COOLING SYSTEMS

Central Chilled Water System: The preferred cooling system for campus buildings will utilize the central campus chilled water system. See *Chilled Water Distribution System* in these *Design Standards* for available chilled water temperature and pressures. The type of cooling system for any building outside the "reach" of the central campus chilled water system shall be coordinated with FP&CP Engineering.

Stand Alone Hydronic Cooling Systems: There may be projects that require a stand-alone hydronic cooling system with chiller, pumps, etc. These projects are typically located on the periphery of campus where extending the campus chilled water system is cost prohibitive. These closed loop, stand-alone systems shall be provided with the all the same hydronic specialties as called for in the "Heating Systems" narrative. This includes: expansion tank, air / dirt separator, pot feeder, side-stream filter, pressure relief valve, etc. All systems shall have a Pressure Relief Valve.

Plate-And-Frame Heat Exchangers: The use of plate-and-frame Heat Exchangers (HTX's) to isolate the building chilled water system from the campus system is discouraged. Exceptions: In new buildings where the high point of the chilled water system will be 4 stories or greater, or in buildings with chilled water piping present in greater than 50% of the
Spaces in the building (such as chilled beam systems), a HTX should be considered. As an alternative to a HTX, design engineer may consider of a booster pump and a pressure sustaining valve. If a chilled water HTX is used, the following design Standards shall apply:

- Design with a minimum of 12 Deg F delta-T (may need to be higher based on AHU cooling coil delta T's) on both the campus and building side of the HTX.
- Each HTX shall be provided with a 1/3-2/3 control valve arrangement on the campus side.
- Provide SS drip pan underneath each HTX and pipe to floor drain.
- HTX's to be fully insulated using factory provided casing panels. Field insulation or blanket type wraps are not acceptable.
- Provide fully redundant duplex strainer with isolation valves on campus side with 1/16" screen baskets.
- Provide side-stream filtration on building side capable of filtering 8 x system volume in 24 hour period with 30 micron bag filter.
- Each HX is to have its own relief valve to prevent damage to HX when isolated and water warms up

Central Air Systems: Where possible, space cooling for HVAC applications shall be provided by centralized air distribution systems that utilize chilled water as its source of cooling. With the exception of mechanical equipment room cooling, telecommunication rooms, stairwells, etc., the use of unitary or terminal cooling equipment that incorporate fans, filters and condensate drain pans shall be avoided.

Chilled Water End Use Equipment: In order to minimize campus pumping energy, all chilled water end use equipment (i.e., cooling coils, fan coil units, etc.) shall be selected to have a minimum water-side temperature rise of 15 Deg F AND minimum leaving temperature of ~~57~~ 60 Deg F (per ASHRAE 90.1 2016) at design conditions. At low load (< 10%) conditions, all coils shall have a minimum water-side rise of 10 Deg F.

Fan coil units or other equipment with heat exchanger tubing less than ½" nominal diameter should include a strainer with 1/16" screen basket and blowdown valves piped to a safe location.

For air handlers or other end use equipment with little to no latent load and a tolerance for higher discharge air temperatures, the design team should consult with FP&CP Engineering to consider the use of a pumped Chilled Water Return loop to provide primary cooling.

Chilled Water Return acting as a secondary cooling loop for DX condensers is discouraged.

Building Chilled Water Pressure Drop: When the central campus chilled water system is utilized, the building chilled water system shall be designed to operate on no more than a 15 psig drop from the campus supply main to the return main (including any coils).

Pressure Independent Control Valves: These types of valves shall be used on chilled water coils serving all air-handling units. On UNL campus, these valves shall be provided by Building Systems Maintenance and installed by the contractor.
Automatic Balancing Valves: An automatic balancing valve (i.e., "autoflow" control valve) shall be installed on all chilled water coils unless a pressure independent control valve is provided.

Chilled Water Service Entrance: For specific requirements, see the section entitled *Chilled Water Distribution Systems* within these *Design Standards*.

Buna-N/Nitrile/NBR: Buna-N/Nitrile/NBR is subject to severe deterioration when exposed to aggressive oxidizing agents, including ozone and chlorine dioxide. The chilled water plants use ozone and/or chlorine dioxide as part of their chemical treatment plan. Ensure no chilled water components contain Buna-N.

"Once-Through" Cooling: Water-cooled equipment of any size that incorporates a "once-through" cooling/condenser water configuration, other than for emergency backup usage, is not allowed. Operation of this type of equipment results in unnecessary, excessive usage of water.

Telecomm Room Cooling (UNL): The preferred means of cooling telecomm rooms is DX split-systems. Preferred size is 3 tons, as over time additional heat-producing systems are added. Units shall be Mitsubishi, low ambient kit for negative 20 deg F – no equivalent. Coordinate location of condensing units with FP&CP Engineering.

Telecomm Room Cooling (UNK and UNO): Consult with FP&CP Engineering.

Mechanical Equipment Room Cooling: The preferred means of cooling mechanical equipment rooms is fan coil units. These shall be generously sized especially in those spaces that have steam heating systems, or mini-split condensers. We have experienced several instances where these are undersized resulting in high room temperatures. This shortens the life of any electronic equipment within the space (i.e., controls and VFD's).

Outdoor Condensing Units and Packaged Chillers: These units shall be scheduled with cottonwood screen filters. Units shall be located to allow for periodic debris removal and power washing. Avoid inaccessible condenser coils or back-to-back coils (i.e., free cooling).

A 120V convenience outlet needs to be provided adjacent to the unit.