insulation For Piping:
      - 1) Snap-on glass fiber or melamine foam pipe insulation, or heavy density pipe insulation with factory vapor jacket.
      - 2) Insulation Thickness:

Service Water Temperature	Pipe Sizes		
	Up to 1-1/4 In	1-1/2 to 2 In	Over 2 In
170 - 180 Deg F	One In	1-1/2 In	2 In
140 - 160 Deg F	1/2 In	One In	1-1/2 In
45 - 130 Deg F	1/2 In	1/2 In	One In

Service Water Temperature	Pipe Sizes
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	Up to 32 mm	38 to 50 mm	Over 50 mm
77 - 82 Deg C	25 mm	38 mm	50 mm
60 - 71 Deg C	13 mm	25 mm	38 mm
7 - 54 Deg C	13 mm	13 mm	25 mm

- 3) Performance Standards: Fiberglas ASJ by Owens-Corning.
- 4) Type One Acceptable Manufacturers:
  - a) Childers Products.
  - b) Knauf.
  - c) Manson.
  - d) Owens-Corning.
  - e) Johns-Manville.
  - f) Equal as approved by Architect before bidding. See Section 01 6200.
- b. Fitting, Valve, And Accessory Covers:
  - 1) PVC.
  - 2) Performance Standard: Zeston by Johns-Manville.
  - 3) Type One Acceptable Manufacturers:
    - a) Knauf.
    - b) Speedline.
    - c) Johns-Manville.
    - d) Equal as approved by Architect before bidding. See Section 01 6200.
2. Below Grade Metal Piping:
  - a. Insulation:
    - 1) 1/2 inch (13 mm) thick.
    - 2) Category Four Acceptable Products. See Section 01 6200 for definition of Categories:
      - a) SS Tubolit by Armacell.
      - b) ImcoLock by Imcoa.
      - c) Nomalock or Therma-Cel by Nomaco.
  - b. Joint Sealant:
    - 1) Category Four Acceptable Products. See Section 01 6200 for definition of Categories:
      - a) Armacell 520.
      - b) Nomaco K-Flex R-373.
3. Pex Piping, Above And Below Grade:
  - a. Insulation:
    - 1) 1/2 inch (13 mm) thick.
    - 2) Category Four Acceptable Products. See Section 01 6200 for definition of Categories:
      - a) SS Tubolit by Armacell.
      - b) ImcoLock by Imcoa.
      - c) Nomalock or Therma-Cel by Nomaco.
  - b. Joint Sealant:
    - 1) Category Four Acceptable Products. See Section 01 6200 for definition of Categories:
      - a) Armacell 520.
      - b) Nomaco K-Flex R-373.
      - c)
4. PVC or ABS Piping, Above And Below Grade - Facility Storm Drain:
  - a. Insulation:
    - 1) 1/2 inch (13 mm) thick.
    - 2) Category Four Acceptable Products. See Section 01 6200 for definition of Categories:
      - a) SS Tubolit by Armacell.
      - b) ImcoLock by Imcoa.
      - c) Nomalock or Therma-Cel by Nomaco.
  - b. Joint Sealant:
    - 1) Category Four Acceptable Products. See Section 01 6200 for definition of Categories:
      - a) Armacell 520.
      - b) Nomaco K-Flex R-373.
5. Mixing Valve MV-1:
  - a. Solid brass construction and CSA B125 certified.
  - b. Includes integral check valves and inlet screen. Features advanced paraffin-based actuation technology.
  - c. Flow of 11 GPM (41.58 LPM) with maximum 10 psi (69 kPA) pressure drop. Perform to minimum flow of 0.5 GPM (1.89 LPM) in accordance with ASSE 1017.

- d. Set for **100 deg F (38 deg C)** Font Service.
- e. Match Construction Drawings for connection sizes.
- f. Class One Quality Standard: Powers LFLM490. See Section 01 6200.
- g. Acceptable Manufacturers: Lawler, Leonard, Powers, Sloan, Symmons, and Watts.

## PART 3 - EXECUTION

### 3.1 APPLICATION

- A. Above Grade Piping:
  - 1. Apply insulation to clean, dry piping with joints tightly butted.
  - 2. Install insulation in manner to facilitate removal for repairs. Place sections or blocks so least possible damage to insulation will result from inspection or repairs of piping or equipment.
  - 3. Piping up to **1-1/4 inch (32 mm)** Diameter:
    - a. Adhere 'factory applied vapor barrier jacket lap' smoothly and securely at longitudinal laps with white vapor barrier adhesive.
    - b. Adhere **3 inch (76 mm)** wide self-sealing butt joint strips over end joints.
  - 4. Piping **1-1/2 inches (38 mm)** Diameter And Larger:
    - a. Use broken-joint construction in application of two-layer covering.
    - b. Fill cracks and depressions with insulating cement mixed to thick plastic paste.
      - 1) Apply by hand in several layers to make up total specified thickness.
      - 2) Final layer shall have smooth uniform finish before application of covering.
  - 5. Fittings, Valves, And Accessories:
    - a. Do not apply insulation over flanged joints or victaulic couplings until piping has been brought up to operating temperature and flange bolts have been fully tightened. Insulate valves so wheel, stem, and packing nut are exposed.
    - b. Insulate with same type and thickness of insulation as pipe, with ends of insulation tucked snugly into throat of fitting and edges adjacent to pipe insulation tufted and tucked in.
    - c. Piping Up To **1-1/4 Inch (32 mm)** Diameter:
      - 1) Cover insulation with one piece fitting cover secured by stapling or taping ends to adjacent pipe covering.
      - 2) Alternate Method:
        - a) Insulate fittings, valves, and accessories with one inch of insulating cement and vapor seal with two **1/8 inch (3 mm)** wet coats of vapor barrier mastic reinforced with glass fabric extending **2 inches (50 mm)** onto adjacent insulation.
    - d. Piping **1-1/2 inches (38 mm)** To **2 Inches (50 mm)**:
      - 1) Insulate with hydraulic setting insulating cement or equal, to thickness equal to adjoining pipe insulation.
      - 2) Apply final coat of fitting mastic over insulating cement.
    - e. Piping **2-1/2 inch (64 mm)** And Larger:
      - 1) Insulate with segments of molded insulation securely wired in place and coated with skim coat of insulating cement.
      - 2) Apply fitting mastic, fitting tape and finish with final coat of fitting mastic.
  - 6. Pipe Hangers:
    - a. Do not allow pipes to come in contact with hangers.
    - b. Pipe Shield:
      - 1) Provide schedule 40 PVC by **6 inch (150 mm)** long at each clevis and/or unistrut type hanger.
      - 2) Provide **16 ga (1.64 mm)** by **6 inch (150 mm)** long galvanized shields at each pipe hanger to protect pipe insulation from crushing by clevis hanger.
      - 3) Provide **22 ga (0.85 mm)** by **6 inch (150 mm)** long galvanized shield at each pipe hanger to protect insulation from crushing by Unistrut type hanger.
    - c. At Pipe Hangers:
      - 1) Provide rigid calcium silicate insulation (**100 psi (690 kPA)** compressive strength) at least **2 inches (50 mm)** beyond shield.
  - 7. Protect insulation wherever leak from valve stem or other source might drip on insulated surface, with aluminum cover or shield rolled up at edges and sufficiently large in area and of shape that dripping will not splash on surrounding insulation.

B. Below Grade Piping:

1. Slip underground pipe insulation onto pipe and seal butt joints.
2. Where slip-on technique is not possible, slit insulation, apply to pipe, and seal seams and joints.

**END OF SECTION**

## SECTION 22 1116

### DOMESTIC WATER PIPING

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Includes But Not Limited To:
1. Perform excavating and backfilling required by work of this Section.
  2. Furnish and install potable water piping complete with necessary valves, connections, and accessories inside building and connect with outside utility lines **5 feet (1 50 m)** from building perimeter as described in Contract Documents.
  3. Rough-in for and connect Food Preparation sinks.
- B. Related Requirements:
1. Section 03 3111: 'Cast-In-Place Structural Concrete'.
    - a. Pre-installation conference held jointly with other concrete related sections.
  2. Section 22 0501: 'Common Piping Requirements'.
  3. Section 22 0719: 'Plumbing Piping Insulation'.
  4. Section 31 2316: 'Excavation' for criteria for performance of excavation.
  5. Section 31 2323: 'Fill' for criteria for performance of backfill.
  6. Section 33 1116: 'Site Water Utility Distribution Piping' for domestic water piping from **5 feet (1 50 m)** from building perimeter to main.

##### 1.2 REFERENCES

- A. Reference Standards:
1. American National Standards Institute / American Society of Sanitary Engineers:
    - a. ANSI/ASSE 1003-2009, 'Water Pressure Reducing Valves for Domestic Water Distribution Systems'.
    - b. ANSI/ASSE 1017-2009, 'Performance Requirements for Temperature Actuated Mixing Valves for Hot Water Distribution Systems'.
    - c. ANSI/ASSE 1070-2015, 'Performance Requirements for Water Temperature Limiting Devices'.
  2. American Water Works Association:
    - a. AWWA C904-16, 'Cross-Linked Polyethylene (PEX) Pressure Pipe, 1/2 inch (12 mm) Through 3 inch (76 mm) for Water Service'.
  3. ASTM International:
    - a. ASTM B88-14, 'Standard Specification for Seamless Copper Water Tube'.
    - b. ASTM E84-15b, 'Standard Test Method for Surface Burning Characteristics of Building Materials'.
    - c. ASTM F876-15a, 'Standard Specification for Crosslinked Polyethylene (PEX) Tubing'.
    - d. ASTM F877-11a, 'Standard Specification for Crosslinked Polyethylene (PEX) Hot- and Cold-Water Distribution Systems'.
    - e. ASTM F1807-15, 'Standard Specification for Metal Insert Fittings Utilizing a Copper Crimp Ring for SDR9 Cross-linked Polyethylene (PEX) Tubing and SDR9 Polyethylene of Raised Temperature (PE-RT) Tubing'.
    - f. ASTM F2023-15, 'Standard Test Method for Evaluating the Oxidative Resistance of Crosslinked Polyethylene (PEX) Tubing and Systems to Hot Chlorinated Water'.

##### 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
1. Participate in pre-installation conference as specified in Section 03 3111.

## 1.4 SUBMITTALS

- A. Informational Submittals:
  - 1. Test And Evaluation Reports:
    - a. Written report of sterilization test.

