DIVISION 22 - PLUMBING

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22 05 00 Common Work Results for Plumbing

22 05 19 Meters and Gauges for Plumbing Piping

1. Pressure gauges shall have maximum readings approximately two times the expected working pressure. A gauge cock must be specified between each gauge and the main line.

22 05 23 Valves

1. Specify that valves be installed with stems horizontal or above except as required for accessibility.

2. Arrange valve handles to be easily accessible.

3. All valves shall be identified with metal tags.

4. In addition to permanent metal tags, valves that are obscured by drop ceilings, movable structures, etc. are to have their access points labeled with same nomenclature as the metal tag on drop ceiling/obscuring structure such that it is visible upon entry onto the space where the valve is located.

5. Specify that valves be installed at all locations requiring shut off during maintenance.

6. Require that hose bibcocks shall include an escutcheon plate for freeze protection.

7. All hose bibcocks, including wall hydrants and sill cocks shall be equipped with a vacuum breaker as per instructions from the S.C. Department of Health and Environmental Control (DHEC).

22 05 23 Hangers and Supports for Plumbing Piping and Equipment

1. Specify that wall clamps and brackets used for support of piping and equipment from concrete or solid masonry shall be secured will self-drilling concrete fasteners.

2. Clamps and brackets on hollow masonry block construction shall be supported with toggle bolts.

3. Specify that horizontal, parallel, and adjacent piping shall be supported by gang hangers with appropriately sized hanger rods no smaller than 3/8” and clamps to match the pipe.

4. Specify that hangers supporting insulated piping be sized to fit over the insulation and have an integral pipe saddle to prevent damage to insulation.

5. Specify that piping support for supply lines serving toilets and urinals be supported by strapping or bracketry integral to the wall and directly behind the fixture.

6. Specify that supports and clamps in contact with copper pipe shall be copper plated.

22 05 48 Vibration and Seismic Controls for Plumbing, Piping and Equipment

1. Shock absorbers for plumbing fixtures up to 1" pipe size shall be the same size as the line on which they are installed.

2. Pipes larger than 1" shall have 1" shock absorbers installed.

3. Shock absorbers must be installed at the end of all branch lines.

4. No pipe extensions are to be used in place of shock absorbers.

22 05 53 Identification for Plumbing, Piping and Equipment

1. Specify that all piping is to be marked and coded with color coded tape in accordance with Section 33 05 97, in a neat and uniform manner.

2. Markings shall not exceed 20 feet apart in mechanical rooms.

3. The wording and color coding shall be coordinated with other mechanical, electrical, and other trades and suppliers.

22 05 76 Facility Drainage Piping Cleanouts

1. The design shall include all necessary clean-outs for efficient maintenance of the waste piping system for the facility. Clean-outs located in exposed areas of the facility shall be equipped with a chrome plated cover plate terminated just inside finished walls.

2. Provide clean-outs in each exposed P-Trap not integral with the fixture.

3. Cleanouts shall be the same nominal size of the pipe for sizes 4" and smaller and 4" nominal size for larger pipe.

4. Cleanouts shall be installed at the base of all stacks, not more than 50 horizontal feet apart, at every change of direction greater than 45 degrees, and be accessible with at least 12 inches of clearance to facilitate maintenance.

5. Specify that cleanouts for sanitary sewer lines serving individual buildings be made using two 45 degree Y-fittings joined in opposing directions so that equipment can service either the building or the public utility without making a 90 degree turn within one fitting.

6. Housing Facilities: Independent or double cleanout for servicing building sewer connection shall be located within 5' of foundation/footing.

22 07 00 Plumbing Insulation

1. New insulation systems must conform to the International Energy Conservation Code as adopted by Chapter 5 of OSE Manual, but in no case carry a lesser rating than applicable listed materials in Products and Materials section of this division.

2. Additions, Alterations, and Repairs will extend insulation the full length of the project scope following the same requirements as new construction.

3. All insulation systems must have composite Fire and Smoke Hazard ratings as tested under procedure ASTM E-84, NFPA 225 and UL 723 not exceeding a Flame Spread of 25 and a Smoke Development of 5.

4. All pipe insulation must be continuous through walls, partitions, ceiling openings and sleeves. Where pipes pass through fire-rated floors, walls, or partitions, the use of a UL approved system for through penetrations is required. The annular space around the pipes must be packed with mineral wool and sealed at each exposed edge to maintain the rating of the system.

5. Insulation on all cold surfaces must be applied with a continuous, unbroken vapor seal.

6. Specify that hangers supporting insulated piping be sized to fit over the insulation or if anchors are secured directly to cold surfaces they must be adequately insulated, and vapor sealed to prevent condensation.

