

Division 33 | Utilities

Section includes various guidelines for the operation and maintenance of campus utilities, common work results, commissioning, water, sanitary sewerage, stormwater management, and electrical utilities.

This design guideline is written to the designer of record (DOR). This guideline is written to document UA standards of work, assist the designers in ensuring UA standards are incorporated into the contract documents and provide a resource to facilitate the design process. It is the designer of record's responsibility to coordinate the criteria set forth in design guideline and in conjunction with the manufacturer requirements and use the most stringent standard.

Section 33 00 00 – Utilities

A. General

1. General

Section 33 11 00 – Water Distribution Piping

A. General

In general, follow the guidelines below when designing and specifying pipe, pipe fittings, and accessories. Unless specifically indicated otherwise, these guidelines are not to restrict or replace professional judgment.

B. General Pipe Material Requirements

Note: Victaulic piping is approved for fire protection only.

1. Eccentric Fittings: Eccentric Fittings shall be used where piping sizes reduce on horizontal runs. Reducing fittings shall be couplings; no bushing will be allowed. Orient eccentric fitting to allow gravity drainage.
2. Tees in Welded Pipe: Saddle and nipple type tees are permitted in welded pipe if made with Weld-O-Lets or Thread-O-Lets and branch size does not exceed 1/2 the size of the main size. All branches in excess of 1/2 of main size shall be made using welding tees. Do not use "T-drill".
3. Solder in Copper Piping Joints: Solder for all piping shall be "lead-free". 50/50 solder is not permitted. Copper piping for combustible gases shall be SIL-FOS or Pro-press.
4. Dielectric Protection: Where dissimilar piping materials (steel and copper) are connected, install a threaded brass nipple for pipe sizes 2" and less. For pipe sizes 2 1/2" and above, install isolating flanges. Dielectric unions are not to be used except at the water heaters.
5. Flanges: Shall be standard weight forged steel, welding neck, 150 pound A.S.A. Flanges shall have raised or flat face as required to match valve or equipment face. Flat face flanges need to have full face gaskets.
6. Unions: Generally, unions shall be malleable iron, ground joint type, and 300 pound test. Unions in galvanized piping systems shall be galvanized. Unions in copper piping systems shall be wrought copper or brass sweat ends.
7. Watertight Sleeves



- A. Foundation Walls: Where below grade piping penetrates, provide a steel sleeve with watertight seal.
- B. Foundation & Building Floors: Where piping penetrates vertically, use Holdrite HydroFlame non-metallic cast-in-place sleeves.
http://holdrite.com/products/water_firestop_sleeves/holdrite_hydroflame
- C. For wall penetrations Above & Below Grade use Advanced Products Innerlynx.

C. Drainage and Vent Pipe Material Requirements

- 1. Storm and Non-Laboratory Waste and Vent Piping
 - A. Above Grade: Piping shall be service weight "No-Hub" cast iron pipe with drainage pattern cast iron fittings, and with heavy duty, "Husky" or equal, stainless steel clamps. Vent piping shall be the same as waste piping.
 - B. Below Grade: Piping shall be cast iron service weight bell and spigot.
- 2. Laboratory Sanitary Waste and Vent Piping
 - A. Above Grade: Piping shall be corrosion resistant polypropylene Schedule 40. Joints shall be no-hub mechanical joints, with S.S. clamps, equivalent to Orion brand. Glass piping may be considered on a case-by-case basis, especially where high temperature waste may be present. All sink P-traps shall be of the same material as the waste pipe.
 - B. Below Grade: Piping shall be corrosion resistant polypropylene Schedule 40. Joints shall be fused, equivalent to Orion brand. High silicon cast iron may be considered if the application warrants the added expense.
- 3. Equipment Drains

These shall be Type "M" hard drawn copper piping with wrought copper solder DWV type fittings.

