

DIVISION 22 – PLUMBING

FORMAT

1. Technical specifications content and numbering system shall be based on 2004 CSI MasterFormat.

BASIS OF DESIGN

1. BGSU Design standards shall not replace fully developed, project and market specific technical specification. Associate shall utilize the Standards as a minimum standard to guide the design and execution in the field. Exceptions to these standards are allowed provided they are approved by Design & Construction.
2. In instances where fewer than 3 manufacturers are indicated, the Associate shall insert “or approved equal” in the Products section of the technical specifications.
3. All submitted substitute products shall be brought to the attention of Design & Construction, prior to approval.

RELATED SECTION

099600—Problem Areas, Miscellaneous Conditions (Painting)

GENERAL PROVISIONS

1. Access Panels
 - a. Provide access panels for valves, filters, dampers, equipment, etc., installed above an inaccessible ceiling such as plaster or concealed spline.
2. Plumbing Identification
 - a. Provide labels to identify all control panels, disconnects, motor control centers as well as equipment served therefrom.
 - b. All piping shall be identified by stencil or label indicating service and direction of flow. Color code piping system as follows:
3. Utility Metering
 - a. Provide full metering of all services to each building supplied from the central system. Where buildings have food service-separate meters are required.
4. Housekeeping Pads
 - a. All floor mounted equipment shall be set on 4” housekeeping concrete pads.
5. Support & Anchors
 - a. Piping
 - i. Attached to structural members by beam clamps bearing on both sides.
 - ii. Do not weld.
 - iii. Attaching to bar joists, attach at the panel points only.
 - iv. Attach to concrete decking using expansion bolts or concrete anchors.

- v. Wrought iron clevis type, Grinnell No. 260. Copper-plated plastic-coated hangers, Grinnell Fig. CT-99C.
- b. Insulated pipe
- c. provide oversized hangers to fit on the outside of the pipe saddles and shields.
- d. Condensate and Steam Piping Over 2"
 - i. Provide pipe covering protection saddles, similar to Grinnell Figure 160.

220553 – MECHANICAL IDENTIFICATION

1. General
 - a. Section Includes
 - i. Nameplates
 - ii. Tags
 - iii. Stencils
 - iv. Pipe Markers
2. Nameplates
 - a. Description: Laminated three-layer plastic with engraved letters.
 - i. Letter Color White
 - ii. Letter Height ¼ inch (6mm)
 - iii. Background Color Black
3. Tags
 - a. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1½ inch (40 mm) diameter
 - b. Metal Tags: Brass with stamped letters; tag size minimum 1½" (40 mm) diameter with smooth edges.
 - c. Chart: Typewritten letter size list in anodized aluminum frame.
4. Pipe Markers
 - a. Color: Conform to ASME A13.1.
 - b. Plastic Pipe Markers: Factory fabricated, flexible, semi- rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.
 - c. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.
 - d. Underground Plastic Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches (150 mm) wide by 4 mil (0.10 mm) thick, manufactured for direct burial service.
5. Ceiling Tacks
 - a. Description: Steel with 3/4 inch (20 mm) diameter color coded head.
 - i. Color code as follows:
 - ii. Yellow - HVAC equipment
 - iii. Red - Fire dampers/smoke dampers
 - iv. Green - Plumbing valves

- v. Blue - Heating/cooling valves
6. Installation
- a. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
 - b. Install tags with corrosion resistant chain.
 - c. Apply stencil painting in accordance with Section 09900.
 - d. Install plastic pipe markers in accordance with manufacturer's instructions.
 - e. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.
 - f. Install underground plastic pipe markers 6 to 8 inches (150 to 200 mm) below finished grade, directly above buried pipe.
 - g. Identify air handling units, pumps, heat transfer equipment, tanks, and water treatment devices with stencil painting or plastic nameplates. Small devices, such as in-line pumps, may be identified with tags.
 - h. Identify control panels and major control components outside panels with plastic nameplates.
 - i. Identify thermostats relating to terminal boxes or valves with nameplates.
 - j. Identify valves in main and branch piping with tags.
 - k. Identify air terminal units and radiator valves with numbered tags.
 - l. Tag automatic controls, instruments, and relays. Key to control schematic.
 - m. Identify piping, concealed or exposed, with plastic tape pipe markers, stenciled painting or plastic pipe markers. Use tags on piping 3/4 inch (20 mm) diameter and smaller. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet (6 m) on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.
 - n. Identify ductwork with stenciled painting or plastic nameplates. Identify with air handling unit identification number and area served. Locate identification at air handling unit, at each side of penetration of structure or enclosure, and at each obstruction.
 - o. Provide ceiling tacks to locate valves or dampers above T-bar type panel ceilings. Locate in corner of panel closest to equipment.

