Campus Mechanical Standards

The following section documents the current campus standards with respect to mechanical equipment, energy efficiency and connections to the central utilities.

Campus Climatic Data:
The closest climatic data in the ASHRAE Region X Weather Data is (city), CA. The campus mean elevation above sea level is XXXX feet.

Summer Design Day Temperatures
0.1% - XX°F DB / XX°F MCWB – used only for critical facilities
0.5% - XX°F DB / XX°F MCWB – used for most campus buildings
0.5% - XX°F WB – used for sizing cooling towers

Winter Design Day Temperatures
0.2% - XX°F DB

Chilled Water System:
The campus utilizes a central plant with CHW thermal energy storage and … to meet the campus cooling requirements.

<table>
<thead>
<tr>
<th>Plant CHWS Temperature</th>
<th>XX°F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plant CHWR Temperature</td>
<td>XX°F</td>
</tr>
<tr>
<td>Available CHW ∆P</td>
<td>XX PSID</td>
</tr>
</tbody>
</table>

Building Connection: Design team shall design the chilled water piping distribution system (piping, valves, fittings, coils, etc.) within the building to a maximum pressure drop of XX feet head, whenever possible.

If it is proved that this is not feasible, a variable speed booster pump arrangement should be designed to maintain differential pressure at the hydraulically remote location in the building loop. A bypass with a check valve shall be provided to allow the building to operate without the booster pump when the central plant differential pressure is adequate to supply the building loop.

Pump head calculations should be provided for all booster pumps.

(Refer to attached building connection schematic)

Building Metering Requirement: CHW BTU meter that will operate reliably down to PX fps velocity.

Refer to CSU Metering Guidelines at www.calstate.edu/cpdc/ae/

Underground Piping Material and Fittings:

Comment [KWP1]: If the distribution system pressure differential is high enough to handle the building pressure drop, no booster pumping would be required. This saves both first cost, space and maintenance costs.

Comment [KWP2]: Minimum velocity is an important parameter for variable flow building connections.

Comment [KWP3]: This should also indicate restrained or unrestrained joints, thrust blocks, etc.
Heating Hot Water System:
The campus utilizes a central plant to meet the campus heating requirements.

- **Plant HHWS Temperature**: XXX°F
- **Plant HHWR Temperature**: XXX°F
- **Available HHW ΔP**: XX PSID

**Building Connection**: Design team shall design the heating hot water piping distribution system (piping, valves, fittings, coils, etc.) within the building to a maximum pressure drop of XX feet head, whenever possible.

If it is proved that this is not feasible, a variable speed booster pump arrangement should be designed to maintain differential pressure at the hydraulically remote location in the building loop. A bypass with a check valve shall be provided to allow the building to operate without the booster pump when the central plant differential pressure is adequate to supply the building loop.

Pump head calculations should be provided for all booster pumps. *(Attach building connection schematic)*

**Building Metering Requirement**: HHW BTU meter that will operate reliably down to 0.X fps velocity. Refer to CSU Metering Guidelines at www.calstate.edu/cpdc/ae/

**Underground Piping Material and Fittings**:

- **DHW and IHW**: All new domestic and industrial water heating shall be achieved with …

**Air Handling System**:

- **Air handling units should be located inside the building whenever possible.** If the units are located exposed to the weather on the roof these units should be of double wall construction. Ductwork and piping for these units should be located within the attic space. Roof mounted ductwork and piping should be minimized.

- **Filters shall be 85%, MERV 11, extended media filter (Aerostar FP mini-pleat V-Bank or equivalent) with no pre-filter for most applications.**

- **Airflow monitoring shall be provided for outside air flow measurement**

- **Define any exterior corrosion protection requirements**

Air handling units should be provided with a convenience electrical outlet for maintenance. Power shall be available for servicing when power to the unit is shut off.

Control valve and balancing valve preferences *[Design consultant shall contact the campus project manager for this information]*
Fan Coil Units:
The use of fan coil units (FCU) is discouraged because excessive sound is transmitted into the space from the fan coil units and it is not cost effective to provide an economizer on a fan coil unit. When a fan coil unit must be used on a project, measures shall be taken to reduce the transmission of the noise from the unit into the occupied spaces.

Off-Hour Cooling:
Spaces requiring routine weekend or holiday ventilation cooling and / or heating requirements, or spaces of such a critical nature as to necessitate redundant cooling and / or heating provisions shall be provided with …

Chilled Water Coil Selection:
The chilled water system utilizes a thermal energy storage (TES) tank to store chilled water during off-peak periods. It is critical that all cooling coils connected to the chilled water system be designed to be compatible with the thermal storage system temperature differential utilized on the campus. [If the campus does not have a TES system then this paragraph should be deleted]

The campus standard coil construction is aluminum [copper (when the campus is within 5 miles from the ocean)] fins on copper tubes with the following parameters.

New Construction Coils

<table>
<thead>
<tr>
<th>Capacity</th>
<th>CHW ΔT</th>
<th>Minimum X°F CHW ΔT, <strong>XX</strong>°F to <strong>XX</strong>°F.</th>
<th>Maximum XX°F CHW ∆T, XX°F to XX°F.</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 tons and larger</td>
<td>Minimum XX°F CHW ΔT, XX°F to XX°F.</td>
<td>The coil shall be sized for maximum XXX FPM, minimum X-row, and maximum XX fins per inch.</td>
<td></td>
</tr>
<tr>
<td>&lt; 5 tons</td>
<td>Minimum XX°F CHW ΔT, XX°F to XX°F.</td>
<td>The coil shall be sized for maximum XXX FPM, minimum X-row, and maximum XX fins per inch.</td>
<td></td>
</tr>
</tbody>
</table>

Replacement Coils

<table>
<thead>
<tr>
<th>Capacity</th>
<th>CHW ΔT</th>
<th>Minimum X°F CHW ΔT, <strong>XX</strong>°F to <strong>XX</strong>°F.</th>
<th>Maximum XX°F CHW ∆T, XX°F to XX°F.</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 tons and larger</td>
<td>Minimum XX°F CHW ΔT, XX°F to XX°F.</td>
<td>The coil shall be sized for maximum XX fins per inch.</td>
<td></td>
</tr>
<tr>
<td>&lt; 5 tons</td>
<td>Minimum XX°F CHW ΔT, XX°F to XX°F.</td>
<td>The coil shall be sized for maximum XX fins per inch.</td>
<td></td>
</tr>
</tbody>
</table>

Motors:
All new motors used throughout the facility shall meet premium efficiency motor requirements.

Control System:
Controls contractor contact information
Does campus have standard control devices it prefers?
Define any specific campus control requirements?
See CSU Control Systems Design Guideline and Control Systems Procurement Guide at Calstate.edu/cpdc/ae

Comment [KWP7]: Fan savings can be realized by sizing cooling coils for 400 fpm or less, especially on buildings with higher operating hours.

Comment [KWP8]: The CHWS temperature entering the coil can be 1-2°F higher than the central plant CHWS temperature depending on the length of piping exposed to the environment.
Water Chemical Treatment:

Water Chemical Treatment company contact information