



ORIFICE PLATES

NOZZLES

VENTURIS

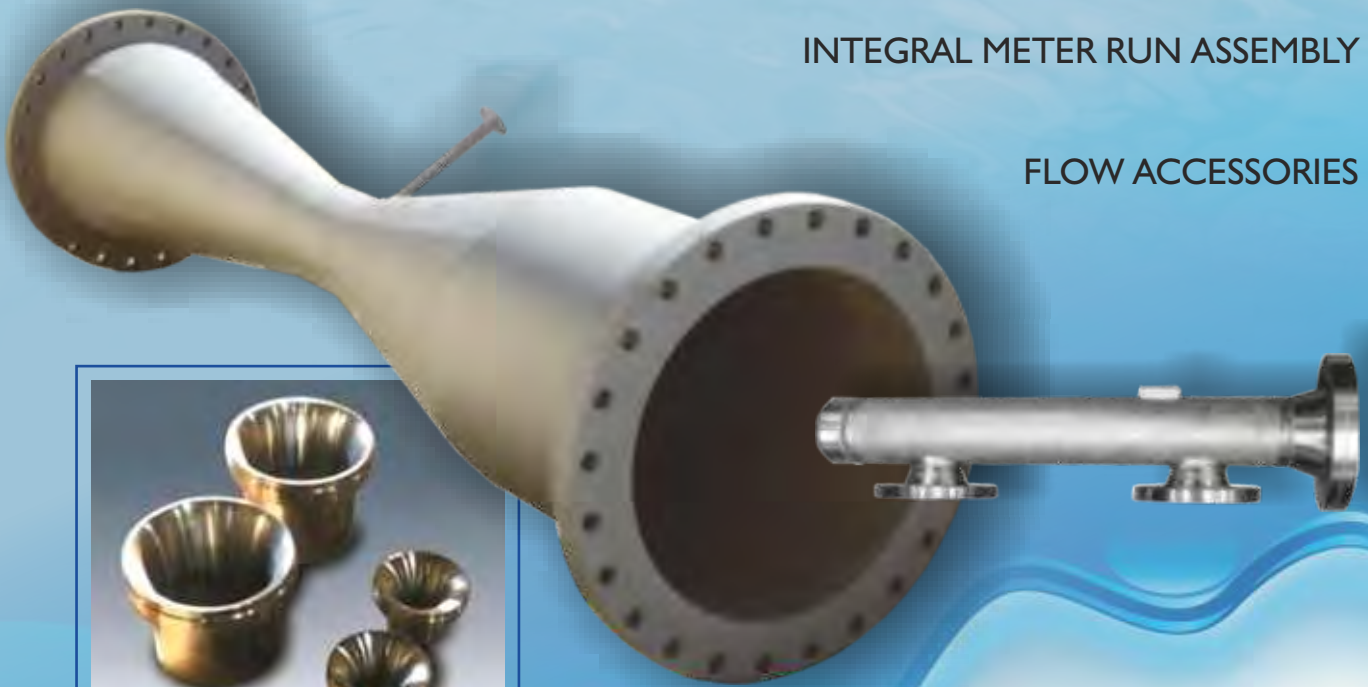
METER RUNS

AVERAGING PITOT TUBE

AEROFOILS

INTEGRAL METER RUN ASSEMBLY

FLOW ACCESSORIES



DynaFluid Valves and Flow Controls Pvt. Ltd was founded by Mr. M. T Kulkarni, an entrepreneur with over 42 years of experience in manufacturing products for measurement of Temperature, Pressure, Flow, Level Instrumentation & Industrial Valves.



We are the leaders in manufacturing various types of Flow Sensors, Industrial Valves and Pump / Valve components for Industrial applications like Sugar, Power, Oil, Gas, Petrochemical and other process Industries.

Our flow measurement and control products ranges from Orifice plate assembly, Restriction Orifice plate assembly (single stage & multistage), Flow Nozzle assembly, Venturi Tube, Averaging Pitot Tube, Aerofoil, Level Cages (Level external chambers / Level bye-pass chambers / Level Bridles) and many more. We manufacture valves in sizes ranging from DN15 to DN600 (sizes larger than DN600 are under development) and machined casted component from 1 kg to 200 Kgs. We have excellent mechanical processing equipments and latest modern inspection and testing equipments for our products.



Our Pump and Valve Component Division manufactures Valve Body, Bonnet, Plugs, Casings, Brackets, Impellers, Bearing Frames, Pump Shafts and many more parts in various materials which we also export in the international markets.

A state-of-the-art manufacturing facility, continuous research & development, innovative technology & stringent quality control at every stage have been some of the key factors in our manufacturing process.

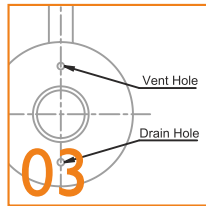
We have built first class reputation of total understanding of customer requirements and needs, thus delivering excellent products and services at competitive prices. Commitment and integrity are valued the most, which reflects in the philosophy of achieving total customer satisfaction.

With a presence in major cities in India and a growing international network across all continents, we are in a position to cater clients all over the world.

# INDEX



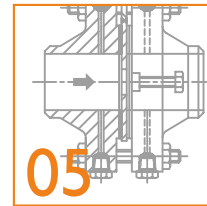
02 Orifice Plates



03 Types of Orifice Plates



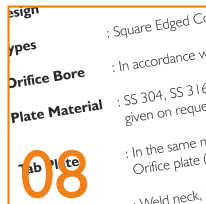
04 Orifice Plate Assembly with RTJ Holder