D. Pressurized Plumbing Pipe Material Requirements

- 1. Compressed Air (0 -125 psig)
 - A. 2" pipe size or less
 - 1) Above Grade: Piping shall be Schedule 40 ASTM A-120 black steel pipe with 150 pound screwed malleable iron fittings and screwed 300 pound malleable iron unions or Type "L" copper piping with either Sil-Fos joints or Pro-press fittings.
 - 2) Below Grade: Use only Type "K" copper piping.
 - B. Greater than 2" pipe size

Above and Below Grade: Piping shall be Schedule 40 ASTM A-53 black steel with welded fittings.
- 2. Natural Gas Piping
 - See Section 33 51 00



3. Distilled and Deionized Water Piping
 - A. Shall be PVC Schedule 80 and in accordance with ASTM D2467 (cement socket type connection fitting and ASTM D785 piping.
 - B. High purity: Shall be Orion Whiteline polypropylene or PVDF (Polyvinylidene Fluoride), Schedule 80, ASTM D2447 with socket fittings. In plenums, use only PVDF or stainless steel piping.
4. Domestic Hot and Cold Water Piping
 - A. Above Grade: Piping shall be type "L" hard tempered seamless copper, ASTM-88 with wrought copper fittings and brazed, soldered or Pro-Press joints. Also acceptable Uponor PEX Type "A" or approved equal 2" and smaller..
 - B. Below Grade: Piping shall be type "K" copper for pipe sizes 2-1/2" and smaller all joints shall be Sil-Fos or Uponor PEX Type "A" or prior approved equal. Pipe sizes 3" and above may be fused HDPE pipe with fused adapters or ductile iron.
5. Nitrogen Piping

Shall be seamless copper, cleaned, ASTM B88 with silver solder joints with nitrogen purge, or Pro-Press fittings (no purge required). Use brazed joints using (B Cup) filler metal, where required by NFPA 99.
6. Vacuum Piping

Shall be Type "L" hard drawn copper with wrought copper solder type fittings or Pro-Press fittings. Provide a plugged cross at all turns greater than 45 degrees, slope in the direction of flow and provide hose end drain valves at all low points for cleaning the system.

E. Hydronic and Steam Pipe Material Requirements

1. Chilled Water and Hot Water Heating Piping
 - A. Above Grade: Piping 2" and smaller shall be tType "L" copper or Uponor PEX Type "A" with wrought copper fittings or screwed schedule 40 steel. Piping larger than 2" shall be Schedule 40 black steel with butt welded fittings, Type "L" copper with silver solder or Pro-Press fittings. Flanged connections may be used, standard weight with bolts and gaskets (similar to flanges on steam piping).
 - B. Below Grade: Piping shall be installed using a pre-insulated piping system. Carrier pipe shall be Schedule 40 A53 Grade B seamless black steel with butt welded fittings. Jacket pipe shall be HDPE with urethane insulation with field installed insulation pack for fittings.
2. Steam Condensate Piping
 - A. Above Grade: Condensate piping shall be Schedule 80 black steel piping with extra heavy cast iron fittings.
 - B. Below Grade: Condensate piping shall be Schedule 80 black steel with extra heavy fittings in a pre-insulated system rated for 1200° F service temperature such as Thermacor Duo Therm "505" or approved equal. Condensate piping shall not be run in common jacket pipe with other carrier pipes.



3. Condenser Water Piping

- A. Above Grade: Condenser water piping shall be Schedule 40 black steel, ASTM A-53. Fittings shall be butt welded black steel ASTM A-284.
- B. Below Grade: Condenser water shall be ductile iron or HDPE, fused.

4. Refrigeration Piping

Shall be type "L" hard temper seamless copper, ASTM B88, ACR cleaned. Sil-Fos, silver soldered or approved mechanical connections are acceptable.

5. Steam Piping

- A. Above Grade: Steam piping up to 125 psig shall be Schedule 40 black steel pipe with 125 pound screwed cast iron fittings up to 2 inch size and 125 pound black steel welded fittings for 2-1/2 inch size and larger. Welding flanges shall be 150 pound forged steel. Screwed unions shall be 300 pound forged steel, ground joint brass to steel.
- B. Below Grade: Steam piping up to 125 psig shall be Schedule 40 black steel with butt welded fittings, in a pre- insulated system as manufactured by Thermacor Duo Therm "505" or approved equal.

F. Labeling on Pipes

- 1. Labeling on piping is to comply with ASTM/ASME A13.1. Piping shall be labeled at least in the following location:
 - A. Valves
 - B. Changes in direction
 - C. Branches and take-offs
 - D. When the piping is within access panels
 - E. Where pipes pass through floor and ceilings
 - F. Room entry and exit points
- 2. The label shall consist of an arrow, approximately six inches in length with the width to be determined by letter height, and name of the service.



