

## SECTION 220000

## PLUMBING SYSTEMS

## PART 1 - GENERAL

## 1.1 SECTION REQUIREMENTS

- A. The work includes new and/or modifying existing plumbing systems and related work. The work also includes providing roughing-in and making final plumbing connections to equipment furnished under other sections of these specifications. Provide each system complete and ready for operation. Plumbing systems including fixtures, equipment, materials, installation and workmanship shall be in accordance with the contract documents, all referenced standards, local ordinances and applicable codes.
- B. Unless otherwise specified, all materials shall be new. All items shall operate safely and without leakage, noise, vibration or hammering. All penetration of building components shall be neat, sleeved and fire-stopped.
- C. Inspect all waster lines and repair all joints that are leaking. Replace all damaged or broken drain lines.
- D. All water supply pipes, riser pipes, and distributing pipes shall be graduated as to size and shall be interconnected in such a manner that a full volume of water may be discharged into forty percent of the plumbing fixtures of any building when operated at any given time without causing loss to more than ten pounds of pressure at the plumbing fixtures which are located on the upper floor of such building for a length of time not less than sixty minutes. All in-place water lines will be checked to insure that no restrictions are present and that the water pressure is at the prescribed pressure according to local code.
- E. Repair or replace all water lines that are leaking.
- F. Shut-off valves shall be provided at each lavatory, water closet, and kitchen sink.
- G. ALL FIXTURES MUST COMPLY WITH THE WATERSENSE SPECIFICATIONS in accordance with the **NSP Green Building Practices Handbook, Section 2.1 – Indoor Water Use Reduction**. However, if brand new faucets have previously been installed in the home that do not comply, the Developer may change out the aerators to low flow upon approval by NSP Construction Management.
- H. No solder containing lead shall be used in any pipe or fixture carry potable water.
- I. Damage to structural members from drilling or notching will not be accepted.
- J. Replace the existing main sewer line from the home to the city tie-in. All work shall be done according to the plumbing code and shall be permitted and inspected accordingly. All terra-cotta and orangeburg pipe shall be replaced with PVC and a clean-out provided. All damaged cast iron pipe shall be replaced. ALL WORK IS SUBJECT TO AN OPEN DITCH INSPECTION.

K. Plumbing required for this work includes but is not necessarily limited to”

1. Domestic cold water distribution
2. Domestic water heating and distribution
3. Sanitary waste and vent piping systems
4. Plumbing fixtures and trim
5. Plumbing accessory items

**L. See NSP Green Building Practices Handbook, Section 2.1 – Indoor Water Use Reduction**

**1. Minimize and improve indoor demand for water through the use of source efficient fixtures and fittings**

- a. Lavatory faucet average flow rate must be  $\leq 2.0$  gpm.**
- b. Shower rate must be  $\leq 2.0$  gpm per stall.**
- c. Average flow rate for all toilets must be  $\leq 1.3$  gpf.**

1.2 QUALITY ASSURANCE

A. General: The work of this section shall comply with all applicable standards, codes and ordinances.

B. Standards:

1. American Society for Testing and Materials (ASTM).
  - a. D1785 & D1784, Poly Vinyl Chloride (PVC) Pipe, Schedules 40, 80 and 120.
  - b. D2466 & D2467, Poly Vinyl Chloride (PVC) Pipe Fittings, Schedule 40 & 80.
  - c. D2665, Poly Vinyl Chloride (PVC) Drain, waste, and vent pipe fittings.
  - d. D2564, Solvent Cements for Poly Vinyl Chloride (PVC) Pipe and Fittings.
  - e. D2855, Making Solvent-Cemented Joints with Poly Vinyl Chloride (PVC) Pipe and fittings.
  - f. F402, Safe Handling of Solvent Cements and Primers Used for Joining Thermoplastic Pipe Fittings.
  - g. B88, Copper Pipe Fittings.
  - h. A74-75, A888, C564, Cast Iron Soil Pipe and Fittings.
  - i. A53, Steel Pipe, Schedule 40, Hot Dip Galvanized.
  - j. D2846, Chlorinated Polyvinyl Chloride (PVC) Plastic Hot and Cold Water Distribution Systems (Copper Tube Sizes).
  - k. F441, Chlorinated Polyvinyl Chloride (PVC) Plastic Pipe, Schedules 40 & 80.
  - l. F439, Socket-Type Chlorinated Polyvinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 80.
  - m. F1412, Polypropylene chemical resistant plastic pipe.
  - n. F493, Solvent Cements or Chlorinated Poly Vinyl Chloride (CPVC) Pipe and Fittings.
  - o. ASTM A240, 300 series stainless steel.
2. Cast Iron Soil Pipe Institute (CISPI): 301-72 Hubless Cast Iron Sanitary System.
3. Plumbing and Drain Institute (PDI): WH201, Water Hammer Arrestors.
4. ANSI, LC-1 Fuel Gas Piping Systems using corrugated stainless tubing (CSST).

