

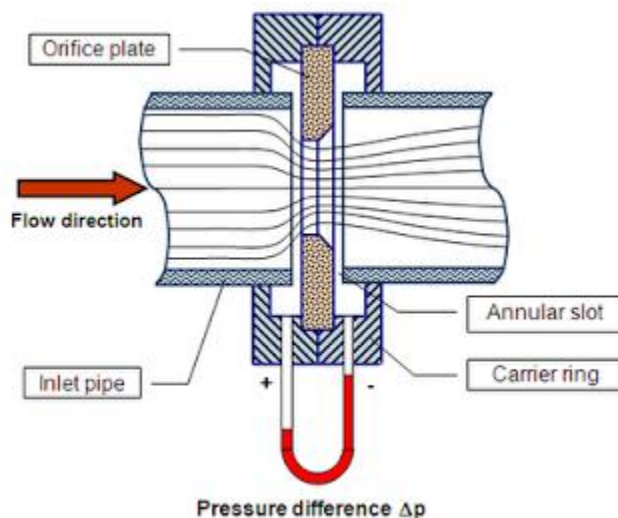
Head type flowmeters – Based on Differential Pressure Measurement

In these head type flowmeters, some device is inserted into a pipe carrying fluid. It obstructs the flow of fluid and creates a pressure difference on either side of the device. The most commonly used devices are as follows:

1. Orifice plate.
2. Venturi plate.
3. Flow nozzle.
4. Doll flow tube.
5. Pilot tube.

The basic principle of all such devices is that due to obstruction, the velocity of the fluid increases and the pressure decreases. Then the volume flow rate is proportional to the square root of pressure difference across the obstruction. To measure pressure difference, diaphragm based differential pressure transducer is used.

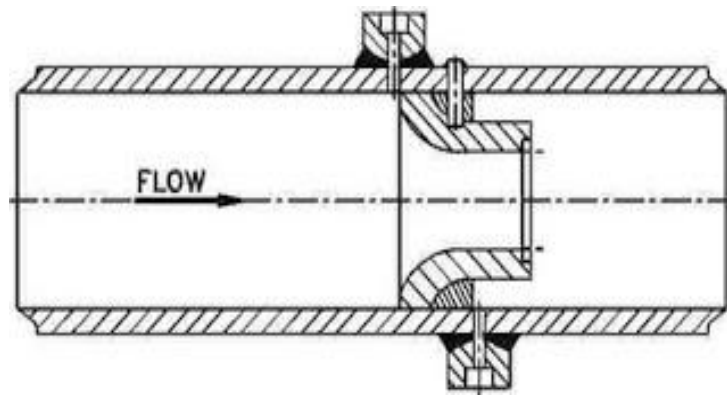
Orifice plate:



The orifice plate is a metal disk with a concentric hole as shown in the figure below. It is the simplest device used in almost all industrial application because of cheapness and availability in wide range of sizes.

There are certain limitations of the orifice plate. For very high flow rates, the permanent pressure losses are very high. Over a period of time, the sharp edge of the hole wear out and the particles in the flowing fluid build up behind the hole reducing diameter. Hence discharge coefficient gradually changes. This problem can be eliminated by using eccentric hole near the bottom of the pipe which sweeps out built-up particles behind the plate. Sometimes bubbles of vapour or gas tend to built up behind plate and obstruct the flow. This can be avoided by mounting the orifice plate in vertical run of the pipe.

Flow nozzle:



As compared to the orifice plate, flow nozzle is better option as no possibility of solid particles or bubbles of gas sticking in the flow restriction. The flow across nozzle is as shown in the figure below.

The measurement accuracy of the flow nozzle is very high as no harm of getting warned out. But the cost is comparatively higher as fabrication of the flow nozzle is difficult. Also permanent pressure losses are also high similar to the orifice plate. The flow nozzles are typically used for the steam flow measurement.

Source:

<http://instrumentationandcontrollers.blogspot.in/2011/01/head-type-flowmeters-based-on.html>