

DIVISION 22 – PLUMBING

22 00 00 – PLUMBING

BASIC MECHANICAL REQUIREMENTS

- A. Provide a list of symbols on drawings.
- B. Provide unique numbers for all applicable equipment, valves, and similar.
- C. Schedule all mechanical equipment on drawings.
- D. Do not show or put plumbing or other piping in transformer vaults, elevator hoistways, elevator equipment rooms, telecommunications equipment rooms, or electrical equipment rooms, unless required to supply room.
- E. Restroom piping chase shall be 3'-0" minimum width with piping located to allow full access.
- F. Each main line strainer shall have valved sensing points at inlet and outlet, piped to a common pressure gauge.

22 05 00 – COMMON WORK RESULTS FOR PLUMBING

BASIC MECHANICAL MATERIALS AND METHODS

A. General

- 1. Pipe routing may be modified as required to clear building structures, openings, lights, ducts, or other services.
- 2. Route piping parallel to building lines.
- 3. Provide sufficient unions, flanges and valves to permit removal of equipment.
- 4. Spacing shall be adequate to permit servicing valves and specialties and replacing sections of pipe.
- 5. Slope pipe to permit complete draining. Install drain valves at low points, vents at high points. Connect branch piping to top of main or sub main (install valve in branch connection).

B. Utility Connections

- 1. Specify that Constructor is to notify Owner's Representative to coordinate connection of services onto existing systems.
- 2. Constructor to purchase and install the domestic water meter from Cedar Falls Utilities.

Also install conduit and wiring for remote reader. Oversize incoming domestic water service by 25% to allow for some future expansion. Constructor shall be required to furnish and install the water meter(s) and coordinate installation with the utility. Specify Badger meter with remote read in cubic feet (gallons will not be accepted).

C. PIPE AND PIPE FITTINGS

1. Plastic pipe shall not be used unless required for specialty piping. Verify with Owner's Representative.
2. Dielectric unions or dielectric couplings should be used where two dissimilar metals are connected together.
3. Subject to meeting Code requirements pipe materials should be according to "UNI STANDARD PIPE SCHEDULE" (below).
4. Specify piping system test pressures for all services.
5. Flanged steam and return lines shall have "Flexitallic" gaskets.
6. All direct buried pipe shall have tracer wire with XHHW-2 insulation (Rhinomarker/Copperhead or approved equal).
7. Install auto flow valve on hot water recirculation line at the hot water connection point to limit water velocity to prevent erosion corrosion. Ball valve style are not acceptable. Valve shall provide laminar flow such as a globe valve.

22 05 19 – METERS AND GAGES FOR PLUMBING PIPING

- A. As a general rule, gages or gage openings are required on all piping systems to facilitate operation of the system. The campus has a central building automation system that remotes gage functions to a central location.
- B. Gage range shall be one and one half (1.5) times the normal operating pressure/temperature of the fluid being measured.
- C. The designer should use the following philosophy in the application of gages on systems.
 1. Where a gage is to be used by the operator on a regular basis, we prefer to have the gage physically installed with a ball valve for replacing the gage.
 2. Where a gage is to be used by the operator on a regular basis and the application is of a differential pressure nature (pumps, strainers, etc.) we prefer to have one gage and piping to either side of the differential, physically installed.
 3. Where the gage is needed for occasional use but not needed every day by an operator,

we do not prefer to have a gage physically installed. We prefer to have a P/T plug installed at this location.

- D. Where gages are installed, we prefer gages to be at least 4" for piping systems and that they be readable without the use of a ladder.
- E. All gages serving pumps shall be liquid filled with snubbers.

22 05 29 – HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

- A. Pipe hangers supporting water lines shall not bear directly on piping. Hanger should be outside of insulation, bearing on metal insulation shield and insulating block.
- B. Insulation shield length and gauge shall be as specified in the current edition of MSS-SP69.
- C. Insulation block shall be the same length and circumference of the insulation shield.

22 05 53 – MECHANICAL IDENTIFICATION

- A. Follow ANSI/ASME A13 for pipe labeling and color coding.
 - 1. Labeling shall be installed per the following:
 - a) Within 5 feet on both sides of every floor and wall penetration
 - b) At least every 20 feet along pipes
 - c) Minimum of 2 labels for any room crossing longer or taller than 10 feet.
 - d) Within 2 feet of any equipment, fixture, valve, tee, wye, or other change in direction.
 - e) All labels must be visible from someone standing on the floor.

