ORIFICE PLATES AND FLANGE UNIONS
PADDOLE TYPE ORIFICE PLATES
FOR USE WITH STANDARD RAISED FACE ORIFICE FLANGE UNIONS

Flow-Lin orifice plates are manufactured in accordance with AGA, ASME, ISA and ISO recommendations.

Standard materials of construction are 304SS, 316SS with other materials such as Monel, Hastelloy C, Alloy 20, Titanium and Tantalum available as required. Flow-Lin orifice plates may be supplied with Concentric, Eccentric, Segmental or Quadrant Edge bores as required.

Unless otherwise specified, Flow-Lin orifice plate handles are stamped with INLET, Line Size & Flange Rating, Bore, Tag Number, Material and Flow-Lin Job Number.

When ordering please specify:
1. MK-52
2. Line Size & Flange Rating
3. Thickness
4. Plate Material
5. Quantity & Tag No.
6. Bore Type (concentric etc.)
7. Orifice Bore, or to be calculated by Flow-Lin
8. Drain or Vent hole if required

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LARGER SIZE ORIFICE PLATES AVAILABLE ON REQUEST.

CONCENTRIC
ECCENTRIC
SEGMENTAL
QUADRANT EDGE
UNIVERSAL TYPE ORIFICE PLATES
FOR USE WITH RING JOINT ORIFICE PLATE HOLDERS

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Flow-Lin Universal Orifice Plates meet industry size standards and can be used interchangeable in orifice fitting up to 10" line size and in RTJ Plate Holders.

Each Flow-Lin universal plate is stamped with OUTLET, Line Size, Bore, Material and Tag No. near outer edge on downstream face.

When ordering please specify:
1. MK-50
2. Line Size
3. Bore Size
4. Material
5. Quantity
6. Tag No.

RING JOINT TYPE PLATE HOLDERS
FOR USE WITH RING JOINT TYPE ORIFICE FLANGES

MK-56

Flow-Lin MK-59 Plate Holders have hold-down screws to keep the MK-50 orifice plate in the holder, while MK-56 Holders are one-piece integral plate seals.
The Oval Form is standard. Flow-Lin Plate Holders are available in mild steel, 304SS, 316SS and Monel.

When ordering please specify:
1. Model Number
2. Line Size
3. Flange Rating
4. Material
5. Bore size if MK56
6. Quantity

DIMENSIONS AND A.P.I. RING NUMBERS

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Note: Dimensions and A.P.I. ring numbers are provided for various sizes, ranging from 1" to 12".
Flow-Lin Orifice Flange Unions are furnished in ASTM A105 to meet ANSI B16.36 Steel Orifice Flange Standard. Other materials such as 304SS, 316SS, Monel, Aluminum, Bronze and PVC are available as required.

Bore tolerances are within AGA and ASME recommendations for 0.75 Beta Ratio. Pressure tap connections are 1/2" NPT and 180° apart as standard. The tap hole diameter is 1/4" for sizes up to 2", 3/8" for sizes 2-1/2" and 3", and 1/2" for sizes 4" and over.

Each Flow-Lin Flange Union is supplied with:
- Stud Bolts - ASTM A193 GR.B7
- Nuts - ASTM A194 GR.2H
- Jackscrews (2) - ASTM A307
- Gaskets (2) - 1/16" Thick
- Pipe Plugs (4) - Hex Head Forged Steel

When ordering please specify:
1. Line size and pipe schedule
2. Flange type and rating
3. Flange Material
4. Tap connections if not 1/2" NPT

### 300# ORIFICE FLANGE UNION DIMENSIONS

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<th>A</th>
<th>Bore</th>
<th>D1</th>
<th>E</th>
<th>E1</th>
<th>E2</th>
<th>F</th>
<th>F1</th>
<th>Face</th>
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<th>Bore</th>
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<th>E</th>
<th>E1</th>
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*For Customer Specifications*
Notes:
3. Weight (lbs) for RFWN and RTJ Unions.
4. Weight (lbs) for RFSD and RFTHD Unions.

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TO INSTALL OR REMOVE ORIFICE PLATE:

1. Make certain the pipeline is not under pressure and has been properly drained or purged as required.

2. Loosen all studs.

3. Remove the studs in one half of the flange union.

4. Spread flange union by turning jackscrews clockwise.

5. Install new plate or remove existing plate for replacement or inspection.

6. Install new gaskets when installing plate. We recommend installing new gaskets each time orifice flange union is separated.