05 Orifice Assemblies



07 Restriction Orifice



08 Specifications



09 Integral Meter Run Assembly



10 Meter Runs



11 Nozzles



13 Venturi Tubes



14 Various Constructions for Venturi Tubes



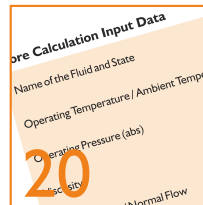
15 Averaging Pitot Tubes



17 Aerofoil



18 Accessories



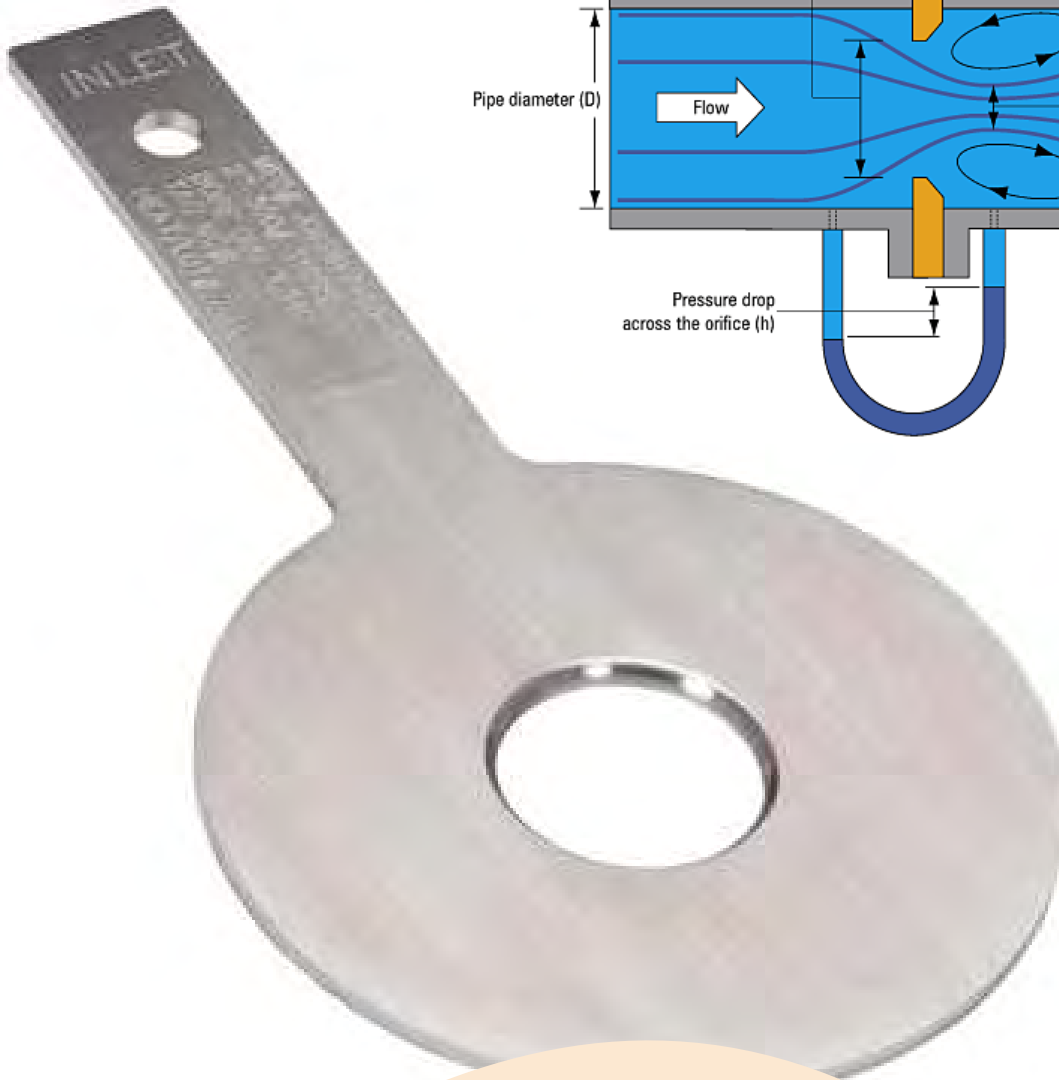
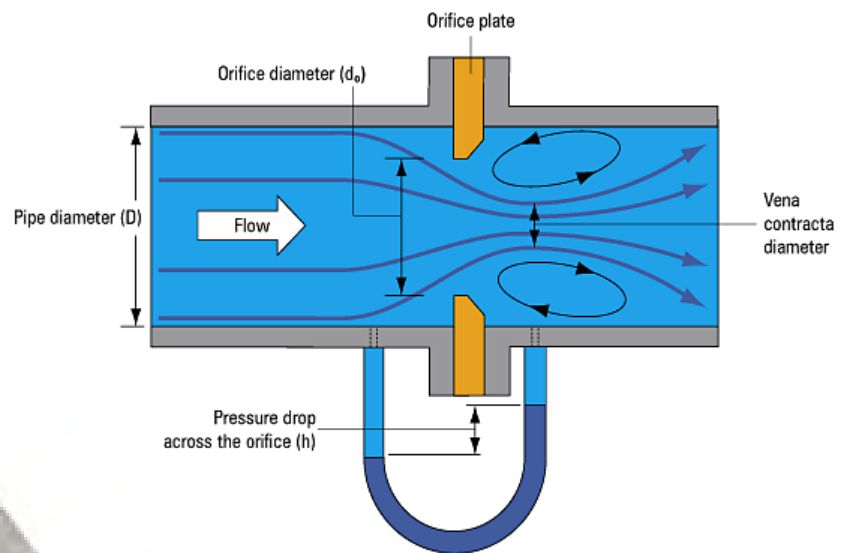
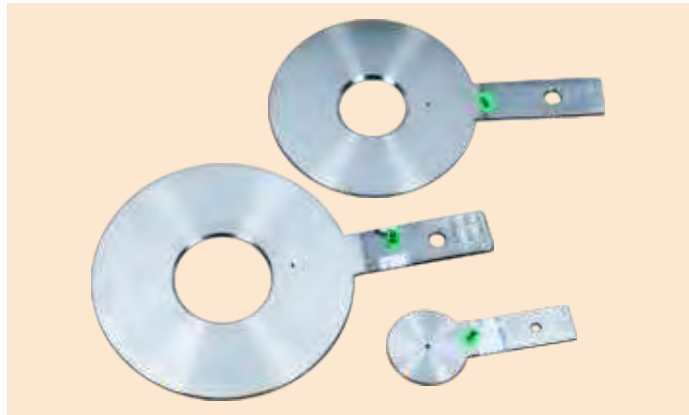
20 Process Data



21 Test Facilities

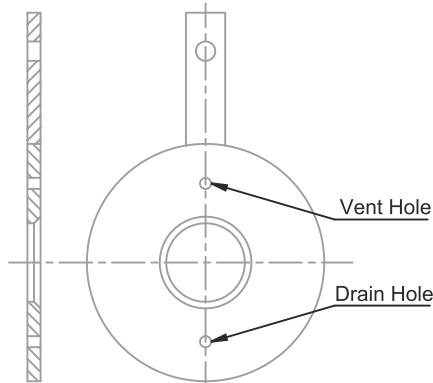
## Orifice Plates

Orifice plate is the heart of the orifice meter. It restricts the flow and develops the differential pressure which is proportional to the square of the flow rate. The flow measuring accuracy depends upon the quality of Orifice Plate, its installation and maintenance. Orifice plates cover a variety of applications of fluid and operating conditions.