## 1.5 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. Meet NSF International Standards for materials or products that come into contact with drinking water, drinking water treatment chemicals, or both for chemical contaminants and impurities that are indirectly imparted to drinking water from products, components, and materials used in drinking water systems.

## PART 2 - PRODUCTS

### 2.1 SYSTEMS

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. Armstrong International Inc, Three Rivers, MI [www.armstrong-intl.com](http://www.armstrong-intl.com).
    - b. Bell & Gossett, Morton Grove, IL [www.bellgossett.com](http://www.bellgossett.com).
    - c. Cash Acme, Cullman, AL [www.cashacme.com](http://www.cashacme.com)
    - d. Cla-Val Company, Costa Mesa, CA or Cla-Val Canada Ltd, Beamsville, ON [www.cla-val.com](http://www.cla-val.com).
    - e. Conbraco Industries Inc, Matthews, NC [www.conbraco.com](http://www.conbraco.com) or Conbraco (Honeywell Ltd), Scarborough, ON (416) 293-8111.
    - f. Hammond Valve, New Berlin, WI [www.hammondvalve.com](http://www.hammondvalve.com).
    - g. Handy & Harmon Products Div, Fairfield, CT [www.handyharmon.com](http://www.handyharmon.com) or Handy and Harmon of Canada Ltd, Rexdale, ON (800) 463-1465 or (416) 675-1860.
    - h. Harris Products Group, Cincinnati, OH [www.harrisproductsgroup.com](http://www.harrisproductsgroup.com).
    - i. Honeywell Inc, Minneapolis, MN [www.honeywell.com](http://www.honeywell.com).
    - j. Leonard Valve Co, Cranston, RI [www.leonardvalve.com](http://www.leonardvalve.com).
    - k. Milwaukee Valve Co, New Berlin, WI [www.milwaukeevalve.com](http://www.milwaukeevalve.com).
    - l. Nibco Inc, Elkhart, IN [www.nibco.com](http://www.nibco.com).
    - m. Rehau, Leesburg, VA [www.rehau-na.com](http://www.rehau-na.com).
    - n. Taco Inc, Cranston, RI or Mississauga, ON [www.taco-hvac.com](http://www.taco-hvac.com).
    - o. Uponor Inc, Apple Valley, MN [www.uponor-usa.com](http://www.uponor-usa.com).
    - p. Viega ProPress, Wichita, KS [www.viega-na.com](http://www.viega-na.com).
    - q. Watts Regulator Co, Andover, MA [www.wattsreg.com](http://www.wattsreg.com).
    - r. Wilkins (Zurn Wilkins), Paso Robles, CA [www.zurn.com](http://www.zurn.com).
    - s. Zurn PEX, Inc., Commerce, TX [www.zurnpex.com](http://www.zurnpex.com).
- B. Materials:
  - 1. Design Criteria:
    - a. All drinking water products, components, and materials above and below grade used in drinking water systems must meet NSF International Standards for Lead Free.
    - b. No CPVC allowed.
  - 2. Pipe:
    - a. Copper:
      - 1) Above-Grade:
        - a) Meet requirements of ASTM B88, Type L.
      - 2) Below-Grade:
        - a) Meet requirements of ASTM B88, Type K. **3/4 inch (19 mm)** minimum under slabs.
        - b) **2 inches (50 mm)** And Smaller: Annealed soft drawn.
        - c) **2-1/2 inches (64 mm)** And Larger: Hard Drawn.
- 3. Fittings:

- a. For Copper Pipe: Wrought copper.
- 4. Connections For Copper Pipe:
  - a. Above-Grade:
    - 1) Sweat copper type with 95/5 or 96/4 Tin-Antimony solder, Bridgit solder, or Silvabrite 100 solder. Use only lead-free solder.
    - 2) Viega ProPress System
  - b. Below Grade:
    - 1) Brazed using following type rods:
      - a) Copper to Copper Connections:
        - (1) AWS Classification BCuP-4 Copper Phosphorus (6 percent silver).
        - (2) AWS Classification BCuP-5 Copper Phosphorus (15 percent silver).
      - 2) Copper to Brass or Copper to Steel Connections: AWS Classification BAg-5 Silver (45 percent silver).
      - 3) Do not use rods containing Cadmium.
      - 4) Brazing Flux:
        - a) Approved Products:
          - (1) Stay-Silv white brazing flux by Harris Product Group.
          - (2) High quality silver solder flux by Handy & Harmon.
      - 5) Joints under slabs acceptable only if allowed by local codes.
  - 5. Ball Valves:
    - a. Use ball valves exclusively unless otherwise specified. Ball valves shall be by single manufacturer from approved list below.
    - b. Valves shall be two-piece, full port for **150 psi (1.03 MPa)** SWP.
      - 1) Operate with flow in either direction, suitable for throttling and tight shut-off.
      - 2) Body: Bronze, **150 psig (1.03 MPa)** wsp at **350 deg F (177 deg C)** and **400 psig (2.76 MPa)** wog.
      - 3) Seat: Bubble tight at **100 psig (0.69 MPa)** under water.
    - c. Class One Quality Standard: Nibco T585 or S585.
      - 1) Equal by Conbraco 'Apollo,' Hammond, Milwaukee, or Watts.
  - 6. Pressure Reducing Valve / Strainer:
    - a. Integral stainless steel strainer, or separate 'Y' strainer installed upstream of pressure reducing valve.
    - b. Meet ANSI/ASSE 1003 or CSA B356 requirements.
    - c. Built-in thermal expansion bypass check valve.
    - d. Class One Quality Standards: Watts LFN223BS (with strainer) or LFN223B, ConBraCo 36H-LF.
      - 1) Equal by Cash Acme, Cla-Val, Conbraco, Spence, Watts, or Wilkins. See Section 01 6200.
  - 7. Combination Pressure Reducing Valve / Strainer:
    - a. Integral stainless steel strainer, or separate 'Y' strainer installed upstream of pressure reducing valve.
    - b. Meet ANSI/ASSE 1003 or CSA B356 requirements.
    - c. Built-in thermal expansion bypass check valve.
    - d. Class One Quality Standard: Watts LFU5B:
      - 1) Equal by Cash Acme, Cla-Val Hi Capacity, Conbraco 36C, Honeywell-Braukmann, Spence Hi Capacity, Watts, or Wilkins. See Section 01 6200.
  - 8. Circuit Balancing Valves:
    - a. Valves **3/4 inch through 6 inches (19 mm through 150 mm)**:
      - 1) Four function capability: Flow measurement, flow balancing with memory stop, positive shut off, and drain.
      - 2) Provide provisions for connecting differential pressure meter. Each meter connection shall have shut off valves.
      - 3) Include tamper proof and memory features.
      - 4) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
        - a) Armstrong: CBV.
        - b) Bell & Gossett: Circuit Setter.
        - c) Taco: Accu-Flo.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Locate cold water lines a minimum of **6 inches (150 mm)** from hot water line.

### **3.2 FIELD QUALITY CONTROL**

- A. Field Tests:
  - 1. Before pipes are covered, test systems in presence of Architect/Engineer at **125 psig (0.86 MPa)** hydrostatic pressure for four (4) hours and show no leaks.
  - 2. Disconnect equipment not suitable for **125 psig (0.86 MPa)** pressure from piping system during test period.

### **3.3 CLEANING**

- A. Sterilize potable water system with solution containing 200 parts per million minimum of available chlorine and maintaining pH of 7.5 minimum. Introduce chlorinating materials into system in manner approved by Architect/Engineer. Allow sterilization solution to remain for twenty four (24) hours and open and close valves and faucets several times during that time.
- B. After sterilization, flush solution from system with clean water until residual chlorine content is less than 0.2 parts per million.
- C. Water system will not be accepted until negative bacteriological test is made on water taken from system. Repeat dosing as necessary until such negative test is accomplished.

**END OF SECTION**

## SECTION 22 1119

### DOMESTIC WATER PIPING SPECIALTIES

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install miscellaneous potable water piping specialties as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 22 0501: 'Common Plumbing Requirements'.

##### 1.2 REFERENCES

- A. Reference Standards:
  - 1. NSF International Standard / American National Standards Institute:
    - a. NSF/ANSI 61-2014a, 'Drinking Water System Components - Health Effects'.
    - b. NSF/ANSI 372-2011, 'Drinking Water System Components - Lead Content'.

##### 1.3 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. Meet NSF International Standards for materials or products that come into contact with drinking water, drinking water treatment chemicals, or both for chemical contaminants and impurities that are indirectly imparted to drinking water from products, components, and materials used in drinking water systems.

#### PART 2 - PRODUCTS

##### 2.1 ACCESSORIES

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. Ashcroft, Stratford, CT [www.ashcroftinc.com](http://www.ashcroftinc.com).
    - b. Chicago Faucet Co, Des Plaines, IL [www.chicagofaucets.com](http://www.chicagofaucets.com).
    - c. H O Terice, Oak Park, MI [www.hotco.com](http://www.hotco.com).
    - d. IPS Corporation, Compton, CA [www.ipscorp.com](http://www.ipscorp.com).
    - e. Josam Co, Michigan City, IN [www.josam.com](http://www.josam.com).
    - f. Jay R. Smith Manufacturing Co, Montgomery, AL [www.jrsmith.com](http://www.jrsmith.com).
    - g. Mifab Manufacturing Inc, Chicago, IL [www.mifab.com](http://www.mifab.com).
    - h. Nibco Inc, Elkhart, IN [www.nibco.com](http://www.nibco.com).
    - i. Oatey, Cleveland, OH [www.oatey.com](http://www.oatey.com).
    - j. Precision Plumbing Products (PPP), Portland, OR [www.pppinc.net](http://www.pppinc.net).
    - k. Prier Products, Inc., Grandview, MD [www.prier.com](http://www.prier.com).
    - l. Proset Systems Inc., Lawrenceville, GA [www.prosetsystems.com](http://www.prosetsystems.com).
    - m. Sioux Chief Manufacturing Co, Peculiar, MO [www.siouxchief.com](http://www.siouxchief.com).
    - n. Sure Seal, Tacoma, WA [www.thesureseal.com](http://www.thesureseal.com).
    - o. Wade (Division of Tyler Pipe), Tyler, TX [www.wadedrains.com](http://www.wadedrains.com).

