

STEAM SYSTEMS

Service Entrance: See the *Steam Distribution Systems* section within these *Design Standards* for requirements regarding steam and condensate service entrances for buildings served by the central steam distribution system.

Pressure Regulating Station: Within each building, a separate pressure regulating (PRV) station shall be installed to serve each distinct steam operating pressure requirement.

Pressure Relief Valve: An appropriately sized and selected relief valve shall be provided immediately downstream of each PRV station. The pressure setting for each relief valve shall be low enough to provide required protection for system components but shall be adequate to prevent nuisance discharges of steam throughout the full range of normal operating conditions. For example, a relief valve serving a 10-15 PSIG system shall typically have a set point of 20-25 PSIG.

Pressure Relief Vent: Each steam pressure relief valve shall be served by an adequately sized vent pipe that extends to 30" above the roofline and is configured to discharge vertically. This vent stack shall be terminated in a manner that prevents the entrance of birds and debris. The base of each vent stack shall include a drip pan elbow.

Condensate Return Systems: All steam condensate shall be collected and returned to the central utility plant. Each steam supply system with a distinct operating pressure shall be served by a dedicated gravity condensate return piping system. All condensate return piping, including vacuum return piping, shall be continually pitched in the direction of flow with no rises in elevation (with few exceptions, such as drip trap discharge lines). The condensate from all gravity return systems within a building shall be returned to one or more vented receivers.

Condensate Receiver and Pump Unit: All condensate from building steam systems that are served by the central steam distribution system shall be collected and pumped back into the central condensate return system. Duplex type condensate receivers are preferred. Condensate pumps shall be electric motor driven.

Condensate Receiver Vent Line: An adequately sized vent line shall be provided for each receiver. It shall be extended to the top of the building and configured to vent flash steam to atmosphere in a safe manner and it shall be terminated in a manner that prevents the entrance of birds and debris. It should be noted that condensate receiver vent lines are often undersized, resulting in elevated pressures/temperatures within receivers. This contributes to cavitation at pump impellers. Vent lines shall typically be sized larger than the receiver vent opening.

Condensate Metering: See the *Steam Distribution Systems* section within these *Design Standards* for condensate metering requirements.

Insulation: Steam and condensate piping including all hot surfaces on related equipment and devices shall be insulated. This includes unions, strainers, valves, valve bonnets, pressure regulating valves, control valves, condensate receivers, etc. Due to limited clearances and the need for access, condensate pumps may be excluded from this requirement.

Insulation is a cheap pay-back item, and needs to be designed for long-term durability. Guides, anchors, drips need well done insulation (no exposed hot metal). Otherwise areas get hot and moisture deterioration via elevated humidification levels works to destroy the surroundings. Again, poor insulation is an easily fixed energy waster. Valves and oddly shaped components to have easily removable strap-on jackets. In areas where pipe will need to be climbed on or squeezed around during maintenance, adequate consideration to be given insulation thicknesses/types (aerogels are thinner) and stiffer jackets (single or double thickness stainless sheet).

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Buildings Without PRV's: If a building is using line pressure steam with no PRV station, and subsequently no vented condensate tank, a failed trap can easily go unnoticed. Trap 'test tees' shall be installed (so can be periodically be inspected to find a failed trap), as well as possibly monitoring trap discharge temperature via building BSM temperature sensors.

Also note that City Campus steam is superheated, and traps will see the superheat, and must be compatible with superheat.

Specification Considerations: Design Engineer to consider adding the following project requirements:

- Verification of piping origin, metallurgy, mill sheets
- Specify domestic pipe projection
- 100% x-rayed pipe if direct-bury pipe
- 3rd party verification of direct-bury pipe installation