22 11 00 Facility Water Distribution

22 11 13 Piping

1. Specify that the domestic water supply to the building be installed in accordance with University Facilities' Fire Suppression and Domestic Riser Schematic.

2. Regulations contained in the Safe Drinking Water Act concerning lead and copper concentrations shall be complied with in the selection of piping materials.

3. Specify that all piping be neatly arranged, running parallel with primary lines of building construction, and that right-of-way must be given to piping that requires gravity sloping for drainage. All domestic water piping shall be sloped for drain down. All changes in pipe direction shall be made with appropriate fittings.

4. Approved connections between piping of dissimilar metals shall be dielectric fittings such as a union, nipple or flange.

5. Where possible, all water piping shall be located in heated areas of the facility.

6. All domestic water supplies that require backflow prevention shall be installed in accordance with Fire Suppression and Domestic Riser Schematic and mounted horizontally as to minimize repair time and shall have isolation valves integral to or before and after each backflow preventer to negate the need to shut off water to an entire facility during service or repair.

7. Overhead piping shall be located below ceiling insulation to prevent freezing.

8. Water, soil, or waste piping is not permitted on exposed parts of the building.

9. No pressure piping is allowed beneath the building slab unless associated with fire suppression systems.

10. Utility piping entering the facility from underground must always do so through a utility trench or areaway as to remain serviceable.

11. Specify that unions or flanges be provided at all connections to each piece of equipment and on both sides of valves and other in-line devices that require removal for maintenance. Specify that cast bronze adaptors be used at all copper to flanged or IPS connections.

12. Specify that piping passing through or under corrosive fill be protected by appropriate coatings, wrapping, or galvanized sleeves. Sleeves shall be at least two pipe sizes larger than the pipe plus insulation.

13. Require all rough-in plumbing to be sealed off with test plugs, caps, etc., until fixtures are ready to be installed.

14. Specify that all openings between pipes and pipe sleeves shall be sealed with approved firestopping materials or systems at fire walls and where required to inhibit noise transmission.

22 13 00 Facility Sanitary Sewerage

22 13 16 Piping

1. Specify that all piping be neatly arranged, running parallel with primary lines of building construction, and that right-of-way must be given to piping that requires gravity sloping for drainage. All changes in pipe direction shall be made with appropriate fittings.

2. Approved connections between piping of dissimilar metals shall be dielectric fittings such as a union, nipple or flange.

3. Specify that traps be installed for each fixture and floor drain, with access to the traps on upper floors.

4. Require all rough-in plumbing to be sealed off with test plugs, caps, etc., until fixtures are ready to be installed.

5. Specify that all openings between pipes and pipe sleeves shall be sealed with a flexible fire-retardant sealant at fire walls and where required to inhibit noise transmission.

6. Utility piping entering the facility from underground must always do so through a utility trench or areaway as to remain serviceable.

7. Specify that there shall be no visible penetrations to the exterior envelope of building

8. Specify that cleanouts for sanitary sewer lines serving individual buildings be made using two 45 degree Y-fittings joined in opposing directions so that equipment can service either the building or the public utility without making a 90 degree turn within

one fitting.

22 13 19 Sanitary Waste Piping Specialties

1. Floor drains shall be provided where required by the activity within the area.
2. Provide floor drains in all public rest rooms. Floor drains can be omitted in private restrooms such as those attached to individual offices with permission.
3. Provide floor drains for all emergency showers.
4. All floor drains shall connect to sanitary sewer.
5. Floor drains shall be acid resisting, with grate and openings to restrict small foreign matter like gravel, peanut hulls, etc.
6. Floor drain bodies shall be tapped for and have trap primers installed.
7. Provide Petro Plugs for Mechanical Room floor drains when equipment with petroleum fuel and lubricants are present.

22 14 00 Facility Storm Drainage

22 14 26 Facility Storm Drains

1. All storm drains that do not connect to a central storm sewer system shall not discharge onto any public way or accessible route.

22 30 00 Fuel-Fired Domestic Water Heaters

22 33 13 Tankless Gas Domestic Water Heaters

1. All gas fired condensing tankless water heaters shall have condensate lines that discharge into sanitary sewer system via an acid neutralizing tank that maintains the pH of discharge between 6.0 and 8.5.
2. All condensate piping between the heater and neutralizing tank shall be at a minimum, schedule 40 PVC or CPVC.