- p. Watts Drainage, Spindale, NC [www.watts.com](http://www.watts.com) or Watts Industries, Burlington, ON, Canada [www.wattscda.com](http://www.wattscda.com).
- q. Weiss Instruments, Inc., Holtsville, NY [www.weissinstruments.com](http://www.weissinstruments.com).
- r. Woodford Manufacturing, Colorado Springs, CO [www.woodfordmfg.com](http://www.woodfordmfg.com).
- s. Zurn Cast Metals, Erie, PA or Zurn Industries Limited, Mississauga, ON [www.zurn.com](http://www.zurn.com).

B. Materials:

1. Trap Guard Trap Seal:
  - a. Design Criteria:
    - 1) Not required to meet NSF International Standards for Lead Free.
  - b. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - 1) Trap Guard by Proset:
      - a) Install per Manufacturer's recommendations.
    - 2) Sure Seal by Sure Seal:
      - a) Install per Manufacturer's recommendation.
2. Trap Primer Valve:
  - a. Design Criteria:
    - 1) Not required to meet NSF International Standards for Lead Free.
    - 2) Pressure drop activated.
    - 3) All brass construction.
  - b. Class One Quality Standard:
    - 1) Mifab MR-500.
    - 2) PR-500 by PPP.
    - 3) 695-01 by Sioux Chief.
3. Pressure Reducing Station:
  - a. Design Criteria:
    - 1) Meet NSF International Standards for Lead Free.
  - b. Pressure Gauges:
    - 1) Gauges shall have following features:
      - a) Cast aluminum case.
      - b) Chrome plated ring.
      - c) Impact resistant window.
      - d) Phosphor bronze alloy steel bourdon tube.
      - e) 1/2 percent scale range accuracy.
      - f) 4-1/2 inch (115 mm) diameter dial face.
      - g) Range 0 to 100 psig.
    - 2) Class One Quality Standard: 500X by H O Terrice.
      - a) Equal by Ashcroft or Weiss. See Section 01 6200.
  - c. Brass Gauge Cocks:
    - 1) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - a) 1092 by Ashcroft.
      - b) 865 by H O Terrice.
4. Exterior Hydrants:
  - a. Design Criteria:
    - 1) Provide with integral anti-siphon device. Key-operated.
    - 2) Non-freeze.
    - 3) Not required to meet NSF International Standards for Lead Free.
  - b. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - 1) Josam: 71050.
    - 2) Jay R. Smith: 5609-QT.
    - 3) Prier: C-634.
    - 4) Wade: W-8600.
    - 5) Watts: HY-725.
    - 6) Woodford: 67.
    - 7) Zurn: Z-1310.
5. Hose Bibbs:
  - a. Design Criteria:
    - 1) Integral vacuum breaker.
    - 2) 3/4 inch (19 mm) for 125 psig working pressure.
    - 3) Steel Handle.

- 4) Not required to meet NSF International Standards for Lead Free.
- b. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
  - 1) Chicago: 293 RCF with E27 vacuum breaker.
  - 2) Nibco: 55 with vacuum breaker.
  - 3) Prier: C-158NP.
- 6. Water Hammer Arrestors:
  - a. Design Criteria:
    - 1) Meet NSF International Standards for Lead Free.
    - 2) Nesting type, air pre-charged bellows with casing.
    - 3) Bellows constructed of stabilized 18-8 stainless steel.
  - b. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - 1) Josam: 75003.
    - 2) Jay R. Smith: 5020.
    - 3) Sioux Chief: 650 Series.
    - 4) Wade: 20.
- 7. Clothes Washing Machine Outlet Box:
  - a. Design Criteria:
    - 1) Includes two (2) 1/4 turn brass ball valves designed for copper sweat connection.
    - 2) Color: Off-White.
    - 3) Not required to meet NSF International Standards for Lead Free.
  - b. Class One Quality Standard: Quadro 38530 by Oatey.
    - 1) Sioux Chief: 696-G2303MF (Fireproof box: 696-GR2303MFR).
    - 2) Equal by Guy Grey, IPS Corporation. See Section 01 6200.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Gauges: Connect to pipe with 1/4 inch (6 mm) connections utilizing gauge cocks.

**END OF SECTION**

## SECTION 22 1313

### FACILITY SANITARY SEWERS

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install soil, waste, and vent piping systems within building and connect with outside utility lines **5 feet (1.5 m)** out from building where applicable.
  - 2. Perform excavation and backfill required by work of this Section.
- B. Related Requirements:
  - 1. Section 07 8400: 'Firestopping' for quality of firestopping material.
  - 2. Section 22 0501: 'Common Plumbing Requirements'.
  - 3. Section 22 1319: 'Facility Sanitary Sewer Specialties' for furnishing of sewer specialties.
  - 4. Section 31 2316: 'Excavation' for criteria for performance of excavation.
  - 5. Section 31 2323: 'Fill' for criteria for performance of backfill and compaction.
  - 6. Section 33 3313: 'Sanitary Utility Sewerage' for sewage piping from **5 feet (1.5 m)** out from building to main.

##### 1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference: Participate in pre-installation conference specified in Section 03 3111.

##### 1.3 REFERENCES

- A. Reference Standards:
  - a. ASTM D2235-04(2011), 'Standard Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings'.
  - b. ASTM D2321-14, 'Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications'.
  - c. ASTM D2564-12, 'Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems'.
  - d. ASTM D3034-14, 'Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings'.
  - e. ASTM F628-12, 'Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe With a Cellular Core'.
  - f. ASTM F656-15, 'Standard Specification for Primers for Use in Solvent Cement Joints of Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings'.
  - g. ASTM F891-10, 'Standard Specification for Coextruded Poly(Vinyl Chloride) (PVC) Plastic Pipe With a Cellular Core'.

#### PART 2 - PRODUCTS

##### 2.1 SYSTEMS

- A. Performance:
  - 1. Design Criteria:
    - a. Minimum size of waste piping installed under floor slab on grade shall be **2 inches (50 mm)**.

B. Materials:

1. Piping And Fittings: PVC Schedule 40 cellular core plastic pipe and pipe fittings meeting requirements of ASTM F891, joined using cement primer meeting requirements of ASTM F656 and pipe cement meeting requirements of ASTM D2564.
  - a. Furnish wall cleanouts with chrome wall cover and screw.
2. Piping And Fittings: ABS Schedule 40 cellular core plastic pipe and pipe fittings meeting requirements of ASTM F628, joined with pipe cement meeting requirements of ASTM D2235.
  - a. Furnish wall cleanouts with chrome wall cover and screw.
3. Cleanouts:
  - a. Furnish wall cleanouts with chrome wall cover and screw.
  - b. Type Two Acceptable Products:
    - 1) Finish Floors:
      - a) Josam: 56010.
      - b) J. R. Smith: 4023.
      - c) Mifab: C1100C-R-1.
      - d) Wade: W-6000.
      - e) Watts: CO-200-R.
      - f) Zurn: Z-1402.
    - 2) Resilient Flooring:
      - a) Josam: 56010-12.
      - b) J. R. Smith: 4140.
      - c) Mifab: C1100C-T-1.
      - d) Wade: W-6000-T.
      - e) Watts: CO-200-T.
      - f) Zurn: Z-1400.
    - 3) Finished Wall:
      - a) Josam: 58790.
      - b) J. R. Smith: 4530.
      - c) Mifab: C1460RD.
      - d) Wade: W8560E.
      - e) Watts: CO-460-RD.
      - f) Zurn: Z-1446.
    - 4) Exposed Drain Lines:
      - a) Josam: 58910.
      - b) J. R. Smith: 4510.
      - c) Mifab: C1460.
      - d) Wade: W8560B.
      - e) Watts: CO-460.
      - f) Zurn: Z-1440.
    - 5) General Purpose:
      - a) Josam: 58900.
      - b) J. R. Smith: 4400.
      - c) Mifab: C1300-MF
      - d) Wade: W8550E.
      - e) Watts: CO-380.
      - f) Zurn: Z-1440.
    - 6) Equal as approved by Architect before installation. See Section 01 6200.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Excavate and backfill as specified in Sections 31 2316 and 31 2323 with following additional requirements:
1. Runs shall be as close as possible to those shown on Drawings.
  2. Excavate to required depth and grade to obtain fall required. Grade soil and waste lines within building perimeter **1/4 inch (6 mm)** fall in **one foot (300 mm)** in direction of flow.
  3. Bottom of trenches shall be hard. Tamp as required.
  4. Remove debris from trench before laying of pipe.

5. Do not cut trenches near footings without consulting Architect.
- B. Thermoplastic Pipe And Fittings:
1. General: Piping and joints shall be clean and installed according to Manufacturer's recommendations. Break down contaminated joints, clean seats and gaskets and reinstall.
  2. Above Grade: Locate pipe hangers every **4 feet (1.2 m)** on center maximum and at elbows.
  3. Below Grade:
    - a. Install in accordance with Manufacturer's recommendations and ASTM D2321.
    - b. Stabilize unstable trench bottoms.
    - c. Bed pipe true to line and grade with continuous support from firm base.
      - 1) Bedding depth: **4 to 6 inches (100 to 150 mm)**.
      - 2) Material and compaction to meet ASTM standard noted above.
    - d. Excavate bell holes into bedding material so pipe is uniformly supported along its entire length. Blocking to grade pipe is forbidden.
    - e. Trench width at top of pipe:
      - 1) Minimum: **18 inches (450 mm)** or diameter of pipe plus **12 inches (300 mm)**, whichever is greater.
      - 2) Maximum: Outside diameter of pipe plus **24 inches (600 mm)**.
    - f. Do not use backhoe or power equipment to assemble pipe.
    - g. Initial backfill shall be **12 inches (300 mm)** above top of pipe with material specified in referenced ASTM standard.
    - h. Minimum cover over top of pipe not under building slab:
      - 1) **36 inches (900 mm)** before wheel loading.
      - 2) **48 inches (1 200 mm)** before compaction.
- C. Install piping so cleanouts may be installed as follows:
1. At every 135 degrees of accumulative change in direction for horizontal lines.
  2. Every **100 feet (30 meters)** of horizontal run.
  3. Extend piping to accessible surface. Do not install piping so cleanouts must be installed in carpeted floors. In such locations, configure piping so wall type cleanouts may be used.
- D. Each fixture and appliance discharging water into sanitary sewer or building sewer lines shall have seal trap in connection with complete venting system so gasses pass freely to atmosphere with no pressure or siphon condition on water seal.
- E. Vent entire waste system to atmosphere. Join lines together in fewest practicable numbers before projecting above roof. Set back vent lines so they will not pierce roof near edge or valley. Vent line terminations shall be:
1. **6 inches (150 mm)** minimum above roof and **12 inches (300 mm)** minimum from any vertical surface.
  2. Same size as vent pipe.
  3. In areas where minimum design temperature is below **0 deg F (minus 18 deg C)** or where frost or snow closure may be possible:
    - a. Vent line terminations shall be same size as vent pipe, except no smaller than **2 inches (50 mm)** in diameter.
    - b. Vents shall terminate **10 inches (250 mm)** minimum above roof or higher if required by local codes.
- F. Furnish and install firestopping at penetrations of fire-rated structures as required under Sections 07 8400 and 22 0501.
- G. If test Tees are used for testing, plug Tees so wall finish can be installed. Do not leave as exposed cleanouts.