22 06 00 – SCHEDULES FOR PLUMBING

A. UNI STANDARD PIPE SCHEDULE

Inside Building

- 1. Potable hot and cold water – above ground
 - 2 ½" and under: Copper tube, type L. SPEC. NO. 1
 - 3" and over: Copper tube, type L, grooved. SPEC. NO. 14

Hot water recirculation lines

~~SPEC. No. 15 or SPEC No. 1~~ Copper tube, type K. SPEC No. 18

2. Potable hot and cold water – underground	Copper tube, type K. SPEC. NO. 2
3. Condensate drain	Copper tube, type L. SPEC. NO. 9 or SPEC. NO. 16
4. Natural gas	Exposed: Black steel pipe, schedule 40. SPEC. NO. 11 Concealed: Black steel pipe, schedule 40 SPEC. NO. 11
5. Acid waste and vent, including traps	Polypropylene. SPEC. NO. 8
6. Compressed air – equipment room	Black steel pipe, schedule 40. SPEC. NO. 3
7. Compressed air – medical and lab	Copper tube, type L. SPEC. NO. 1
8. Vacuum	Copper tube, type L. SPEC. NO. 1
9. Sprinkler	Black steel pipe, schedule 40 SPEC. NO. 10

B. UNI STANDARD PIPE SPECIFICATIONS

SPEC. NO. 1

Pipe:	Type L hard temper copper, ASTM B88.
Joints:	Solder type with 95-5 solder.
Fittings:	Wrought copper solder joint, ANSI B16.22.

SPEC. NO. 2

Pipe:	Type K soft temper copper, ASTM B88.
Joints:	Solder type with “Sil-fos”, or flared type.
Fittings:	Wrought copper solder joint, ANSI B16.22, or brass flared fittings, ANSI B16.26.

Note: 1. No fittings under floor slabs or inaccessible.

SPEC. NO. 3

Pipe: Schedule 40 black steel, ASTM A120, or A53 < 25 PSI ASTM A53 or A106 Grade B > 25 PSI

Joints, Unions, Fittings: High pressure: 2" and under: socket weld

High pressure steam piping fittings shall be steel.
Low pressure: 2" and under: Malleable iron or cast iron screwed fittings, ANSI B16.3, 125 lb. (S) - 175 lb (WOG)

Flanges: 2 1/2" and over: Butt weld schedule 40 steel fittings, ANSI B16.9.
2 1/2" and over: Forged steel welding neck or slip-on, 150PSIG, ANSI B16.5

SPEC. NO. 4

Pipe: Schedule 80 black steel, ASTM A120.

Joints, Unions, Fittings: High pressure: 2" and under socket weld
Low pressure: 2" and under: Malleable iron screwed fittings, ANSI B16.3, 125lb. (S) - (WOG).

Flanges: 2 1/2" and over: Forged steel welding neck or slip-on, 150 PSIG, ANSI B16.5.

SPEC. NO. 5

Pipe: Schedule 40, galvanized steel, ASTM A120, or A53.

Joints: Screwed.

Fittings: Galvanized cast iron drainage type, ANSI B16.12.

SPEC. NO. 6

Pipe: Schedule 40, galvanized steel, ASTM A120, or A53.

Joints: Bolted clamp type coupling with grooved end lock. Victaulic or equal.

Fittings: Galvanized malleable iron, grooved ends, ASTM-A47. Use q drainage type for storm lines.

SPEC. NO. 7

Pipe: Cast iron soil pipe, service weight, coated inside and out, ASTM A74.

Joints: Bell and spigot, or molded elastomeric gasket type with push-on joints.

SPEC. NO. 8

Pipe: Polypropylene flame retardant pipe, schedule 40, Fuseal or equal, Charlotte acid waste glued pipe preferred.

Joints: Electrical fusion type.

Fittings: Socket type to match piping.

SPEC. NO. 9

Pipe: Type L hard temper copper, ASTM B88.

Joints: Solder type with 95-5 solder.

Fittings: Cast brass solder joint drainage type ANSI B16.23 or wrought copper solder joint drainage type, ANSI B16.29.

SPEC. NO. 10

Pipe: Schedule 40 black steel, ASTM A120 or A53.

Joints: Screwed or flanged.
2 ½" and over: Screwed, flanged, or grooved.

Fittings: Screwed: cast iron 125 lb. class, ANSI B16.4, or malleable iron, 150 lb. class, ANSI B16.3.
Flanged: cast iron 125 lb. class, ANSI B16.1.
Grooved: malleable iron, U.L. listed and FM approved.