220719 – PLUMBING PIPING INSULATION

1. Composite assembly shall have a flame spread rating not over 25 and a smoke developed rating not higher than 50.
2. Piping Insulation – Above Ground, Mineral Fiber or Cellular Glass. All service jacket with self-sealing lap adhesive. Thermal conductivity(k) shall not exceed 0.24 BTUH square foot F°/inch.

3. Pipe fittings shall be covered with insulating cement or preformed insulating fitting cover. All exposed piping insulation shall be covered with a plastic jacket.
4. Only materials meeting the 25/50 flame spread and smoke developed ratings are allowable in air ducts, air chases or air plenums.
5. All lavatories with exposed P-trap, hot and cold water angle stops and supplies shall be insulated.
6. Plumbing Piping Insulation Thickness
 - a. Service:

	PIPE SIZE				
	As Noted	≤1"	1¼"-2"	2½"-4"	>4"
Domestic Hot Water (without heating cable) Above and Below Floor	----	½"	1"	1"	1½"
Domestic Hot Water Recirculating Above and Below Floor	----	½"	1"	1"	1½"
Domestic Hot Water (with heating cable)	----	1"	1½"	2"	2"
Domestic Hot Water Storage Tank	2½"	----	----	----	----
Domestic Cold Water Above and Below Floor	----	½"	½"	1"	1"
Storm Drainage, All Horizontal, Including Piping Up to 45° Angle and Roof Drain Sumps	1"	----	----	----	----
Floor Drain Sump Including Trap and 10'-0" of Horizontal Runouts. (Receiving Condensate from A.C. Units)	1"	----	----	----	----
Condensate Drain from A.C. Units	½"	----	----	----	----
Trap Primer Lines Above and Below Floor	½"	----	----	----	----

221005 – PLUMBING PIPING**1. Schedule of Valves – (Plumbing):**

GENERAL SERVICE	TYPE	MIN.VALVE RATING SWP (PSI)	ENDS	BODY	TRIM
Copper Piping ≥2½" Ø (Good for 250° Service) <i>*Use copper flanges with dielectric bolt sets</i>	Globe	125	Flanged	C.I.	Bronze
	Ball	125	Flanged	C.I.	Bronze
	Check	125	Flanged	Bronze	Teflon
	Butterfly	125	Flanged	C.I.	Bronze
	Balance	150	Tapped	C.I.	EPDM
		125	Lug	Semi-Steel	Liner
			Flanged		-----
Copper Piping ≤2" Ø (Good for 250° Service)	Globe	125	Screwed	Bronze	Bronze
	Check	125	Screwed	Bronze	Bronze
	Balance	125	Screwed	Bronze	Teflon
	Ball	125	Screwed	Bronze	Teflon
Site Water Distribution Copper Piping ≤2" Ø	Plug	125	Soldered	Bronze	Bronze
Site Water Distribution Cast Iron ≥2½" Ø	Gate	125	Varies	C.I.	Bronze
Natural Gas ≤2" Ø	Ball	125	Screwed	Bronze	Teflon
	Plug	125	Screwed	Semi-Steel	-----
Natural Gas ≥2½" Ø	Plug	125	Flanged	Semi-Steel	-----
Sanitary Lift Pump Discharge and Clearwater Lift Pump Discharge	Check	125	Screwed	Bronze	Bronze
	Lug Type	125	Screwed	Bronze	Bronze
	Butterfly	125	Flanged	C.I.	Bronze
	Check	125	Flanged	C.I.	Bronze

- a. All valves shall be of one manufacturer for each type of valve.
- b. Valves shall be installed on supply and return piping at all equipment for isolation and/or removal and also at all sinks in Residence Halls. Ball or butterfly valves depending on size shall be used.
- c. Provide drain valves at air handling unit coils for draining, locate between isolation valve and coil.