### 3.2 FIELD QUALITY CONTROL

- A. Field Tests:
1. Conduct tests for leaks and defective work. Notify Architect before testing.
  2. Thermoplastic Pipe System:

- a. Before backfilling and compacting of trenches, Fill waste and vent system with water to roof level or **10 feet (3 meters)** minimum, and show no leaks for two hours. Correct leaks and defective work.
- b. After backfilling and compacting of trenches is complete but before placing floor slab, re-test as specified above. Uncover pipe and correct leaks and defective work. Re-backfill and compact and re-test.

**END OF SECTION**

## SECTION 22 1319

### FACILITY SANITARY SEWER SPECIALTIES

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Products Furnished But Not Installed Under this Section as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 09 3013: 'Ceramic Tile' for floor drains in ceramic tile floors.
  - 2. Section 22 0501: 'Common Plumbing Requirements'.
  - 3. Section 22 1119: 'Domestic Water Piping Specialties'.
  - 4. Section 22 1313: 'Facility Sanitary Sewers' for installation of miscellaneous sanitary sewer specialties.

#### PART 2 - PRODUCTS

##### 2.1 SYSTEMS

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. ABT Inc, Troutman, NC [www.abtdrains.com](http://www.abtdrains.com).
    - b. ACO Polymer Products Inc, Chardon, OH [www.acousa.com](http://www.acousa.com).
    - c. Josam Co, Michigan City, IN [www.josam.com](http://www.josam.com).
    - d. Jay R. Smith Manufacturing Co, Montgomery, AL [www.jrsmith.com](http://www.jrsmith.com).
    - e. Mifab Manufacturing Inc, Chicago, IL [www.mifab.com](http://www.mifab.com).
    - f. Scherping Systems, Winstead, MN [www.scherpingsystems.com](http://www.scherpingsystems.com).
    - g. Sioux Chief Manufacturing Co, Peculiar, MO [www.siouxchief.com](http://www.siouxchief.com).
    - h. Strongwell Ebert, Bristol, VA [www.strongwell.com](http://www.strongwell.com).
    - i. Wade Div Tyler Pipe, Tyler, TX [www.wadedrains.com](http://www.wadedrains.com).
    - j. Watts Drainage, Spindale, NC [www.watts.com](http://www.watts.com) or Watts Industries, Burlington, ON, Canada [www.wattscda.com](http://www.wattscda.com).
    - k. Zurn Industries, LLC, Erie PA [www.zurn.com](http://www.zurn.com). or Zurn Industries Ltd, Mississauga, ON (905) 795-8844.
- B. Performance:
  - 1. Design Criteria:
    - a. All materials NOT required to be low lead compliant.
- C. Components:
  - 1. Drains And Drain Accessories:
    - a. Floor Drain FD-1:
      - 1) Approved types with deep seal trap and chrome plated strainer.
      - 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
        - a) Josam: 30000-50-Z-5A.
        - b) J. R. Smith: 2010-A.
        - c) Mifab: F-1100-C.
        - d) Sioux Chief: 832.
        - e) Wade: 1100.
        - f) Watts: FD-200-A.
        - g) Zurn: Z-415.
    - b. Floor Drain FD-2:

- 1) Stainless steel drain, 10 inch (254 mm) top with removable perforated basket and drain cover, trap primer connection.
  - 2) Category Four Approved Product. See Section 01 6200 for definitions of Categories:
    - a) Scherping Systems: SF15850.
2. Trench Drains:
- a. 6 inch (150 mm) wide pre-sloped trench drainage system.
    - 1) Channels:
      - a) Pre-cast polymer concrete or high-density polyethylene structural composite material with radiused bottoms.
      - b) Interlocking sections and horizontal anchoring ribs.
      - c) 4 inch (100 mm) vertical knock-out.
    - 2) Grates: Slotted or epoxy-coated ductile iron with built-in lock-down mechanism.
    - 3) Quality Standard: PolyDrain by ABT Inc.
    - 4) Type One Acceptable Products:
      - a) Equal by ABT Inc.
      - b) Proformer by Mifab.
      - c) Equal by ACO Polymer Products Inc.
      - d) Fast Track Trench System by Sioux Chief.
      - e) Polycast by Strongwell Ebert.
      - f) Perma-Trench System by Zurn.
      - g) Equal by as approved by Architect before bidding. See Section 01 6200.

**PART 3 - EXECUTION: Not Used**

**END OF SECTION**

## SECTION 22 1400

### FACILITY STORM DRAINAGE

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install complete roof drainage system as described in Contract Documents.
- B. Related Requirements:
  - 1. Sections under 07 5000 heading: Membrane Roofing.
  - 2. Section 22 0501: 'Common Plumbing Requirements'.

##### 1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference:
  - 1. Participate in pre-installation conference specified in Section 03 3111.

##### 1.3 REFERENCES

- A. Reference Standards:
  - 1. ASTM International:
    - a. ASTM D2235-04(2011), 'Standard Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings'.
    - b. ASTM D2564-12, 'Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems'.
    - c. ASTM D3034-14, 'Standard Specification for Type PSM Poly Vinyl Chloride) (PVC) Sewer Pipe and Fittings'.
    - d. ASTM F628-12, 'Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe and Fittings with a Cellular Core'.
    - e. ASTM F656-10, 'Standard Specification for Primers for Use in Solvent Cement Joints of Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings'.
    - f. ASTM F891-10, 'Standard Specification for Coextruded Poly (Vinyl Chloride) (PVC) Plastic Pipe with a Cellular Core'.

#### PART 2 - PRODUCTS

##### 2.1 SYSTEM

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. Jay R. Smith Manufacturing Co, Montgomery, AL [www.jrsmith.com](http://www.jrsmith.com).
    - b. Josam, Michigan City, IN [www.josam.com](http://www.josam.com).
    - c. Mifab Manufacturing Inc, Chicago, IL [www.mifab.com](http://www.mifab.com).
    - d. Sioux Chief Mfg. Co. Inc. Peculiar, MO [www.siouxchief.com](http://www.siouxchief.com).
    - e. Wade Div Tyler Pipe, Tyler, TX [www.wadedrains.com](http://www.wadedrains.com).
    - f. Watts Drainage, Spindale, NC [www.watts.com](http://www.watts.com) or Watts Industries, Burlington, ON, Canada [www.wattscda.com](http://www.wattscda.com).
    - g. Zurn Cast Metals, Erie, PA or Zurn Industries Limited, Mississauga, ON [www.zurn.com](http://www.zurn.com).
- B. Materials:
  - 1. Piping And Fittings: PVC Schedule 40 cellular core plastic pipe and pipe fittings meeting requirements of ASTM F891, joined using cement primer meeting requirements of ASTM F656 and pipe cement meeting requirements of ASTM D2564.

2. Piping And Fittings: ABS Schedule 40 cellular core plastic pipe and pipe fittings meeting requirements of ASTM F628, joined with pipe cement meeting requirements of ASTM D2235.
3. Roof Drains:
  - a. Roof Drains (RD-1):
    - 1) Size: As scheduled on Drawings.
    - 2) Duco cast-iron body, with adjustable extension, reversible collar flashing clamp, gravel stop, underdeck clamp, sump receiver, and cast iron dome.
    - 3) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - a) J R Smith: 1015.
      - b) Josam: 21500-AE-3-22-Z.
      - c) Mifab: R-1200-EU-M-B-U.
      - d) Sioux Chief: 868-15-E.
      - e) Watts: RD-300-F.
      - f) Zurn: Z 100 EA.
  - b. Overflow Roof Drains (OD-1):
    - 1) Size: As shown on Drawings.
    - 2) Duco cast-iron body, with **2 inch (50 mm)** water dam collar, gravel stop, underdeck clamp, sump receiver, and cast iron dome.
    - 3) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - a) J R Smith: 1080 with 1015 extension.
      - b) Josam: 21500-AE-3-17-Z.
      - c) Mifab: R-1200-EU-M-B-U-R.
      - d) Sioux Chief: 868-15-EW.
      - e) Watts: RD-300-R.
      - f) Zurn: Z 100 EA-89.
4. Downspout Nozzle:
  - a. Cast bronze downspout and flange with nickel-bronze finish. Include rodent screen/guards if typical for area.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Grade roof drain piping **1/8 inch in one foot (3 mm in 300 mm)** minimum in direction of flow.
- B. Seal joints at roof drains.
- C. Thermoplastic Pipe And Fittings:
  1. General:
    - a. Piping and joints shall be clean and installed according to Manufacturer's recommendations.
    - b. Break down contaminated joints, clean seats and gaskets and reinstall.
  2. Above Grade:
    - a. Locate pipe hangers every **4 feet (1.20 m)** on center maximum and at elbows.

### **3.2 FIELD QUALITY CONTROL**

- A. Field Tests:
  1. Subject roof drain piping system, in sections or in entirety, to water pressure of **5 psig (34.5 kPa)** and prove tight for period of two hours.
  2. Verify all roof drain lines and over flow drain lines are clear of any blockage and are not plugged by debris. Run tests in presence of Architect.

**END OF SECTION**

## SECTION 22 3305

### ELECTRIC DOMESTIC WATER HEATERS

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install electric water heater as specified in Contract Documents.
- B. Related Requirements:
  - 1. Section 22 0501: 'Common Plumbing Requirements'.
  - 2. Section 22 1116: 'Domestic Water Piping'.

##### 1.2 REFERENCES

- A. Reference Standard:
  - 1. NSF International Standard / American National Standards Institute:
    - a. NSF/ANSI 61-2015, 'Drinking Water System Components - Health Effects'.
    - b. NSF/ANSI 372-2016, 'Drinking Water System Components - Lead Content'.