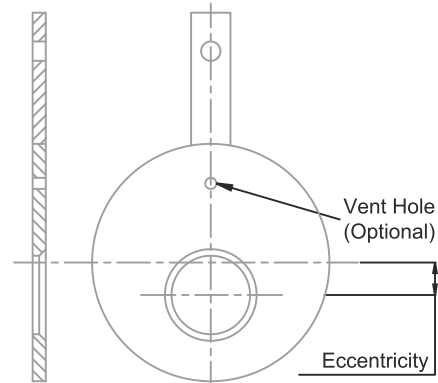


## Types of Orifice Plates



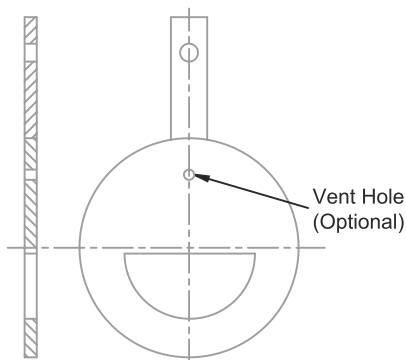
### Square Edged Concentric

An orifice plate with straight-through edges for the hole through which fluid flows; used to measure fluid flow in fluid conduits by means of differential pressure drop across the orifice.



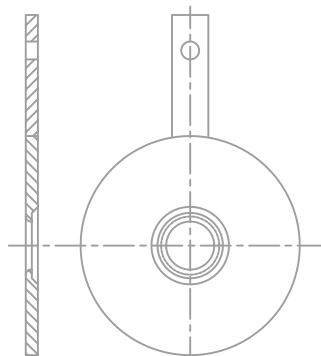
### Eccentric

For liquids containing solid particles that are likely to sediment or for vapours 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 vapours, it may be installed with its eccentric bore top flush with ID of the piping to avoid stay of gas or vapours in its vicinity.



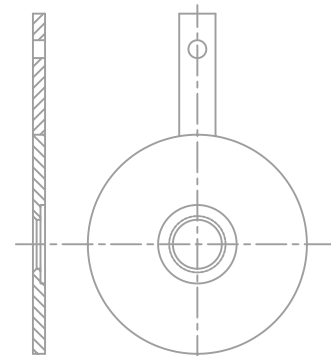
### Segmental

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



### Quadrant Edge

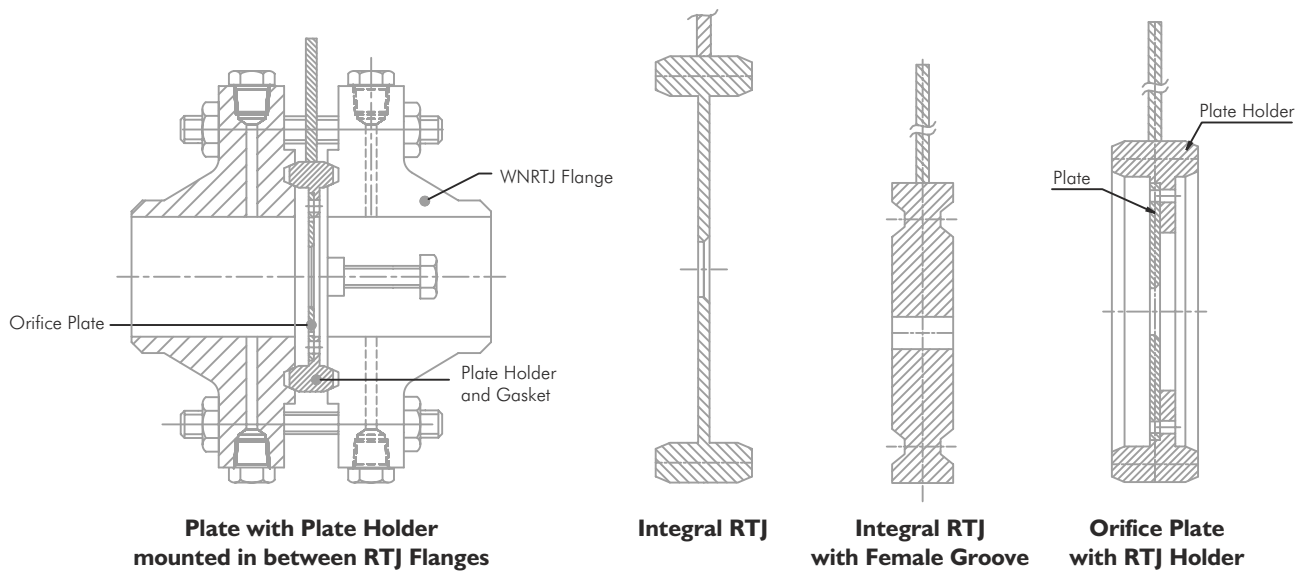
The inlet edge of the bore of this orifice plate is rounded to a quarter circle. This Orifice plate is usually used for viscous fluids and Reynolds number between 2000 to 10000



### Conical Entrance

These Conical Orifice plates are used for low Reynolds number ranging between 80 to 2000 and give more constant or predictable discharge coefficient. At lower Reynolds Number, the discharge coefficient of square edged orifice plate may change by as more as 30%. These are used for more viscous services.

## Orifice Plate Assembly with RTJ Holder



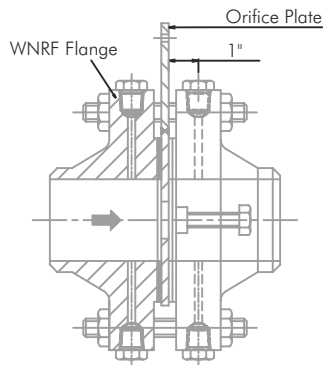
## Orifice Assemblies



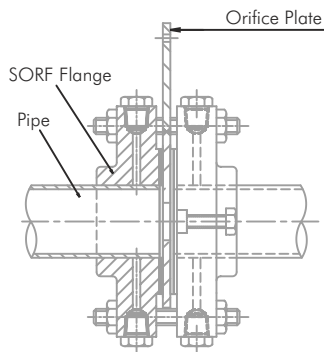
Orifice plates with flange assemblies are employed for measuring the rate of flow or quantity of moving fluids like liquids, gases or vapours.



