

SECTION 238400 – HUMIDIFIERS

- 1.0 ASHRAE 90.1 Compliance: University of Pennsylvania buildings shall comply with the Commercial Energy Efficiency Requirements of ASHRAE Standard 90.1-2016. The ASHRAE 90.1-2016 compliance paths shall be followed instead of the International Energy Conservation Code (IECC) requirements as permitted by 2018 IECC Section 401.2 Application.
- 2.0 Humidifiers shall be of the non-jacketed rapid absorption, jacketed dry steam or self-contained steam types. Pan, wetted drum, and power wetted element humidifiers are prohibited. Infrared pan type humidifiers are allowed in self-contained Computer Room units only, refer to Section 236200.
- 3.0 All humidifiers shall use a steam dispersion manifold. The preferred location for humidifiers is in the air handling unit up-stream of the cooling coil. Review applications with the University Engineering Department. All controls, valves, and traps, etc. must be located outside of the air stream.
- 4.0 The Campus central steam system may be used as a humidification source and can be directly dispersed into the air stream. (Preferred Method).
- 5.0 All steam humidifiers shall operate with low pressure steam (15 PSI or less at the inlet to the humidifier's modulating steam control valve). All control valves shall be rated for 150% of the operating pressure, otherwise, pressure reducing valves shall be provided.
- 6.0 All free standing space humidifiers shall be of the self-contained type.
- 7.0 Non-jacketed rapid absorption shall contain the following components: Modulating steam control valve, high efficiency insulated steam dispersion tubes & headers constructed from stainless steel, and steam traps.
- 8.0 Jacketed dry steam shall contain the following components:
 - A. Incoming steam service automatic 2-position isolation control valve and capacity modulating steam control valve.
 - B. Stainless steel steam jacketed dispersion tube(s) with insulating value of at least R-0.5.
 - C. Steam separator.
 - D. Separating baffles.
 - E. Steam trap(s).
 - F. Electronic Control valve (60:1 rangeability for 100% outdoor systems).
 - G. Drying chamber.
- 9.0 Self-contained humidifiers (not preferred) shall be of the electrode steam generator type and contain the following:
 - A. Disposable cylinders.
 - B. Microprocessor controls to accept a signal from BAS provided humidity sensors

- C. Automatic cylinder fill and drain controls to maintain water conductivity and minimize energy waste. Built-in timers for repetitive drain cycles are prohibited.
 - D. Cylinder monitor to discern end of cylinder life.
 - E. 16 gauge steel cabinet with hinged and lockable access door.
 - F. Fill cup to prevent back siphonage.
 - G. Fuses to protect the heater and transformer.
 - H. U.L. or ETL listing.
- 10.0 Designer shall review the control of all humidifiers to ascertain that system response can meet or exceed expected load variations and maintain desired humidity levels. The suggested control options are as follows:
- A. For HVAC systems with central humidification, setpoint conditions shall be maintained from a signal from a relative humidity transmitter located in the discharge air duct controlling the humidifier steam control valve. Supply air relative humidity control shall be reset by one (or more) space sensors located in the space(s) served. The steam control valve shall close when the high limit is reached in the duct.
 - B. For individual space humidification applications, a normally closed steam control valve shall be used to control the humidifier output via a space humidity sensor wired in series with a high limit controller.
 - C. Return air duct (for ducts returning multiple spaces) humidity sensors shall not be used to control space humidity levels.
- 11.0 The majority of the buildings on campus are not humidified. Only special spaces such as vivaria, museums, selected laboratories and data centers may require humidification to maintain a required humidity level. Confirm humidification requirements and humidity levels with the project program requirements. In no case shall the level be in excess of that which the existing structure can maintain without resulting in the formation of condensation. In new buildings that require humidification, the Engineer must work with the Architect to design building walls and glazing components which will permit winter period humidity levels that meet present indoor air quality requirements. The Engineer shall submit calculations showing the anticipated wall and window temperature gradients based upon a 0 F and 93 F ambient temperatures. Special consideration shall be given to structural steel exposed to space conditions.
- 12.0 The locations of humidifiers shall generally be restricted to Mechanical Rooms. Where individual humidifiers are duct mounted, the duct construction must be watertight stainless steel for 150 percent of the humidifier's absorption distance. Duct mounted humidifiers shall be located in corridors or other accessible areas. They shall not be located above rooms being served. The duct section shall have a drain connection piped to the nearest floor drain. Blocking valves shall be provided to prevent condensation.