"The Most Cost Effective Valve Solutions"

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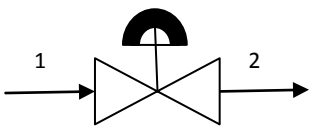
TECHNICAL DETAILS

Valve Trim Technology

We are offering the **VECTOR®** Multi-Stage, Multi-Path Velocity Control Trim. The Disk Stack (the velocity control element) is a labyrinth type with 90° turns/stages.

View of VECTOR® Disks

Each 90° turn/stage introduces a loss and a portion of the pressure drop is taken in a controlled manner, just like a 90° elbow generates a predictable loss in a piping system. Based upon Bernoulli's equation in terms of pressure applied to the inlet and outlet of the valve:



$$h_1\gamma + P_1 + \rho_1 \frac{V_1^2}{2g} = h_2\gamma + P_2 + \rho_2 \frac{V_2^2}{2g}$$

In a valve the geodetic terms h_1 and h_2 are irrelevant and can be ignored. Bernoulli's equation states that the pressure drop across the valve ($P_1 - P_2$) is equivalent to the kinetic energy KE exiting the trim:

$$P_1 - P_2 \propto \rho \frac{V_{\text{Trim Exit}}^2}{2g} = KE$$

The fluid is forced to pass through each individual path in the **VECTOR®** Disks without any short-circuiting, ensuring a specific and controlled loss, pressure drop, at each stage/turn and based upon Bernoulli's equation a controlled velocity.

The proposed **VECTOR®** Disk Stacks are custom designed to ensure that the valve trim exit velocity is kept within ISA S75.01 guidelines to avoid damage due to high velocities:

Liquid Service: **Sheer Velocity at Trim Exit (liquids' density remains constant)**

Incipient Cavitation: ≤ 30.0 m/sec (100 feet/sec)
Cavitation/Flashing: ≤ 23.0 m/sec (75 feet/sec)

Gas/Steam Service: **Kinetic Energy at Trim Exit (density changes with pressure)**

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Continuous Duty: ≤ 4.8 bar (480 KPa or 70 psi)
Intermittent Duty: ≤ 10.3 bar (1030 KPa or 150 psi)
Rarely Operated: ≤ 20.6 bar (2060 KPa or 300 psi)

KOSO **VECTOR®** valve trim is designed to provide:

- Equal pressurization around the plug in order to minimize vibration and prevent any potential for binding.
- Quick-change type for ease of maintenance. No internal components are screwed or welded into the valve bodies or bonnets.

Noise

KOSO **VECTOR®** Multi-Stage, Multi-Path trim provides exceptional and field proven noise attenuating capabilities.

With regards to valve noise we confirm that the calculations detailed are in full compliance with ISA S75.17 "*Valve Aerodynamic Noise Prediction*" and IEC 534-8-3, "*Control valve aerodynamic noise prediction method*." The noise is based on a measurement point of 1.0 meter downstream of the valve and 1.0 meter perpendicularly from the pipewall with a tolerance of +0/-5 dBA.

The noise guarantee applies only to the noise generated by KOSO's valves/equipment and assumes a non-reflective environment. KOSO will not be responsible for noise generated by other equipment installed upstream and/or downstream of the valve/equipment or for other sources in the proximity of this equipment.

Shut-Off

VECTOR® valves are designed to provide long lasting and repeatable tight shut-off as per your requirements and in compliance with ANSI/FCI-70.2. Unlike other valve manufacturers that assume arbitrary seating load requirements in their actuator calculations KOSO follows ISA guidelines:

Shut-Off Class FCI-70.2	Seating Force (per inch/mm of seat diameter)
IV	300 lb/inch (52.52 N/mm)
V	500 lb/inch (87.53 N/mm)
VI (1)	100 lb/inch (17.50 N/mm)
MSS-SP61 (2)	700 lb/inch (122.55 N/mm)

(1) Bubble tight. Seat with Teflon® insert.
(2) Isolation block valve shut-off.

Seating Angles

The seating of the **VECTOR®** valves are designed to provide an "edge" contact seating and not a surface contact like most competitor valves. An "edge" contact seating provides repeatable tight shut-off and easy to repair seating surfaces