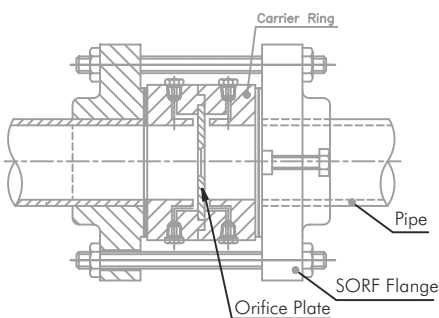
## Types of Orifice Assemblies



**Orifice Assembly with WNRF  
Flange & Flange Taps**



**Orifice Assembly with SORF  
Flange & Flange Taps**



**Orifice Plate with Carrier  
Ring & Flange Union**

### Orifice Plate with weld neck flange union

The weld neck flange is normally referred to as "High Hub" flange. It is designed to transfer stresses to the pipe, thereby reducing high stress concentration at the base of the flange. The pressure tapping's are provided through the flange which are at a distance of 1" from the face of the plate as in fig. Weld neck flanges are preferred where radiography on welding is involved.

### Orifice Plate with slip on flange union

The slip on flange has a low hub because the pipe slips into the flange prior to welding. It is welded both from inside and outside to provide better strength and prevent leakage. The slip on flanges are bored slightly larger than Outside diameter of the pipe.

### Orifice Plate with carrier ring and flange union

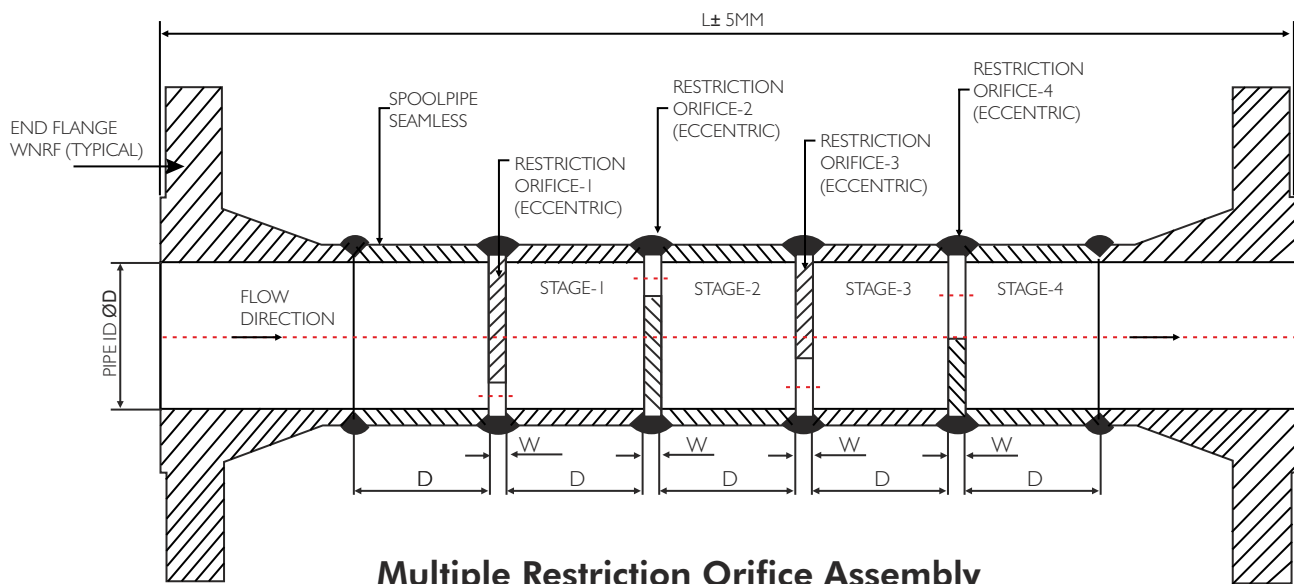
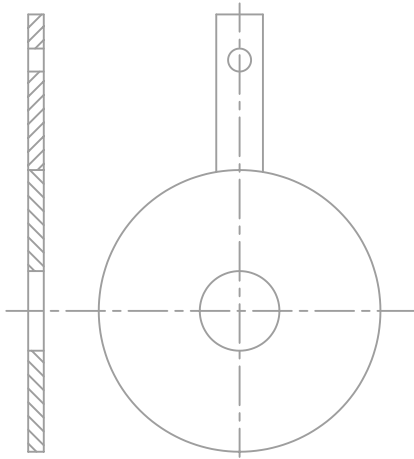
The construction is similar to the above except male-female carrier ring is provided to facilitate pressure tapping through it (corner tapping). This construction is generally used for lower line sizes (normally less than 2"). Carrier rings are also available for bigger sizes on request. Carrier ring machined from single block is also offered in place of male-female carrier.

For better accuracy, honed meter run assemblies are recommended which employ upstream and downstream straight lengths. The end connection in such case can be plain (suitable for welding) or flanged.





## Restriction Orifice



**Multiple Restriction Orifice Assembly**

Restriction Orifice plates have traditionally been used to reduce pressure in gas and liquid flow by forcing the flow through a restricted bore. The precise pressure drop is produced by accurately calculating the orifice bore taking in to consideration relevant process and flow conditions.

While single restriction orifice plates are often sufficient to meet the requirements, there are some situations where limitations arise due to process conditions making a single restriction orifice plate unacceptable.

Multistage Restriction orifice prevents a) Cavitation and Flashing in Liquids b) choked Flow in gases c) Excessive Noise/Vibration.

Construction of multi stage orifice assembly comprises of multi restriction orifice plates separated by a distance of one pipe diameter and welded with the pipes in between them. End connection is either suitable for butt welding or with end flanges.