2. Plumbing Piping

SERVICE	CONDITIONS	MATERIALS
Sanitary Waste	Exterior of Building Underground	PVC ASTM D-3034 SDR 35,
		Nonreinforced Extra Strength "O" Ring Concrete Pipe
		Reinforced "O" Ring Concrete Pipe
Sanitary Waste	Inside Building Underground $\leq 10"$ \emptyset	Asphalt-coated, Service Weight Cast Iron
		PVC Schedule 40 DWV ASTM D-2665
		Reinforced "O" Ring Concrete Pipe ASTM 706.2 C-76, Class V
Storm	Exterior of Building Underground	Nonreinforced Extra Strength "O" Ring Concrete Pipe
		Reinforced "O" Ring Concrete Pipe
		PVC ASTM D-3034 SDR 35,
Storm	Inside Building Underground $\leq 15"$ \emptyset	Asphalt-coated Service Weight Cast Iron
		PVC Schedule 40 DWV ASTM D-2665
		Reinforced "O" Ring Concrete Pipe
Storm	Inside Building Aboveground	Asphalt-coated Service Weight
		Schedule 40 ASTM A-53 Galvanized Steel
Sanitary Waste & Vent	Inside Building Aboveground	Asphalt-coated Service Weight Cast Iron
		Schedule 40 ASTM A-53 Galvanized Steel
Domestic Water	Exterior of Building Underground $\geq 4"$ \emptyset	Cement Lined Ductile Cast Iron Class 52
	$\leq 3"$ \emptyset	Soft Copper Tube
Domestic Water	Inside Building	Type "K" Soft Copper Tube
Domestic Water	Inside Building Above Floor $\geq 4"$ \emptyset	Type "L" Copper Hard Temper
		Schedule 40 ASTM A-53
		Cement Lined Ductile Cast Iron Class 52
Relief Valve Discharge Domestic Water	----	Type "L" Copper
Natural Gas	Exterior of Building Underground	Schedule 40 Black Steel
		ASTM A-53 Coated and Wrapped X-Tru-Coat Polyethylene ASTM D-2513 with Tracer Line
Natural Gas	Inside Building Aboveground $\leq 2"$ \emptyset	Schedule 40 Black Steel ASTM A-53

- a. No water, steam, condensate, or air piping shall be installed in exterior walls without insulation. This condition should be avoided wherever possible.
- b. Sanitary Piping – Avoid the use of cross tees for all branch line. Y fittings are preferred for cleanout purposes. No tees in lavatory drain piping. Piping in multistory buildings must be cast iron. Piping in and downstream of Kitchens and Mechanical Rooms must be cast iron and all PVC connections to this line must include 3'-0" of cast iron at the connection fitting. No hub bands on cast iron pipe shall be "heavy duty" type.
- c. Vent Piping – PVC is acceptable in non-plenum areas.
- d. Vent System – Air admittance valves are to be avoided if possible.
- e. Buried or under floor services shall be avoided wherever possible. When not avoidable, these services shall be coordinated with other trades and dimensionally located and noted so other service shall be installed over such services.
- f. Cleanouts in sanitary systems shall be located internal to toilet chases if accessible or in chase walls if there is not access. Cleanouts shall not be located in main communication areas.

221006 - PLUMBING SPECIALTIES

1. Floor Drain - FD
 - a. Cast iron body, 6" diameter type B nickel bronze strainer, adjustable height and 1/2" trap primer connection.
 - b. Cast iron body, 9" square medium grate, sediment bucket.
 - c. Cast iron body, 12" square heavy duty grate, and sediment bucket.
2. Roof Drain – RD
 - a. Cast iron body, receiver, extension for roof insulation, underdeck clamp and ply come.
3. Wall Hydrant – WH
 - a. Wall hydrant, wall type, freezeproof with vacuum breaker.
 - b. Provide at intervals not to exceed 75 feet between hydrants.

223000 – PLUMBING EQUIPMENT

1. Simplex Clear Water Lift Station
 - a. Pump to be complete with built-in capacitor and starting switch, #303 Stainless Steel shaft, ball bearings, mechanical seal and strainer.
 - b. NEMA alarm panel including cable, float, alarm light and alarm horn with silencing switch. A separate 115 volt power source shall be furnished for this alarm panel.
 - c. Control system with control box, two float switches with cable and a heavy duty contactor.
 - d. Clear water sump shall be cast iron with tapped flanged or precast reinforced concrete or high strength plastic fiberglass reinforced.

