

## **DIVISION 22: PLUMBING**

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## **DIVISION 22 PLUMBING**

### **SECTION 22 0501 - COMMON PLUMBING REQUIREMENTS**

#### **PART 1 - GENERAL**

##### **1.1 RELATED DOCUMENTS**

- A.** Drawings and General Provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

##### **1.2 SUMMARY**

- A.** Furnish labor, materials, and equipment necessary for completion of work as described in Contract Documents.
- B.** It is the intent of these specifications that the systems specified herein are to be complete and operational before being turned over to the owner. During the bidding process, the contractor is to ask questions or call to the engineer's attention any items that are not shown or may be required to make the system complete and operational. Once the project is bid and the contractor has accepted the contract, it is his responsibility to furnish and install all equipment and parts necessary to provide a complete and operational system without additional cost to the owner.
- C.** Furnish and install fire stopping materials to seal penetrations through fire rated structures and draft stops.

##### **1.3 SUBMITTALS**

- A.** Substitutions: By specific designation and description, standards are established for specialties and equipment. Other makes of specialties and equipment of equal quality will be considered provided such proposed substitutions are submitted to the Architect for his approval, complete with specification data showing how it meets the specifications, at least 5 working days prior to bid opening. A list of approved substitutions will be published as an addendum, but does not relieve Contractor from meeting all requirements of the specifications.
  1. Submit a single copy of Manufacturer's catalog data including Manufacturer's complete specification for each proposed substitution.
  2. The Architect or Engineer is to be the sole judge as to the quality of any material offered as an equal.
- B.** Product Data, Shop Drawings: Within 30 days after award of contract, submit 10 sets of Manufacturer's catalog data for each manufactured item.
  1. Literature shall include enough information to show complete compliance with Contract Document requirements.
  2. Mark literature to indicate specific item with applicable data underlined.
  3. Information shall include but not be limited to capacities, ratings, type of material used, guarantee, and such dimensions as are necessary to check space requirements.
  4. When accepted, submittal shall be an addition to Contract Documents and shall be in equal force. No variation shall be permitted.
  5. Even though the submittals have been accepted by the Engineer, it does not relieve the contractor from meeting all of the requirements of the plans and specifications and providing a complete and operational system.
- C.** Drawings of Record: One complete set of blue line mechanical drawings shall be provided for the purpose of showing a complete picture of the work as actually installed.

1. These drawings shall serve as work progress report sheets. Contractor shall make notations neat and legible therein daily as the work proceeds.
2. The drawings shall be kept at the job at a location designated by the Mechanical Engineer.
3. At completion of the project these "as-built" drawings shall be signed by the Contractor, dated, and returned to the Architect.

D. Operating Instructions and Service Manual: The Mechanical Contractor shall prepare 2 copies of an Operation and Maintenance Manual for all mechanical systems and equipment used in this project. Manuals shall be bound in hard-backed binders and the front cover and spine of each binder shall indicate the name and location of the project. Use plastic tab indexes for all sections. Provide a section for each different type of equipment item. The following items shall be included in the manual, together with any other pertinent data. This list is not complete and is to be used as a guide.

1. Provide a master index at the beginning of the manual showing all items included.
2. The first section of the manual shall contain:
  - a. Names, addresses, and telephone numbers of Architect, Mechanical Engineer, Electrical Engineer, General Contractor, Plumbing Contractor, Sheet Metal Contractor, and Temperature Control Contractor.
  - b. List of Suppliers which shall include a complete list of each piece of equipment used with the name, address, and telephone number of vendor.
  - c. General Description of Systems including –
    - 1) Location of all major equipment
    - 2) Description of the various mechanical systems
    - 3) Description of operation and control of the mechanical systems
    - 4) Suggested maintenance schedule
  - d. Copy of contractor's written warranty
3. Provide a copy of approved submittal literature for each piece of equipment.
4. Provide maintenance and operation literature published by the manufacturer for each piece of equipment which includes: oiling, lubrication and greasing data; belt sizes, types and lengths; wiring diagrams; step-by-step procedure to follow in putting each piece of mechanical equipment in operation.
5. Include parts numbers of all replaceable items.
6. Provide control diagram and operation sequence, along with labeling of control piping and instruments to match diagram.
7. Include a valve chart indicating valve locations.
8. Include air balance and/or water balance reports.

#### 1.4 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies:

1. Perform work in accordance with applicable provisions of local and state Plumbing Code, Gas Ordinances, and adoptions thereof. Provide materials and labor necessary to comply with rules, regulations, and ordinances.
2. In case of differences between building codes, state laws, local ordinances, utility company regulations, and Contract Documents, the most stringent shall govern. Promptly notify Architect in writing of such differences.

B. Applicable Specifications: Referenced specifications, standards, and publications shall be of the issues in effect on date of Advertisement for Bid.

1. "Heating, Ventilating and Air Conditioning Guide" published by the American Society of Heating and Air Conditioning Engineers.
2. "Engineering Standards" published by the Heating, Piping, and Air Conditioning Contractors National Association.
1. "2009 International Building Code", "2009 International Mechanical Code", and "2009 International Fire Code" as published by the International Conference of Building Officials.
2. 2009 Idaho Plumbing Code as published by the International Association of Plumbing and Mechanical Officials.