## Specifications

|                           |                                                                                                                                                                                                                                                                                     |
|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Design</b>             | : Conforms to ISA RP 3.2, DIN 1952, BS 1042, ISO – 5167                                                                                                                                                                                                                             |
| <b>Types</b>              | : Square Edged Concentric, Quadrant Edged, Conical Entrance, Eccentric, Segmental.                                                                                                                                                                                                  |
| <b>Orifice Bore</b>       | : In accordance with ISO 5167, BS 1042, ASME MFC 3M, R W Miller, L K Spink, AGA- 3                                                                                                                                                                                                  |
| <b>Plate Material</b>     | : SS 304, SS 316, SS 316L as standard. Hastelloy–C, Monel, PP, PVC, PTFE coated etc can also be given on request.                                                                                                                                                                   |
| <b>Tab Plate</b>          | : In the same material as plate and is welded to the Orifice Plate. Tab plate integral to the Orifice plate (i.e. without welding ) can also be given as on request.                                                                                                                |
| <b>Flange Union</b>       | : Weld neck, Slip on, Threaded , Socket weld with RF or RTJ facing Orifice flanges are in accordance with ASME B 16.36 with minimum flange rating of #300 for sizes up to 8" or Male – Female flanges as ASME B 16.5                                                                |
| <b>Pressure Tapping's</b> | : Corner Tapping's are recommended for sizes up to 1 ½"; Flange taps for sizes 2" to 16"; D-D/2 taps for higher sizes.                                                                                                                                                              |
| <b>Vent / Drain</b>       | : Vent or Drain can be provided as per customer . The diameter of the vent or drain holes as per ISA RP 3.2                                                                                                                                                                         |
| <b>Gaskets</b>            | : CAF as per IS :2712 Gr.0/1 , Spiral wound + CAF, SS spiral wound + Grafoil, SS spiral wound + PTFE are normally supplied as per process requirement.<br><br>For RTJ flanges, the plate is fixed on the plate holder. The plate holder is in soft iron material and acts as gasket |
| <b>Stud / Nuts</b>        | : ASTM A 193 Gr. B7 / A 194 2H as standard, Others on request.                                                                                                                                                                                                                      |
| <b>Jack Screws</b>        | : ASTM A 193 Gr. B7 / A 194 2H as standard, Others on request.                                                                                                                                                                                                                      |

## Integral Meter Run Assembly



An Integral orifice assembly or Integral meter run assembly is a specially designed prefabricated meter run used when a high accuracy in flow measurement is required for extremely small flow rates. It is also used when differential pressure transmitter is to be directly mounted on the assembly. This eliminates the cost of installation of differential transmitter with impulse piping to the orifice assembly. It is used for line sizes 2" and below.

There is a temperature limit of the transmitter hence it cannot be used for process temperature above 120° C. The assembly generally consists of orifice plates between two integral blocks having corner taps. Generally meter run pipe is recommended with upstream length of 750 mm and downstream length of 250 mm. The pipes are welded to the blocks with end flanges.



## Meter Runs



Meter runs are used for the measurement of small flow rates precisely where high accuracy of flow rates is required. They are generally supplied as a unit normally of 1M length to ensure the necessary straight pipe length to achieve highest possible accuracy.

### Types of Meter Runs

- Orifice Flange union with Meter Run.
- Orifice Flange union with Carrier ring and Meter Run

Generally meter run pipe is recommended with upstream length of 750mm and downstream length of 250mm. These are available in line sizes mostly below 50mm. However Meter run sizes above 50mm are also available as per customer process requirements.

We comply Meter Tube internal Diameter Roundness Tolerance, in strict accordance as per American Gas Association Report No 3 Part 2

Any internal diameter measured in distance one pipe diameter will be less than 0.25% of the mean diameter for the upstream side

$$\left| \frac{[\text{Any diameter within One D}] - D \text{ Mean} \times 100}{D} \right| \leq 0.25\%$$

Also the percentage difference between the maximum and minimum measured internal diameter through all upstream meter tube will be less than 0.5%

$$\frac{\text{Maximum Diameter} - \text{Minimum Diameter} \times 100}{\text{Mean D}} \leq 0.5\%$$

For the down stream side any internal diameter measured will be less than 0.5% of the mean diameter for the down stream side

$$\left| \frac{[\text{Any down stream diameter D}] - D \text{ Mean} \times 100}{D} \right| \leq 0.25\%$$



## Nozzles



Flow nozzles are manufactured in accordance with ASME codes and standards. Flow nozzles are suitable for measuring liquids and gases and are commonly used for measure steam and water flow. They are manufactured strictly in accordance with ASME, MFC-3M, BS 1042 and ISO 5167.

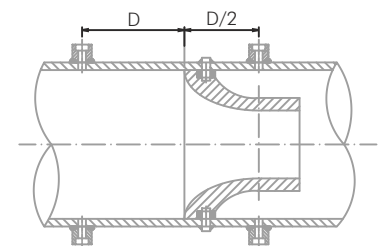
Flow nozzles are erosion resistant, consistently accurate and maintenance free. The rounded design provides a more effective sweep through of particles in the flow stream which in turn extends product life by reducing wear and potential damage

### There are three types of flow nozzles

- ISA 1932, with corner taps
- ASME long radius, low beta ratio ( $0.20 < \beta < 0.5$ ), with throat tap
- ASME long radius, high beta ratio ( $0.25 < \beta < 0.8$ ), with radius taps D & D/2

### Holding ring type Flow nozzle

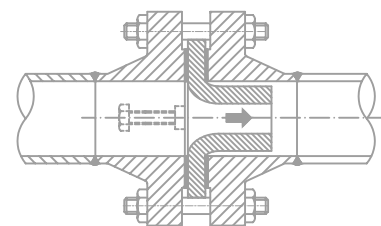
These nozzles are designed for installation in the pipeline without flanges. The flow nozzle is installed with the help of holding ring and locating pins which are made of same material as that of pipe thereby eliminating welding of dissimilar materials.



**Long Radius High Beta Ratio  
Holding Ring Type Nozzle**

### Flanged type Flow nozzle

These type of nozzles are generally used for insertion between pipe flanges. This type of nozzle is designed for pipe wall taps whose locations is determined by Beta ratio and pipe.

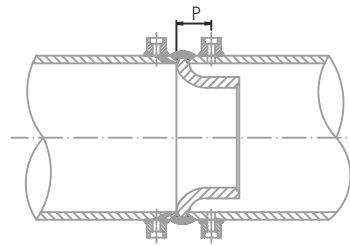


**Flanged Type Flow Nozzle**

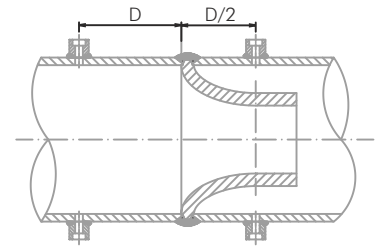
## Nozzles

### Weld in type Flow Nozzle

This type of nozzle has a machined tongue around its greatest diameter designed to fit between beveled ends of both inlet and outlet pipe section. The pipe sections with the nozzle in place are firmly clamped and welded. It is used where flanges are not applicable such as high temperature and pressure applications.