- e. Pump shall be screenless non-clog submersible sewage lift pump. NEMA 6 air filled submersible type having cast iron shell with special fin cooling to permit continuous operation while running dry. Pump shall have an oil filled seal chamber with two (2) mechanical seals.
 - f. Control system shall include sealed mercury switches in a polypropylene float set at the NEMA 1, simplex control panel, one (1) fusible disconnect switch, one (1) magnetic starter one (1) overload reset button, one (1) running light for pump motor, one (1) control circuit transformer, one (1) Test-Off-Automatic selector switch, alarm light and alarm horn with silencing switch.
 - g. Clear water sump shall be cast iron with tapped flanged or precast reinforced concrete, high strength plastic fiberglass reinforced.
2. Sanitary Waste Equipment
- a. Kitchen Grease Interceptor
 - i. Exterior Interceptor; Prefabricated concrete reinforced tank, minimum 3" thick of 4500 psi reinforced concrete with 6" x 6" ten gauge mesh.
 - ii. Interior Interceptor: Acid resisting epoxy coated interior and exterior grease trap, internal air relief by-pass, bronze cleanout plug, visible double wall trap seal, gas and watertight gasketed non-skid cover.
3. Simplex Sanitary Lift Station (Clear Water Only)
- a. Pump to be complete with built-in capacitor and starting switch, #303 Stainless Steel shaft, ball bearings, mechanical seal and strainer.
 - b. NEMA 1 alarm panel including cable, float, alarm light and alarm horn with silencing switch.
 - c. Control system with control box, two float switches with cable and a heavy duty contactor.
 - d. Sanitary sump shall be cast iron with tapped flange or precast reinforced concrete or high strength plastic fiberglass reinforced supply gasketed fittings to seal gas-tight all pipes, wires, etc. that penetrate the sump cover.
4. Simplex Sanitary Lift Station
- a. Heavy duty screenless non-clog submersible sewage lift pumps. NEMA 6 air filled submersible type having cast iron shell with special fin cooling to permit continuous operation while running dry, oil filled seal chamber with two (2) mechanical seals, capable of passing 2" solids.
 - b. Control system shall include sealed mercury switches in a polypropylene float set, NEMA 1 simplex control panel, one (1) fusible disconnect switch, one (1) magnetic starter, one (1) overload reset button, one (1) running light for pump motor, one (1) control circuit transformer, one (1) Test-Off-Automatic selector switch, alarm light mounted on the panel door and a NEMA 1 alarm panel.

- c. Sump shall be cast iron with tapped flange or precast reinforced concrete or high strength plastic fiberglass reinforced, supply gasketed fittings to seal gas-tight all pipes.
- 5. Domestic Hot Water Heating
 - a. Domestic hot water system temperature shall be set to maintain 120°F.
 - b. Steam water heaters shall be Paterson Kelly Compact or Leslie.
 - c. The domestic hot water system shall use a re-circulation pump to keep the mains warm at all times. The use of heating cable is not acceptable.

224000 - PLUMBING FIXTURES

- 1. General
 - a. All plumbing fixtures shall be of one manufacturer insofar as possible and white in color. Toilets shall have black seats. See Schedule.
 - b. Set floor sinks in leveling bed of cement grout.
 - c. Install removable key stop valve in an accessible location in each water supply to each fixture.
 - d. Install escutcheons at each wall, floor and ceiling penetration in exposed finished locations and within cabinets and millwork.
 - e. Seal fixtures to walls, floors and counters using a sanitary-type, one-part, mildew-resistant, silicone sealant with sealant.
 - f. Only faucets with separate cold and hot water handles shall be specified for lavatories, No automatic metering faucets shall be specified.
 - g. Drains for hand lavatories shall be grid type only.
 - h. Shower drain traps shall be 4" diameter only, no exceptions. Shower drain shall be Zurn.
 - i. Lavatory drains shall be separately piped to main horizontal branches only. Combining two or more lavatories to one drop to main is not allowed.
 - j. All lavatories and sink traps shall have cleanouts in bottom of trap.
 - k. Only Sloan or Zurn flush valves shall be specified.
- 2. Approved Manufacturers
 - a. Manufacturers: Subject to compliance with requirements, provide products in each category, by one of the following listed for that category:

Water Closets Urinals Lavatories Service Sinks	<ul style="list-style-type: none"> • Kohler • American Standard • Crane • Eljer
Electric Water Coolers Drinking Fountains	<ul style="list-style-type: none"> • Oasis • Elkay • Halsey Taylor • Haws