3. "National Electrical Code" as published by the National Fire Protection Association.
4. "2009 International Energy Conservation Code".

1.5        INSPECTIONS AND PERMITS

A. Pay for permits, fees, or charges for inspection or other services. Local and state codes and ordinances must be properly executed without expense to Owner and are considered as minimum requirements. Local and state codes and ordinances do not relieve the Contractor from work shown that exceeds minimum requirements.

1.6        ADDITIONAL WORK:

A. Design is based on equipment as described in the drawing equipment schedule. Any change in foundation bases, electrical wiring, conduit connections, piping, controls and openings required by alternate equipment submitted and approved shall be paid for by this division. All work shall be in accordance with the requirements of the applicable sections.

END OF SECTION 22 0501

## **SECTION 22 0503 - PIPE, PIPE FITTINGS, PIPE HANGERS & VALVES**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

- A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and Section 22 05 01 apply to this Section.

#### **1.2 SUMMARY**

- A. General piping and valve materials and installation procedures for all piping systems.

#### **1.3 QUALITY ASSURANCE**

- A. Manufacture:
  - 1. Use domestic made valves, pipe and pipe fittings.
- B. General: Support components shall conform to Manufacturer's Standardization Society Specification SP-58.

### **PART 2 - PRODUCTS**

#### **2.1 VALVES**

- A. Stop and Waste Cocks:
  - 1. Milwaukee No. F-2885 with 3/4" Milwaukee No. 105 gate valve tapped into pipe on outlet side of main valve.
- B. Use ball valves or butterfly valves everywhere unless noted otherwise.
- C. Approved Manufacturers:
  - 1. Crane
  - 2. Nibco
  - 3. Hammond
  - 4. Stockham
  - 5. Milwaukee
  - 6. Victaulic

#### **2.2 PIPE**

- A. Exposed waste, vent and water piping connections to fixtures shall be chrome plated.
- B. Condensate Drain Piping: Type "M" copper with sweat fittings or Schedule 40 PVC pipe and fittings.

#### **2.3 PIPE HANGERS**

- A. Adjustable, malleable iron clevis type of a diameter adequate to support pipe size.
- B. Approved Manufacturers:
  - 1. B-Line Systems Fig. B3100
  - 2. Grinnell No. 260
  - 3. Kin-Line 455
  - 4. Superstrut CL-710

## 2.4 INSULATING COUPLINGS

- A. Suitable for at least 175 PSIG WP at 250 deg F.
- B. Approved Manufacturers:
  - 1. Central Plastics Co
  - 2. Victaulic Co
  - 3. Watts Regulator Co

## 2.5 EXPANSION JOINTS

- A. Install at all building expansion joints and as shown on the drawings, flexible, or nipple/flexible coupling combinations for added expansion/deflection. Submit Manufacturer's data.
- B. Approved Manufacturers
  - 1. Victaulic Style 155, 150
  - 2. Grinnell - Gruv-Lok
  - 3. Garlock Garflex 8100
  - 4. Vibration Mountings & Controls, Inc.

## 2.6 SLEEVES

- A. Sleeves shall be standard weight galvanized iron pipe, Schedule 40 PVC, or 14 gauge galvanized sheet metal two sizes larger than pipe or insulation.
- B. Steel or heavy steel metal of the telescoping type of a size to accommodate pipe and covering wherever it passes through floors, walls, or ceilings.

## 2.7 INTERMEDIATE ATTACHMENTS

- A. Continuous threaded rod may be used wherever possible.
- B. No chain, wire, or perforated strap shall be used.

## 2.8 FLOOR AND CEILING PLATES

- A. Brass chrome plated

## 2.9 APPROVED MANUFACTURERS - Grinnell and Fee/Mason

- A. Concrete Inserts: Grinnell Fig. 282
- B. Pipe Hanger Flange: Grinnell Fig. 163
- C. Vertical Pipe: Grinnell Fig. 261 or equal.
- D. Cast Iron Pipe: Grinnell Fig. 260 clevis hanger or equal
- E. Pipe Attachments for steel pipe with 1" or less of insulation:
  - 1. Grinnell Fig. 108 ring
  - 2. Grinnell Fig. 114 turnbuckle adjuster
  - 3. Or equal

