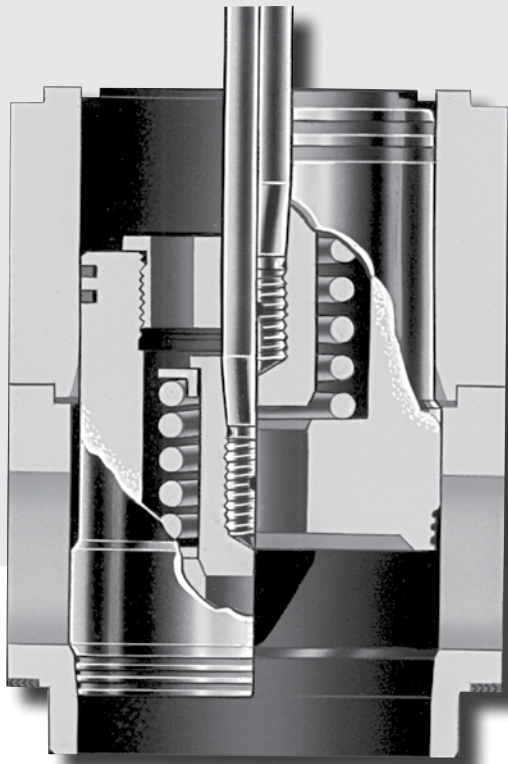


**SPX**®



**COPES-VULCAN**

Tandem Trims

# Tandem Trim

## Application

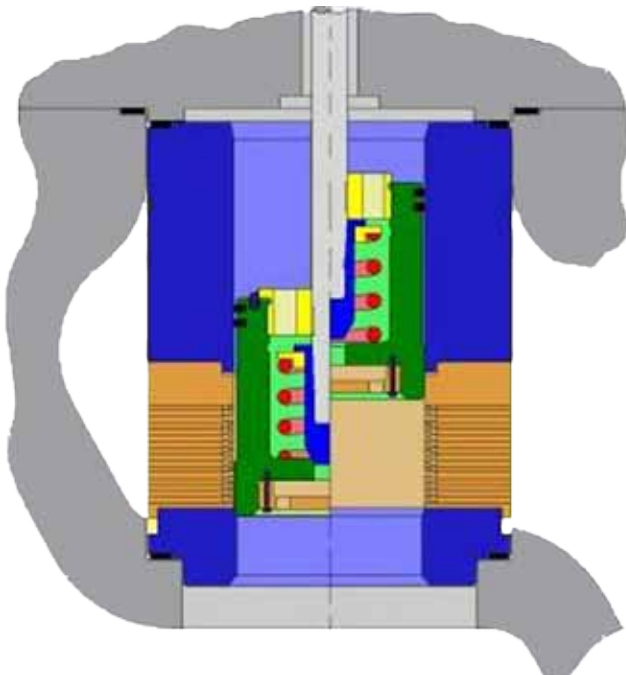
Tandem Trim valves are available in sizes from 4–14" (100–350mm) and classes 150 through 2500.

Applications include steam and water pressure reducing, steam throttling to atmosphere or to a condenser, isolation, supercritical boiler startup and a variety of other uses in power and process control systems.

Many valve manufacturers use conventional single seated valves for these applications, however, in order to obtain tight shutoff, large actuators are required. The unique design features of Tandem Trim provide tight shutoff, excellent control and rangeability and yet use a small actuator which provides for economic pricing.

## Function

Tandem Trim provides the capability of tight shutoff against high differential pressure without using a large valve actuator. Basically, it is a single seat design with the main valve and its pilot valve working in tandem (similar to operation of a relay).



## Features

**Design** — Copes-Vulcan has been awarded U.S. Patent number 3,575,213 for Tandem Trim.

**Cage Guiding** — A Copes-Vulcan standard for over 65 years, Cage Guiding supports the plug against dynamic forces, and also assures a smooth operation throughout the full stroke range of the trim.

