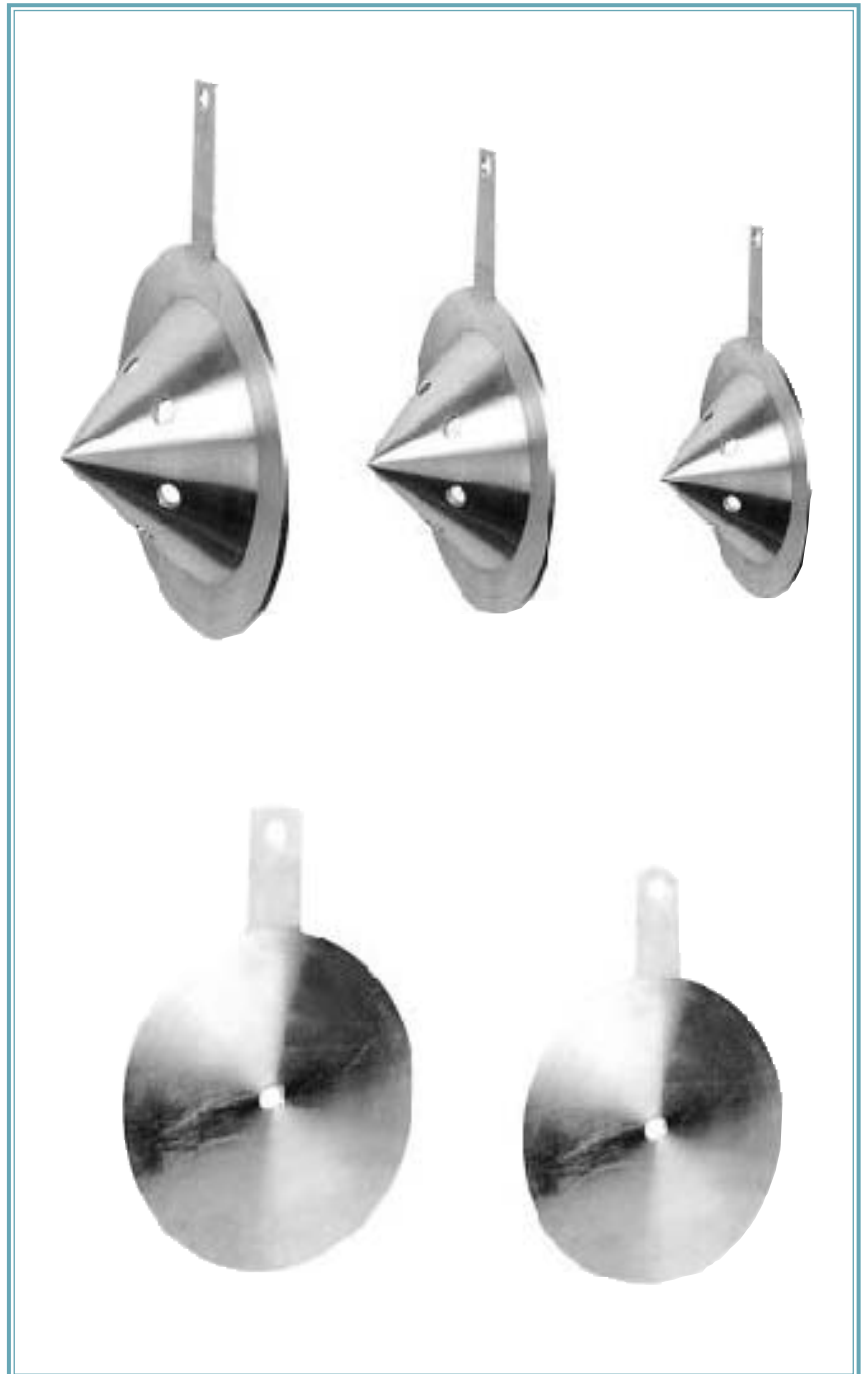


General Information

HRO-Series

Restriction Orifices



Q
QUALITY ASSURED COMPANY
ISO 9001

LEVEL LEVEL LEVEL
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HITROL

General Information



HITROL CO., LTD.