##### 1.3 SUBMITTALS

- A. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Operations and Maintenance Data:
      - 1) Maintenance and operational instructions.
    - b. Warranty Documentation:
      - 1) Final, executed copy of Warranty.
    - c. Record Documentation:
      - 1) Manufacturers documentation:
        - a) Manufacturer's literature or cut sheet.

##### 1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. Meet NSF International Standards for materials or products that come into contact with drinking water, drinking water treatment chemicals, or both for chemical contaminants and impurities that are indirectly imparted to drinking water from products, components, and materials used in drinking water systems.

##### 1.5 WARRANTY

- A. Special Warranty:
  - 1. Three-year non-prorated warranty on water heaters of 20 gallon (76 liters) capacity and larger.

## PART 2 - PRODUCTS

### 2.1 ASSEMBLIES

#### A. Manufacturers:

1. Manufacturer Contact List:
  - a. American Water Heater Co, Johnson City, TN [www.americanwaterheater.com](http://www.americanwaterheater.com).
  - b. Bradford-White Corp, Ambler, PA [www.bradfordwhite.com](http://www.bradfordwhite.com).
  - c. Lochinvar, Lebanon, TN [www.lochinvar.com](http://www.lochinvar.com).
  - d. Rheem / Ruud Water Heater Div Rheem Manufacturing, Atlanta, GA [www.rheem.com](http://www.rheem.com) or Rheem Canada Inc Water Heater Division, Hamilton, ON (800) 268-6966 or (905) 527-9194.

#### B. Materials:

1. Design Criteria:
  - a. All (wetted) drinking water products, components, and materials used in drinking water systems must meet NSF International Standards for Lead Free.
  - b. All water heaters require 'Tempered Water Temperature Control' (mixing valves) as specified in Section 22 1116.
2. **19 / 20 Gallon (72 / 76 Liter):**
  - a. Glass lined storage tank pressure tested and rated for **125 psi (862 kPa)** working pressure.
  - b. 110-120 V, single phase, 1500 - 1650 watts maximum heating capacity.
  - c. Water heaters shall each have ASME rated temperature-pressure relief valve rated at MBH input of heater minimum set to relieve at **120 psi (827 kPa)**.
  - d. Complete with thermostat, high limit control, and anode rod.
  - e. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - 1) American: E61-19L-045DV.
    - 2) A O Smith: DEL-20.
    - 3) Bradford White: LE120L3-3 or LE120U3-1.
    - 4) Lochenvar: JRC020DS or JTC020DS (both 1650 watts).
    - 5) Rheem: 81VP20S or EGSP20.
    - 6) State Industries: PCE-20.
3. **2 / 2.5 Gallon (7.6 / 9.5 Liter):**
  - a. UL listed.
  - b. 110-120 V, single phase, 1500 watts maximum heating capacity.
  - c. Thermostatic control with adjustable setting.
  - d. Category Four Approved Product. See Section 01 6200 for definitions of Categories:
    - 1) American: E1E2.5US015V.
    - 2) Bradford-White: Model RE1-2U.
    - 3) Lochenvar: JRC002CS (1500 watts).
    - 4) Rheem: 81VP2S or EGSP2 or PROE2 1 RH POU.

### 2.2 ACCESSORIES

#### A. Anchoring Components:

1. **One inch (25 mm)** by **18 ga (1.2 mm)** galvanized steel straps.
2. No. 10 by **2-1/2 inch (64 mm)** screws.

#### B. Thermal Expansion Absorbers:

1. Bladder type for use with potable water systems.
2. Type One Acceptable Products.
  - a. Therm-X-Trol ST-12-C by Amtrol Inc, West Warwick, RI [www.amtrol.com](http://www.amtrol.com).
  - b. Equal as approved by Architect before bidding. See Section 01 6200.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Install temperature-pressure relief valve on hot water heater and pipe discharge to directly above funnel of floor drain.
- B. Anchor 20 gallon (76 liter) and larger water heaters to wall using anchoring straps and specified screws.

### **3.2 ADJUSTING**

- A. Set discharge water temperature at 140 deg F (60 deg C). Final hot water temperature shall be 110 deg F (43 deg C) after thermostatic mixing valve. If no mixing valve set discharge temperature at 110 deg F (43 deg C).

**END OF SECTION**

## SECTION 22 3413

### INSTANTANEOUS, TANKLESS, GAS DOMESTIC WATER HEATERS

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install gas-fired tankless water heaters as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 22 0501: 'Common Plumbing Requirements'.
  - 2. Section 22 1116: 'Domestic Water Piping'.
  - 3. Section 23 1123: 'Facility Natural Gas Piping'.
  - 4. Section 23 5135: 'Air Piping'.

##### 1.2 REFERENCES

- A. Reference Standards:
  - 1. ASTM International:
    - a. ASTM D1785-12, 'Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120'.
    - b. ASTM D2564-12, 'Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems'.
    - c. ASTM D2661-11, 'Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe and Fittings'.
    - d. ASTM D2665-12, 'Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings'.
  - 2. NSF International Standard / American National Standards Institute:
    - a. NSF/ANSI 61-2012, 'Drinking Water System Components - Health Effects'.
    - b. NSF/ANSI 372-2011, 'Drinking Water System Components - Lead Content'.

##### 1.3 SUBMITTALS

- A. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Operations and Maintenance Data:
      - 1) Maintenance and operational instructions.
    - b. Warranty Documentation:
      - 1) Final, executed copy of Warranty.
    - c. Record Documentation:
      - 1) Manufacturers documentation:
        - a) Manufacturer's literature or cut sheet.

##### 1.4 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. Meet NSF International Standards for materials or products that come into contact with drinking water, drinking water treatment chemicals, or both for chemical contaminants and impurities that are indirectly imparted to drinking water from products, components, and materials used in drinking water systems.

## 1.5 WARRANTY

- A. Manufacturer Warranty:
  - 1. Direct Vent Water Heater:
    - a. 10 year factory warranty on heat exchanger and 3 years on other parts.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURED UNITS

- A. Design Criteria:
  - 1. All (wetted) drinking water products, components, and materials used in drinking water systems must meet NSF International Standards for Lead Free.
- B. Direct Vent
  - 1. Include vent package and direct vent termination kit for complete vent installation.
  - 2. All domestic water wetted components must be Lead Free and certified to NSF Lead Free standards.
  - 3. Category Four Approved Products. See Section 01 6200 for definition of Categories:
    - a. Model NCC-1991-DV or NCC1992-DV by Noritz , distributed by Franklin James Company, Sandy, UT.
      - 1) Attn: Mark Evans, cell (801) 558-3142 mark@franklinjames.com.
    - b. Model RU98i (REU-KB3237FFUD-US) by Rinnai-MJM Associates Inc, Herriman, UT Attn: Colin Schmidt [www.foreverhotwater.com](http://www.foreverhotwater.com).
    - c. Model T-H3-DV by Takagi, Irvine, CA [www.takagi.com](http://www.takagi.com).

### 2.2 ACCESSORIES

- A. PVC Flue Piping (Instantaneous Tankless Water Heaters):
  - 1. Manufacturer Contact List:
    - a. Armaflex by Armacell, Mebane, NC [www.armaflex.com](http://www.armaflex.com).
    - b. Nomaco, Youngsville, NC [www.nomacokflex.com](http://www.nomacokflex.com).
  - 2. Flue:
    - a. Air Piping: Schedule 40 pipe and fittings meeting requirements of ASTM D1785, ASTM D2661, or ASTM D2665.
    - b. Piping Primer And Cement.
      - a) Meet requirements of ASTM D2564.
    - c. Flexible Foamed Pipe Insulation:
      - 1) Thickness:
        - a) **1/2 inch (13 mm)** for **2 through 3 inch (50 through 75 mm)** outside diameter pipe.
        - b) **1/2 inch (13 mm)** sheet for fittings as recommended by Manufacturer.
      - 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
        - a) Tubolit by Armaflex.
        - b) ImcoLock or Therma-Cel by Nomaco K-Flex.
    - d. Insulation Joint Sealer:
      - 1) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
        - a) 520 by Armaflex.
        - b) R-320 by Nomaco K-Flex.
- B. Stainless Steel Flues (Instantaneous Tankless Water Heaters):
  - 1. Manufacturer Contact List:
    - a. Double wall, factory-fabricated Category III type.
      - 1) Armaflex by Armacell, Mebane, NC [www.armaflex.com](http://www.armaflex.com).
      - 2) Nomaco, Youngsville, NC [www.nomacokflex.com](http://www.nomacokflex.com).
  - 2. Flue:
    - a. Design Criteria:
      - 1) Double wall, factory-fabricated Category III type.

- 2) AL-29-4C stainless steel inner conduit and Type 430 stainless steel outer jacket.
  - 3) Inspection cap, condensate drain, and roof flashing. Provide horizontal, vertical, and roof support.
  - 4) Seal joints as recommended by Flue Manufacturer.
- b. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
- 1) Saf-T Vent C1 by Heat-Fab.
  - 2) Fasnseal W2 by Protech Systems.
  - 3) Z-Vent III by Z-Flex (US).

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Water Heaters:
1. Water heaters shall each have relief valve sized to match heat input and set to relieve at **120 psi (827 kPa)**.
  2. Install temperature-pressure relief valve on hot water heater and pipe discharge directly above funnel of floor drain.
  3. Provide mixing valve at all water heater installations as specified in Section 22 1116.
- B. Vent:
1. Vent package and direct vent termination to be installed per Manufacturer's recommendations.
  2. PVC Flue Piping:
    - a. General:
      - 1) Run individual vent and individual combustion intake piping from each water heater to roof termination as recommended by Water Heater Manufacturer. Concentric roof termination kit may be used if approved by and provided by Water Heater Manufacturer. Slope lines downward toward water heater.
      - 2) Slope combustion chamber exhaust drain downward to floor drain.
    - b. Support:
      - 1) Support concentric roof termination kit at ceiling or roof line with **20 ga (0.95 mm)** sheet metal straps as detailed on Drawings.
      - 2) Support horizontal sections of pipe in accordance with requirements of Section 23 0501. Anchor securely to structure, not allowing pipe to sway.
    - c. Insulation:
      - 1) General:
        - a) Install insulation in snug contact with pipe and in accordance with Manufacturer's recommendations.
        - b) Slip insulation on piping before piping sections and fittings are assembled keeping slitting of insulation to a minimum.
      - c) Joints:
        - (1) Place 'slit' joint seams of insulation exposed outside building on bottom of pipe.
        - (2) Stagger joints on layered insulation.
        - (3) Seal joints in insulation.
      - d) Paint exterior exposed insulation with two coats of finish recommended by Insulation Manufacturer, color selected by Architect.
  3. Stainless Steel Flues (Instantaneous Tankless Water Heaters):
    - a. General:
      - 1) Height of flue above roof shall be as shown on Drawings unless local code requires it be higher.
      - 2) Length of horizontal flues or flue connectors shall not be longer than 75 percent of height of vertical flue between point at which horizontal flue enters vertical flue to top of vertical flue. In no case shall horizontal run exceed **15 feet (4.57 m)**.
      - 3) Every portion of flue connector shall have rise of **one inch (25 mm)** per **1 foot (300 mm)** minimum from appliance to vertical flue.