Section 33 12 33 – Water Utility Metering**A. General**

1. Each new building, building expansion, or special application shall have metering requirements discussed with The University of Alabama Energy Management Department (UAEMD). To account for building utility costs, each project shall include equipment for measuring and totalizing the following campus utilities to the building or department: chilled water, electricity, steam, natural gas, domestic water and irrigation water. In those cases where multiple users or profit centers occupy the same building, provide cost sub-metering capability.
2. Related sections include:
 - A. Section 33 51 00 – Natural Gas Piping, Regulators and Meters
 - B. Section 42 10 00 – Hot Water Systems
 - C. Section 23 71 00 – Chilled Water Systems
 - D. Section 23 09 00 – Instrumentation and Control for HVAC
 - E. Section 26 27 13 – Electrical Metering
3. In most cases domestic water and irrigation meters will be installed by the City of Tuscaloosa Water and Sewer Department. There is a flat fee for installation of each size water meter up to 2". Meters over 2" installation fee based on actual installation cost. Contact your Project Manager to discuss each application.
4. Each utility will use the specified metering equipment and schemes as primary measuring devices and will electrically transmit the signal to the specified multifunction electronic controller. The multi-function controller will be tied into the overall campus-wide metering system through a RS485 4-wire/fiber optic Ethernet data highway. (Coordinate with the Energy Management Department for the data highway path.)
5. Utility meters shall be designed and specified by the project consulting engineers with approval of UA Facilities Engineering Department. Project contractor shall furnish and install all utility meters. Utility meter commissioning shall be a joint effort between the project contractor, the project engineer and The University of Alabama. The University will not accept any utility meter until it has been shown to be fully functioning and operational.
6. Project control drawings and specifications shall include all information, including, but not necessarily limited to, points, termination, and programming necessary to provide complete building energy use reporting on the University's Energy Management System (EMS).
7. Submittal documents for equipment to be installed in the metering system shall be submitted to UAEMD for approval.
8. The project drawings and specifications shall include the following utility meter information as a minimum:
 - A. Type of Service (i.e. domestic water, chilled water, hot water for building heat)
 - B. Size of meter



- C. Manufacturer, type, model number
- D. Location of meter, sensors, and remote readouts
- E. Accuracy and repeatability
- F. Range: maximum, minimum and normal flow expected at design conditions
- G. Maximum pressure drop allowed across the meter



Section 33 51 00 – Natural Gas Piping, Regulators and Meters**A. Natural Gas Piping**

1. Piping Interior to Building
 - A. 2" pipe size or less
 - 1) Schedule 40 ASTM A-120 steel pipe with 150# screwed malleable iron fittings
 - 2) Type L copper piping with; Sil-Fos joints or Pro-Press G fittings
 - B. Greater than 2" pipe size

Schedule 40 steel pipe with screwed or welded fittings
 - C. No gas piping to be below grade under building
2. Exterior
 - A. Below Grade
 - 1) Schedule 40 coated black steel piping, equal to XtruCoat
 - 2) Polypropylene piping with fused joints
 - a. Always bury a minimum of 18 inches below grade
 - b. Always use pipe locator wire buried 12 inches above pipe and terminating above ground to pipe
 - B. Above Grade

Schedule 40 steel piping, painted

B. Natural Gas Regulators

1. Building regulators to be American Meter Company Model 1813B or 1813C with built-in under and over pressure shut off
2. Appliance regulators to be American Meter Company
 - A. 1 inch or less use model J-78
 - B. Greater than 1 inch use model J-48
3. Other manufacturers will be accepted only with approval prior to issuing bid documents
4. Regulators to be full line size
5. Regulators are to be provided with positive shut-off and vent limiting devices. Where vent limiting devices are not acceptable follow ASME CSD-1 requirements.



C. Gas Meters

1. To be positive displacement gas meters in metal case with temperature compensation and corrosion-resistant internal components
 - A. Building meter to be American Meter Company
 - B. RPM series 2M to 16M Rotary Meter where applicable
 - C. Diaphragm type only where applicable
 - D. Pipe connections:
 - 1) NPS 2 inch or smaller: Threaded
 - 2) Greater than NPS 2 inch: Flange
 - E. Capacity
 - 1) 500 cfh or less: ANSI B109.1
 - 2) Greater than 500 cfh: ANSI B109.2

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