General

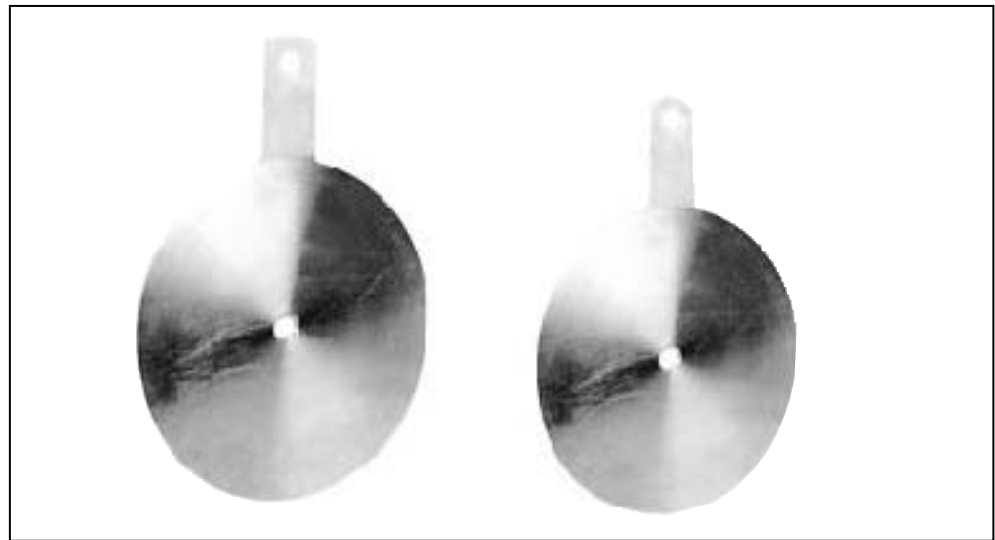
HRO-Series (Restriction Orifice) is an element which drops the fluid pressure in the pipeline such as a pressure reducing valve, and it can be applied to most of fluids such as liquids, gases, steam and etc. Cavitation phenomena is generated when a high pressure of liquid is reduced to a low pressure, and there is a possibility to give damages to pipelines and other related components due to noise and vibration at this time. HRO-Series can reduce the process pressure to a desired arbitrary pressure suitable to the process conditions without generating cavitation.

HRO-Series is an advanced technology developed for nuclear power

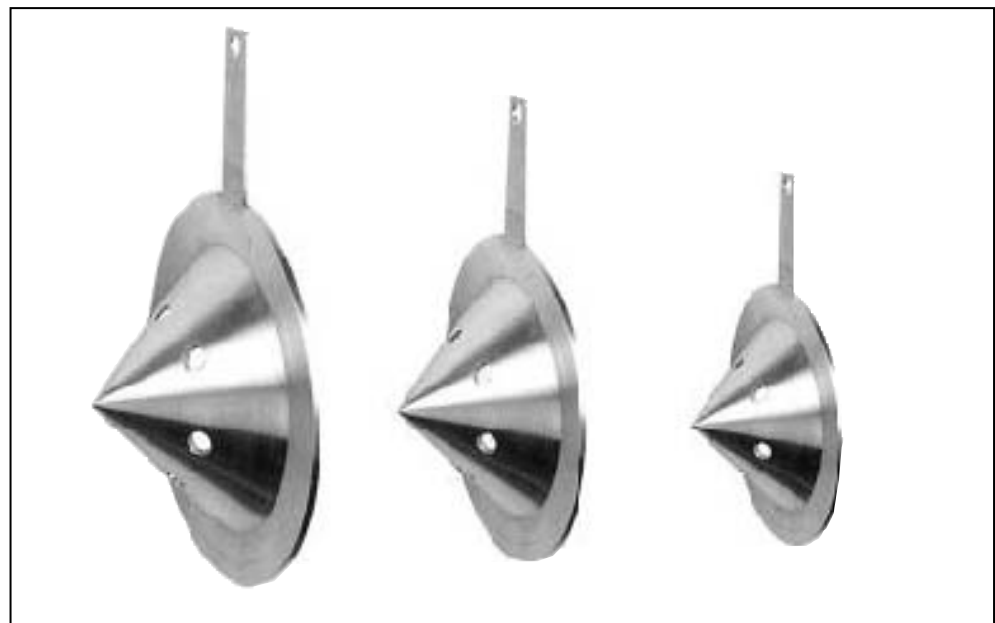
generating stations(Q classification), and it was developed by HITROL with Korea Electric Power Corporation (KEPCO). It is developed for design and manufacturing by considering thickness of orifice plate by seismic analysis, flow rate, differential pressure, diameter ratio, number of holes, process conditions and etc.