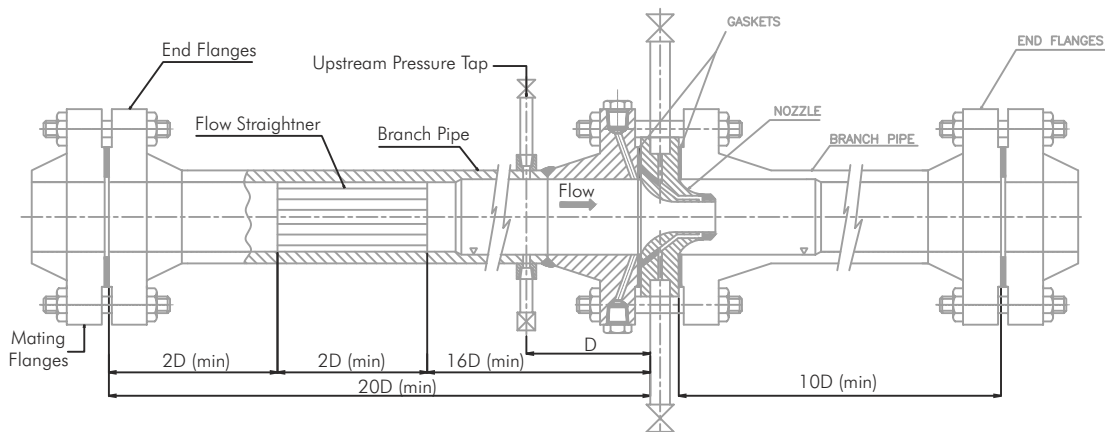
ISA1932 Weld-In Type Nozzle  
Corner Tappings



Long Radius High Beta Ratio  
Weld-In Type Nozzle

### Flanged type throat- tap Flow Nozzle

It is used when extremely accuracy and repeatability is required. It is generally purchased with a complete flow section and laboratory flow calibrated. These nozzles are manufactured strictly in accordance with ASME performance test code PTC 6



Flow Nozzle Assembly as per ASME PTC-6



## Venturi Tubes



A venturi is suitable for measuring liquids, gases or steam flow. Since the venturi offers no sharp edge protrusions into the flowing stream it is particularly useful in accurate flow measurement of any fluid containing suspended solids.

Venturis offer the best repeatability and pressure recovery, due to the continuous geometry of the contraction, throat, and divergent sections. The low overall pressure loss characteristic of a Venturi, reduces operating costs and head requirements of prime movers in systems. Experience has shown that Venturis have less stringent up- and downstream piping requirements than other flow systems.

Venturis are offered with several geometries. A particular geometry may be recommended by our Application Engineers based on the user's specific application, compliance requirements, beta ratio (throat diameter to inlet pipe internal diameter) and line size, in order to determine the best combination of performance and economy. Classical Herschel-Type Venturis consist of a conical inlet section, cylindrical throat section, and conical divergent section. Meters with line sizes less than 8 inches are machined, while larger line sizes are fabricated. Beta ratios are offered from 0.4 to 0.75. Combination of ISA 1932 Nozzle and classical venturi is known as Venturi Nozzle

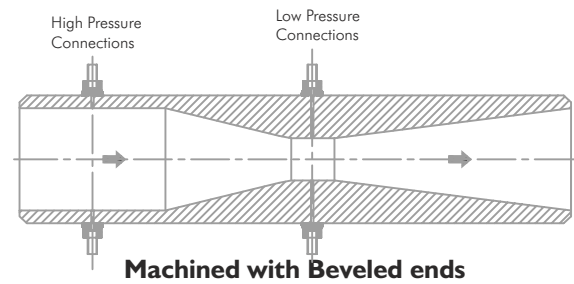
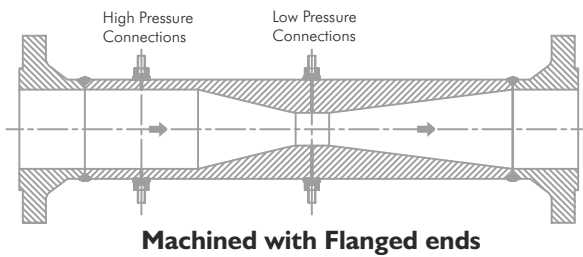
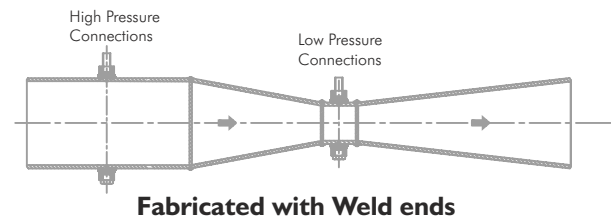
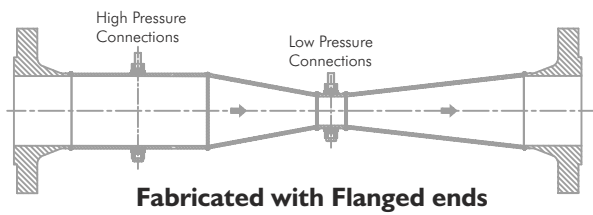