7. Release the flange union by turning jackscrews counter clockwise.

8. Replace studs.

9. Tighten studs starting with two studs opposite each other.
**ORIFICE BORE CALCULATION**

* FLOW-LIN CALCULATION (ASME MFC-3M-2004) *
* CONCENTRIC SHARP EDGE ORIFICE PLATE *

CUSTOMER NAME: ABC INSTRUMENT COMPANY  
PURCHASE ORDER NO.: 10-0110  
TAG NO.: FE-1098  
CAL. NO.: BC-24000-1  
DATE: 10-07-2010  
ENTERED BY: K. Lin

**OPERATING CONDITIONS:**

- UPSTREAM PIPE I.D. AT 68 DEG.F (INCHES) = 7.981
- DIFFERENTIAL PRESSURE AT MAX. FLOW (INCH. WATER) = 100.0000
- MAXIMUM FLOW RATE (LB/HR) = 40,000.00
- NORMAL FLOW RATE (LB/HR) = 30,000.00
- FLOWING PRESSURE (P.S.I.G.) = 150.000
- FLOWING TEMPERATURE (DEG. F) (SATURATED) = 365.869
- BAROMETRIC PRESSURE (P.S.I.A) = 14.700
- DENSITY OF DRY STEAM (LBm/CU-FT) = 0.3628
- PERCENT OF MOISTURE = 0.00
- VISCOSITY AT FLOW CONDITIONS (CENTIPOISES) = 0.0153
- FLOWING FLUID = STEAM
- ORIFICE PLATE MATERIAL = 316SS
- UPSTREAM PIPE MATERIAL = CARBON STEEL
- PRESSURE TAP LOCATIONS = FLANGE
- STATIC PRESSURE TAP LOCATION = UPSTREAM

**CALCULATION DETAILS:**

\[ Q_m = \frac{0.09970190 \times C \times Y \times d \times d \times Fa \times \text{SQR} \left( H_w \times D_f \right)}{(1 - B^4)} \]

- \( Q_m \): MAXIMUM MASS FLOW RATE (LBm/SEC) = 11.1111
- \( C \): DISCHARGE COEFFICIENT, EQ.(2-4) (2-5) = 0.6044
- \( Fa \): THERMAL EXPANSION CORRECTION FACTOR = 1.0061
- \( Y \): EXPANSION FACTOR OF FLOWING FLUID, EQ.(2-6) = 0.9960
- \( H_w \): MAXIMUM DIFFERENTIAL PRESSURE (INCH. WATER) = 100.0000
- \( D_f \): DENSITY OF FLOWING FLUID (LBm/CU-FT) = 0.3628
- \( V \): MAXIMUM MEAN VELOCITY IN THE PIPE (FT/SEC) = 88.1492
- \( R_n \): PIPE REYNOLDS NUMBER AT NORMAL FLOW = 1,555,329

- \( B \): BETA RATIO (BORE / PIPE I.D.) = 0.65761
- \( d \): ORIFICE BORE DIAMETER (INCHES) = 5.2484

\[ \text{FLOW RATE (LB/HR)} = 4,000.00 \times \text{SQ. ROOT (DIFF. INCH. WATER)} \]

- DIFFERENTIAL PRESSURE AT NORMAL FLOW (INCH. WATER) = 56.2500
- PERMANENT PRESSURE LOSS AT MAX. FLOW (PSI) EQ.(2-9) = 2.035
- PERMANENT PRESSURE LOSS AT NORMAL FLOW (PSI) = 1.145

DRAIN HOLE DIAMETER = 3/16 INCH.
HOLE CENTER TO ORIFICE BORE EDGE = 1.273 INCH.


E-MAIL SALES@FLOWLIN.COM : PH.817-478-0808 : FAX 817-478-7954
ORIFICE HOLDING BLOCKS

Flow Lin Orifice Holding Blocks are available in PVC, Teflon and other materials suitable for use in severe or caustic applications. They are used between 150# ANSI flanges.

For sizes up to 3", the holding block O.D. equals flange O.D. and bolt holes are included. For sizes 4" and over, the holding block O.D. equal orifice plate O.D. and bolt holes are not included.

When ordering please specify:
1. Material
2. Line size
3. Flange I.D.
4. Hardware if required

Flow-Lin CORPORATION

P. O. Box 171197
Arlington, Texas 76003

Phone (817) 478-0808
Dallas-Fort Worth Area

Fax (817) 478-7954