**Quick Change** — Tandem Trim utilizes Copes-Vulcan's Quick Change design, providing a fast means of removal, inspection and, if necessary, replacement of the valve trim. Maintenance is thereby accomplished without removing the valve body from the line. The cage is not screwed or welded into the body but is held securely in place by bonnet.

**Cascading** — Tandem Trim is available with cascading (multi breakdown of pressure in stages) which provides increased rangeability for high pressure drop liquid service when modulating close to the seat.

**Tight Shutoff** — Tandem Trim's tight shutoff is due to two important features:

1. Compound seating angles on the plug and seat offer line contact seating for excellent shutoff.
2. With high pressure drops, the differential pressure in the balancing chamber forces the main valve into the seat, hence the higher the differential pressure the tighter the shutoff.

**Fully Trapped Gaskets** — Controlled compression provides optimum loading on the fully trapped gaskets. The bonnet bolting load ensures necessary stresses to seal upstream fluid and prevent leakage. Seating forces cannot overcompress the gaskets which have a metal to metal controlled compression design. This design also ensures that the gaskets will not become dislodged and go downstream.

**Stainless Steel Construction** — Standard materials for the cage and plug are 410 and 420 Stainless Steel. These materials are ideally suited for long service on high pressure drop applications. Other materials are available to suit the requirements of the fluid or specifications.

## **Principle of Operation**

### **1. Valve Closed**

When the valve is closed, the balancing chamber (above the main valve plug) is at inlet pressure due to minimal flow past the piston rings into the chamber. Full inlet pressure is exerted on the Tandem Trim plug, thus, affecting high seating stresses which help to maintain positive shutoff.

### **2. Valve Opening**

As the actuator receives a signal to open the initial stem motion opens the pilot valve and vents the balancing chamber. The venting is accomplished by an annular port which is opened between the balancing chamber and downstream. The balancing chamber pressure is quickly reduced to equal that of the downstream pressure. This equalization of pressure greatly reduces the unbalanced force on the main plug. As the pilot valve continues to open, the stem shoulder contacts the main plug to open it. The main plug will now open readily, due to its reduced unbalance created by venting the balancing chamber. This feature permits the use of a smaller, more economical actuator to open, close and control the valve.

### **3. Valve Modulating**

As the stem positions the main valve to modulate the flow, the unbalance force will not vary with a constant differential pressure. This constant force allows the position of the main valve to be precisely and smoothly controlled. Also, while modulating, this constant force holds the main valve against the stem shoulder ensuring that the pilot valve is open and venting the balancing chamber.

### **4. Valve Closing**

When the valve is closing, the main plug first contacts its seat; further downward movement of the stem then closes the pilot valve. The minimal flow past the piston rings into the balancing chamber then pressurizes the chamber to upstream conditions, holding the main plug against the seat with full inlet pressure, creating high seating forces to effect tight shutoff.

	<b>SPECIAL APPLICATION GLOBE STYLE CONTROL VALVES</b> <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>
	<b>STEAM CONDITIONING EQUIPMENT (DESUPERHEATERS)</b> <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>
	<b>TRIM TYPES</b> <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>
	<b>ACTUATORS</b> <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>
	<b>NUCLEAR CONTROL VALVES</b> <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>Size Range: 3/8" - 20" class 150 - 2500</li> <li>Globe, Angle, Isolation &amp; Three Way Body Configurations</li> <li>ASME Section III "N" &amp; "NPT" Stamp Certified</li> </ul>
	<b>NUCLEAR HIGH PERFORMANCE BUTTERFLY AND BALL VALVES</b> <ul style="list-style-type: none"> <li>Bi-Directional Class VI Shut off</li> <li>Metal &amp; Resilient Seats</li> <li>Pneumatic, Motor, Manual Operators</li> <li>Modulating or Isolation</li> <li>Two &amp; Three Piece Ball Valve design</li> <li>Torque Seated/Position Seated (Butterfly only)</li> <li>ASME Section III "N" &amp; "NPT" Stamp Certified</li> </ul>
	<b>AFTERMARKETS AND REFURBISHMENTS</b> <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	



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