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Furnish and install complete system of piping, valved as indicated or as necessary to completely control entire apparatus. 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 Contractor from responsibility for proper erection of systems of piping in every respect.
- B. Properly support piping and make adequate provisions for expansion, contraction, slope, and anchorage.
  - 1. Cut piping accurately for fabrication to measurements established at site and work into place without springing or forcing.
  - 2. Do not use pipe hooks, chains, or perforated metal for pipe support.
  - 3. Remove burr and cutting slag from pipes.
  - 4. Make changes in direction with proper fittings.
  - 5. Insulate hangers for copper pipe from piping by means of at least two layers of Scotch 33 plastic tape.
  - 6. Support piping at 8 feet on center maximum for pipe 1-1/4 inches or larger and 6 feet on center maximum for pipe one inch or less. Provide support at each elbow. Install additional support as required.
  - 7. Suspend piping from roof trusses or clamp to vertical walls using Unistrut and clamps (except underground pipe). Laying of piping on any building member is not allowed.
- C. Arrange piping to not interfere with removal of other equipment, ducts, or devices, or block access to doors, windows, or access openings. Provide accessible, ground joint unions in piping at connections to equipment.
- D. Make connections of dissimilar metals with insulating couplings.
- E. Provide sleeves around pipes passing through floors, walls, partitions, or structural members.
  - 1. Seal sleeves with plastic or other acceptable material.
  - 2. Do not place sleeves around soil, waste, vent, or roof drain lines passing through concrete floors on grade.
- F. 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.
- G. Install piping systems so they may be easily drained.
- H. Grade soil and waste lines within building perimeter 1/4 inch fall per ft in direction of flow.
- I. Insulate water piping buried within building perimeter.
  - 1. Do not use reducing bushings, street elbows, or close nipples.
  - 2. Bury water piping 6 inches minimum below bottom of slab and encase in 2 inches minimum of sand.
  - 3. Do not install piping in shear walls.

### 3.2 HORIZONTAL PIPING INSTALLATION

- A. Locate hangers, supports, and anchors near or at changes in piping direction and concentrated loads.
- B. Provide for vertical adjustment to maintain pitch required for proper drainage.
- C. Allow for expansion and contraction of the piping.

### 3.3 PIPE SLEEVES AND INSERTS

- A. Set sleeves before concrete is poured or floors finished.
- B. Inserts for units should be placed in the concrete or masonry during construction to avoid cutting of finished work. When and if cutting becomes necessary, it must be done in accordance with the cutting and patching specifications.

### 3.4 FLOOR AND CEILING PLATES

- A. Install on all pipes passing through floors, partitions, and ceilings.

### 3.5 UNIONS AND CONNECTIONS

- A. Install malleable ground joint unions in hot and cold water piping throughout the system so that any portion can be taken down for repairs or inspections without injury to same or covering.
- B. Running threads or long screws will not be permitted in jointing any pipe.
- C. Provide dielectric waterways Style #47 between ferrous and non-ferrous metals.

### 3.6 FIRE STOPPING

- A. Fire stop all penetrations of fire walls, fire barriers, fire petitions, and other fire rated walls and ceilings and floors as per IBC Section 711. See Specification 22 0800.

END OF SECTION 22 0503

## **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 Materials**

A. Paint:

1. One Coat Primer:
  - a. 6-2 Quick Drying Latex Primer Sealer over fabric covers.
  - b. 6-205 Metal Primer under dark color paint.
  - c. 6-6 Metal Primer under light color paint.
2. Finish Coats: Two coats 53 Line Acrylic Enamel.
3. 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.
4. Type Two Acceptable Products. See Section 01 6200.
  - a. Paint of equal quality from following Manufacturers may be submitted for Architect's approval before use. Maintain specified colors, shades, and contrasts.
    - 1) Benjamin Moore, Montvale, NJ [www.benjaminmoore.com](http://www.benjaminmoore.com) or Toronto, ON (800) 304-0304 or (416) 766-1176.
    - 2) ICI Dulux, Cleveland, OH or ICI Paints Canada Inc, Concord, ON [www.dulux.com](http://www.dulux.com).
    - 3) Sherwin Williams, Cleveland, OH [www.sherwin-williams.com](http://www.sherwin-williams.com).

#### **2.2 VALVE IDENTIFICATION**

A. Make a list of and tag all valves installed in this work.

1. Valve tags shall be of brass, not less than 1"x2" size, hung with brass chains.
2. Tag shall indicate plumbing or heating service.

### **PART 3 - EXECUTION**

#### **3.1 SCHEDULES**

A. Pipe Identification Schedule:

1. Apply stenciled symbols as follows:

Pipe Use	Abbreviation
Domestic Cold Water	CH
Domestic Hot Water	HW

END OF SECTION 22 0553

## **SECTION 22 0703 - MECHANICAL INSULATION AND FIRE STOPPING**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

- A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and Section 22 05 01 apply to this Section.

#### **1.2 SUMMARY**

- A. Furnish and install mechanical insulation and fire stopping as described in Contract Documents including but not limited to the following:
  1. Cold Water Piping Insulation
  2. Hot Water Piping Insulation (Domestic)
  3. Handicapped Fixture Insulation
  4. Fire Stopping

#### **1.3 QUALITY ASSURANCE**

- A. Insulation shall have composite (insulation, jacket or facing and adhesive used to adhere facing or jacket to insulation) fire and smoke hazard ratings as tested by Procedure ASTM E-84, NFPA 255 and UL 723 not exceeding: Flame Spread of 25 and Smoke Developed of 50.
- B. Insulation Contractor shall certify in writing, prior to installation, that all products to be used will meet the above criteria.
- C. Accessories, such as adhesives, mastics, cements, and tapes, for fittings shall have the same component ratings as listed above.
- D. Products, or their shipping cartons, shall bear a label indicating that flame and smoke ratings do not exceed above requirements.
- E. Any treatment of jacket or facings to impart flame and smoke safety shall be permanent.
- F. The use of water-soluble treatments is prohibited.