**Venturi Nozzle**



**Machined Venturi**

## Various Constructions for Venturi Tubes



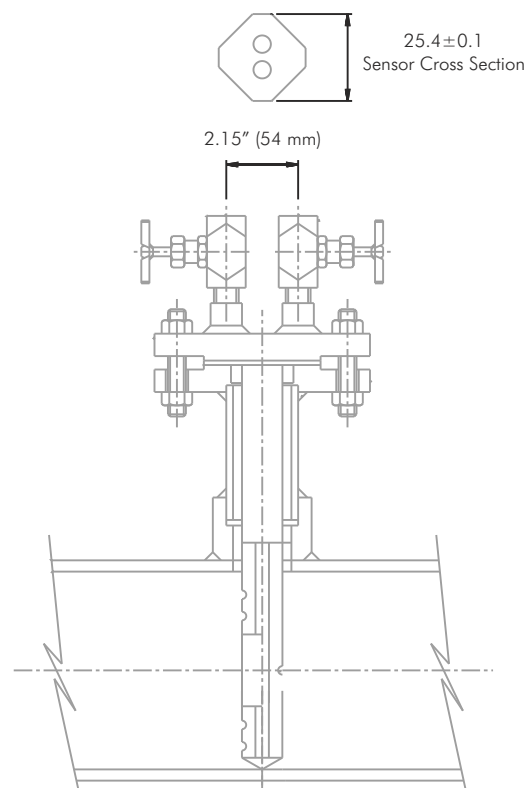
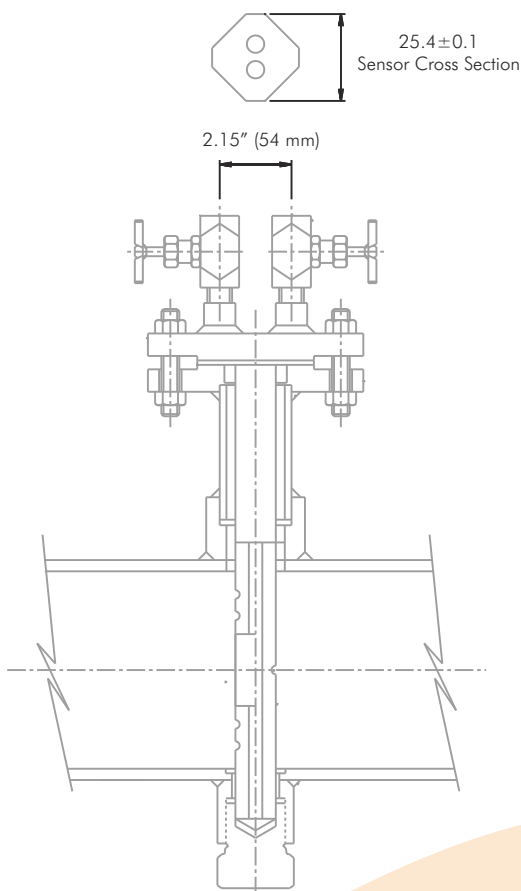
## Averaging Pitot Tubes



Averaging Pitot tube is a differential pressure producer suitable for liquid, gas and steam flow measurement. It offers simple, low cost installation into pipes and ducts, and high energy savings due to its low unrecovered pressure loss. There are no moving parts or sharp edges to wear, so long term accuracy can be maintained.

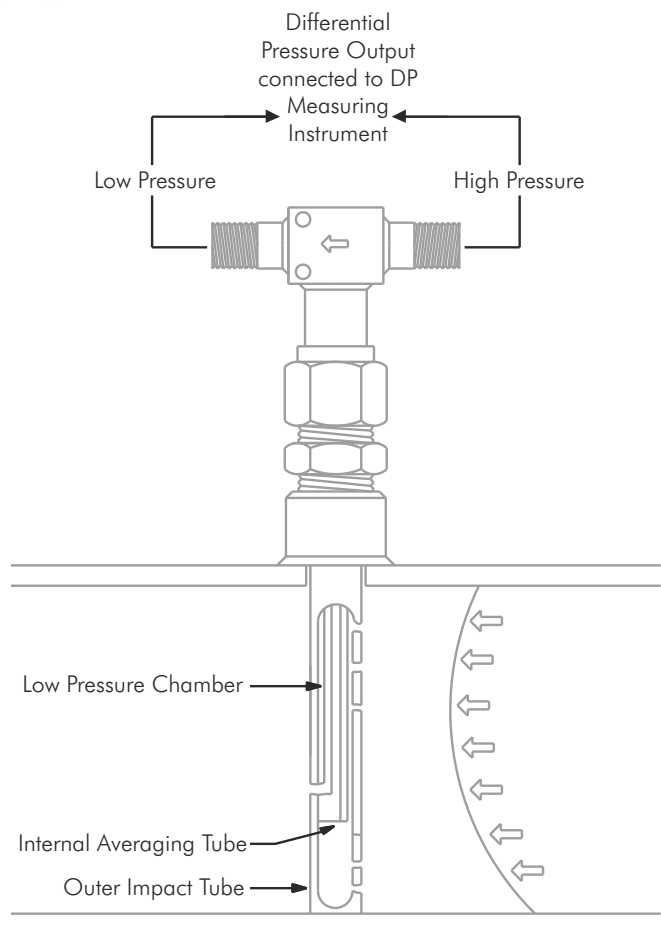
### Features

- Unique profile shape enables high flow rate tam down.
- Dual averaging for better accuracy.
- Suitable for gas, liquid, steam flow measurement.
- Repeatability of measurement  $\pm 0.1\%$
- Short Upstream and Downstream pipe lengths.
- Long term accuracy unaffected by wear.





## Averaging Pitot Tubes



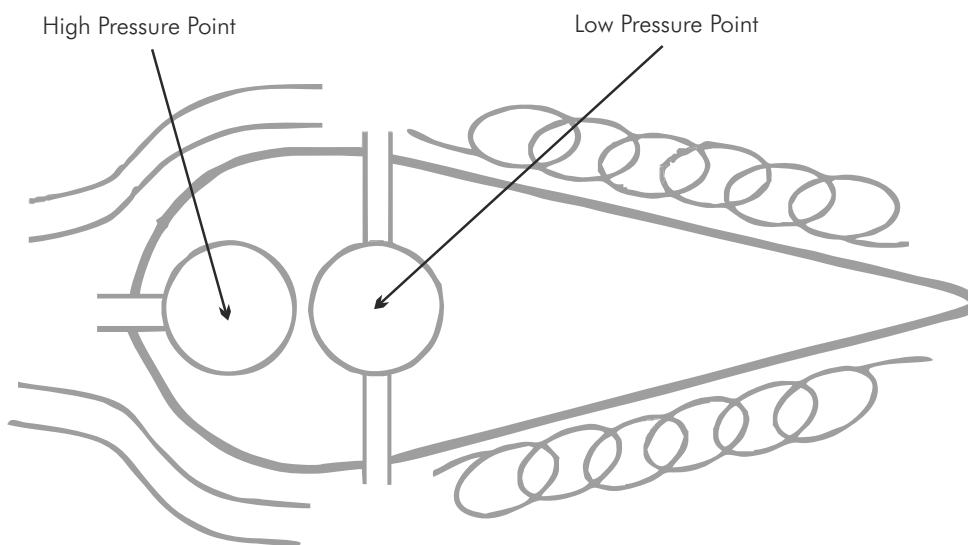
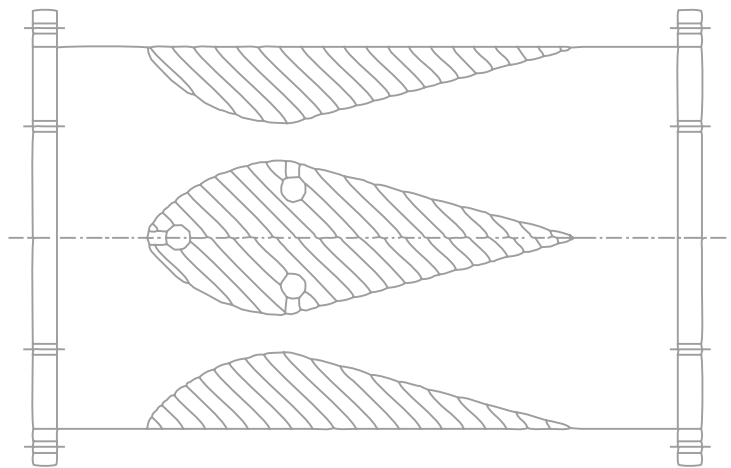
The outer impact tube has a number of pressure sensing holes facing upstream which are positioned at equal annular points in accordance with a log-linear distribution. The 'total pressures' developed at each upstream hole by sum of the impact of the flowing medium and the static pressure are firstly averaged within the outer impact tube and then to a second order (and more accurately) averaged within the internal averaging tube. This pressure is represented at the head as the high pressure component of the DP output. The low pressure component is generated from a single sensing hole located on the downstream side of the outer impact tube, measuring static pressure.

