Information on physics of designing General’s Orifice assembly

**General Instruments orifice plate** is a device used for measuring flow rate. Either a volumetric or mass flow rate may be determined, depending on the calculation associated with the it. It uses the same principle, namely Bernoulli's principle which states that there is a relationship between the pressure of the fluid and the velocity of the fluid. When the velocity increases, the pressure decreases and vice versa.

**Description**

General’s orifice plate is a thin plate with a hole in the middle or edge depending on design as per application. It is usually placed in a pipe in which fluid flows. When the fluid reaches the orifice plate, the fluid is forced to converge to go through the small hole; the point of maximum convergence actually occurs shortly downstream of the physical orifice, at the so-called vena contracta point. As it does so, the velocity and the pressure changes. Beyond the vena contracta, the fluid expands and the velocity and pressure change once again. By measuring the difference in fluid pressure between the normal pipe section and at the vena contracta, the volumetric and mass flow rates can be obtained from Bernoulli’s equation.

**Orifice assemblies manufacturing std. as per ISO 5167, AGA-3, and as per B16.5, B16.47, B16.36**

Orifice plates are most commonly used primary elements for flow measurement in pipelines based on the principle of measurement of ‘differential pressure’ created when an obstruction is placed in the fluid flow, due to increase in fluid velocity.

Orifice Plates cover a wide range of applications of fluid and operating conditions. They give an acceptable level of uncertainties at lowest cost and long life without regular maintenance.
Types of Orifice Plate

We manufacture orifice plates, restriction orifice plates, with or without carrier ring, meter run assemblies, integral orifice plates to suit customer’s requirements.

We have fully equipped integrated designing, manufacturing and testing facilities which are among the best in country. Over the years we have manufactured and supplied orifice plate assemblies to many prestigious projects in the domestic as well as international market.

<table>
<thead>
<tr>
<th>Type of orifice plate</th>
<th>Reynolds</th>
<th>Application</th>
<th>Viscosity @ 30°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Square edge concentric</td>
<td>5000 onwards</td>
<td>For all applications with clean of foreign particles</td>
<td>0.01cp to 10cp</td>
</tr>
<tr>
<td>Conical entrance</td>
<td>80 to 1500</td>
<td>High viscosity measuring capacity leading to ruling off application which requires accuracy at lowest reynolds, thus effectively rid off applications of magnetic and vortex</td>
<td>0.01cp to 150cp</td>
</tr>
<tr>
<td>Eccentric</td>
<td>3000 to 12000</td>
<td>For liquids containing solid particles that are likely to sediment or for vapors likely to deposit water condensate, also used for bottom flush application</td>
<td>0.01cp to 15cp</td>
</tr>
<tr>
<td>Quadrant edge</td>
<td>1500 to 9000</td>
<td>Viscous fluids and all and most for Fertilizer and petrochemicals</td>
<td>0.01cp to 40cp</td>
</tr>
<tr>
<td>Segmental</td>
<td>5000 to 20000</td>
<td>Sedimentation process application</td>
<td>0.01cp to 20cp</td>
</tr>
</tbody>
</table>

Square Edged Concentric

These are most commonly used for flow measurement. This has special features such as simple structures, high accuracy, and ease of installation & replacement. The orifice plates are correctly finished to the dimensions, surface roughness, and flatness to the applicable standard. These plates are recommended for clean liquids, gases & steam flow, when the Reynold number 75000.

Eccentric

For liquids containing solid particles that are likely to sediment or for vapors likely to deposit water condensate, this orifice plate is used with its eccentric bore bottom flush with the bottom of the piping inside surface so that the sedimentation of such inclusions are avoided. Likewise, for gases or vapors, it may be installed with its eccentric bore top flush with the ID of the piping to avoid stay of gas or vapor in its vicinity.

Segmental

Segmental orifice plates are most useful where there are substantial entrained water or air and also if there are suspension in the fluids. This avoids build up in front of the orifice plate. The orifice hole is placed at the bottom for gas service and top for liquids.

Quadrant Edge

The inlet edge of the bore of this orifice plate is rounded to a quarter circle. This orifice plate is usually used for viscous fluids & Reynolds number between 1500 to 9000.

Conical Entrance

These conical entrance orifice plates are used for low Reynolds number in the range of 80 to 1500 and give more constant or predictable discharge coefficient. At lower Reynolds numbers, the discharge coefficient of square edge orifice plate may change by as much as 30%. These are more usable for viscous service.