### 3.2 ADJUSTING

- A. Adjust gas input pressure to be between 6 and 7 inches (150 and 180 mm) of water column at regulator inlet. Adjust burner manifold pressure to 4.3 inches (110 mm) of water column on down stream side of gas regulator.

**END OF SECTION**

**SECTION 22 4126**  
**RESIDENTIAL DISPOSERS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Includes But Not Limited To:
  - 1. Furnish and install disposers as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 11 4200: 'Food Preparation Equipment' for disposers for food preparation sink.
  - 2. Section 22 0501: 'Common Plumbing Requirements'.

**PART 2 - PRODUCTS**

**2.1 MANUFACTURED UNITS**

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. Anaheim Manufacturing, Anaheim, CA [www.anaheimmfg.com](http://www.anaheimmfg.com).
    - b. In-Sink-Erator, Racine, WI [www.insinkerator.com](http://www.insinkerator.com).
- B. Disposer:
  - 1. Heavy-duty residential continuous feed type with adaptor assembly for direct sink mounting.
  - 2. Stainless steel grinding chamber.
  - 3. Motor: 3/4 hp, single phase, 115 V, totally enclosed, fan cooled.
  - 4. Category Four Approved Products. See Section 01 6200 for definitions of Categories.
    - a. 555ss by In-Sink-Erator.
    - b. Waste King 9950 by Anaheim Manufacturing.

**PART 3 - EXECUTION: Not Used**

**END OF SECTION**

## SECTION 22 4213

### COMMERCIAL WATER CLOSETS

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install plumbing fixtures as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 07 9213: 'Elastomeric Joint Sealants' for sealants used between fixtures and other substrates.
  - 2. Section 22 0501: 'Common Plumbing Requirements'.
  - 3. Section 22 1116: 'Domestic Water Piping'.

##### 1.2 REFERENCES

- A. Definitions:
  - 1. High-Efficiency Toilet (HET): Toilets with effective flush volume of 1.28 gallons (4.8 liters) or less.
  - 2. Maximum Performance (MaP): Toilet testing that rates toilet efficiency and flush performance by measuring number of grams of solid waste (soybean paste and toilet paper) that a toilet can flush and remove completely from fixture in single flush represented as a scale or score. 1000 grams is highest score possible ([www.map-testing.com](http://www.map-testing.com)).
- B. Reference Standards:
  - 1. American Society of Mechanical Engineers / CSA Group (Canadian Standards Association):
    - a. ASME A112.19.2-2013/CSA B45.1-13, 'Ceramic Plumbing Fixtures'.

##### 1.3 SUBMITTALS

- A. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Operation and Maintenance Data:
      - 1) Sensor Operated operation and maintenance manuals.

#### PART 2 - PRODUCTS

##### 2.1 ASSEMBLIES

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. American Standard Brands, Piscataway, NJ [www.americanstandard-us.com](http://www.americanstandard-us.com) or American Standard Canada, Mississauga, ON [www.americanstandard.ca](http://www.americanstandard.ca).
    - b. AMTC - Advanced Modern Technologies Corp, Woodland Hills, CA [www.amtccorporation.com](http://www.amtccorporation.com).
    - c. Bemis Manufacturing Co, Sheboygan Falls, WI [www.bemismfg.com](http://www.bemismfg.com).
    - d. Beneke by Sanderson Plumbing Products, Columbus, MS [www.sppi.com](http://www.sppi.com).
    - e. Church Seat Co, Sheboygan Falls WI [www.churchseats.com](http://www.churchseats.com).
    - f. Delany Flush Valves, Charlottesville, VA [www.delanyproduct.com](http://www.delanyproduct.com).

- g. Delta Faucet Co, Indianapolis, IN [www.deltafaucet.com](http://www.deltafaucet.com) or Delta Faucet Canada, London, ON (519) 659-3626.
- h. Dearborn Brass, Cleveland, OH [www.dearbornbrass.com](http://www.dearbornbrass.com).
- i. Gerber Plumbing Fixtures LLC, Woodridge, IL [www.gerberonline.com](http://www.gerberonline.com).
- j. Josam Co, Michigan City, IN [www.josam.com](http://www.josam.com).
- k. Jay R. Smith Mfg. Co, Montgomery, AL [www.jrsmith.com](http://www.jrsmith.com).
- l. Kohler Co Plumbing Div, Kohler, WI [www.us.kohler.com](http://www.us.kohler.com).
- m. McGuire Manufacturing Co, Cheshire, CT [www.mcquiremfg.com](http://www.mcquiremfg.com).
- n. Mifab Manufacturing Inc, Amherst, NY [www.mifab.com](http://www.mifab.com).
- o. Moen Incorporated, North Olmsted, OH, or Moen Canada, Oakville, ON [www.moen.com](http://www.moen.com).
- p. Olsonite Corp, Newnan, GA [www.olsonite.net](http://www.olsonite.net) or Olsonite Co Ltd, Tilbury, ON (519) 682-1240.
- q. Sloan Valve Co, Franklin Park, IL [www.sloanvalve.com](http://www.sloanvalve.com).
- r. South Fork Manufacturing, Coalville, UT (801) 953-3001 [www.dirt-grabber.com](http://www.dirt-grabber.com).
- s. Toto U.S.A., Inc., Morrow, GA [www.totousa.com](http://www.totousa.com)
- t. Wade Div Tyler Pipe, Tyler, TX [www.wadedrains.com](http://www.wadedrains.com).
- u. Watts Drainage, Spindale, NC [www.wattsdrainage.com](http://www.wattsdrainage.com) or Watts Industries, Burlington, ON, Canada [www.wattscda.com](http://www.wattscda.com).
- v. Zurn Industries, LLC, Erie PA [www.zurn.com](http://www.zurn.com). or Zurn Industries Ltd, Mississauga, ON (905) 795-8844.

B. Performance:

- 1. Design Criteria:
  - a. Meet or exceed ASME A112.19.2/CSA B45.1 for Vitreous China Plumbing Fixtures.
  - b. Interior exposed pipe, valves, and fixture trim, including trim behind custom casework doors, shall be chrome plated.
  - c. All materials NOT required to be low lead compliant.

C. Materials:

- 1. Water Closets:
  - a. Floor Mounted (Top Spud) with matched Flush Valve:
    - 1) HET (High-Efficiency Toilet) - Standard Fixture:
      - a) Water usage of 1.28 gallons (4.8 liters) per flush.
      - b) Battery operated.
      - c) MaP Score of 1000 grams.
      - d) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
        - (1) American Standard: Madera Elongated 3451.00 (water closet) with American Standard 6065.161.002.
        - (2) Kohler: Wellworth K-4406 with Tripoint DC 1.28 GPF WC Flushometer K-10956-SV.
        - (3) Sloan ST-2009-A with flushometer Sloan G2 OPTIMA Plus 8111-1.28.
    - 2) HET (High-Efficiency Toilet) - Handicap Accessible Fixture:
      - a) Water usage of 1.28 gallons (4.8 liters) per flush.
      - b) Required in existing projects with HET fixtures.
      - c) 18 inch (450 mm) maximum rim height.
      - d) MaP Score of 1000 grams.
      - e) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
        - (1) American Standard: Madera FloWise Elongated 3461.001 with Flushometer American Standard 6065.121.002.
        - (2) Kohler: Highline EL ADA K-4405 with Tripoint DC 1.28 GPF WC Flushometer K-10956-SV.
        - (3) Sloan ST-2009-A with Flushometer Sloan G2 OPTIMA Plus 8111-1.28.
- 2. Water Closet Accessories:
  - a. Flush Valves:
    - 1) Water Closets must have required flush valves.
  - b. Seats:
    - 1) Provide split front type with check hinge.
    - 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - a) Standard And Handicap Accessible Fixtures:
        - (1) American Standard: 5905.100SS.

- (2) Bemis: 1655SSC.
  - (3) Beneke: 527 SS.
  - (4) Church: 9500SSC.
  - (5) Kohler: K-4731-C.
  - (6) Olsonite: 95SSC.
  - (7) Toto SC534.
- c. Flush Valve Filter:
- 1) Required in following flush valves:
    - a) Sloan.
    - b) Zurn.
  - 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a) SFDG1 'Dirt Grabber' by South Fork Manufacturing.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Install each fixture with separate vent line. Do not circuit vent.
- B. Ensure provisions are made for proper support of fixtures and that rough-in piping is accurately set and protected from movement and damage.
  1. Seal wall-mounted fixtures around edges to wall with sealant specified in Section 07 9213 'Elastomeric Joint Sealants'.
  2. Attach wall-hung fixtures to carriers.
  3. Support fixture hanger or arm free of finished wall.
- C. Adjust flush valves for proper flow.
- D. Provide each individual fixture supply with accessible chrome-plated stop valve with hand wheel.
- E. Water Closets:
  1. Floor or Wall Fixtures:
    - a. Make fixture connections with approved brand of cast iron flange, soldered or caulked securely to waste pipe. Make joints between fixtures and flanges tight with approved fixture setting compound or gaskets. Caulk between fixtures with sealant specified in Section 07 9213. Point edges.
- F. Flush Valve Filters:
  1. Install in Sloan and Zurn only flush valves.
  2. Install after water lines have been flushed out, but before turning water into flush valve.

### **3.2 CLEANING**

- A. Polish chrome finish at completion of Project.

**END OF SECTION**

## SECTION 22 4216

### COMMERCIAL LAVATORIES AND SINKS

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install plumbing fixtures as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 07 9213: 'Elastomeric Joint Sealants' for sealants used between fixtures and other substrates.
  - 2. Section 22 0501: 'Common Plumbing Requirements'.
  - 3. Section 22 1116: 'Domestic Water Piping'.
  - 4. Section 11 4200: 'Food Preparation Equipment' for Vegetable Prep / Dry Pack Sink.