Note: 1. Plain end fittings and couplings are not approved.
1. Use of welded joints must be approved by Owner.

SPEC. NO. 11

Pipe: Schedule 40 black steel, ASTM A120, or A53.

Joints: 2" and under: Welded
2 ½" and over: Welded and flanged.

Fittings: 2" and under: Socket weld steel fittings, ANSI B16.11, 2000 lb.
2 ½" and over: Butt weld schedule 40 steel, fittings, ANSI B16.9.

Unions: 2" and under: Malleable iron ground joint with brass seat, 250 lbs.
(S) – 500 lb. (WOG)

Flanges: 2 ½" and over: Forged steel welding neck or slip-on, 150 PSIG, ANSI B16.5.

Note: 1. No flanged connections in concealed spaces.

SPEC. NO. 12

Pipe: Cast iron soil pipe, service weight, coated inside and out, "No-Hub," ASTM A74.

Joints: Neoprene sealing sleeve with Type 301 stainless steel shield and screw type clamps.

SPEC. NO. 13

Pipe: Schedule 40, black steel, ASTM A135, or A53.

Joints: Bolted clamp type coupling with grooved end lock. Victaulic or equal.
 Fittings: Black malleable iron, grooved ends, ASTM-A47.
 SPEC. NO. 14
 Pipe: Type L hard temper copper, ASTM B88.
 Joints: Bolted clamp type coupling with grooved end lock, ASTM A-536. Victaulic or equal.
 Fittings: Cast bronze, grooved ends, ASTM B-584-87, or wrought copper, grooved ends ASTM B-75.
 Note: 1. Fluid velocity in roll groove area must be less than 5 fps.

SPEC NO. 15 Uponor Wirsbo pipe with expansion fittings preferred.
 Written approval from the Owner is required.

SPEC NO. 16 PVC piping

SPEC NO. 17 Concrete storm sewer piping

SPEC NO. 18
Pipe: Type K Hard Tempered Copper, ASTM B88
Joints: Solder type with 95-5 solder
Fittings: Wrought Copper solder Joint, ANSI B16.22

C. Pipe Schedule and Specifications Notes

1. This information is given as a general guide. Design Professional is responsible that piping, fittings, etc. are suitable for service intended.
2. All welding shall conform as to workmanship, testing and general requirements with welding section ANSI B31.

22 07 00 – PLUMBING INSULATION

A. General

1. Pipe insulation shall conform to or exceed minimum thicknesses stated in ASHRAE/IESNA 90.1, codified version.
2. Items concealed, valves, strainers, unions, etc. shall be clearly marked on the outside of the covering.
3. The following systems shall be insulated. All cold piping shall have complete vapor barrier protection.
 - a) Cold potable water piping.
 - b) Refrigerant suction piping.
 - c) Roof drain piping.
 - d) Condensate drain piping.
 - e) Hot potable water piping.
 - f) Plumbing vents for five feet below roof.
 - g) Heat exchangers.
 - h) Storage water heaters.
 - i) Air eliminating units.

B. Materials

1. All products shall conform to NFPA Sections 90A and 90B with special regard to fire hazard classification requirements of NFPA No. 255, latest revision, including vapor barriers and adhesives. All products shall possess a flame spread rating of not over 25, without evidence of continued progressive combustion and a smoke developed rating no higher than 50.

22 11 23 – PUMPS

- A. Pumps shall be provided with motors, starters, controls, strainers, pressure gauges, vibration isolators, check valves, isolation valves and taps for flow measurement.
- B. Drawing set shall include a pump schedule indicating number, capacities, pressures, motor horsepower, rpm and other pertinent data for all pumps.

- C. Pumps shall be set on a concrete foundation above the finished floor with vibration isolators when required to avoid sound or vibration transmission.
- D. Two (2) sets of strainer mesh are to be supplied with pumps. A fine mesh startup strainer and a running size mesh.
- E. Where possible, use end suction pumps instead of split casing pumps. All pumps 1 h.p. and larger are to be base mounted pumps.
- F. Generally, the preferred pump is the Grundfos line. Alternate manufacturers include B&G and Taco.
- G. All circulating pumps must have a ball, or butterfly valve on either side of the pump. Do not use a check valve for a stop function.
- H. The inlet to pumps needs to be 7 straight diameters as a minimum, or suction diffusers may be used as an alternate.
- I. Pumps which require removal from the system piping for servicing the impeller are unacceptable.
- J. Use submersible pumps for sewage ejection and sump pumping applications.
- K. All pumps are to have mechanical seals.
- L. Provide service space around all pumps. No pumps to be tight to ceilings or walls.

