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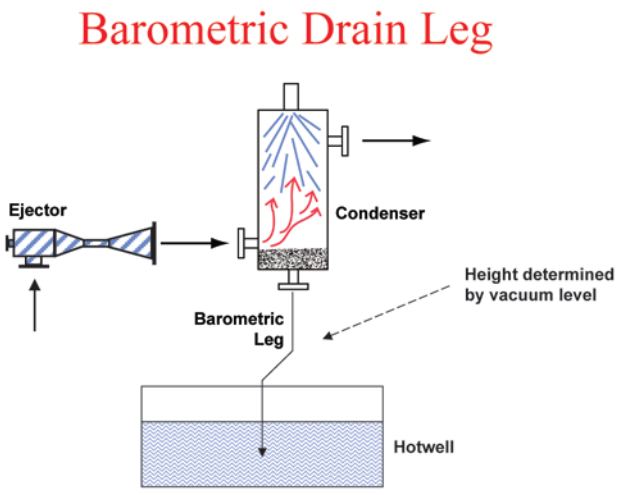
THE BAROMETRIC LEG AS DEFINED FOR UTILIZATION ON A DIRECT CONTACT CONDENSER WITHIN AN EJECTOR VACUUM SYSTEM

The steam jet ejector is the 'driving force' within a vacuum system that utilizes a 'jetting' steam flow through an expansion nozzle, into a suction mixing chamber and out through a 'recompression' venturi diffuser with the ejector mass flow discharge developing a capability to increase the pressure to operate with a following barometric condenser. The steam ejector supports preceding process equipment that is engineered to operate under sub-atmospheric conditions. A vacuum system can have multiple ejector/condenser stages wherein each stage incrementally increases pressure until atmospheric pressure is achieved.

As stated, a "barometric leg" is terminology applied to the drain connection and piping connected to the condenser drain as a tail leg. The operating range of these direct contact condensers are from 1" up to 30" of Hg vacuum. Since a cooling medium (primarily water in all cases) is used for condensing of carry-over steam, other condensable vapors and non-condensibles from the preceding steam jet ejector, the condenser has a "drain leg" to expel the cooling water/condensate mixture to atmosphere while saturated non-condensibles exit the condenser vent. The vertical 'down-flow' drain leg terminates in a receiver (or Hotwell) installed at ground level.

For further definition of the "barometric leg", let us say that the operating pressure of the direct contact condenser is 15" HgA while the 'sealed' drain leg to the Hotwell receiver is at atmospheric pressure (say 30" HgA or 14.7 psia). In this case, the atmospheric pressure 'pressing down' on the hotwell water level surface will push the water level up to meet the condenser's operating pressure of 15"HgA (or 17 feet of water in the drain leg piping). The condenser would have to be installed so that the flanged tail pipe outlet from the condenser is 17 feet absolute minimum above the Hotwell. To insure that the condenser lower body bottom section does not flood if vacuum actually increases, it is recommended that the condenser be mounted 34 ft above the Hotwell water level. Certainly, this is not imperative for installing a barometric condenser and the length of the barometric leg, but considerations should be made as to potential variations in operating vacuum to prohibit potential flooding of the barometric condenser. There should be no 90 deg turns (should have only 'straight' pipe or, if necessary, a 45 deg 'jog' as a maximum) in the barometric leg assembly.



The Hotwell receiver itself should have certain criteria of design and provide a liquid level control by installation of a weir baffle and have the barometric leg 'sealed' a minimum of 6" below the top of the weir. The Hotwell would also serve as a sump for condensate removal. The Hotwell receiver sump could be 'self-draining' if it were elevated above ground level.

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