END OF SECTION 22 0703

## **SECTION 22 0705 - UNDERGROUND PIPING INSULATION**

### **PART 1 - GENERAL**

#### 1.1 RELATED DOCUMENTS

- A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and Section 22 05 01 apply to this Section.

#### 1.2 SUMMARY

- A. Furnish and install insulation on underground hot and cold water pipes within confines of building as described in Contract Documents.

### **PART 2 - PRODUCTS**

#### 2.1 MATERIAL

- A. Insulation:
  - 1. 1/2 inch thick Armaflex Standard Pipe Insulation
  - 2. Equal by Rubatex
  - 3. Equal by Imcolock
- B. Joint Sealant:
  - 1. Armstrong 520

### **PART 3 - EXECUTION**

#### 3.1 INSTALLATION

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

END OF SECTION 22 0705

## **SECTION 22 0710 - POTABLE WATER PIPE INSULATION**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

- A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and Section 22 05 01 apply to this Section.

#### **1.2 SUMMARY**

- A. Furnish and install insulation on above ground hot and cold water lines, fittings, valves, pump bodies, flanges, and accessories as described in Contract Documents.

### **PART 2 - PRODUCTS**

#### **2.1 INSULATION**

- A. One inch thick snap-on glass fiber pipe insulation.
- B. Heavy density pipe insulation with factory vapor jacket equal to Fiberglass ASJ may be used.
- C. Approved Manufacturers:
  - 1. CTM
  - 2. Manville
  - 3. Owens-Corning
  - 4. Knauf

#### **2.2 PVC FITTING, VALVE, & ACCESSORY COVERS**

- A. Approved Manufacturers:
  - 1. Knauf
  - 2. Zeston

### **PART 3 - EXECUTION**

#### **3.1 APPLICATION**

- A. Piping:
  - 1. Apply insulation to clean, dry piping with joints tightly butted.
  - 2. Adhere "factory applied vapor barrier jacket lap" smoothly and securely at longitudinal laps with a white vapor barrier adhesive.
  - 3. Adhere 3 inch wide self-sealing butt joint strips over end joints.
- B. Fittings, Valves, & Accessories:
  - 1. 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.
  - 2. Cover insulation with one piece fitting cover secured by stapling or taping ends to adjacent pipe covering.
- C. Pipe Hangers:
  - 1. Do not allow pipes to come in contact with hangers.
  - 2. Provide 16 ga x 6 inch long galvanized shields at each pipe hanger to protect pipe insulation from crushing by clevis hanger.

END OF SECTION 22 0710

## **SECTION 22 07 11 - HANDICAPPED FIXTURES INSULATION**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

- A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, and Section 22 05 00 apply to this Section.

#### **1.2 SUMMARY**

- A. Furnish and install handicapped fixtures insulation as described in Contract Documents.

#### **1.3 QUALITY ASSURANCE**

- A. Insulating device must comply with UBC-85 and federal accessibility standards.
- B. Cover must meet federal standards for protection from burns and abrasions.

### **PART 2 - PRODUCTS**

#### **2.1 MANUFACTURED UNITS**

- A. Insulating device shall be molded fire resistant foam, to encapsulate hot water piping, stop, and P-trap.
  - 1. Approved Manufacturers:
    - a. TCI Products' Skal+Gard SG-100B
- B. Safety cover with recloseable sealing strips which allow for removal and replacement for line maintenance may be used on drain and supply lines under lavatories.
  - 1. Approved Manufacturers:
    - a. Handy-Shield
    - b. Plumberex
- C. Color shall be white.

### **PART 3 - EXECUTION**

#### **3.1 INSTALLATION**

- A. Install tamper-proof locking strap to discourage pilferage.

END OF SECTION

## **SECTION 22 07 24 - PREMOLDED ONE PIECE PVC FITTINGS INSULATION**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

- A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and Section 22 05 01 apply to this Section.

#### **1.2 SUMMARY**

- A. Furnish and install premolded one piece PVC fittings insulation as described in Contract Documents.

#### **1.3 QUALITY ASSURANCE**

- A. Fittings shall be UL rated 25/50 PVC.

### **PART 2 - PRODUCTS**

#### **2.1 MANUFACTURED UNITS**

- A. Approved Manufacturers:
  - 1. Zeston

### **PART 3 - EXECUTION**

#### **3.1 INSTALLATION**

- A. Where factory premolded one piece PVC insulating fitting covers are to be used, proper factory precut Hi-Lo Temp insulation shall be applied to the fitting. Ends of Hi-Lo Temp insulation shall be tucked snugly into throat of fitting and edges adjacent to pipe covering tufted and tucked in. Fully insulate pipe fittings. One piece PVC fitting cover is then secured by stapling, tack fastening, banding or taping ends to adjacent pipe covering.
- B. Cold:
  - 1. Chilled water systems shall be insulated as "A" above and have all seam edges of cover sealed with Zeston's vapor barrier adhesive or equal.
  - 2. Circumferential edges of cover shall be wrapped with Zeston's vapor barrier pressure sensitive color matched Z tape.
  - 3. Tape shall extend over adjacent pipe insulation and have an overlap on itself at least 2" on downward side.
- C. Hot:
  - 1. On fittings where temperature exceeds 250 degrees F., two layers of factory precut Hi-Lo Temp insulation inserts shall be applied with a few wrappings of twine on first layer, to be sure there are no voids or hot spots. Fitting cover shall then be applied over Hi-Lo Temp insulation as described above in "A."

