

Condensate Removal from HVAC Equipment

Mechanical Specification – Condensate Trap

The installer of the HVAC cooling (or Energy Recovery) equipment shall be responsible for the removal of condensate, and other possible sources of water formation, from the unit and the delivery of the water to an approved drainage system as determined by local codes or owner's preferences, such as gray water storage or storm water drainage system. The external drain lines shall be connected to the unit by means of unit manufacturer supplied standard male pipe connections stubbed external to the unit, near the base. The drain line shall be sloped downward at a minimum of 1/8 inch per running foot in the direction of water flow away from the unit.

To prevent air from entering or leaving the HVAC unit, a condensate trap shall be placed within the water drain line that prevents air flow through the trap but allows water to exit the unit and flow to the drainage system. Whether positive plenum pressure (fan blowing through cooling coil) or negative plenum pressure (fan drawing through cooling coil) a trap shall be installed within the drain line as near to the unit drain connection as is practicable.

The trap shall prevent any noticeable or measurable air flow from or to the HVAC unit by way of the condensate drain line at any time during the year. In addition, the drain line and trap shall:

- a) Be designed to prevent any water from remaining in the drain pan, drain line, or trap when there is no condensate being produced.
- b) Not require priming with water after extended period of no condensate formation.
- c) Have means to access the trap and lines for purpose of flushing debris from condensate line.
- d) Meet standard building code requirements.

Air entering or leaving an HVAC unit via the condensate drain line manifests itself as an energy loss and a reduction of indoor air quality, the reason being that the replacement air must be filtered and conditioned. In addition, air drawn into a unit (which occurs often with a dry P-Trap, usually originates at undesirable locations such as gray water storage tanks or near sewer vents. As a result, the condensate line trap shall essentially never allow air to flow through the drain line.

The drain line, in addition to being properly sloped away from the unit, may require inclusion of a vent pipe. If required, the vent should be installed as close to the exit of the trap as possible. The purpose of the vent is to prevent a vacuum from developing at exit of trap which could result in a trap malfunction. All condensate piping shall be supported at intervals to maintain a straight alignment and a uniform slope as required by the Uniform Plumbing Code. Allow for thermal expansion and movement in all piping installations using approved methods. Support, but do not rigidly restrain, piping at branches or changes of direction. Do not anchor rigidly in walls. Holes through framing members shall be adequately sized to allow free movement. The below table shows a recommended condensate-line pipe size as a function of AC tonnage; however, pipe size could vary depending on local weather conditions. For instance, a 20-ton AC unit may require 1 to 1 ¼- inch diameter in South Carolina and could easily be a ¾-inch in Las Vegas.

Size (tons)	0-20	21-40	41-60	61-100	101-250	>250
Minimum Condensate Drain Size (inches)	¾ to 1	1¼	1½	1½ - 2	2-3	3-4

Sample Specification:

For HVAC Unit# _____ the condensate drain line shall be _____ inch diameter schedule 40 PVC and the condensate trap shall be manufactured by _____, Model _____, capable of accommodating _____ GPH of condensate at a plenum pressure of _____ inches WC positive negative . Refer to Manufacturer's instructions for installation, operation, and maintenance of the condensate trap.

