

**COPES-VULCAN**  
AN SPX BRAND

# RAVEN™ Trim

Retrofits & Aftermarket



**SPX**®

# Retrofits & Aftermarket

You can now solve your problems and benefit from RAVEN...the latest advance in Multi-Labyrinth, Multi-Disc, Stack design control valves for severe applications without the cost of purchasing a new valve.



Cavitation Damaged Plug

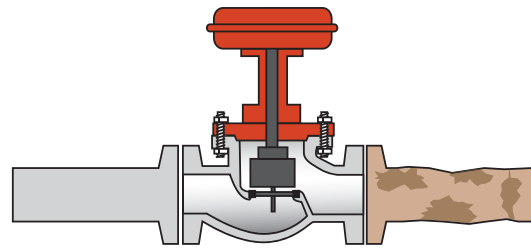
Copes-Vulcan has further developed the well proven labyrinth multistage letdown design and made it less prone to blockage and lower in noise. When using RAVEN trim in your valve body, the process fluid is forced through a specially designed tortuous path which keeps its velocity at a low level where vibration and erosion are eliminated. The energy dissipated by dropping a high pressure across the valve is absorbed in a controlled manner over the correct number of 90-degree bends in the fluid path. High velocities in the valve trim are eliminated.

Now Copes-Vulcan can fit the RAVEN trim into your existing valve body without the need even to remove your valve from the line. You do not need to have a high capital budget approved for complete valve renewal...retrofits can be bought on maintenance budgets as spare trim. Cost is substantially lower than a complete new valve. Guarantee for the entire valve, including old body etc, is identical to a brand new valve.

Retrofits are available for almost any make and model of linear motion control valve so you could be benefiting from improved performance, less downtime and reduced maintenance costs in a very short time.



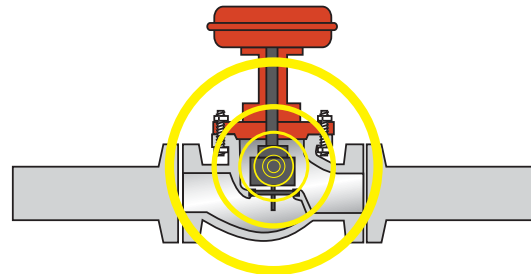
Cavitation Damaged Cage



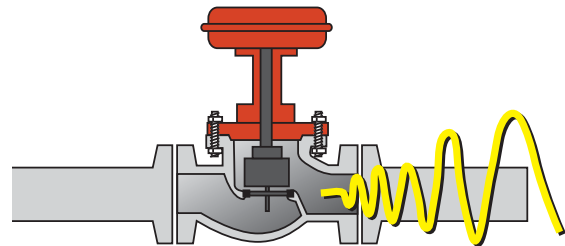
Downstream Pipe Erosion



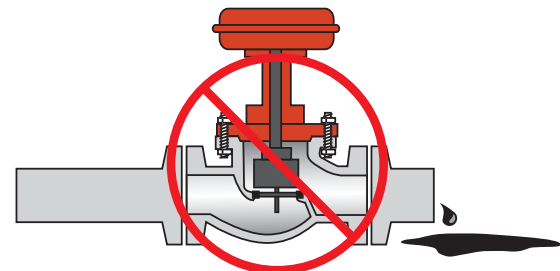
High Maintenance Costs



Excessive Noise



Lack of Control



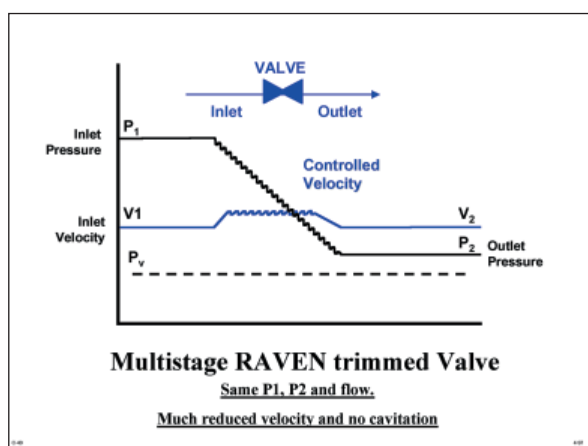
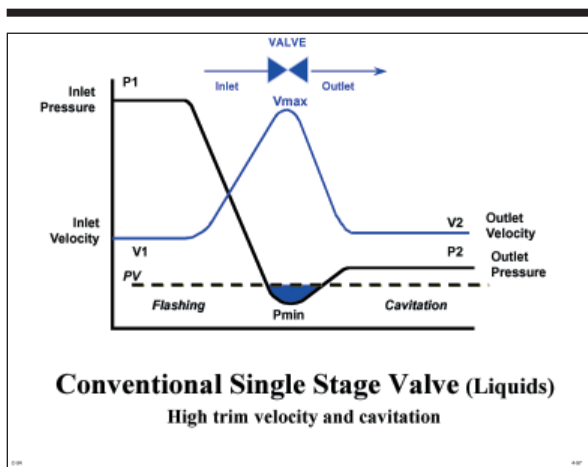
System Shutdown

## Velocity and Pressure

The velocity and pressure profiles shown below are for a single stage control valve and a RAVEN multistage retrofit at the same pressure and flow conditions.

It can be seen that the damaging high velocities experienced in the single stage valve are totally eliminated in the RAVEN retrofit. Even if the original valve has multiple reducing stages, it is not uncommon for velocities to be at a level high enough to cause vibration, noise and erosion. In this case, a RAVEN retrofit with a higher number of pressure reducing stages will solve the problem. The labyrinth design RAVEN trim can package more pressure reducing stages into a given valve body size than any other design.