##### 1.2 REFERENCES

- A. Reference Standard:
  - 1. American National Standards Institute / International Code Council:
    - a. ANSI/ICC A117.1-2009, 'Standard for Accessible and Usable Buildings and Facilities'.
  - 2. American Society of Mechanical Engineers / Canadian Standards Association (CSA Group):
    - a. ASME A112.18.1-2012/CSA B125.1-12, 'Plumbing Supply Fittings'.
    - b. ASME A112.6.7-2010 (R2015), 'Sanitary Floor Sinks'.
    - c. ASME A112.19.1-2013/CSA B45.2-13, 'Enamelled cast iron and enamelled steel plumbing fixtures'.
    - d. ASME A112.19.3-2008/CSA B45.4-08 (R2013), 'Stainless steel plumbing fixtures'.

##### 1.3 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. Meet NSF International Standards for materials or products that come into contact with drinking water, drinking water treatment chemicals, or both for chemical contaminants and impurities that are indirectly imparted to drinking water from products, components, and materials used in drinking water systems.

##### 1.4 SUBMITTALS

- A. Closeout Submittals:
  - 1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
    - a. Warranty Documentation:
      - 1) Final, executed copy of Warranty.

##### 1.5 WARRANTY

- A. Manufacturer Warranty:
  - 1. Manufacturer's standard Warranty against material or Manufacturing defects.

## PART 2 - PRODUCTS

### 2.1 ASSEMBLIES

#### A. Manufacturers:

##### 1. Manufacturer Contact List:

- a. American Standard Brands, Piscataway, NJ [www.americanstandard-us.com](http://www.americanstandard-us.com) or American Standard Canada, Mississauga, ON [www.americanstandard.ca](http://www.americanstandard.ca).
- b. Brocar Products Inc, Cincinnati, OH [www.brocar.com](http://www.brocar.com).
- c. CECO, Huntington Park, CA [www.cecosinks.com](http://www.cecosinks.com).
- d. Chicago Faucet Co, Des Plaines, IL [www.chicagofaucets.com](http://www.chicagofaucets.com).
- e. Dearborn Brass, Tyler, TX [www.dearbornbrass.com](http://www.dearbornbrass.com).
- f. Delta Faucet Co, Indianapolis, IN [www.deltafaucet.com](http://www.deltafaucet.com) or Delta Faucet Canada, London, ON (519) 659-3626.
- g. Engineered Brass Co. (EBC) (Just Manufacturing Co.), Franklin Park, IL [www.justmfg.com](http://www.justmfg.com).
- h. Elkay Manufacturing Co, Oak Brook, IL [www.elkay.com](http://www.elkay.com).
- i. Gerber Plumbing Fixtures LLC, Woodridge, IL [www.gerberonline.com](http://www.gerberonline.com).
- j. Josam Co, Michigan City, IN [www.josam.com](http://www.josam.com).
- k. Jay R. Smith Manufacturing Co, Montgomery, AL [www.jrsmith.com](http://www.jrsmith.com).
- l. Just Manufacturing Co, Franklin Park, IL [www.justsinks.com](http://www.justsinks.com).
- m. Keeney Manufacturing Co, Newington, CT [www.keeneymfg.com](http://www.keeneymfg.com).
- n. Kindred USA, Midland, ON [www.kindred-sinkware.com](http://www.kindred-sinkware.com).
- o. Kohler Co Plumbing Div, Kohler, WI [www.us.kohler.com](http://www.us.kohler.com).
- p. McGuire Manufacturing Co, Cheshire, CT [www.mcquiremfg.com](http://www.mcquiremfg.com).
- q. Mifab Manufacturing Inc, Amherst, NY [www.mifab.com](http://www.mifab.com).
- r. Moen Incorporated, North Olmsted, OH, or Moen Canada, Oakville, ON [www.moen.com](http://www.moen.com).
- s. Omni Flow Controls, Harbor City, CA [www.chromomite.com](http://www.chromomite.com) or [www.omniflowcontrols.com](http://www.omniflowcontrols.com).
- t. Plumberex Specialty Products, Palm Springs, CA [www.plumberex.com](http://www.plumberex.com).
- u. Sloan Valve Co, Franklin Park, IL [www.sloanvalve.com](http://www.sloanvalve.com).
- v. Speakman Company, New Castle, DE [www.speakmancompany.com](http://www.speakmancompany.com).
- w. Symmons, Braintree, MA [www.symmons.com](http://www.symmons.com).
- x. T & S Brass & Bronze Works Inc, Travelers Rest, SC [www.tsbrass.com](http://www.tsbrass.com).
- y. TrueBro Inc, Collierville, TN [www.truebro.com](http://www.truebro.com).
- z. Wade Div Tyler Pipe, Tyler, TX [www.wadedrains.com](http://www.wadedrains.com).
- aa. Watts Drainage, Spindale, NC [www.wattsdrainage.com](http://www.wattsdrainage.com) or Watts Industries, Burlington, ON, Canada [www.wattscda.com](http://www.wattscda.com).
- bb. Zurn Commercial Brass, Sanford, NC [www.zurn.com](http://www.zurn.com) or Zurn Industries Ltd, Mississauga, ON (905) 795-8844.
- cc. Zurn Cast Metal, Erie, PA [www.zurn.com](http://www.zurn.com).

#### B. Performance:

##### 1. Design Criteria:

- a. Interior exposed pipe, valves, and fixture trim, including trim behind custom casework doors, shall be chrome plated.
- b. Faucets and other fixture fittings shall conform to requirements of ASME A112.18.1/CSA B125.1.
- c. Floor Sinks (Sanitary) shall conform to requirements of ASME A112.6.7.
- d. Lavatories shall conform to requirements of:
  - 1) Enamelled cast iron and enamelled steel fixtures.
    - a) ASME A112.19.1/CSA B45.2.
    - b) CSA B45.2/ASME A112.19.1.
  - 2) Stainless steel plumbing fixtures:
    - a) ASME A112.19.3/CSA B45.4.
    - b) CSA B45.4/ASME A112.19.3.
- e. Standard and Handicap Accessible Self Supporting Lavatories:
  - 1) Size: **20 by 18 inches** (500 by 450 mm) nominal.
  - 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a) American Standard: Lucern 0355.012.
    - b) Kohler: Greenwich K-2032.
  - 3) Carrier / Support:

- a) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
  - (1) Josam: 17100.
  - (2) Jay R. Smith: 0700.
  - (3) Mifab: MC-41.
  - (4) Wade: 520-M36.
- f. Lavatory Fittings:
  - 1) Faucet and Grid Strainer For Standard Sinks:
    - a) Design Criteria:
      - (1) Meet NSF International Standards for Lead Free.
    - b) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - (1) American Standard: Monterrey Two-Handle Centerset Lavatory Faucet with Vandal-Resistant Wrist Blade handles and grid strainer drain 5502.170.
      - (2) Chicago: 802CP with 327XCP.
      - (3) Delta: 2529HDF.
      - (4) Gerber: C4-44-412.
      - (5) Kohler: K-7404-5A with K-7715 strainer.
      - (6) Moen: 8215 with 14750 grid strainer.
      - (7) Speakman: SC 3072.
      - (8) T & S: B-0890 with B-0899 Grid Strainer.
      - (9) Zurn: Z81104 with McGuire 155A Grid Strainer.
  - 2) Faucet and Grid Strainer For Handicap Accessible Sinks:
    - a) Design Criteria:
      - (1) Meet NSF International Standards for Lead Free.
    - b) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - (1) American Standard: Monterrey Two-Handle Centerset Lavatory Faucet with Vandal-Resistant Wrist Blade handles and grid strainer drain 5502.170.
      - (2) Chicago: 802-317CP with K7715 strainer.
      - (3) Delta: 2529HDF.
      - (4) Gerber: CO-44-412.
      - (5) Kohler: K-7404-5A with K-13885 strainer.
      - (6) Moen: 8215 with 14750 grid strainer.
      - (7) Speakman: SC 3074.
      - (8) T & S: B-0890 with B-0899 Grid Strainer.
      - (9) Zurn: Z-81104 with McGuire 155A grid strainer.
  - 3) Flow Control Fitting:
    - a) Design Criteria:
      - (1) Meet NSF International Standards for Lead Free.
    - b) Accessories:
      - (1) Provide vandal-proof type in place of aerator. Flow shall be 0.5 gpm.
    - c) Category Four Approved Product. See Section 01 6200 for definitions of Categories:
      - (1) Omni L-200 Series by Chronomite Laboratories.
  - 4) Supply pipes with stops:
    - a) Design Criteria:
      - (1) Meet NSF International Standards for Lead Free.
    - b) Accessories:
      - (1) Provide chrome plated quarter-turn brass ball valve, 12 inches (305 mm) long braided stainless steel riser, and chrome-plated steel flange.
    - c) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - (1) McGuire: BV2165CC.
      - (2) Zurn: Z8804 LRQ-PC.
  - 5) Trap:
    - a) Description:
      - (1) 17 gauge (1.4 mm) tube 'P' trap, chrome plated.
    - b) Design Criteria:
      - (1) Not required to meet NSF International Standards for Lead Free.
    - c) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - (1) Dearborn.
      - (2) Engineered Brass Company (EBC).
      - (3) Keeney Manufacturing.
      - (4) McGuire.