END OF SECTION 22 07 24

## **SECTION 22 0800**

### **FIRE STOPPING**

#### **PART 1 - GENERAL**

##### **1.1 RELATED DOCUMENTS**

- A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and Section 22 05 01 apply to this Section.

##### **1.2 SUMMARY**

- A. Furnish and install fire stopping as described in Contract Documents.

##### **1.3 QUALITY ASSURANCE**

- A. Fire stopping material shall meet ASTM E814, E84 and be UL listed.

#### **PART 2 - PRODUCTS**

##### **2.1 MANUFACTURED UNITS**

- A. Material shall be flexible, long lasting, intumescent acrylic seal to accommodate vibration and building movement.
- B. Caulk simple penetrations with gaps of 1/4" or less with:
  1. Dow Corning Fire Stop Sealant
  2. Pensil 300
- C. Caulk multiple penetrations and/or penetrations with gaps in excess of 1/4" with:
  1. Dow Corning Fire Stop Foam
  2. Pensil 200
  3. IPC flame safe FS-1900
  4. Tremco "Tremstop 1A"

#### **PART 3 - EXECUTION**

##### **3.1 INSTALLATION**

- A. Follow manufacturer's installation instructions explicitly.
- B. Seal penetrations of ductwork, piping, and other mechanical equipment through one-hour and two-hour rated partitions as shown on Architectural and Mechanical Drawings.
- C. Install fire stopping material on clean surfaces to assure adherence.

END OF SECTION 22 0800

## **SECTION 22 1114**

### **NATURAL GAS SYSTEMS**

#### **PART 1 - GENERAL**

##### **1.1 RELATED DOCUMENTS**

- A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, and Section 22 0501 apply to this Section.

##### **1.2 SUMMARY**

- A. Furnish and install gas piping and fittings within building including connection to meter.

##### **1.3 QUALITY ASSURANCE**

- A. Qualifications:
  - 1. Welders shall be certified and bear evidence of certification 30 days prior to commencing work on project. If there is doubt as to proficiency of welder, Owner's Representative may require welder to take another test. This shall be done at no cost to Owner. Certification shall be by Pittsburgh Testing Laboratories or other approved authority.

#### **PART 2 - PRODUCTS**

##### **2.1 PIPE**

- A. Meet requirements of ASTM A 53-89a, "Specification for Pipe, Steel, Black & Hot-Dipped Zinc-Coated Welded & Seamless".
- B. Carbon steel, butt welded, Schedule 40 black steel pipe.

##### **2.2 FITTINGS**

- A. Black Pipe:
  - 1. Welded forged steel fittings meeting requirements of ASTM A 234-89a, "Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures", or standard weight malleable iron screwed.

##### **2.3 GAS PRESSURE REGULATOR**

- A. Self- operated, spring loaded regulator with large diaphragm area.
- B. Internal registration and relief.
- C. Tamper-resistant adjustment with corrosion resistance for indoor or outdoor use.
- D. Install with manual shut off cock.
- E. Emerson Y600AR or approved equal.

##### **2.4 VALVES**

- A. 125 psi bronze body ball valve, UL listed

B. Approved Manufacturers & Models:

1. ConBraCo - "Apollo" series 80-100
2. Jenkins - FIG-30-A
3. Jomar - Model T-204
4. McDonald - 3410
5. PGL Corp - "Red Cap" gas ball valve
6. Watts - Model B-6000-UL

## 2.5 PRESSURE REDUCING REGULATORS

- A. Corrosion Resistant Brass Body.
- B. 1/2" to 4" Threaded NPT
- C. 2" and Above Flanged.
- D. Max Inlet Pressure 10 psi.
- E. Max Outlet Pressure 0.5 psi.
- F. Temperature Capabilities - ~20 to 180° F.
- G. Approved Manufacturers and Models.
  1. Emerson Process Management.
  2. Maxitrol 3UP33
  3. Or approved equal.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Pipe installed underground, through air plenums, in walls, and pipes 2-1/2 inches and larger shall have welded fittings and joints. Other pipe may have screwed or welded fittings.
- B. Wrap and lay underground pipe in accordance with local gas utility company regulations and specifications.
- C. Install gas cocks on lines serving boilers, furnaces, duct heaters, and water heaters adjacent to boiler, furnace, or heater on outside of boiler, furnace, or heater cabinet and easily accessible.
- D. Do not use flexible pipe connections to boilers, furnaces, duct heaters, or hot water heaters.
- E. Install dirt leg with pipe cap, 6 inches long minimum, on each vertical gas drop to heating equipment.
- F. Use fittings for changes of direction in pipe and for branch runouts.
- G. Paint exterior exposed gas piping with gray paint to match gas meter.

END OF SECTION 22 1114

## **SECTION 22 1115 – FURNACE AIR PIPING**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

- A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, Section 15055 apply to this Section.

#### **1.2 SUMMARY**

- A. Furnish and install furnace vent piping and combustion air intake piping as described in Contract Documents.

