Basis of Design

This section applies to the design and installation of steam and condensate systems.

Design Criteria

- Heat all buildings adjacent to the utility tunnel by steam from the power plant. Steam is available at 185 psig and/or 10 psig. Check with Engineering Services on the availability of steam service. Use 10 psig steam whenever possible because it benefits the operation of the power plant turbine generator. The 185 psig steam is reserved for use in buildings distant from the power plant (i.e., Campus Parkway and South Campus) and laboratory buildings that need the higher pressure steam for laboratory or process use. Provide local building two-stage pressure reducing stations to reduce the 185 psig steam down to 15 psig for use on all building heating systems. Return the steam condensate to the Power Plant whenever possible. Steam radiant heating is not acceptable except for special applications approved by Engineering Services.

- Convert Power Plant steam to hot water at all buildings to meet all heating requirements except one-way air (100% outside air) system preheat coils. Use steam in one-way air system preheat coils to prevent freeze damage to the system. Provide two-position control valves on preheat coils in one-way air systems. Use low pressure steam, no greater than 15 psig; size the preheat coil based on 7 psig steam to the valve.

- See Metering section for steam/condensate meter and monitoring requirements.

- Recommended AHU coil arrangement in order from the outside air intake to the supply fan on a draw thru system is (heat recovery, steam preheat, heating water, and cooling coil). Discuss with Engineering Services if different.

Design Evaluation

The following information is required to evaluate the design:

Schematic Design Phase: Identify all systems, and include single line system flow diagrams, shaft locations, design calculations, and energy balances. Special occupancy zone requirements must be called out and systems identified.

Design Development Phase: Provide updated single line system flow diagrams, equipment schedules, design calculations, and an outline of specifications.

Construction Document Phase: Provide equipment access indications, final single line system flow diagrams, tunnel pipe supports design and calculations, equipment schedules, design calculations, and specifications.

Products, Material and Equipment

- For steam and condensate piping, see Piping, Valves & Accessories section.

- Provide inverted bucket-type traps at the end of high pressure steam mains. Provide float and thermostatic type traps for low pressure steam mains.

- Provide pneumatic rather than self-contained steam control valves on hot water converters.

- Hand valves for radiators or convectors should be packed type suitable for servicing.
• Converters must be ASME approved, stamped, and State Boiler Inspector's certificate forwarded to University. Use low pressure steam only (15 psig maximum) with capacity based on 7 psig steam to the control valve.

• Provide slip-type pipe expansion joints. Bellows type pipe expansion joints are not acceptable.

• Provide 1” warmup bypass pipe with globe valve across all main building steam isolation valves and all tunnel steam isolation valves.

• Orient steam piping and install steam traps to avoid accumulating steam condensate above vertically oriented steam shutoff valves.

• Where inverted bucket traps are used, avoid traps that lose their prime during low load conditions then need to be manually re-primed.

• Preferably, avoid use of noise reduction orifice plates at steam PRVs.

• See Steam Trap Assembly detail at the end of this section.

Installation, Fabrication, and Construction

• Steam headers shall have valved branches to each specific load, hot water, storage heater, converter, heating coil, etc.

• Pressure reducing stations shall include at least two valves sized for \( \frac{1}{3} - \frac{2}{3} \) of total load. Show loads on drawings.

• Flash high pressure steam (185 psig) condensate in a flash tank to the low pressure steam system.

• Drip and trap all low and medium pressure steam (1 - 110 psig) supply main branches over 12 feet long.

• Provide strainers ahead of traps on coils, converters, or other heat exchangers. Provide adequate static head (minimum 12”) above traps to insure proper operation.

• Do not attempt to lift condensate by steam pressure.

• Do not install steam or condensate piping below slabs on grade.

• If steam is intended to be used for temporary heat, discuss with Engineering Services. Condensate shall be wasted by tempering to below 140F then dumped to sewer drain.

END OF DESIGN GUIDE SECTION
LOW PRESSURE STEAM

H.P. TRAP
CHECK VALVE
GATE VALVE

SURGE SUPPRESSOR 4"Ø SCHEDULE 40 PIPE 6" LONG WITH WELDED CAPS
H.P. STEAM (OVER 15 PSIG)
WELD TEE FITTING

3" DRIP LEG
1/2" GATE VALVE

NOTE:
ALL SCREWED NIPPLES MUST BE FACTORY CUT AND THREADED

MEDIUM OR HIGH PRESSURE STEAM

H.P. Drip
GATE VALVE SAME SIZE AS STRAINER CONNECTOR

Steam Trap Assembly

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