Cryogenic Metal Seated Butterfly Valves
The Key to Cryogenic Valve Solutions

VELAN Inc Group

VELAN Inc is one of the world’s leading independent manufacturer of steel gate, globe, check, butterfly and ball valves. Founded in 1949 in Montreal - Canada, VELAN Inc employs over 2,000 people and is located worldwide with 14 specialized manufacturing plants in Canada, USA, France, Portugal, Germany, UK, South Korea, Taiwan, China.

Design & Technology

VELAN SAS has strong design, research & development capabilities to keep valves on the cutting edge of technology in the field of Nuclear Power and cryogenics. Our research laboratory is equipped with advanced facilities such as steam test loop, Cv loop, cryogenic test benches and CAD-FEM software.

Quality Assurance

With 30 years of experience in the supply of valves for critical applications, VELAN SAS has a comprehensive Quality Management system including the following certifications:
- ISO 9001 (edition 2000)
- ISO 14001 (edition 2004)
- OHSAS 18001 (edition 1999)

Maintenance & Customer Services

VELAN SAS has a fully integrated maintenance and services department able to carry out on-site servicing worldwide, that gives us a continuous feedback experience to improve valve performances. The Maintenance & Customer Services department gathers all competences to handle large turnkey maintenance operation or specific on-site services in severe environments.

Located in Lyon - France, in a modern 160,000 sq.ft (16,000 m²) plant, VELAN SAS is a 100% subsidiary of VELAN inc group (Canada).

VELAN SAS is specialised in design and manufacture of high performance valves for Nuclear and Cryogenic applications.

High Performance Production Equipment

High performance production equipment such as CNC machining centers, plasma hard facing stations, 3D measuring machine, clean assembly room, enables us to provide to our customers a constant high level of quality.

Worldwide Sales Network

VELAN SAS products are available worldwide through the sales network of VELAN inc group.
Valve design features

• Stem Seal
  • Viton O-rings
  • Expanded graphite ring for "fire safe"

• No Cavity
  There is no cavity to allow build-up of solids

• In-Line Servicing
  Allows quick and easy in-line seat inspection or replacement within minutes

• Off-Centered Disc
  Ensures a progressive smooth and low friction seat-disc closing. Hardened sealing surface to provide high level of tightness and long lifetime

• Fire Safe Design
  All metal construction providing inherent fire safe

• Unique Sealing System
  Combined with the eccentric disc rotation, the patented flexible metallic seat provides an exceptional tight shut-off even with high temperature fluctuations

• Actuators
  Pneumatic, hydraulic, electric or manual gear
  Fast acting actuators for Emergency Shut Down function (ESD)

• Extended Bonnet
  With a sufficient gas column to keep the stem packing away from the cold fluid

• High Quality Castings
  With X-ray and PT examinations from approved foundries

• Stainless Steel Shaft Bearings
  Coated with nickel-reinforced PTFE for high cycle and smooth operation

Reliability
Reliability of valve operation affects service life and ease of inspection and maintenance. In order to predict reliability, a sound valve design must be backed up by a stress analysis and functional qualification testing under critical operating conditions.

42" BW Side Entry Butterfly Valve after cryogenic tests
**Butt weld end valves**
DN 150 - 1050  NPS 6" - 42"
Class 150 - 300
Down to -252°C (420°F)

Available versions for:
- Liquefied Hydrogen
- Liquefied Oxygen
- Liquefied Helium, reduced thermal losses
- Flow control service
- Forged Design

---

**Materials**

<table>
<thead>
<tr>
<th>Part</th>
<th>ASTM grade</th>
<th>Part</th>
<th>ASTM grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body</td>
<td>A 351 CF 3M</td>
<td>Extension</td>
<td>A 351 CF 3M or A 479 F 316L</td>
</tr>
<tr>
<td>Stem</td>
<td>A 479 F 316 or Gr. 660</td>
<td>Gasket</td>
<td>Graphite</td>
</tr>
<tr>
<td>Disc</td>
<td>A 351 CF 8M or A 182 F 316</td>
<td>Stud</td>
<td>A 320 B 8M</td>
</tr>
<tr>
<td>Metallic seal</td>
<td>Copper or Nickel alloy</td>
<td>Nut</td>
<td>A 194 gr 8</td>
</tr>
</tbody>
</table>