## Aerofoil



Aerofoil is primary flow element used to measure flow in rectangular duct. It works on the principle of the relationship between flow velocity and the pressure fields in friction less flow. Since the air particles follow the curved streamlines above the upper surface there must be a centripetal force across the streamlines which is accelerating the flow towards the centre of the curvature. That force must be associated with a pressure gradient across the streamlines i.e. ambient atmospheric pressure at some distance from the surface grading to a lower pressure on the upper wing surface.

Flow Direction →



## Accessories

### Condensate Pots

The main function of the condensate is to catch and hold condensate and foreign particle. This prevents the damage to the metering system and or manifold. They are used as barrier between main line and secondary instruments in the measurement of steam or other vapours which condense to the liquid state insuring compatibility with the secondary instruments. They can also be used to cool very high temperature liquids.



### Flow Straightner

Flow straighteners are used to produce swirl free, distortion free, highly repeatable velocity flow profile for measuring in flow meter and pump systems. These eliminates flow distortion effects of upstream elbows, pipe size changes, valves, dampeners and more to produce a consistent flow profile. They are used to minimize these straight run requirements.



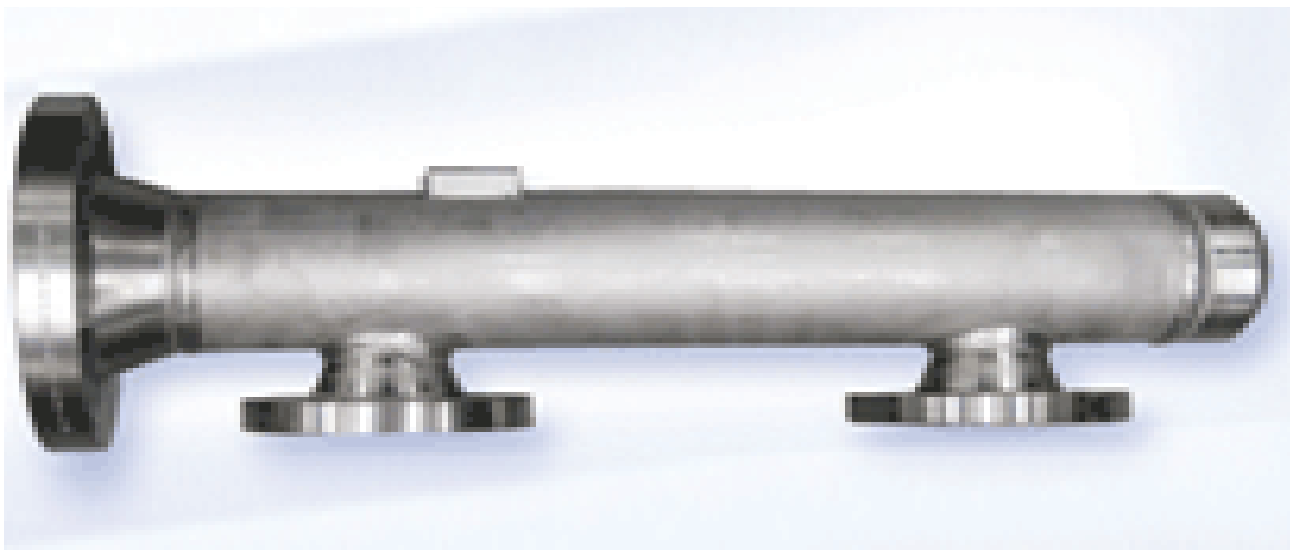
## Accessories

### Level Cage / External Chamber / Bridle

These high quality chambers which allow external mounting of level measurement and control instrumentation on process vessels. Normally used to mount Guided wave Radar (GWR) transmitters, Displacer Level gauges and so on.

They are manufactured using only certified and traceable materials and is manufactured using full penetration welds, with welders and welding procedures qualified to both ASME and European standards. All chambers are hydro tested on completion, with a full range of NDT or customer inspection options available to order.

- Standardized or custom design to fit existing vessels
- Allows external mounting of process level instrumentation
- Enables live maintenance
- Designed to ASME B31.3
- Used worldwide by major industries
- Ideal for critical area and general purpose applications
- Variety of process connections and optional drain and vent connections



## Process Data

To help us serve you better and maintain our high bench marks of precision, Kindly furnish the following data to us whenever there is any product enquiry.

### Bore Calculation Input Data

|                                                    |  |
|----------------------------------------------------|--|
| Name of the Fluid and State                        |  |
| Operating Temperature / Ambient Temperature        |  |
| Operating Pressure (abs)                           |  |
| Viscosity                                          |  |
| Maximum Flow / Normal Flow                         |  |
| Differential Range                                 |  |
| Base Sp. Gravity / density (only for Gas)          |  |
| Operating Sp. Gravity / density (for Gas & Liquid) |  |
| Specific heat ratio $C_p / C_v$ only for Gas       |  |
| Pipe size and Schedule                             |  |
| Pipe Material                                      |  |
| Tap type                                           |  |
| Element material                                   |  |
| Drain / Vent                                       |  |



## Test Facilities







# **DynaFluid**

**DynaFluid Valves And Flow Controls Pvt. Ltd.**

R. S No. 63/7 and 63/13, Navage Industrial Area, Navage, Belgaum, INDIA - 590018

Tel: +91 831 2951227 Cell : +91 9326101282

E-mail: yogish@dyna-fluid.com website : <https://www.dyna-fluid.com>