22 13 00 – FACILITY SANITARY SEWERAGE

Service

- 1. Sanitary and vent, underground.
- 2. Sanitary and vent, above ground.

Material

Cast iron soil pipe.
SPEC. NO. 7
 1 ½” and under: Galvanized steel pipe.
SPEC. NO. 5 or
 Copper tube, type L.
SPEC. NO. 9
 2” and over: Cast iron soil pipe.
SPEC. NO. 7 or
 Cast iron soil pipe.
SPEC. NO. 12

22 14 00 – FACILITY STORM DRAINAGE

- 1. Storm – underground

Cast iron soil pipe.
SPEC. NO. 16 or 17

2. Storm – above ground

Cast iron soil pipe.
SPEC. NO. 7 or
Cast iron soil pipe.
SPEC. NO. 12

22 30 00 – PLUMBING EQUIPMENT

- A. In general, steam fired semi-instantaneous water heaters shall be used.
- B. Semi-instantaneous water heaters shall have copper lining and 10 year non-prorated warranty on tank and heat exchanger.
- C. Working pressure shall be 150 psig.

22 40 00 – PLUMBING FIXTURES

- A. Show all valve locations on drawings. Show all cleanout locations on drawings.
- B. Provide isolating valves on all items subject to repair or replacement. Including, but not limited to bathroom fixtures, sinks and hose bibs.
- C. Stop valves on lavatories with sensor operated mixing valves shall include integral check valves accessible through the removable valve handle and cap.
- D. All valves should be rising stem valves except where ball valves are used.
- E. Provide valving to isolate branch sections of main lines. Apollo lead free ball valves preferred.
- F. Use wall hung water closets.
- G. Water closets shall be siphon jet flush valve type with elongated bowl and black open front seat with check hinge. Low water usage. Color shall be white. Use Sloan or Zurn as basis of design for flush valves.
- H. Urinals shall be washout flush valve type with integral side panels. Low water usage. Use Sloan as basis of design for flush valves.
- I. Service sinks shall be floor type receptor with hose, hose bracket, mop hanger and pail hook double supply spout set at 36" above receptor rim. Install sanitary panels on wall around sink – 3' minimum height.
- J. Lavatory faucets shall conform to ASHRAE/IESNA 90.1, codified version. Sloan and Delta faucets preferred.
- K. Use electric water coolers with bottle fillers and "total filled" display. No filters allowed.
- L. Install ADA compliant fixtures as required.

- M. Provide floor drains in all toilet rooms and mechanical rooms.
- N. Provide a hose bib in mechanical rooms within 20' of each air handler to facilitate air handling unit cleaning. Provide a freeze-proof hose bib near condensing units at exterior locations.
- O. Provide loose key hose bibs on all exterior walls of the building. Install with an isolation ball valve on the interior.
- P. Provide vacuum breakers on all faucets with hose connections. This shall include lab faucets, but exclude distilled water faucets.
- Q. In public areas, use hard-wired sensor type flush valves and faucets. Sloan or Delta is the preferred brand. Install stop valves with integral check valve to prevent cross contamination. Chicago Faucets 1017-CSTABCP or EQ
- R. Provide eye washes and safety showers to meet EH&S standards. Haas eye and face stations preferred.
- AA. Fume hood water service vacuum breakers shall not be located within hood.
- BB. Do not use pop-up lavatory drains in public areas. Provide perforated or grid drains.
- CC. Roof drains shall be "Zurn" Z100 or equal. Specify 15" diameter main roof drain with an aluminum dome grate and a no-hub outlet joint connection. 4" diameter pipe size shall be standard unless requested by consultant to use different size for a specific purpose.
- DD. Install manual bypass piping and valves on backflow preventers for annual testing and service.
- EE. Water softeners to have a sample port installed close to the units for testing hardness.
- FF. Restrooms should be built with a pipe chase between rooms and wide enough to allow easy access for servicing waste and water lines. Cleanouts for sewer lines will be in the chase so the lines can be serviced without entering the rooms. Cleanouts must be installed at the end of each sanitary run and well above the flow line.
- GG. Provide Tersano SAO Dispenser with SAO-4 cartridge in custodial closets with mop sinks. Provide 110 electrical outlet within 6' of water supply for Tersano water system. Coordinate location and quantity within the building with Owner's Representative.