As a result of continuous design improvements, Velan is offering live-loading of bonnet “take-up” bolting as a standard pressure seal valve feature. At the present time, live-loading is available in 6–24” (150–600 mm) Class 1500 and 8–24” (200–600 mm) Class 2500. This new design has been successfully field tested in tough power applications such as in “peaking” type cogeneration plants or DSS, WSS plants where valves are subject to frequent start-ups and shut-downs.

**HOW IT WORKS**

1. **Live-loading of bonnet bolting** stores the required sealing load during a pressure or temperature induced transient.

2. **Live-loading** automatically compensates for the transient loads which cause bonnet movement by maintaining a positive load on the pressure seal gasket as the pressure reduces.

**GRAPHITE GASKETS**

Velan recommends the use of graphite pressure seal gaskets, in lieu of standard soft iron gaskets, in high temperature and frequently temperature-cycled applications. Daily Start and Stop (DSS) and Week-end Start and Stop (WSS) operations require graphite gaskets. Customer must inform Velan of such applications.

- Below 1,000 psi operating pressure graphite gaskets are recommended.
- Between 500 and 700 psi graphite gaskets are a must.
- Below 500 psi bolted bonnet valves are recommended.
**STRONGER, LEAKPROOF BOLTED BODY-BONNET JOINT**

**Fully-Encased Spiral Wound Gasket**

The design of gasketed joints is critical for low-emission applications. For better control and elimination of unwinding of spiral wound gaskets, a fully-enclosed gasket cavity is desirable.

**Stronger Bolting Ensures Joint Tightness**

Simple stress versus deflection tests conducted in our laboratory in 1972 on spiral wound gaskets confirmed that control of leakage is highly dependent on gasket seating stress and that the ASME Section III Code data at the time, namely the seating factor \( m = 3 \) and seating stress \( y = 4,500 \text{ psi} \), were inadequate. Gasket seating stress of \( y = 16,000 \text{ psi} \) was found to be essential for a leakproof joint. The ASME later changed \( y \) to \( 10,000 \text{ psi} \) but the seating factor \( m \) remains unchanged.

**Velan Recommended Values**

<table>
<thead>
<tr>
<th>GASKET OD</th>
<th>ASME ( m )</th>
<th>VELAN ( m )</th>
<th>ASME ( y )</th>
<th>VELAN ( y )</th>
</tr>
</thead>
<tbody>
<tr>
<td>2–5.5”</td>
<td>3</td>
<td>7</td>
<td>10,000</td>
<td>16,000–28,000</td>
</tr>
<tr>
<td>6–11”</td>
<td>3</td>
<td>6</td>
<td>10,000</td>
<td>16,000–25,000</td>
</tr>
<tr>
<td>12–20”</td>
<td>3</td>
<td>6</td>
<td>10,000</td>
<td>16,000–20,000</td>
</tr>
</tbody>
</table>

**Higher Bolting Torques**

Tests also revealed that bolts are more resistant to fatigue and creep if pre-loaded to as high as 70% of yield at room temperature. SA-193-B7 or SA-564-630 bolts are torqued to 45,000 psi.

**Modern Torquing Procedure**

Since it is important to control gasket seating stress, the method of applying gasket load must be accurate. The first torquing of bolts is performed at 10-20% higher than recommended values. In the second round, each nut is removed and lubricated, and the bolts are retorqued at maximum values (standard for forged valves 2–24”, 50–600 mm).

**Seal Welding Provision**

 Provision for seal welding is available for all bolted bonnet forged valves sizes 2½–24” (65–600 mm).

**Calculations**

The bolt load is calculated to meet the operating load \( W_{m1} \) or the gasket seating load \( W_{m2} \), whichever is greater. In low pressure applications the seating load is larger.

**VELAN ADVANCED DESIGN STEM SEAL**

**THE VELAN STEM SEAL evolved from extensive testing, offers a tight seal with little or no maintenance over long periods of time.**

1. Lower operating torque due to non-rotating stem. Torque arm prevents rotation, indicates position and actuates limit switches.
2. Live-loading (optional). Two sets of Belleville springs maintain a minimum permanent packing stress of 4,000 psi (275 bar). Live-loading keeps the stem tight for long periods of time without maintenance. Bolt torques control total spring load.
3. Heavy two-piece gland.
4. Leak-off for double packing (optional). A lantern ring and leak-off pipe are provided for removal of leakage, if any, from lower packing set.
5. Non-rotating stem has close roundness and straightness tolerances and is burnished for a superior surface finish.
6. Short and narrow packing chamber. Sealing effectiveness improves as overall packing length shortens. Chamber wall is burnished for superior finish.
7. Precompressed rings. Each braided graphite ring is preformed and compressed to 4,000 psi (275 bar) at installation to ensure extreme tightness at high packing strain.
8. Packing blowout (optional) ensures fast removal of old packing rings when time-consuming conventional packing removal methods are unacceptable (nuclear service, for example). A pneumatic source is normally used for this purpose.