Other materials available on request

---

**Dimensions, Cv class 150**

| DN   | NPS | 150 | 200 | 250 | 300 | 350 | 400 | 450 | 500 | 600 | 650 | 700 | 750 | 800 | 900 | 950 | 1000 | 1050 |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| H    | 6   | 610 | 640 | 665 | 715 | 760 | 807 | 855 | 932 | 1050| 1110| 1170| 1220| 1240| 1295| 1510| 1590| 1590|
| P    | 122 | 148 | 180 | 207 | 232 | 270 | 303 | 331 | 395 | 430 | 455 | 500 | 520 | 560 | 648 | 680 | 703 |
| L    | 395 | 410 | 455 | 530 | 555 | 590 | 625 | 680 | 625 | 770 | 795 | 830 | 890 | 930 | 1100 | 1190| 1190|
| L1   | 125 | 130 | 140 | 145 | 165 | 155 | 175 | 175 | 185 | 190 | 200 | 215 | 230 | 265 | 315 | 335 | 335 |
| Cv   | 903 | 1730| 2810| 4175| 5850| 7850| 10190|12880|19370|23200|27440|32100|37210|48790|55200|62320|69860|
| Weight| 79  | 96  | 147 | 200 | 275 | 335 | 425 | 555 | 824 | 1004| 1202|1337|1606|2190|2252|3040|3048|

Class 300 data available on request.
For larger sizes, contact us.

---

**Design Standards**

ANSI B16.34, ANSI B16.25, API 6FA, API 607, BS 6755, API 598.
In compliance with European Pressure Equipment Directive (PED), CE Marking for Europe.
Flanged valves
DN 150 - 1200 NPS 6” - 48”
Class 150 - 300
Down to -252°C (-420°F)

Available versions for:
- Liquefied Hydrogen
- Liquefied Oxygen
- Liquefied Helium, reduced thermal losses
- Flow control service
- Forged Design

Materials

<table>
<thead>
<tr>
<th>Part</th>
<th>ASTM grade</th>
<th>Part</th>
<th>ASTM grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body</td>
<td>A 351 CF 8M</td>
<td>Extension</td>
<td>A 351 CF 3M or A 479 F 316L</td>
</tr>
<tr>
<td>Stem</td>
<td>A 182 F 316 or Gr. 660</td>
<td>Gasket</td>
<td>Graphite</td>
</tr>
<tr>
<td>Disc</td>
<td>A 351 CF 8M or A 182 F 316</td>
<td>Stud</td>
<td>A 320 B 8M</td>
</tr>
<tr>
<td>Metallic seal</td>
<td>Copper or Nickel alloy</td>
<td>Nut</td>
<td>A 194 gr 8</td>
</tr>
</tbody>
</table>

Dimensions, Cv class 150

<table>
<thead>
<tr>
<th>DN NPS 6 8 10 12 14 16 18</th>
<th>Part</th>
<th>ASTM grade</th>
<th>Part</th>
<th>ASTM grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>L 140 152 165 178 190 216 222</td>
<td>Body</td>
<td>A 351 CF 8M</td>
<td>Extension</td>
<td>A 351 CF 3M or A 479 F 316L</td>
</tr>
<tr>
<td>H 610 640 665 715 760 807 855</td>
<td>Stem</td>
<td>A 182 F 316 or Gr. 660</td>
<td>Gasket</td>
<td>Graphite</td>
</tr>
<tr>
<td>D 280 343 407 483 534 597 635</td>
<td>Disc</td>
<td>A 351 CF 8M or A 182 F 316</td>
<td>Stud</td>
<td>A 320 B 8M</td>
</tr>
<tr>
<td>Cv 930 1730 2810 4175 5850 7850 10190</td>
<td>Metallic seal</td>
<td>Copper or Nickel alloy</td>
<td>Nut</td>
<td>A 194 gr 8</td>
</tr>
</tbody>
</table>

