



Flow Measurement & Restriction

“Rototherm has experience developed over 40 years in the design and manufacture of DP FLOW devices. Our facilities are tailored to meet the highest standards required across the energy industry”

Talk to the experts...

- Over 40 years of specialist experience endorsed by an extensive reference list of projects for the key industry players
- Wide range of tailored solutions in standard and exotic materials
- Fully traceable certification for high quality materials, testing and inspection
- Extensive documentation packages
- Highly professional project management
- Fast track delivery to meet production requirements
- Manufacture according to EN ISO 5167 and AGA 3 (American Gas Association)
- Compliance, where applicable, with the European Pressure Equipment Directive (PED) and CE mark

Industries:

- Oil & Gas
- Chemical
- Pharmaceutical
- Nuclear
- Coal Fired Power Stations
- LNG

Applications:

- Offshore Platforms
- Gas blow down
- Water recycle lines
- Cooling wastewater
- Pipeline Flow Measurement
- Restriction Control

Flow Restriction

Restriction Orifice Plates

ROs



- Most common and widely used differential pressure producer
- Suitable for a wide range of flow restriction measurement applications in line sizes of 50mm and above
- Wide range of materials including exotics such as monel, hastelloy, as well as ceramic
- Orifice sizing on request
- Proven technology
- Range of Orifice Types
 - Concentric Square Edge
 - Conical Entrance
 - Quarter Circle
 - Segmental
 - Eccentric

Multi-Stage & Multi-Hole Restriction Orifice Assemblies

MSROs



Flanged assembly consisting of a series of orifice plates to produce a specified reduction in line pressure or to create a critical flow, giving controlled flow rate regardless of changes in downstream conditions. In-house expertise covers all aspects of design and manufacture associated with restriction of pressure for control purposes.

Flow Restriction Benefits:

- Cavitation Elimination
- Preventing flashing in liquid flows
- Choked flow in gases
- Noise/Vibration Reduction
- Permanent Pressure Reduction
- Feed & Vent Flow
- Pressure drop
- Preventing cavitation and flashing in liquid flows
- Choked flow in gases
- Excessive noise/ vibration

Project Management & Testing Capabilities:

Rototherm team is experienced and set-up to handle flow based projects. Our large team of project engineers handle all aspects of project management, design, documentation, testing and communications with our customers to allow for projects to be delivered 100% to scope of supply and on-time. We pride ourselves on meeting this.

Our testing services typically include:

- Hydrostatic Pressure Test
- X-Ray (Welds)
- PMI
- Dye Penetrant Inspection
- Ultrasonic examination
- Magnetic Particle Inspection
- Charpy Impact Testing
- Hardness Survey
- Independent 3rd Party Inspection

DP Flow Measurement

Orifice Carrier Assemblies

Orifice Carrier Assemblies



- Orifice carriers are supplied for applications where existing pipework has no facilities for tappings
- Wide range of materials
- Suitable for 1" lines and above
- Range of Carrier Types:
 - Single Ring, Corner Tappings
 - Double Ring, Flange Tappings
 - Double Ring, Corner Tappings
 - Double Ring, Annular Chambers
- Orifice sizing on request

Orifice / Flange Union

Orifice Assemblies



- Orifice flange assemblies consist of a pair of flanges, studs, nuts, gaskets, jacking screws and plugs (where requested)
- Orifice flanges ensure best flow measurement accuracy with an economic solution
- Wide range of materials, including ASTM A105N Carbon Steel, ASTM A350 LF2 Carbon Steel, ASTM A182 F316L Stainless Steel as standards
- Exotic materials used depending on application
- Ratings from 300 lb to 2500 lb
- Sizes from 1" Nominal Bore
- Corner Tapping Versions Available

Meter Runs

Orifice Flange Meter Run



- Typically consisting of a factory assembled section of pipe with an orifice plate mounted between two flanges near the bottom third of the run, terminated with a flange at each end connected to the process
- Can be supplied with temperature pockets if required
- Building the assembly in the factory allows us to control all the variables which can lead to inaccuracies which can arise if the system is assembled by untrained personnel on site

Venturi

Classical Venturi Tubes



- Classical Venturi Tubes - used on applications where a low permanent pressure loss is required
- Can be used on clean and dirty fluid in line sizes from 1" to 60"
- Calculation, design and manufacture to BS EN ISO 5167:1
- Fabricated from plate or machined from bar/ forgings
- Flanged or weld-in construction
- Wide range of material grades
- Calibration service on request

Flow Nozzle

Flow Nozzle



- If high temperatures and velocities are present, the flow nozzle may provide a better solution than an orifice plate
- Its construction makes it substantially more rigid and flow coefficient data at high Reynolds number is better documented
- The inlet is contoured, and may be either radius entrance (ISA1932) or elliptical entrance (ASME long radius)
- The flow nozzle has about 65% greater flow capacity than an orifice with the same diameter
- Flow nozzles are also suitable for erosive fluids where the sharp edge of an orifice plate could quickly deteriorate

Flow Applications / Projects

Multi-Stage Restriction Orifice (RO) Assembly for High Pressure Gas Blowdown

Rototherm has a significant offshore installation base across the North Sea, Middle East, South East Asia and Australia, working with key industry players, such as Shell, ExxonMobil and BP, demonstrating success in our designs and meeting the necessary process requirements. We ensure that the mechanical integrity of our systems are never compromised, which is why we maintain 100% record of successful operation and, in many occasions, this results in our team being brought in to replace malfunctioning RO designs that can lead to significant safety and cost implications for the user.

Multi-Stage ROs are typically required to reduce pressure down to atmospheric. This solution is increasingly common on offshore platforms where higher pressure drops and flow rates exist and control valves are expensive to install and maintain. For example, a multistage restriction orifice assembly is installed at the downstream of blow down valves. When blowdown valve opens to release the high pressure on its upstream, the RO at its downstream ensures that the flow is not excessive to overload the flare header. Usually the pressure drop in a blowdown circuit across an RO can be very high.



When designing a solution, Rototherm engineers always consider four critical factors:

- High pressure drop – ensuring that the required pressure drop is achieved with proven design
- Noise – achieving the lowest noise level (<85dBA according to international noise standards)
- Joule-Thompson Effect – considering the change in temperature across the assembly and subsequent impact on bore size and plate thickness
- Length – meeting the process requirements in the shortest overall length, especially when space is tight and limited

Multi-Hole Restriction Orifice (RO) Assembly for Cooling Water Recycling Lines

Multi-hole ROs are typically used in LNG terminals, LNG producing plants, chemicals, petrochemicals and refineries. This type of solution is a cost effective method for managing pressure within the water system. For example, a multi-hole restriction orifice assembly is used to manage a constant recirculation flow.

The recirculation ensures that cavitation and starvation cannot happen in the pump, as well as ensuring noise levels are kept to a safe level (<85dBA).



Rototherm designs' also account for the impact of Acoustic Induced Vibration (AIV), which can cause significant damage to surrounding equipment if such resonance levels are reached as a result of the process flow. Material selection and manufacturing capability is another critical factor to ensure the long-term success of a solution in the field. Our engineers always work in depth with process design teams to ensure successful solutions can be implemented.