### **PART 2 - PRODUCTS**

#### **2.1 AIR PIPING**

- A. Schedule 40 pipe and fittings meeting requirements of one of following:
  1. ASTM D 1785-89, “Specification for Poly(Vinyl Chloride)(PVC) Plastic Pipe, Schedules 40, 80, and 120.”
  2. ASTM D 2661-89, “Specification for Acrylonitrile-Butadiene- Styrene (ABS) Plastic Drain, Waste, and Vent Pipe and Fittings.”
  3. ASTM D 2665-89a, “Specification for Poly(Vinyl Chloride)(PVC) Plastic Drain, Waste, and Vent Pipe and Fittings.”

#### **2.2 PRIMER & CEMENT**

- A. Meet requirements of ASTM D 2564-88, “Specification for Solvent Cements for Poly(Vinyl Chloride)(PVC) Plastic Pipe and Fittings.”

### **PART 3 - EXECUTION**

#### **3.1 INSTALLATION**

- A. Do not combine furnace drain piping with cooling coil drain piping.
- B. Run individual vent and individual combustion intake piping from each furnace to outdoors with location and formation recommended by Furnace Manufacturer. Slope lines downward toward furnaces.
- C. Slope combustion chamber drain downward to funnel drain. Anchor to wall with wall clamps, allowing free movement through clamp for expansion.
- D. Use vent terminal kit or clamping system provided by Furnace Manufacturer. Install vent and combustion air intake piping at clearance and distances required by Furnace Manufacturer.
- E. Attach factory-supplied neoprene coupling to furnace combustion-air inlet connection and secure with clamp.
- F. Ensure that factory-supplied perforated metal disc is installed in flexible coupling, unless its removal is required.

END OF SECTION 22 1115

## **SECTION 22 1116 – POTABLE WATER PIPING SYSTEMS**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

- A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and Section 22 05 01 apply to this Section.

#### **1.2 SUMMARY**

- A. Furnish and install potable water piping complete with necessary valves, connections, and accessories inside building and connect with outside utility lines 5 feet from building perimeter.
- B. Perform excavating and backfilling required by work of this Section.

#### **1.3 SUBMITTALS**

- A. Quality Control:
  - 1. Submit written report of sterilization test to Architect.

### **PART 2 - PRODUCTS**

#### **2.1 PIPE**

- A. Type K copper for piping underground or beneath concrete slab. 3/4 inch minimum under slabs.
- B. Type L hard drawn copper for above ground applications.

#### **2.2 FITTINGS**

- A. Wrought copper.

#### **2.3 CONNECTIONS:**

- A. Sweat copper type with 95/5 or 96/4 Tin-Antimony solder. Victaulic copper connection system with "FS" flush-seal gasket and zero-flex couplings.
- B. Joints under slabs, if allowed by local codes, shall be brazed.

#### **2.4 BALL VALVES**

- A. Use ball valves exclusively unless otherwise specified. Ball valves shall be by single manufacturer from approved list below. Valves shall be for 150 PSI SWP.
- B. Approved Manufacturers:
  - 1. Nibco-Scott T595 or S595 or equal by
  - 2. ConBraCo (Apollo)
  - 3. Crane
  - 4. Hammond
  - 5. Jenkins
  - 6. Ohio Brass
  - 7. Stockham
  - 8. Walworth

9. Watts
10. Victaulic

## 2.5 STOP & WASTE VALVES

A. Approved Manufacturers:

1. Mark II Oriseal stop & waste valve H15134 by Mueller
2. Buffalo screw type curb box H-10350 complete with lid and H-10349 enlarged base by Mueller.

## 2.6 COMBINATION PRESSURE REDUCING VALVE/STRAINER

A. Integral stainless steel strainer, or separate 'Y' strainer installed upstream of pressure reducing valve.

B. Built-in thermal expansion bypass check valve.

C. Approved Manufacturers:

1. Watts U5B or equal by
2. Cash Valve
3. Clayton Valve
4. Spencer
5. Thrush
6. Wilkins

## 2.7 DOMESTIC WATER PRESSURE REGULATOR

A. Bronze body

B. Bronze trim

C. Heat resistant seat and diaphragm

D. Built-in monel strainer with separate cleanout plug

E. Stainless steel body seat

F. Screwed ends.

G. Install with manual shutoff valve on each side and 3/4" bypass line with gate valve.

H. Provide 0-200 psi pressure gauge on each side.

I. Approved Manufacturers:

1. Cash-Acme Type E
2. or approved equal

## PART 3 - EXECUTION

### 3.1 INSTALLATION

A. Install piping under slabs without joints where possible.

B. Locate cold water lines a minimum of 6 inches from hot water line.

C. Run main water pipe and branches to all fixtures.

- D. Size piping as shown.
- E. Run piping direct and concealed from view, unless otherwise shown.
- F. Grade horizontal runs to allow for drainage.
- G. Provide sufficient drains to draw water from entire domestic water system and sections thereof where cutoffs are shown.
- H. Furnish and install complete hot and/or cold water to all fixtures as shown on drawings.
- I. Run lines parallel to each other and parallel with the lines of the building.
- J. Cut pipes accurately to required measurements and work into place without springing or forcing.
- K. Provide for expansion and contraction of piping.
- L. Paint exposed threads on underground piping one coat asphaltum varnish.

