

23 60 00 - Chilled Water Systems

1. Introduction

- A. The desired medium for all air conditioning systems is chilled water. Duke University has a campus chilled water system currently served by two central chilled water plants on West Campus and one central chilled water plant on East Campus, as well as several satellite chillers/chiller plants. The campus distribution system is configured in a variable primary flow arrangement, removing the need for decoupler pipes and building (secondary/tertiary) pumps.
- B. Campus chilled water is supplied to all buildings at 40°F with pressures up to 125 psi, depending on where the building is located on the distribution loop.

2. References

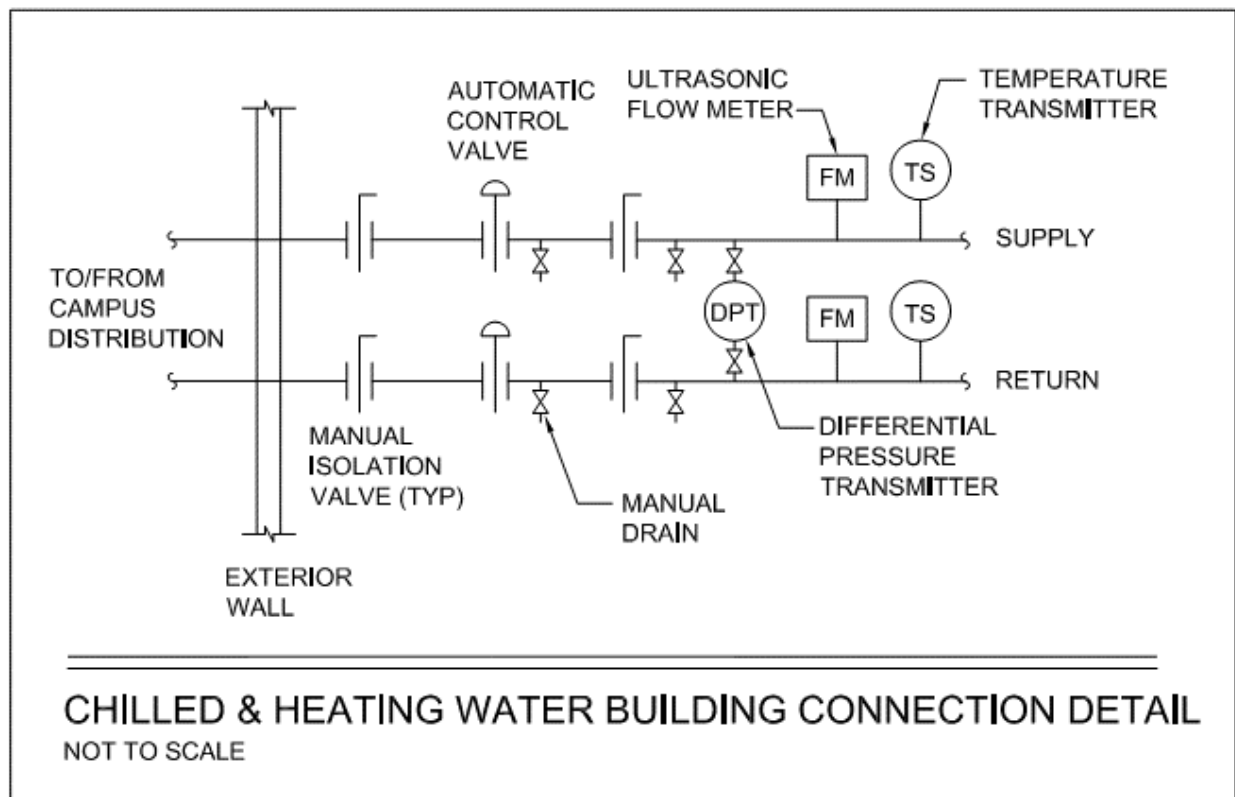
- A. NA

3. Design Standards

- A. All chilled water valves shall to be specified for ample close off pressures and capable of handling varying pressure gradients.
- B. All cooling coils should be designed for a 16°F-20°F chilled water temperature drop.
- C. Campus chilled water will not be used for anything other than HVAC systems or a closed heat exchanger.
 - 1. Process chilled water systems should be isolated from the campus chilled water system with a water-to-water heat exchanger.
- D. Though the central chilled water system is equipped with emergency generators, server rooms and computer rooms that require guaranteed chilled water service should be designed with a secondary cooling source.
- E. Chilled water control valves should be pressure independent (PI) valves
 - 1. Basis of design for all chilled water control valves will be the DeltaPValve® manufactured by Flow Control Industries.
 - 2. All PI valves should be installed on the coil return line.

3. A differential pressure (DP) sensor should be installed across the hydraulically most remove valve and should report back to the Central Plant Control System (Siemens Apogee) to be used in controlling the loop pump speed.
 4. Balancing devices are not necessary at chilled water coils. Flow will be measured and limited using the PI valves.
4. Documentation and Review Requirements
 - A. Provide all calculations used to size PI valves.
5. Installation and Performance Requirements
 - A. Building connection to campus chilled water system should include appropriate control and metering.
 1. Modulating standard butterfly valves should be located as close as possible to the pipe entrance/exit points.
 2. Ultrasonic (EMCO) strap-on flow meters should be located on the building entering and leaving chilled water mains.
 - a. These meters require 10 pipe diameters of straight pipe upstream of the meter and 5 pipe diameters of straight pipe downstream of the meter for appropriate metering.
 3. Building supply and return temperature sensors and a building differential pressure sensor are also required devices at the building entrance/exit points.
 4. All chilled water system devices are to be connected to a Siemens Apogee panel. These devices will be managed and monitored by Duke Utilities and Engineering Services Department (DUES).

5. Building Tie-In Schematic



- B. Air separators are required in all new construction installations.
- C. Make-up water for the chilled water system is not required; make-up water for the chilled water system is done at the central chilled water plant.
- D. Air vents should be installed at the highest system points.

6. As-Built Requirements

- A. The designer must provide drawings showing all as-built piping and equipment. Drawings must include final piping distribution, details of pertinent equipment (control valves, air separators, meters, etc.), details of all building connection points and devices, as well as anchorage points, cross-over/under of other utilities, obstructions, and other pertinent data.
- B. Provide a typed identifying list for all valves. Coordinate with DUES for formatting and compliance with existing recordkeeping.