22 40 00 Plumbing Fixtures

22 42 13 Commercial Water Closets, Urinals, and Bidets

1. Specify that water closets and urinals are to be wall hung with plumbing chase of 30” min. clear width and having an access doorway as specified in Section 08 10 00.
    - Water closets in building not cleaned or maintained by Facilities Maintenance and Custodial departments, single occupancy, and apartment style residential restrooms may be floor mounted and can be exempt from this requirement.

2. Water closets shall have flush valve, vacuum breaker, top spud, elongated, vitreous china bowl, and a white, open front seat. Seat heights and mounting locations on all water closets must comply with the most recent edition of ICC A117.1.

    - Water closets and seats used in apartment style, residential units may use a tank type residential design with a closed front seat.

3. Urinals shall have flush valve, vacuum breaker, top spud, and be made of vitreous china. All mounting locations of urinals must comply with the most recent edition of ICC A117.1.

4. Waterless fixtures are not allowed.

5. All fixtures shall be WaterSense complaint.

22 42 16 Commercial Lavatories and Sinks

1. Any wall hung lavatory must be either vitreous china or enameled cast iron, with 4" faucet centers, 3/8" angle supplies with stops and equipped with a 1-1/4" min. P-trap. Countertop lavatories shall be equipped like wall hung lavatories.

2. Laboratory sinks shall have 8" faucet centers and vacuum breakers

3. All floor mounted mop basins shall be constructed of either stainless steel or Terrazzo with stainless steel edge caps.

22 42 23 Commercial Showers

1. All Accessible showers in new construction shall be a roll-in design with seat (36"x60"') as defined by the most current version of ICC A117.1

2. Accessible showers installed in existing buildings can be a standard transfer type with seat (36"x36") if it is technically infeasible to install a roll-in shower. This must be approved through a deviation request as referenced in the preamble of this document.

3. All fixtures shall be WaterSense compliant.

22 42 39 Commercial Faucets

4. Use remote sensor lavatory faucets with maximum continuous flow rate of ½ gallon per minute and a maximum metered flow rate of ¼ gallon per 10 seconds.

5. All fixtures shall be WaterSense compliant.

22 45 00 Emergency Plumbing Fixtures

1. Emergency showers and eyewash stations will be placed in locations dictated by applicable OSHA 29 CFR 1910.151C and installed in accordance with ANSI/ISEA Z358.1-2014.

2. All showers and eyewashes in locations meant for use by people other than custodial and service personnel shall be in accordance with Clemson's Accessible Eyewash and Shower Standards.

22 47 00 Drinking Fountains and Water Coolers

1. Specify one bottle filling station/fountain combination unit. Install such that fountain meets with all applicable requirements of ICC A117.1.
2. Install vandal resistant water fountains in all housing and residential facilities on Clemson's main campus.

22 63 00 Gas Systems for Laboratory and Healthcare Facilities

22 63 19 Laboratory Gas Storage Tanks

1. Buildings with laboratories shall have areas for handling the delivery and return of gas storage tanks (bottles).

2. Specify separate empty and full container holding areas including chain restraints per applicable codes.

PRODUCTS AND MATERIALS-DIVISION 22 – PLUMBING

Back Flow Preventer

- Domestic Water: Watts, Apollo or approved equal reduced pressure zone models that include service/isolation shutoffs before and after preventer. (Include protected test bypass and complete rubber parts repair kit)
- Fire Protection: Ames double check valve models that include service/isolation shutoffs before and after preventer. (Include protected test bypass and complete rubber parts repair kit)

Carriers

- Water Closets and Urinals: JR Smith, Josam, or approved equal

Clean-outs

- JR Smith
- Zurn
- Josam
- Wade

Domestic Water Heaters

- Steam: Leslie Constant Temp or approved equal
- Gas: Rheem or approved equal - Non-condensing preferred.
- Electric: Marathon Commercial or approved equal metal free where demand factor and fixture unit values allow
- Tankless/Instant: Rinnai, AO Smith, Takagi, Noritz, Peerless
- Acid Neutralizers for Condensing Tankless: Follow manufacturer recommendation. If no recommendation is given, use limestone chip style.

Domestic Water Piping

- 1" thru 3" Metal Piping: Copper Type L
- Greater than 3" Metal Piping: Carbon steel, Schedule 40 or Copper Type L
- PEX Piping: Type A and Type B
- Polypropylene piping systems are not to be used.

