Containment Sampling Isolation Valve

MODEL F100-40 FOR NUCLEAR APPLICATIONS
Containment Sampling Isolation Valve

FEATURES
The Copes-Vulcan Model F100-40 valve can solve your leakage problems in critical applications by offering:

- Positive shutoff
- Reliable operation
- Radiation resistant materials
- Fast, easy maintenance
- No need for piping supports or restraints

3/8” (10MM) SAMPLING VALVE
The Copes-Vulcan F100-40 Sampling Valve was developed to provide positive shutoff and reliable operation for both sampling and containment isolation applications in nuclear power plants.

Such high-pressure water, steam and gas applications demand exceptional seat tightness. The Copes-Vulcan design incorporates a high-thrust actuator with thru-hardened trim components to ensure better than ANSI 70-2 Class V leakage at 2500 psid (17,225 kPa).

The valve was designed, built and tested in accordance with ASME Boiler and Pressure Vessel Code Section III for Classes 1, 2 or 3. ANSI B16.34 valves are also available. A maximum design pressure and temperature rating of 2500 psig (17,225 kPag) at 680°F (360°C) is standard.

Materials of construction were chosen for borate water service. These same materials are excellent choices for service water, steam and hydrogen media. Stainless steel is used for body, seat, plug/stem, actuator frame, frame-to-body mounting components and packing gland. The absence of hardfacing limits cobalt to minor residual elements.

The use of inert and radiation-resistant materials reduces maintenance and the risk of failure. The only non-metallic component used on the valve assembly that could experience degradation from exposure to radiation is the diaphragm. Copes-Vulcan has qualified the EPDM diaphragm material to 20 years service at 2.0 x 10^7 rads.
Easily Removed Trim

Piping supports and restraints are eliminated by the convenient actuator wall-mounting of the entire valve. This design allows groups of valves to be bank or gang-mounted.

Maintenance time and costs are also greatly reduced by the trim and packing gland arrangements. While the actuator may be removed from the valve when necessary, there is no need to do so when repacking or changing the trim. Ease of trim removal and a minimum of components involved (plug/stem, seat, packing and two seals) allow maintenance personnel to get the job done fast, which is especially important during short outages or when working in hot areas of the plant. Packing life is extended by backseat, double-packed stuffing box and leak-off features.

**Typical product applications**

**Nuclear Power**
- Sampling/Containment Isolation Valves
- Steam Generator Sample Isolation
- Feedwater Test Circuit Isolation

**DESIGN EVALUATION TESTING**

Over 45,000 hot cycles and this containment sampling/isolation valve still exceeds leakage requirements.

**Purpose**
The testing at our plant was designed to evaluate the performance of the Copes-Vulcan 3/8” (vzv) Sampling/Isolation Valve while operating under expected service conditions as simulated by the Copes-Vulcan hot test loop.

**Description**
The valve was cycle tested in a pressurized water hot flow loop.

**Conclusion**
The valve performed successfully in all phases of operation, including 45,500 hot cycles with no loss of structural integrity.
PRELIMINARY TESTING
A baseline of satisfactory operation was established during preliminary testing at ambient temperature:

Fluid Boundary Integrity
Hydrostatic testing at 5825 psig (40,135 kPag).

Mainseat Leakage
Zero leakage obtained at 2500 psi differential (17225 kPa differential), thus exceeding the requirements of FCI 70-2/ANSI Class V.

Cycling
100 cycles with 2500 psi differential (17,225 kPa differential) closed and 500 psi differential (3445 kPa differential), minimum, open.

Stroke times:
Closing — .4 seconds
Opening — .4 seconds

Specifications

<table>
<thead>
<tr>
<th>MATERIALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>BODY</td>
</tr>
<tr>
<td>SEAT</td>
</tr>
<tr>
<td>PLUG/STEM</td>
</tr>
<tr>
<td>FRAME</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FEATURES</th>
</tr>
</thead>
<tbody>
<tr>
<td>END CONNECTIONS</td>
</tr>
<tr>
<td>ANSI PRESSURE CLASS</td>
</tr>
<tr>
<td>ACTUATOR</td>
</tr>
<tr>
<td>SEATING THRUST</td>
</tr>
<tr>
<td>ACCESSORIES</td>
</tr>
<tr>
<td>SEISMIC QUALIFICATION</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEAK-OFF</td>
</tr>
<tr>
<td>ACCESSORIES</td>
</tr>
<tr>
<td>END EXTENSIONS</td>
</tr>
</tbody>
</table>

HOT TESTING
A testing model was configured with 630°F (332°C) water at 2500 psig (17,225 kPag).

Hot Cycles
45,500 cycles were successfully performed. 26,800 hot cycles were conducted with 2500 psi differential (17,225 kPa differential) in closed position, and a minimum of 500 psi differential (3445 kPa differential) in open position. The remainder of the cycles were conducted at system pressure. Stroke times of .4 second closed and .4 second open were typical throughout.

Hot Mainseat Leakage
The mainseat leakage was measured frequently during cycling (every 1000 cycles minimum) and exceeded the FCI 70-2/ANSI Class V requirements throughout.
1.20" 30 mm
1.13" ± .50" 29 mm 15 mm
6.62" 168 mm
7.25" 184 mm
8.50" 216 mm
Space Required for Trim Replacement
10.00" 50 mm
1.50" Clearance Required 40 mm for Reverse Action

21.50" 546 mm
1.00" 25 mm

11.23" ± 1.00" 285 mm 25 mm
3/8" (10 mm) x .065" (17 mm) Wall Tubing Square Ends (both ends identical)

Flow

6.00" 150 mm
250" 6345 mm
12.00" + .00 - .06"
6.62" 168 mm
3/4" (20 mm) Socket Weld End per ANSI B16.11 (both ends identical)

Trim Detail

Ø1.065" ± .010" (.25 mm) 27 mm -.000
50" 15 mm

9.62" ± 12" 244 mm 3 mm
Global locations

**SPX FLOW TECHNOLOGY**
5620 West Road
McKean, PA 16426
United States of America
+1 814 476 5800

**SPX FLOW TECHNOLOGY**
Road Two, Industrial Estate
Winsford, Cheshire CW7 3QL
England
+44 1606 552041

**SPX FLOW TECHNOLOGY**
25 International Business Park
#03-03/12 German Centre
Singapore 609916
+65 6264 4366

**SPX FLOW TECHNOLOGY**
6F Treasury Building
1568 Hua Shan Road
Shanghai 200052
PR China
+86 21 2208 5888

Based in Charlotte, North Carolina, SPX Corporation (NYSE: SPW) is a global Fortune 500 multi-industry manufacturing leader. For more information, please visit www.spx.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. Please contact your local sales representative for product availability in your region. For more information visit www.spx.com.

The green "*" is a trademark of SPX Corporation, Inc.