- (5) Zurn.
- 6) Safety Covers for Handicap Accessible Lavatories:
  - a) Description:
    - (1) Provide protection on water supply pipes and on trap.
  - b) Design Criteria:
    - (1) Not required to meet NSF International Standards for Lead Free.
  - c) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - (1) Trapwrap by Brocar Products Inc.
    - (2) Pro Wrap by McGuire Products.
    - (3) Lav Guard 2 by TrueBro.
    - (4) Pro Extreme by Plumberex.
- 2. Stainless Steel Sinks And Fittings:
  - a. Design Criteria:
    - 1) Not required to meet NSF International Standards for Lead Free.
    - 2) Self-rimming, 18 gauge (1.2 mm) stainless steel, satin finish.
  - b. Double Compartment Sinks:
    - 1) Design Criteria:
      - a) Not required to meet NSF International Standards for Lead Free.
    - 2) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - a) Elkay: LR 3319.
      - b) Just: DL-1933-A-GR.
      - c) Kindred: LBT 4408P-1.
      - d) Elkay: LRAD 3319.
      - e) Just: DL-ADA-1933-A-GR.
      - f) Kindred: ALBD 4405P-1.
  - c. Single Compartment Sink:
    - 1) Description:
      - a) Size: 17 by 16 inches (430 by 400 mm) nominal.
    - 2) Design Criteria:
      - a) Not required to meet NSF International Standards for Lead Free.
    - 3) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - a) Elkay: LR-1716.
      - b) Just: SL-1617-AGR.
- 3. Kindred: LBS 9408P-1. Miscellaneous Sinks And Fittings:
  - a. Service Sink:
    - 1) Description:
      - a) Floor Type, enameled cast iron, 28 inches (711 mm) square with vinyl coated rim guard or 24 inches (610 mm) square with Stainless Steel rim guard.
    - 2) Design Criteria:
      - a) Not required to meet NSF International Standards for Lead Free.
    - 3) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - a) American Standard: Florwell Enameled Cast Iron 7741.000 with vinyl rim guard 7745.811.
      - b) CECO: 871.
      - c) Kohler: Whitby K-6710.
      - d) Zurn: 5850.
    - 4) Service Sink Fittings:
      - a) Design Criteria:
        - (1) Not required to meet NSF International Standards for Lead Free.
      - b) Supply:
        - (1) Mounting height of 42 inches (1 050 mm).
        - (2) Provide 48 inch (1 200 mm) hose and clamp unless spout is threaded.
        - (3) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
          - (a) American Standard: Exposed Yoke Wall-Mount Utility Faucet with top brace 8344.112 with threaded spout.
          - (b) Chicago: 897 CP.
          - (c) Delta: 28T9 with 28T911 hose and bracket.
          - (d) Gerber: C4-44-654.
          - (d) Kohler: K-8928.

- (e) Moen: 8124.
    - (f) Speakman: SC-5812.
    - (g) T&S: B-0665-BSTP.
    - (h) Zurn: Z-843M1.
  - c) Drain and Strainer:
    - (1) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
      - (a) American Standard: Grid strainer 7721.038.
      - (b) Kohler: K-9146, 3 inch IPS.
    - d) Trap: Cast iron, PVC, or ABS to match piping.
- b. Floor Sink:
  - 1) Description:
    - a) Duco cast-iron body with flashing flange, acid resisting porcelain enamel interior, with dome strainer, and 8-1/2 inch (203 mm) square nickel-bronze rim and half grate.
    - b) Provide 36 inches (915 mm) by 36 inches (915 mm) by 4 lb (1.8 kg) / sq ft lead pan.
    - c) Provide deep seal cast iron 'P' trap with clean out.
  - 2) Design Criteria:
    - a) Not required to meet NSF International Standards for Lead Free.
  - 3) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - a) Jay R. Smith: 3100.
    - b) Josam: 49000-43.
    - c) Mifab: FS-1520-FL-1.
    - d) Watts Drainage:
    - e) Zurn Cast Metal: Z-1910.
- c. Gooseneck Faucets for Compartment Sinks:
  - a) Design Criteria:
    - (1) Meet NSF International Standards for Lead Free.
  - b) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - (1) Moen: 8227 (swivel).
    - (2) Speakman: SC-5724 (swivel).
- d. Faucets for Standard Double and Single Compartment Sinks:
  - a) Design Criteria:
    - (1) Meet NSF International Standards for Lead Free.
  - b) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - (1) American Standard: Heritage/Amarilis Two-Handle Bottom-Mount Kitchen Faucet with Swivel spout 7270.
    - (2) Chicago: 1888CP.
    - (3) Delta: 27C2243-S5.
    - (4) Gerber: CO-44-002.
    - (5) Kohler: K-7761-K with handles K-16012-5.
    - (6) Zurn Commercial Brass: Z-831J3.
- e. Supply pipes with stops:
  - a) Design Criteria:
    - (1) Meet NSF International Standards for Lead Free.
  - b) Accessories:
    - (1) Provide chrome plated quarter-turn brass ball valve, 12 inches (300 mm) long braided stainless steel riser, and chrome-plated steel flange.
  - c) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - (1) McGuire: BV2165CC.
    - (2) Zurn: Z8804 LRQ-PC.
- f. Flow Control Fitting:
  - a) Design Criteria:
    - (1) Meet NSF International Standards for Lead Free.
  - b) Accessories:
    - (1) Provide vandal-proof type in place of aerator. Flow shall be 1.5 gpm.
  - c) Category Four Approved Product. See Section 01 6200 for definitions of Categories:
    - (1) Omni A-200 Series by Chronomite Laboratories.
- g. Waste For Standard Stainless Steel Sinks:
  - a) Design Criteria:
    - (1) Not required to meet NSF International Standards for Lead Free.

- b) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
  - (1) Elkay: LK-99.
  - (2) Kindred: 1130.
  - (3) Kohler: K8801.
  - (4) McGuire: 151.
  - (5) Zurn Z-8740-PC.
- h. Trap:
  - a) Description:
    - (1) 17 gauge (1.4 mm) tube 'P' trap, chrome plated.
  - b) Design Criteria:
    - (1) Not required to meet NSF International Standards for Lead Free.
  - c) Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - (1) Dearborn.
    - (2) Engineered Brass Company (EBC).
    - (3) Keeney Manufacturing.
    - (4) McGuire: MCT150075NCZN.
    - (5) Zurn.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Install each fixture with separate vent line. Do not circuit vent.
- B. Ensure provisions are made for proper support of fixtures and that rough-in piping is accurately set and protected from movement and damage.
- C. Seal wall-mounted fixtures around edges to wall and counter top fixtures to countertop with sealant specified in Section 07 9213.
- D. Unless otherwise noted, provide each individual fixture supply with chrome-plated stop valve with hand wheel.
- E. Install fixtures with accessible stop or control valve in each hot and cold water branch supply line.
- F. Self-Supporting Lavatories: Install using carriers. Support carrier free of finished wall.
- G. Install Safety Covers on all under sink / lavatories with exposed water supply pipes and traps.
- H. Install Handicap Accessible Lavatories as per ADA height mounting requirements.

### **3.2 CLEANING**

- A. Polish chrome finish at completion of Project.

**END OF SECTION**

## SECTION 22 4700

### DRINKING FOUNTAINS AND WATER COOLERS

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Includes But Not Limited To:
  - 1. Furnish and install drinking water cooling system units as described in Contract Documents.
- B. Related Requirements:
  - 1. Section 22 0501: 'Common Plumbing Requirements'.
  - 2. Section 22 1116: 'Domestic Water Piping'.

##### 1.2 REFERENCES

- A. Reference Standard:
  - 1. American National Standards Institute / International Code Council:
    - a. ANSI/ICC A117.1-2009, 'Standard for Accessible and Usable Buildings and Facilities'.
  - 2. NSF International Standard / American National Standards Institute:
    - a. NSF/ANSI 61-2012, 'Drinking Water System Components - Health Effects'.
    - b. NSF/ANSI 372-2011, 'Drinking Water System Components - Lead Content'.

##### 1.3 QUALITY ASSURANCE

- A. Regulatory Agency Sustainability Approvals:
  - 1. Handicap Accessible Products to meet ANSI/ICC A117 Accessible requirements.
  - 2. Meet NSF International Standards for materials or products that come into contact with drinking water, drinking water treatment chemicals, or both for chemical contaminants and impurities that are indirectly imparted to drinking water from products, components, and materials used in drinking water systems.

#### PART 2 - PRODUCTS

##### 2.1 MANUFACTURED UNITS

- A. Manufacturers:
  - 1. Manufacturer Contact List:
    - a. Acorn Aqua, City of Industry, CA [www.acornaqua.com](http://www.acornaqua.com).
    - b. Elkay Manufacturing Co, Oak Brook, IL [www.elkay.com](http://www.elkay.com).
    - c. Halsey Taylor, Oak Brook, IL [www.halseytaylor.com](http://www.halseytaylor.com).
    - d. Oasis, Tri Palm International, Columbus OH [www.oasiswatercoolers.com](http://www.oasiswatercoolers.com).
- B. Design Criteria:
  - 1. All drinking water products, components, and materials above and below grade used in drinking water systems must meet NSF International Standards for Lead Free.
  - 2. Interior exposed pipe, valves, and fixture trim shall be chrome plated.
  - 3. Do not use flexible water piping.
- C. Materials:
  - 1. Handicap Accessible Bi-Level Fountain:

- a. Include accessory fountain. Vandal proof operating bar on front and both sides. 7.8 GPH (29.5 LPH) minimum of 50 deg F (10 deg C) water with 90 deg F (32 deg C) room temperature, 1/5 horsepower motor, 120 V, 60 Hz, single phase. Flexi-guard or chrome plated brass bubbler.
  - b. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
    - 1) AcornAqua: AquaAccess A172408B-UBL.
    - 2) Elkay: Model EZSTL8LC.
    - 3) Halsey Taylor: HAC8FSBL-Q-ADA.
    - 4) Oasis: PG8ACSL.
2. Hydration Station.
- a.. Touchless sensor activated, 1.5 GPM Quick Fill, with automatic 20 second shut-off timer. 120V, 60 HZ single phase.
  - b. Visual user interface display includes:
    - 1. Innovative Green Ticker counting number of bottles saved from waste.
    - 2. Filter monitor indicating when replacement is needed.
  - c. Water Sentry Plus Filler:
    - 1. 3000 Gallon Capacity.
    - 2. Quick ¼ turn for easy installation.
    - 3. Polypropylene pre-filter mesh prevents coarse sediment from entering filter.
    - 4. Made with activated carbon and patented ATS lead-removal media.
    - 5. Final filter mesh prevents loose carbon from entering water.
    - 6. ANSI/NSF Standard 42 and 53.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install fixtures with accessible stop or control valve.
- B. Mounting:
  - 1. General:
    - a. Coordinate location of fountain with location and height of electrical outlet to ensure concealment of outlet by fountain.
    - b. Anchor bottom of fountain to wall.
    - c. Install 3/8 inch (9.5 mm) IPS union connection and Chicago No. 441 stop to building supply line.
    - d. Install 1-1/4 inch (32 mm) IPS slip cast brass 'P' trap. Install trap so it is concealed.
  - 2. Accessible Drinking Fountains:
    - a. Spout outlets of wheelchair accessible drinking fountains shall be 36 inches (915 mm) maximum above floor.
    - b. Spout outlets of drinking fountains for standing persons shall be 38 inches (965 mm) and 43 inches (1090 mm) maximum above floor.

### 3.2 CLEANING

- A. Polish chrome finish at completion of Project.

**END OF SECTION**