### 3.2 FIELD QUALITY CONTROL

- A. Before pipes are covered, test systems in presence of Architect at 100 psi hydrostatic pressure for two hours and show no leaks.
- B. Sterilize potable water system with solution containing 250 parts per million minimum of available chlorine. Introduce chlorinating materials into system in manner approved by Architect. Allow sterilization solution to remain for 24 hours and open and close valves and faucets several times during that time.
- C. After sterilization, flush solution from system with clean water until residual chlorine content is less than 0.2 parts per million.
- D. 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 22 1116

## **SECTION 22 1316 - SANITARY, WASTE, & VENT PIPING SYSTEMS**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

- A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and Section 22 05 00 apply to this Section.

#### **1.2 SUMMARY**

- A. Furnish and install soil, waste, and vent piping systems within building and connect with outside utility lines 5 feet out from building where applicable.
- B. Perform excavation and backfill required by work of this Section.

### **PART 2 - PRODUCTS**

#### **2.1 BURIED LINES**

- A. ABS-DWV or PVC-DWV plastic waste pipe and fittings as permitted by state and local plumbing code.

#### **2.2 ABOVE GRADE PIPING & VENT LINES**

- 1. ABS-DWV solvent weld fittings

### **PART 3 - EXECUTION**

#### **3.1 INSTALLATION**

- A. Do not caulk threaded work.
- B. Slope horizontal pipe at 1/4 in/ft.
- C. Cleanouts:
  - 1. Provide and set full size cleanouts at foot of each riser, and ends of branches from toilets, at points where a change of direction occurs, on exposed and accessible traps, at points where required to remove rust accumulation or other obstructions and as shown on plans. Set screw cap in cleanout with graphite paste. Cleanouts in walls shall be flush and covered with a chrome plated cleanout cover screwed into the cleanout plug. Cleanouts in floors shall be flush using Zurn, Josam, or Wade floor level cleanout fittings. Location of all cleanouts subject to approval of inspector.
- 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. Discharge 14 inches above roof. Join lines together in fewest practicable number before projecting above roof. Set back vent lines so they will not pierce roof near edge or valley.
- F. Use torque wrench to obtain proper tension in cinch bands when using hubless cast iron pipe. Butt ends of pipe against centering flange of coupling.

- G. Flash pipes passing through roof with 16 oz sheet copper flashing fitted snugly around pipes and caulk between flashing and pipe with flexible waterproof compound. Flashing base shall be at least 24 inches square.
  - 1. Flashing may be 4 lb per sq ft lead flashing fitted around pipes and turned down into pipe 1/2 inch with turned edge hammered against pipe wall.

### 3.2 FIELD QUALITY CONTROL

- A. Before piping is covered, conduct tests for leaks and defective work. Notify Architect prior to testing. Correct leaks and defective work. Fill waste and vent system to roof level with water, 10 feet minimum, and show no leaks for two hours.

END OF SECTION

## **SECTION 22 3420 – GAS FIRED STORAGE TYPE WATER HEATERS**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

- A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and Section 22 0501 apply to this Section.

#### **1.2 SUMMARY**

- A. Furnish and install water heater as described in Contract Documents.

### **PART 2 - PRODUCTS**

#### **2.1 MANUFACTURED UNITS**

- A. Glass lined storage tank, pressure tested and rated for 150 psi wp complete with thermostat, high limit control, gas valve, gas pressure regulator, 100% safety shut-off, and draft diverter. AGA approved.
- B. 50 Gallon - (Direct Vent Type)
  - 1. With five year tank warranty.
  - 2. Direct vent kit for through-roof applications with vent cap protector.
  - 3. Approved Manufacturers:
    - a. Mor-Flo/American
    - b. State Industries
    - c. Paragon
    - d. PVI

#### **2.2 ACCESSORIES**

- A. Anchoring Components:
  - 1. One inch by 18 ga galvanized steel straps.
  - 2. No. 10 by 2-1/2 inch screws.
- B. Thermal Expansion Absorbers:
  - 1. Bladder type for use with potable water systems.
  - 2. Acceptable Products:
    - a. Therm-X-Trol ST-12 by Amtrol.
    - b. Equal as approved by Architect before bidding. See Section 01600.

### **PART 3 - EXECUTION**

#### **3.1 INSTALLATION**

- A. Water heaters shall each have temperature-pressure relief valve sized to match heat input and set to relieve at 120 psi.
- B. Install temperature-pressure relief valve on hot water heater and pipe discharge to directly above funnel of floor drain.

### 3.2 WATER TEMPERATURE

- A. Contractor shall be responsible to verify and/or change temperature settings on water heaters supplied on this project to meet requirements of Life Safety and Health Department Codes. Any setting above 120 deg. F. shall require warning labels placed on outside of water heaters in conspicuous places indicating water temperature setting and fact that any temperature above 120 deg. F. may be a hazard.

END OF SECTION 22 3420

## **SECTION 22 4001 – PLUMBING FIXTURES**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

- A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and Section 22 0501 apply to this Section.

