

Multi Stage Restriction Orifice Assemblies



Applications

- Gas and Liquid Flows
- High Pressure Drops

Prevents

- Cavitation and Flashing in Liquid flows
- Choked flow in gases.
- Excessive Noise / Vibration

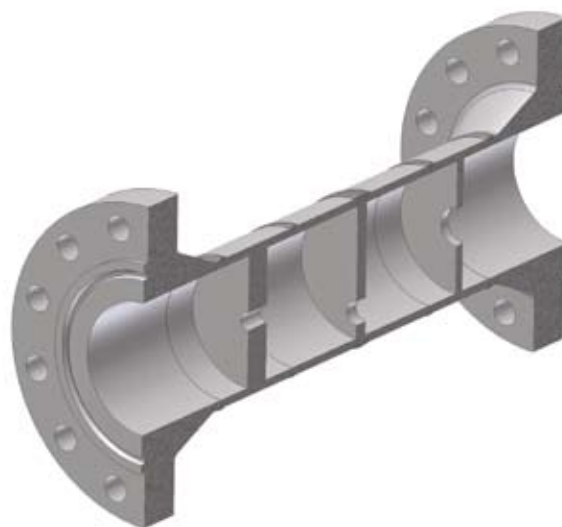
Restriction orifice plates have traditionally been used to reduce pressures in GAS AND LIQUID FLOWS by forcing the flow through a restricted bore. The precise pressure drop is produced by accurately calculating the orifice bore, having taken into account all the relevant process and flow conditions. Where very HIGH PRESSURE DROPS in liquid flows are required MULTISTAGE RESTRICTION ORIFICE ASSEMBLIES may be required to achieve the desired pressure drop whilst preventing problems such as CAVITATION, FLASHING and high NOISE and VIBRATION levels.

CAVITATION is a potentially damaging, erosive condition which occurs when the internal pressure of the liquid passing through the orifice falls below its vapour pressure and vapour bubbles form. Further downstream from the orifice the pressure recovers sufficiently to collapse the bubbles with extreme violence. Cavitation calculations are performed during the design stage of a Multistage RO to calculate cavitation factors at each stage in the orifice assembly.

FLASHING is a similar phenomenon to cavitation except that the process pressure never recovers sufficiently to collapse the gas bubbles resulting in two phase flow - liquid and gas - downstream of the orifice. Erosion of pipe work and valves and other instrumentation can occur due to the impact of liquid droplets carried at high speed in the vapour flow.

CHOKED FLOW IN GASES – also known as critical flow – occurs when too large a pressure drop is attempted across a single orifice plate. When the downstream pressure is less than 52.8% of the upstream pressure, the flow through the orifice will become sonic, at which point no further increase in flow can be achieved by either increasing the upstream pressure or lowering the downstream pressure. A multistage RO will enable staged reductions in pressure to prevent choked flow occurring.

Rototherm Multistage ROs are manufactured from a wide range of materials and are engineered to meet specific project process conditions and requirements. Plates are usually welded into pipe with a separation of one pipe diameter, the number of plates and orifice bores being determined by calculation. Process connections to existing pipe work can be either standard process flanges or machined ends suitable for butt welding.



Cutaway drawing showing the internal arrangement of a multistage restriction orifice assembly