## C. Requirements of Regulatory Agencies:

1. 2004 Florida Building Code, Mechanical and Plumbing.
2. Code requirements and local ordinances of City and/or County having supervisory jurisdiction.

## D. Permits and Fees:

1. The Contractor shall arrange for all permits, pay all fees, charges and expenses necessary for a complete and operating system.

## 1.3 MANUFACTURERS

**A. The NSP Program Manager has obtained special program pricing from the following manufacturers, which can be purchased through the local supplier, Gorman Company of Jacksonville. Contact Ad Kellogg at 904-354-0631 for details.**

1. **Delta**
2. **Briggs**
3. **Watco**
4. **Kindred**
5. **Rheem**
6. **Alsons**

## 1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver items in manufacturer's original unopened protective packaging.
- B. Deliver materials with manufacturer's tags and labels intact.
- C. Store materials and equipment in dry, clean location
- D. Handle and store as to avoid damage
- E. Remove items delivered in broken, damaged, rusted or unlabeled conditions from project site immediately.

## PART 2 - PRODUCTS

## 2.1 PIPE

## A. General:

1. Free from defects impairing strength and durability and best commercial quality for purposes specified.
2. Structural properties sufficient to safely sustain or withstand strains to which it is normally subjected.

**B. Pipe Materials:**

1. DWV (Drain, Waste, and Vent) Piping: Fittings shall be long radius fittings, except fittings in vent piping may be short radius fittings. Minimum size piping shall be 2 inches for buried piping and 1-1/4 inches for above ground piping. Contractors option:
  - a. Below Grade: Cast Iron ASTM A74, standard, single hub coated.
  - b. Above Grade: Cast Iron, No Hub, CISPI 301/ASTM A888.
2. Domestic Water Piping (Contractors Option):
  - a. Copper meeting ASTM B88.
    - 1) Below Grade: Type K, coated with coal tar shellac.
    - 2) Above Grade: Type L.
  - b. Chlorinated Polyvinyl Chloride (PVC):
    - 1) Piping up to 1-1/4 inch shall meet ASTM D2846.
    - 2) Piping 1-1/2 inch and larger shall be Schedule 80 and meet ASTM F441 and ASTM F439.
3. Exterior Water Piping: PVC, Schedule 40, meeting ASTM D1785.

**C. Fittings and Joints:**

1. DWV Pipe:
  - a. Joints Below Grade: Hub and spigot compression gasket meeting ASTM C564.
  - b. Joints Above Grade: Cast Iron coupling with neoprene gasket and stainless steel bands meeting CISPI 310 and ASTM C564.
  - c. Fittings: Cast Iron, same as pipe.
  - d. Joints Above and Below Grade: Solvent weld meeting ASTM D2564.
2. Copper: (Contractors Option)
  - a. Joints: Solder, 95% tin, 5% antimony.
  - b. Fittings: Wrought copper.
  - c. Joints: Propress system by Viega or prior approved equal.
3. CPVC:
  - a. Joints: Solvent weld.
  - b. Fittings: CPVC, same as pipe.
4. Steel: 150# malleable iron fittings.
  - a. 2" diameter and smaller: threaded joints.
  - b. Larger than 2" diameter: welded joints.
5. CSST:

- a. Autoflare mechanical attachment fittings.
- b. Trac Pipe or equal fittings to include:
  - 1) Galvanized steel box with manifold bracket.
  - 2) Iron Poly coated manifold.
  - 3) Pressure regulator.
  - 4) Stainless steel ball valve.
  - 5) Carbon steel striker plate.
  - 6) Galvanized steel conduit.
  - 7) Excess safety flow device equal to gas breaker.

6. Dielectric Unions: Shall be used at all joints of dissimilar pipe materials.

## 2.2 INSULATION

A. Piping to insulated as follows:

- 1. 1-inch standard fiberglass.
- 2. Factory jacket and fitting covers.
- 3. Domestic Water Piping Exposed to Exterior: Nitrile rubber based elastomeric sheet insulation; Armstrong "Armaflex 2" Minimum insulation thickness shall be  $\frac{3}{4}$  inch providing a minimum value of R-4.

B. Piping to be un-insulated: Piping run-outs to fixtures (except as noted for handicap-accessible fixtures).

## 2.3 WATER SYSTEM SPECIALTIES

A. Water Hammer Arrestors: All arrestors shall conform to PDI Standard WH201 and ASSE 1010, Acceptable: Zurn Shoktrols Z-1700

**B. Washing Machine Connections: Provide and install recessed connections for washing machine at the location specified by the Developer and/or the NSP Construction Manager. These connections will include hot and cold water connections and the drain will be properly connected into the waste system per local plumbing code.**

**C. Hose Valves (Bibbs):**

- 1. Location: 1 Front, 1 Rear**
- 2. Material: Brass**
- 3. Seal penetration**

## 2.4 WATER HEATERS

**A. Provide and install a new electric or gas 40 gallon (minimum), round, double element, energy efficient water heater with drain pan per code. The water heater shall have a pressure-relief valve piped to the exterior of the structure as per the plumbing code. Wiring to the water heater shall be placed in conduit or armored cable with proper**