#### **1.2 SUMMARY**

- A. Furnish and install plumbing fixtures as described in Contract Documents.
- B. Before fixtures are ordered, the Contractor shall submit a complete list of plumbing fixtures, giving the catalog number, cut and make, for approval. Fixtures shall not be ordered until this list is approved.

### **PART 2 - PRODUCTS**

#### **2.1 GENERAL**

- A. Interior exposed pipe, valves, and fixture trim shall be chrome plated.
- B. Do not use flexible water piping.
- C. Flow Control Fittings:
  - 1. Vandal proof type and fit faucet spout of fixture used. Flow shall be controlled as required by local codes.
- D. Furnish and install the necessary plumbing fixtures in quantity as shown on plans. Provide all necessary valves, chrome plated 17 gauge or cast "P" traps, stops with risers, fittings, and accessories to make the job complete with the fixtures specified on the drawings. Exposed stops to be equal to Brasscraft with compression inlet, chrome plated nipples, cross handles,  $\frac{1}{4}$  turn ball valves and flexible risers.
- E. Fixtures shall be PROFLO, Kohler, Crane, Briggs, Eljer, American Standard, or an approved equal. Specialties shall be Zurn, Josam, MiFab, J. R. Smith, Wade, or Watts.
- F. Toilet seat manufacturers shall be Beneke, Church, Olsonite, or Bemis.
- G. Carrier and wall hydrant manufacturers shall be Smith, Zurn, Wade, Josam, or Watts.
- H. Mop sink manufacturers shall be Stern-Williams or Fiat.
- I. Stainless steel sink manufacturers shall be Elkay or Just.

### **PART 3 - EXECUTION**

#### **3.1 INSTALLATION**

- A. Install fixtures including traps and accessories with accessible stop or control valve in each hot and cold water branch supply line.
- B. Make fixture floor connections with approved brand of cast iron floor flange, soldered or caulked securely to waste pipe.

- C. Make joints between fixtures and floor flanges tight with approved fixture setting compound or gaskets.
- D. Caulk between fixtures and wall and floor with white butyl rubber non-absorbent caulking compound. Point edges.
- E. Cleanouts: Provide and set full size cleanouts at foot of each riser, and ends of branches from toilets, at points where a change of direction occurs, on exposed and accessible traps, at points where required to remove rust accumulation or other obstructions and as shown on plans. Set screw cap in cleanout with graphite paste. Location of all cleanouts subject to approval of inspector.
- F. Traps: Install "P" traps in branch lines from floor drains or where required. Traps installed in connection with threaded pipe shall be recess drainage pattern. Traps installed in connection with cast iron pipe shall be of the same quality and grade as the pipe. Traps installed in connection with fixtures shall have a seal of not less than 2" nor more than 4". Exposed traps shall be chrome plated cast brass or chrome plated 17 gauge tubular type. Provide trap primers as required by Code.

### 3.2 FIXTURE INSTALLATION

- A. Provide stop valves and 18" minimum air chambers on all water connections to fixtures. Furnish and install wall carriers for wall mounted fixtures, wood backing, where necessary, to be installed by General Contractor at the direction of this Contractor. Provide exact locations, including proper mounting heights, obtained from details on drawings and from manufacturer's specifications. Provide hudee rims for countertop installations.
- B. Interior exposed pipe, valves, and fixtures trim shall be chrome plated.
- C. Complete installation of each fixture including trap and accessories with accessible stop or control valve in each hot and cold water branch supply line. Make fixture floor connections with approved brand of cast iron floor flange, soldered or caulked securely to waste pipe. Make joint between fixture and floor flange tight with approved fixture setting compound or gaskets.
- D. Polish chrome finish at completion of project.
- E. Caulk between fixtures and wall and floor with white butyl rubber non-absorbent caulking compound. Paint all edges.
- F. Install fixtures and fittings as per local codes and manufacturer's instructions.

END OF SECTION 22 4001

## **SECTION 22 4703 – HANDICAP DRINKING WATER COOLING SYSTEM**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

- A. Drawings, General Provisions of Contract, including General and Supplementary Conditions and Section 22 05 01 apply to this Section.

#### **1.2 SUMMARY**

- A. Furnish and install handicap drinking water cooling system as described in Contract Documents.

### **PART 2 - PRODUCTS**

#### **2.1 HANDICAPPED FOUNTAIN**

- A. Vandal proof operating bar on front and both sides. 7-1/2 GPH of 50 deg F water with 90 deg F room temperature, 1/5 horsepower compressor motor, 120 V, 60 Hz, single phase. One piece stainless steel back splash and basin. Flexi-guard or chrome plated brass bubbler.
- B. Approved Manufacturers:
  - 1. Sunroc
  - 2. Halsey Taylor
  - 3. Haws
  - 4. Elkay
  - 5. Oasis

### **PART 3 - EXECUTION**

#### **3.1 INSTALLATION**

- A. Anchor bottom of fountain to wall.
- B. Top surface to be 32 inches above floor unless required otherwise by local code.
- C. Install 3/8 inch IPS union connection and Chicago No. 376 stop to building supply line.
- D. Install 1-1/4 inch IPS slip cast brass "P" trap. Install trap so it is concealed.

END OF SECTION 22 4703

END OF DIVISION