RELIABILITY THROUGH FUNCTIONAL QUALIFICATION TESTS

Reliability of valve operation affects service life and maintenance. To predict reliability, a sound valve design, backed up by a stress analysis must be subjected to functional cycle testing under critical operating conditions.

To develop the Velan Torqseal Triple Offset Metal-seated Butterfly valves, it required an unusual effort and extended period of time as many competitive valves in the same category, tested in our R&D, showed repeated leaks of seats and laminated disc gaskets. Some highlights of the tests performed in our R&D laboratory are shown here. Detailed reports are available on request.

TYPICAL TEST PROCEDURE
FOR CLASS 300 ALLOY STEEL VALVE

A. HYDROSTATIC AND AIR TEST

<table>
<thead>
<tr>
<th>NO.</th>
<th>TYPE</th>
<th>TEST FLUID</th>
<th>PRESSURE psi</th>
<th>TEMPERATURE</th>
<th>DURATION</th>
<th>VALVE SIDE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Shell</td>
<td>Water</td>
<td>1100</td>
<td>Ambient</td>
<td>5 minutes</td>
<td>Valve open</td>
</tr>
<tr>
<td>2.</td>
<td>Seat low pressure</td>
<td>Air or Nitrogen</td>
<td>60–100</td>
<td>Ambient</td>
<td>2 minutes</td>
<td>Both sides</td>
</tr>
<tr>
<td>3.</td>
<td>Seat high pressure</td>
<td>Nitrogen</td>
<td>325</td>
<td>Ambient</td>
<td>2 minutes</td>
<td>Preferred</td>
</tr>
<tr>
<td>4.</td>
<td>Seat high pressure</td>
<td>Water</td>
<td>800</td>
<td>Ambient</td>
<td>2 minutes</td>
<td>Preferred</td>
</tr>
<tr>
<td>5.</td>
<td>Seat high pressure</td>
<td>Nitrogen</td>
<td>195</td>
<td>Ambient</td>
<td>2 minutes</td>
<td>Non preferred</td>
</tr>
<tr>
<td>6.</td>
<td>Seat high pressure</td>
<td>Water</td>
<td>480</td>
<td>Ambient</td>
<td>2 minutes</td>
<td>Non preferred</td>
</tr>
</tbody>
</table>

B. COLD CYCLING TEST

1000 Cycles 820 psi water to test preferred seat side
490 psi water to test nonpreferred seat side

C. HOT CYCLING TEST

1000 Cycles 150–200 psi superheated steam at 650–900°F

ACCEPTABLE RESULTS

0 bubble performance after and during the tests, measuring and recording the running, closing and breaking torque in ft•lbs.
RELIABILITY THROUGH FUNCTIONAL QUALIFICATION TESTS

TYPICAL TEST RESULTS
14” CLASS 300 C12 BODY

A. HYDROSTATIC TESTS
Valve passed testing with zero leakage.

B. AMBIENT CYCLING TESTS
Valve passed:
5000 Cycles with preferred flow direction,
3000 Cycles with nonpreferred flow direction
and zero leakage at seats and gasket

Also tested 8” Class 300 to 30,000 cycles with no jamming.

C. HOT CYCLING TESTS
The valve under flow of steam at 150–200 psi
superheated to 800–900°F passed 7250 cycles
without seizing or jamming.

Steam test on 14” Class 150 valve.

8” Class 300 valve hot cycled at 150 psi steam
superheated to 800°F.