There are two types in HRO-Series, that is, flat and conical types, and there are two types in flat type, that is a multiple stage and single stage types. It is designed using the exclusive software developed by HITROL, and manufactured using HITROL's strict quality assurance system.

HRO - 吩吩吩吩 - F(FLAT TYPE)



HRO - 吩吩吩吩 - C(CONICAL TYPE)

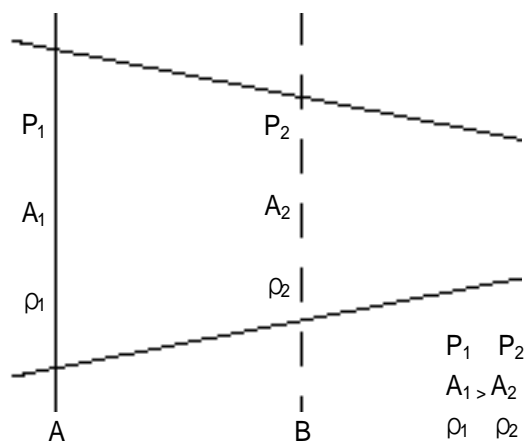


Principle

Principle of HRO-Series is given below. When the cross-sectional area through which the fluid is flowing is reduced, flow velocity is increased at the reduced location (by continuity equation), the pressure at the reduced location is decreased, and differential pressure between two locations (A and B) is generated (by Bernoulli equation).

Differential pressure can be obtained using the following equation given below since there is a certain relationship between generated differential pressure (P) and the flow rate (Q_v). It is the same principle as the differential pressure flow meter.

$$Q_v = C_d \cdot A_2 \cdot E \cdot \varepsilon \cdot \sqrt{\frac{2 \cdot P}{\rho}}$$



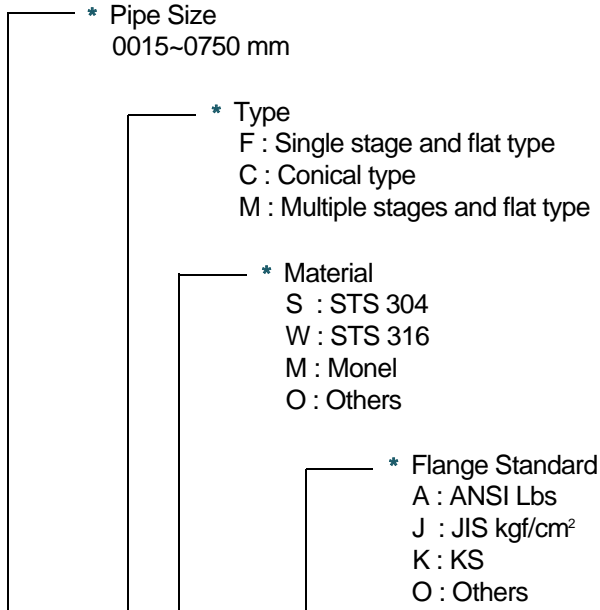
C_d : discharge coefficient (ratio of flow rate measured and the theoretical flow rate)
 A_2 : cross-sectional area at the reduced location
 E : velocity of approach factor
 ε : thermal expansion coefficient
 ρ : fluid density
 P : differential pressure

※ Throat size of restriction orifice is determined when a certain differential pressure of P is desired at a given flow rate using the above equation

Specifications

Applicable fluids	liquids, gases, steam
Material	304 SS, 306 SS, Monel, and etc.
Operating pressure	no limit
Operating temperature	maximum 350 °C
Accuracy	within ± 5 %
Technical regulations	ISO 5167 and HITROL' s Technical Notes

ORDER CODES



HRO - 吩吩吩吩- 吩 吩 - 吩吩吩吩



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