**fasteners. Locate the water heater as per local building codes. If gas unit, install/replace gas vent and supply line, if required.**

**B. See NSP Green Building Practices Handbook, Section 3.5 – Water Heating**

**1. Incorporate more efficient heating and cooling system**

- a. Provide insulated water heaters with a minimum value of R-7.**
- b. Insulate all exposed domestic hot water piping to a minimum value of R-4.**

**C. Gas Water Heaters:**

1. Tank: Zero inch clearance UL listed glass tank water heater with a 160 psi working pressure enclosed with foam insulation exceeding the latest requirements of ASHRAE 90.1 and the Florida Building Code.
2. Controls: Control shall be an integrated solid state temperature and ignition control device with integral diagnostics, LED fault display capability and a digital display of temperature settings.
3. Provide factory drain and ASME rated Pressure and Temperature relief valve.
4. Provide factory three year limited warranty.
5. Provide and install water heater in accordance with the manufacturer's installation instructions to include manifold kits and direct exhaust and intake air vents.

**D. Electric Water Heaters:**

1. Rheem "Fury Rheemglas Energy Miser" Electric Water Heater.
2. 50 Gallon Minimum.
3. Dual heating Elements.
4. Minimum Six (6) year warranty.
5. Brass Drain Valve

**2.5 PLUMBING FIXTURES**

**A. Kitchen:**

1. Faucet: Delta, 440-SSWE-DST
2. Sink: Kindred, DG804BX
  - a. Must be double compartment stainless steel no less than 33" x 22" x 8"**
  - b. Installation must include supply line shut-off valves, hammer arrestor, and p-trap.**
3. Waste Disposer: Kindred, KWD50

**B. Bathrooms:**

1. Faucet: Delta, 2520-A or 520-A-DST
2. Shower: Delta, T13410-H20 and R10000-HP
3. Sink: Briggs, 5509

**a. Installation must include supply line shut-off valves, hammer arrestor, pop-up, and p-trap.**

4. Toilet: Briggs, 4680 round or 4685 elongated
5. Tub: Briggs, 2504/2505
6. Bath Waste Kit: Watco, 901-LT-PVC-CP

2.6 INSPECTION

- A. Examine areas to receive piping for:
1. Defects that adversely affect execution and quality of work.
  2. Deviations beyond allowable tolerances for piping clearances.
- B. Check location of rough-in work to assure match with fixtures.
- C. Verify that electrical facilities are compatible with equipment.
- D. Start work only when conditions are satisfactory and all sections of this specification have been read and understood.

2.7 3.2 INSTALLATION

- A. Piping Layout:
1. Complete installation to present a neat, orderly appearance.
  2. Run piping parallel to walls of building unless otherwise indicated.
  3. Keep piping free from contact with building structure and all other equipment.
- B. Pipe Supports and Fasteners:
1. Hang and support as required with approved structural fasteners.
  2. Support metallic pipe with hangers and fasteners of the same material.
  3. Maximum spacing of pipe hangers shall be in accordance with Table 308.5 of the 2004 Florida Building Code – Plumbing.
- C. Piping Within Walls:
1. Anchor as required to prevent vibration or movement of any kind.
  2. Secure piping to flush valves with support system designed specifically for this purpose.
- D. Penetrations:
1. Coordinate penetrations for vents and roof drains with roof system.
  2. Do not penetrate structural members without written approval from Structural Engineer.
  3. Provide chromium plated cast brass adjustable escutcheon plates at exposed pipe penetrations through walls, partitions, ceilings or floor.
- E. Water Hammer Arrestors (Domestic Water System):

1. Install where shown or required for elimination of water hammer.
2. Air chambers are not acceptable.

F. ProPress Installation:

1. Copper press fittings shall be made in accordance with the manufacturer's installation instruction. The tubing shall be fully inserted into the fitting and the tubing marked at the shoulder of the fitting. The fitting alignment shall be checked against the mark on the tubing to assure the tubing is fully engaged (inserted) in the fitting. The joints shall be pressed using the tool approved by the manufacturer.

2.8 3.3 TESTING AND DISINFECTING

A. Testing:

1. Test prior to covering or concealing piping.
2. Perform all tests in presence of Building Official. Provide 24-hour advance notice.
3. Soil, Waste, Vent and Roof Drain System:
  - a. Temporarily plug all outlets.
  - b. Fill line with water to the roof level.
  - c. Allow to remain full for 24 hours.
4. Water System:
  - a. Test at 150 % of design pressure but not less than 100 psig.
  - b. Allow pressure to remain on line for 24 hours.
5. Repair all detectable leaks in piping systems.

B. Disinfection of Domestic Water System:

1. Disinfect domestic water system after approval of test results and piping installation by Building Official.
2. Prior to substantial completion sterilize piping system in accordance with local plumbing code requirements.
3. Deliver certification to Building Official and NSP Construction Manager.

END OF SECTION 220000