

Note: Control drawings 15680-3 and 15680-4 are currently under review and have not been included herein. Consult Project Coordinator.

WATER CHILLERS

General

Generally, all large chillers (>100 tons) on the Central Campus will be of the absorption type to make use of cogeneration steam from the University's Central Power Plant. Beyond Central Campus, A/E should consider electric centrifugal, electric screw, or gas fired chillers.

Start/stop control of the unit shall be as described in Section 15950 Automatic Temperature Controls - Chiller Controls paragraph. One signal from Central Environmental Control (C.E.C.) to the absorption machine shall start the chiller and all peripheral equipment (chilled and condenser water pumps).

Design Requirements

General Requirements

The capacity of the machine shall be based on a .0005 fouling factor in the evaporator section, and a .001 factor in the absorber and condenser section.

Consider noise and vibration criteria in mechanical room and adjacent areas. Evaluate need for noise and vibration abatement to achieve acceptable noise levels.

Consider need for oxygen deprivation detection systems and additional ventilation to meet current standards and codes, including ASHRAE 15, Safety Code for Mechanical Refrigeration.

Provide overhead I-beam, lifting lugs and steel supports for removal of heads and piping at chiller. Provide short spool pieces at chiller for easy removal.

Chillers shall include manufacturers standard DDC control panel. Coordinate system control with the U of M Controls Group.

The manufacturer shall supply the University with a factory repair manual for the machine prior to shop print approval.

The manufacturer, in conjunction with any other necessary vendors or subcontractors, shall provide an 8-hour training session covering the chiller operation and maintenance for Plant Maintenance personnel.

The manufacturer shall provide job specific as-built wiring diagrams indicating interlocks to pumps and cooling towers. Standard factory drawings are not acceptable.

Mechanical Refrigeration Chillers

Centrifugal chillers should be specified to use HCFC-123 or, HFC-134a. Screw chillers using HCFC-22 may be considered as an alternative to centrifugal machines.

Select chiller for maximum practical efficiency, based on evaluation of IPLV.

Furnish centrifugal and screw chillers with marine style water boxes.

Furnish chiller with reseating relief valves in lieu of rupture discs. Vent relief to outside.

A/E shall consider need for providing a refrigerant pump-down system.

Refrigerants shall be recovered when removing a chiller, per EPA and ASHRAE standards.

Absorption Chillers

Absorption chillers shall be of hermetic design, factory assembled and leak tested, and selected for 5 psi steam at inlet to steam control valve. Steam shall be controlled by low pressure drop control valve. Chillers with low load operation (below 25% of capacity) shall be provided with dual steam control valves, with one valve sized for low load operation. The condenser water system shall be designed with a 3-way cooling tower bypass valve.

If the unit is supplied with an anti-crystallization device such as Trane's positive concentration limiter (PCL) valve, it must be provided with a factory installed manual bypass switch.

The unit shall be supplied with chromate inhibited lithium bromide. The inhibitor shall be pre-mixed into the solution before it is charged into the machine.

Tube wall shall be 0.028" for absorber, evaporator and condenser, and 0.035" for generator. The machine shall be supplied with 95/5 cupro-nickel tubes in the absorber, evaporator, and concentrator section, and copper in the condenser section.

Many chilled water and condenser water systems are drained at the end of each cooling season. Therefore, provide a bypass line sized for full flow (not full size) with a manually operated valve across chiller for flushing condenser water lines at the start of the cooling season.

Provide steam start-up stabilizer only on absorption chillers fed from a local boiler.

Provide economizer valve for energy savings at part-load operation.

Pay particular attention to the manufacturer's requirement for minimum required vertical drop in the condensate piping between the concentrator outlet and steam trap inlet and proper pitch of the entire machine.

Instruct Contractor to arrange for a representative from the Plant Department through the University Project Coordinator to be present when the machine is initially charged with lithium bromide and water.

When an existing absorption chiller is to be removed, the lithium bromide is to be removed and legally disposed of by the contractor, with associated hazardous waste manifests filed with the Project Coordinator and OSEH.

Installation and Start-Up Requirements

Final trimming of absorption chillers by chiller manufacturer shall be done, in conjunction with U of M Plant Operations and Test and Balance contractor under full load conditions at the chiller. Since chiller start-up does not typically take place during peak cooling season, contractor must develop a plan to fully load the chiller, either by imposing a false load or waiting to complete the contractually required trimming until a natural load can be developed. After manufacturer trimming has been completed, test and balance contractor shall perform final performance verification, measuring and document chiller performance under full load.

Chilled Water System Metering

Buildings served by a multiple building chilled water loop must be provided with BTU metering for utilities accounting.

The metering may be accomplished by providing appropriate inputs to the building management system where available or by providing a separate flow computer. Flow computers shall be complete with a low voltage pulse totalizer output and a 4-20 mA output proportional to flow for external interface with the building management system.

Chilled Water System Design Considerations

Where practical, large systems shall be designed or modified as decoupled systems, with constant volume primary, variable speed secondary chilled water pumps and two-way control valves.

02/02/00 01:42 PM