**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 Guidelines** 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 FMP 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 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.

**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. Exception: In new buildings where the high point of the chilled water system will be 4 stories or greater, a HTX should be considered so that the overall static pressure requirements of the campus system is not increased. 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 guidelines 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 to 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.

**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 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.

**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).

**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 General Guidelines.
**Buna-N (Nitrile):** Buna-N (Nitrile) is subject to severe deterioration when exposed to ozone. The chilled water plants inject ozone, which has a half-life of 30 minutes. Be sure no valve components or other items in the chilled water system have Buna-N in them.

**“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. Basis of design is Mitsubishi, low ambient kit good for negative 20 deg F.

**Telecomm Room Cooling (UNK and UNO):** Consult with FPC 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. We have experienced 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).

**Condensers:** Condensers that don’t come with filters shall have cottonwood screen filters (The Filter Shop), and be oriented for periodic removal, brooming off, and ideally visual inspection from a distance. Even with these cottonwood screens, condensers will get loaded up and must be easily cleanable via power sprayer. Things to avoid are inaccessible condenser coils, or back-to-back coils (free cooling), and cannot get to the face of a coil.