Drinking Fountains

- Elkay LZS8WSK or approved equal
- Elkay LVRC8WSK or approved equal (Vandal Resistant)

Emergency Shower, Eyewash, Facewash, and Combination Units

- Haws Axion or approved equal
- Encon Model #01050216 combination eye and safety shower, and universal

emergency sign or approved equal

Fittings for Domestic Water Piping

- Copper: Solder Jointed wrought copper conforming to ANSI B16.22, Viega ProPress compression fittings ½" – 4", Grooved Victualic fittings greater than 4".
- Carbon Steel: Welded, Threaded, Flanged, Viega MegaPress.
- PEX Type A: Uponor or approved equal
- PEX Type B: Viega PureFlow or approved equal

Flush Valves

- Manual for all Locations: Sloan Regal 110XL or approved equal
- Automatic for University Facilities: Sloan Regal 100XL with EBV500A Sensor/Actuator or approved equal
- Automatic for Housing Facilities: Toto TET1GA32#CP or approved equal
- In-Tank Valve: FluidMaster Pro 45 or approved equal

Hangers and Support Devices

- Grinnell, Unistrut, Fee & Mason, Elcene, Kindorf, Mueller, Auto-Grip

Hose Bibcocks

- Interior: Woodford Manufacturing with wheel handle that fits standard garden hose or approved equal.
- Exterior: Woodford Manufacturing that is freeze-proof, tee key actuated and fits standard garden hose or approved equal.

Insulation

- Domestic Hot Water Piping: 1" fiberglass
- Domestic Cold Water Piping: ½" fiberglass
- Soil and Waste Lines (above ceiling): ½" fiberglass or 1" foamed plastic

Residential Kitchen Faucets

- Moen Chateau Single Handle Models 7423 and 7437 or approved equal

Lavatory Faucets

- Residential Facilities: Manually operated Moen Commercial M-Bition Single Handle Models 8432 and 8434 or approved equal
- All Other Locations: Touchless and WaterSense Complaint T & S 5Ef-1D-DS or Sloan Optima ETF-80 or approved equal

Mop Basins

- Floor Mounted Placement Along Wall: ACORN Terrazzo-Ware TDF-32- SSC or dimensional equivalent in stainless steel with 48" backsplash or approved equal.

- Floor Mounted Corner Placement: ACORN Terrazzo-Ware TCR-28- SSC or dimensional equivalent in stainless steel with 48” backsplash or approved equal.
- Mop Basin Faucet: T&S B-0665-BSTR or approved equal.

Nipples

- Brass when used with copper piping
- Dielectric: Galvanized Steel

Pressure Gauges

- Ashcroft, Dwyer, or approved equal

Service Sinks

- Kohler Model K-6718 or approved equal, with T&S Model B-0674-BSTR or approved equal

Shock Absorbers

- Josam 1480/1481, Watts or Zurn with shut off valve

Shower Valves and Trim

- Kohler Coralais, Moen, or approved equal
- Housing Facilities: Moen Posi-Temp Mixing Valve Model 62370(CC) with Moen Chateau Posi-Temp Trim Kit TL181, TL182 or TL183 or approved equal

Shower Heads

- WaterSense Compliant

Strainers

- Watts or approved equal

Wall Mounted Toilets

- Flushometer Equipped: American Standard 2257.101, Kohler with top spud, TOTO with top spud or approved equal

Floor Mounted Toilets

- Tank Toilet: American Standard 215CA.104 or approved equal
- Flushometer Equipped: American Standard 2234.001 or approved equal

Toilet Seats

- Benis, Beneke, Sperzel Open front type.
- Residential apartment style may use closed front models.

Trim

- Kohler, Chicago Faucet, T & S Brass, Crane, Eljer, American Standard

Unions

- Copper to Steel: Insulating dielectric nipple and union with ball valve
- Copper to Copper: 200 lbs. SWP, brass ground joint
- Steel to Steel: 250 lbs. SWP, malleable iron with brass iron seat

Vacuum Breakers

- Domestic Water: Watts or approved equal
- Fire protection: Ames or approved equal

Valves

- 2" or Less: 150 # minimum Ball valves with replaceable packing full port with stem extensions for insulation installations
- 2-1/2" or Larger: 150# bronze flanged full port with packing gland and rising stem and flanged connections.

Chemical Drains

- Blue Orion or approved equal
- Spears or approved equal

Waste & Vent Piping

- Above slab: PVC, Schedule 40, cast iron or copper
- Below slab: PVC Schedule 40 or ductile iron - depending on location and use
- No hub couplings: 4 band stainless steel. Husky, Clamp-all, or equivalent. No "Fernco" all rubber fittings.

Deionized and Reverse Osmosis Water Piping

- Niron or approved equal

Water Meters

- Octave Ultrasonic Master Meter or approved equal capable of connecting with current campus-wide Building Automation System.