VENTURI METER AND ORIFICE METER

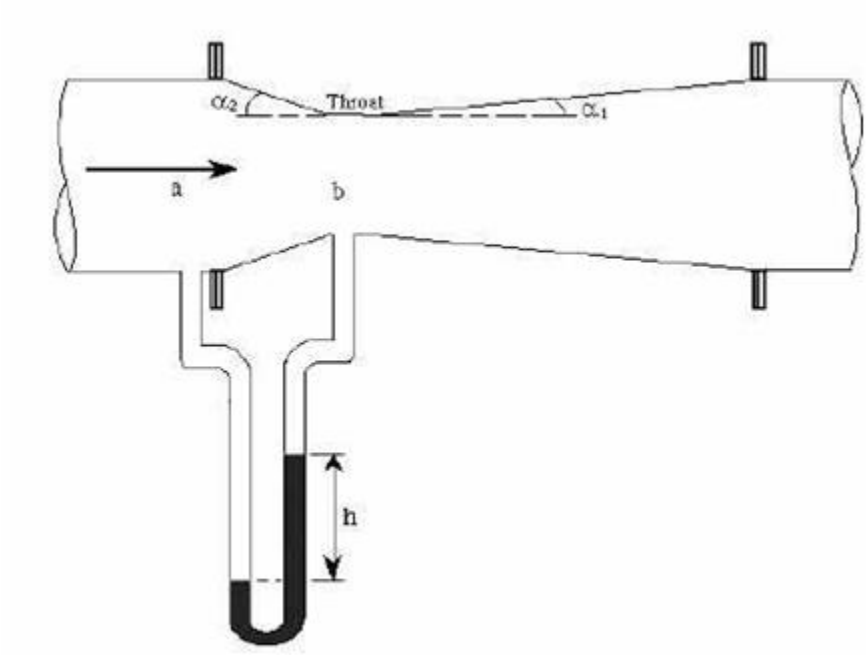
VENTURIMETER

In this meter the fluid is accelerated by its passage through a converging cone of angle 15-20o.

The pressure difference between the upstream end if the cone and the throat are measured and provide the signal for the rate of flow.

The fluid is then retarded in a cone of smaller angle (5-7o) in which large proportion of kinetic energy is converted back to pressure energy.

Because of the gradual reduction in the area there is no vena contracta and the flow area is a minimum at the throat so that the coefficient of contraction
is unity.



The attraction of this meter lies in its high-energy recovery so that it may be used where only a small pressure head is available, though its construction
is expensive.

To make the pressure recovery large, the angle of downstream cone is small, so boundary layer separation is prevented and friction minimized.

Since separation does not occur in a contracting cross section, the upstream cone can be made shorter than the downstream cone with but little friction, and space and material are thereby conserved.

Although Venturimeter can be applied to the measurement of gas, they are most commonly used for liquids.

The following treatment is limited to incompressible fluids.

The basic equation for the venturimeter is obtained by writing the Bernoulli equation for incompressible fluids between the two sections a and b. Friction is neglected, the meter is assumed to be horizontal.

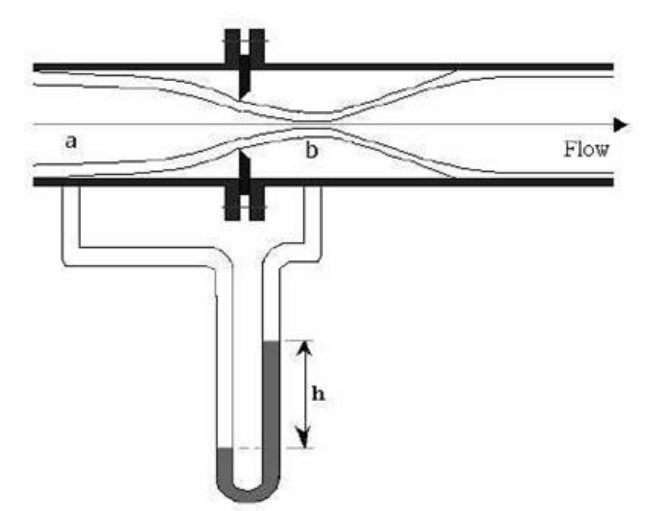
ORIFICE METER

The Venturi meter described earlier is a reliable flow-measuring device. Furthermore, it causes little pressure loss.

For these reasons it is widely used, particularly for large-volume liquid and gas flows. However this meter is relatively complex to construct and hence
expensive. Especially for small pipelines, its cost seems prohibitive, so simpler devices such as orifice meters are used.

The orifice meter consists of a flat orifice plate with a circular hole drilled in it.
There is a pressure tap upstream from the orifice plate and another just downstream.

The principle of the orifice meter is identical with that of the venturi meter.



The reduction of the cross section of the flowing stream in passing through the orifice increases the velocity head at the expense of the pressure head, and manometer measures the reduction in pressure between the taps.

Bernoulli's equation provides a basis for correlating the increase in velocity head with the decrease in pressure head.

Source : http://mediatoget.blogspot.in/2011/11/orifice-meter.html