In the RAVEN retrofitted example shown, note that the pressure never drops below the vapour pressure in the trim and hence cavitation is eliminated. In the original valve shown on the left, damaging cavitation is evident.



## Retrofit Raven

Typical applications for a RAVEN retrofit on a liquid service include feedwater control, minimum pump recirculation control, overboard dump valves etc. Whilst gas applications include HP vent valves, compressor recycle (or antisurge) valves, Turbine Bypass Valves, High pressure letdowns and many, many more.

It is not uncommon today for the period between planned shutdowns to be extended and control valves asked to work harder than ever before. RAVEN Retrofits can ensure that you obtain optimum performance from your control valves and unnecessary and unwanted unplanned shutdowns are avoided. You get long trouble free service life.

However, if you have any valve problems, don't delay, contact the Copes-Vulcan experts now at the following numbers and put an end to those problems at the most competitive price. Our field service experts are ready to help in any way possible.

## Typical Applications for RAVEN Trim

- Boiler Feed Control
- Boiler Feed Pump Minimum Flow (Bypass)
- Inter Stage Attenuator Water Control
- Heater Drain Valves
- Boiler Drum Level Control
- Soot Blower Header Control
- Turbine Bypass
- Start-Up Steam Vent
- Compressor Anti-Surge
- Pipeline Packing
- Overboard Water Dump Valves
- Pump Recirculation Valves
- First Stage Level Separator Valves
- Depressurising and Vent Valves
- Gas Injection/Re-injection systems

	<p style="text-align: center;"><b>SPECIAL APPLICATION GLOBE STYLE CONTROL VALVES</b></p> <ul style="list-style-type: none"> <li>• General Service application</li> <li>• Severe Duty application</li> <li>• High turndown</li> <li>• .75 - 24" Sizes</li> <li>• 150 - 4500 ANSI Ratings</li> <li>• Special ANSI Ratings</li> <li>• Meets ASTM/ASME Standards</li> <li>• Threaded, Butt/Socket Weld, Flanged Ends</li> </ul>
	<p style="text-align: center;"><b>STEAM CONDITIONING EQUIPMENT (DESUPERHEATERS)</b></p> <ul style="list-style-type: none"> <li>• 7 Styles</li> <li>• Mechanical Atomizing</li> <li>• Variable Orifice</li> <li>• Integral Cooling Water function available</li> <li>• High turndowns</li> <li>• 150 - 2500 ANSI Ratings</li> <li>• Special ANSI Ratings</li> <li>• Meets ASTM/ASME Standards</li> </ul>
	<p style="text-align: center;"><b>TRIM TYPES</b></p> <ul style="list-style-type: none"> <li>• 13 types</li> <li>• RAVEN™</li> <li>• HUSH™</li> <li>• CAV B9©</li> <li>• One Stage Hush©</li> <li>• Noise control</li> <li>• Cavitation elimination</li> <li>• Velocity &amp; Erosion control</li> </ul>
	<p style="text-align: center;"><b>ACTUATORS</b></p> <ul style="list-style-type: none"> <li>• Diaphragm Style. Model 700</li> <li>• Diaphragm Style. Model 1000</li> <li>• Manual Style 820</li> <li>• Electric available</li> <li>• Electro/Hydraulic available</li> <li>• Piston</li> <li>• Reverse acting</li> <li>• Direct acting</li> </ul>
	<p style="text-align: center;"><b>NUCLEAR CONTROL VALVES</b></p> <ul style="list-style-type: none"> <li>• Pneumatic, Motor, Manual Operators</li> <li>• Metal &amp; Resilient Seats</li> <li>• Widest Selection of Trim in the Industry</li> <li>• Globe, Angle, Isolation &amp; Three Way Body Configurations</li> <li>• Size Range: 3/8" - 20" class 150 - 2500</li> <li>• ASME Section III "N" &amp; "NPT" Stamp Certified</li> </ul>
	<p style="text-align: center;"><b>NUCLEAR HIGH PERFORMANCE BUTTERFLY AND BALL VALVES</b></p> <ul style="list-style-type: none"> <li>• Bi-Directional Class VI Shut off</li> <li>• Metal &amp; Resilient Seats</li> <li>• Torque Seated/Position Seated (Butterfly only)</li> <li>• Pneumatic, Motor, Manual Operators</li> <li>• Modulating or Isolation</li> <li>• Two &amp; Three Piece Ball Valve design</li> <li>• ASME Section III "N" &amp; "NPT" Stamp Certified</li> </ul>
	<p style="text-align: center;"><b>AFTERMARKET AND REFURBISHMENTS</b></p> <ul style="list-style-type: none"> <li>• Reduce Outage Cycle Times</li> <li>• Maximize Years/Life Cycle</li> <li>• Recondition the OEM parts, while minimizing lead times and costs.</li> </ul>

Common Applications: Power, Pulp & Paper, Water, Oil & Gas, Petrochemical.

Manufacturing Standards: Certifications - ISO-9001, ASME SECTION III "N" & "NPT" Stamps, ASME SECTION I "S" Stamp, CSA-Z299.2, .3 & .4, 97/23/EC-PED-CE

**SPX**®

**FLOW CONTROL**

Your local contact:

SPX Flow Control  
5620 West Rd.  
McKean, PA 16426  
Phone: (814)476-5800 Fax: (814)476-5854  
E-mail: cv@spx.com

For more information about our worldwide locations, approvals, certifications, and local representatives, please visit [www.spxfc.com](http://www.spxfc.com).

SPX reserves the right to incorporate our latest design and material changes without notice or obligation.

Design features, materials of construction and dimensional data, as described in this bulletin, are provided for your information only and should not be relied upon unless confirmed in writing. Certified drawings are available upon request.