**PADDLE TYPE ORIFICE PLATE**

- D = Inside Line I.D.
- G = Vent & Drain Hole Diameter
- Dw = Diameter of Vent & Drain Hole Circle

**UNIVERSAL TYPE ORIFICE PLATE**

- The Universal Type Orifice Plate is designed to be used in an orifice fitting. Line sizes 2"-10" require a removable Orifice Plate Seal. Depending on the service, these seals are made of Nitrile, TFE, or stainless steel. Line sizes 12" and above require the seal to be vulcanized to the O.D. of the plate.

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**FLOW MEASUREMENT DEVICES**

**AVCO**

Alloy Valves and Control

3087 S. Harbor Blvd, Santa Ana, CA 92704 Tel (714) 427-0877 Fax (714) 427-6392 Web-site: www.avcovalve.com
AVCO manufactures Orifice Plates from 1/4"-96" in line size. The standard material of construction is 316 stainless steel. Orifice Plates are manufactured in strict accordance to AGA, ISA, ASME, API, and ISO standards. Special custom designs are also available. AVCO has a complete engineering department to assist in product selection and application.

This is the standard flow element “FE” type orifice plate. The orifice is beveled on the downstream edge, in accordance to AGA report #3. The purpose of the bevel is to reduce the width of the throat to the “e” dimension. The ratio of the orifice bore divided by the line I.D. is called the beta ratio “β”. The “β” ratio should be between .2 and .7. The accuracy of the flow coefficient diminishes beyond these limits.

Instead of beveling the downstream face of the orifice plate at 45°, a Counter Bore is another method of reducing the throat thickness to the “e” dimension. The Counter Bore diameter is equal to the bore plus dimension “A”.

The outside diameter of the bevel of the Eccentric Orifice is tangent to 98% of the line I.D. When set at the top of the line, entrained gases in a liquid will pass the orifice.

The Quadrant Orifice is designed to measure the flow of high viscosity fluids, and is recommended when the Reynold's Number is below 10,000. Quadrant Orifices maintain a constant coefficient in laminar flow. The radius “R” is a function of the β ratio. The thickness of the orifice is equal to quadrant radius “R”. The thickness of the orifice plate is equal to “R” rounded up to the next 1/8” increment. For example if R=.899, the orifice plate would be 1 inch thick. Due to the thickness and rounded entrance edge, the plate is very durable.

The purpose of the Restriction Orifice is to reduce the flow rate or to create a pressure drop. The Restriction Orifice plates are placed downstream of a turbine meter to guard against over-spin. A Restriction Orifice is denoted by “HO” or “FO”. When specifying a Restriction Orifice, plate thickness “E” should be thick enough to reduce plate deflection to a minimum. As a rule, the maximum pressure drop across a single orifice for a gas is 50%. For greater drops, multiple orifices may be used. Cavitation and excessive noise can be a problem.

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PERMANENT PRESSURE DROP VS. BETA RATIO FOR ORIFICE PLATES WITH FLANGE TAPS

PERMANENT PRESSURE LOSS \[ \Delta P_L = (1-0.24 \beta - 0.52 \beta^2 - 0.16 \beta^3) \Delta P \]

PERMANENT PRESSURE LOSS % OF DIFFERENTIAL PRESSURE

PERMANENT PRESSURE DROP VS BETA RATIO FOR ORIFICE PLATE WITH FLANGE TAPS

[Graph showing permanent pressure drop vs. beta ratio]

PERMANENT PRESSURE DROP VS. BETA RATIO FOR DIFFERENTIAL DEVICES

[Graph showing permanent pressure drop vs. beta ratio for various differential devices]