Janitor's Floor Sinks	<ul style="list-style-type: none"> • Fiat Products • Creative Industries • Stern Williams • Mustee
Elevated Utility Sinks	<ul style="list-style-type: none"> • Fiat • Mustee
Stainless Steel Sinks	<ul style="list-style-type: none"> • Elkay • Just • Belvedere • Shower Mixing Valves (Pressure Balance): • Speakman or approved equal
	<ul style="list-style-type: none"> •
Shower Stalls	<ul style="list-style-type: none"> • Aquarius • Fiat Products • Lasco
Emergency Safety Showers Emergency Eye/Face Wash	<ul style="list-style-type: none"> • Speakman • Bradley • Guardian • Haws
Flush Valves	<ul style="list-style-type: none"> • Sloan • Zurn
Toilet Seats	<ul style="list-style-type: none"> • Olsonite • Church • Beneke • Sperzel
Carriers or Supports	<ul style="list-style-type: none"> • Zurn • Wade • Josam • Smith
Faucets	<ul style="list-style-type: none"> • Speakman Model 3073-LD with 2 handles and no pop-up or equal
Miscellaneous Trim (Traps, Supplies, Strainers)	<ul style="list-style-type: none"> • Dearborn Brass • Brass Craft • Chicago • Kohler • McGuire • American Standard • Royal Brass • McGuire T & S Brass
Drain and Supplies Insulation Kits	<ul style="list-style-type: none"> • True-Bro • Skal-Gard

3. Fixture model numbers:

Water Closets	<ul style="list-style-type: none"> • Kohler K-4330 (wall hung, flush valve) • Flush Valve: Sloan Regal 111-XL-C, 11 1/2" high, 1.6 gallons per flush, roughin on the left with flush handle towards the right. • Toilet Seat: Black Olsonite 95-CC-SS, commercial, heavy duty solid plastic, elongated, open front without cover, self-sustaining check hinges. • Carrier: Zurn Z-1203 or Z-1204
Urinal Data	<ul style="list-style-type: none"> • Urinal, UR-1: Kohler K-4972 (wall hung, flush valve) • Flush Valve: Sloan Regal 180-XL-1, 11-1/2" high, 1 gallon per flush, 1-1/4" top spud • Carrier: Zurn Z-1222
Lavatory, LAV-1	<ul style="list-style-type: none"> • Kohler K-2032 • Carrier: Zurn Z-1231 • Faucet Flow Restrictor-Aerator: 2.0 GPM • Drain and Supplies Insulation Kit: True Bro Model #102W
Water Cooler Data	<ul style="list-style-type: none"> • Water Cooler: Oasis PLF8WFEE • Barrier Free: Fully recessed
Floor Sink Data	<ul style="list-style-type: none"> • Floor Sink, FLSK-1: Fiat Model MSB-2424 • Dimensions: 24" x 24" x 10"
Utility Sink Data	<ul style="list-style-type: none"> • Utility Sink, USK-1: Fiat Products FL-1 • Material: Molded stone • Sink Type: Single bowl with 4 self-leveling legs
Sink Data	<ul style="list-style-type: none"> • Sink, SK-1: Elkay LR-Series • Material: 302 stainless steel • Gage: 18
Showers	<ul style="list-style-type: none"> • Shower walls, base and curtain rod by others • Shower Valve, Head, Arm and Flange: Speakman pressure balance SR-1420 • Trap: 3" C.I. P-Trap • Drain: Floor Drain (FD-1)
Shower (ADA)	<ul style="list-style-type: none"> • Shower walls, base and curtain rod by others (ADA) • Shower Valve, Wall Bar and Adjustable Head: Speakman pressure balance SR-1420 • Shower Flow Control Fitting Rate: 2.75 GPM • Trap: 3" C.I. P-Trap • Drain: Floor Drain (FD-1)

Emergency Safety Shower	<ul style="list-style-type: none">• Speakman SE-603 (combination free standing shower and eyewash)• Material: Galvanized steel pipe and fittings painted safety green• Shower Head: 8" diameter, yellow plastic, mounted at 7'-0" A.F.F.• Receptor: 18 3/4" x 13" stainless steel
Emergency Eye/Face Wash, EEW-1:	<ul style="list-style-type: none">• Speakman SE-420
Emergency Eye/Face Wash, EEW-2	<ul style="list-style-type: none">• Speakman SE-400
Emergency Eye/Face Wash, EEW-3	<ul style="list-style-type: none">• Speakman SE-572• Mounting: Countertop

End of Section