Dimensions, Cv class 300

<table>
<thead>
<tr>
<th>DN NPS 6 8 10 12 14 16 18</th>
<th>Part</th>
<th>ASTM grade</th>
<th>Part</th>
<th>ASTM grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>L 140 152 165 178 190 216 222</td>
<td>Body</td>
<td>A 351 CF 8M</td>
<td>Extension</td>
<td>A 351 CF 3M or A 479 F 316L</td>
</tr>
<tr>
<td>H 610 640 665 715 760 807 855</td>
<td>Stem</td>
<td>A 182 F 316 or Gr. 660</td>
<td>Gasket</td>
<td>Graphite</td>
</tr>
<tr>
<td>D 317.5 381 444.5 520.5 584 647.5 811</td>
<td>Disc</td>
<td>A 351 CF 8M or A 182 F 316</td>
<td>Stud</td>
<td>A 320 B 8M</td>
</tr>
<tr>
<td>Cv 930 1730 2810 4175 5850 7850 10190</td>
<td>Metallic seal</td>
<td>Copper or Nickel alloy</td>
<td>Nut</td>
<td>A 194 gr 8</td>
</tr>
</tbody>
</table>

All dimensions are in mm
Weights are in kg

Dimensions, Cv class 300

<table>
<thead>
<tr>
<th>DN NPS 6 8 10 12 14 16 18</th>
<th>Part</th>
<th>ASTM grade</th>
<th>Part</th>
<th>ASTM grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>L 140 152 165 178 190 216 222</td>
<td>Body</td>
<td>A 351 CF 8M</td>
<td>Extension</td>
<td>A 351 CF 3M or A 479 F 316L</td>
</tr>
<tr>
<td>H 610 640 665 715 760 807 855</td>
<td>Stem</td>
<td>A 182 F 316 or Gr. 660</td>
<td>Gasket</td>
<td>Graphite</td>
</tr>
<tr>
<td>D 317.5 381 444.5 520.5 584 647.5 811</td>
<td>Disc</td>
<td>A 351 CF 8M or A 182 F 316</td>
<td>Stud</td>
<td>A 320 B 8M</td>
</tr>
<tr>
<td>Cv 930 1730 2810 4175 5850 7850 10190</td>
<td>Metallic seal</td>
<td>Copper or Nickel alloy</td>
<td>Nut</td>
<td>A 194 gr 8</td>
</tr>
</tbody>
</table>

All dimensions are in mm
Weights are in kg

For larger sizes, contact us.

Design Standards

ANSI B16.34, ANSI B16.5, ISO 5752 short pattern, BS 5155, MS SSP 44, API 6FA, API 607, BS 6755, API 598.
Standard flange finish is FF and SF, other types (RF, RTJ...) are optional.
Alternative flange standards available on request.
In compliance with European Pressure Equipment Directive (PED), CE Marking for Europe.
A double spring-energized metallic O-ring seat provides a static (1) and dynamic seal (2) as well as the inherent fire safe function. Each O-ring has a double envelope, the inner one in stainless steel, the external one in copper or nickel alloy. The spring is made of Inconel. The flexible retaining ring (3) ensures a complementary contact pressure onto the disc. Thanks to a special arrangement, the tightening screws are secured by a jam nut and can’t be lost inside the piping.

This design allows easy and quick in-line maintenance. Thanks to the window placed on the side of the valve, free access inside the valve is possible for inspection and maintenance without disac coupling the actuator. No special tool is required.

Stem sealing
Stem sealing is achieved by a system of superposed O-ring gaskets and a graphite packing for the fire-safe function.

In compliance with:
- API 607
- API 6FA
- BS 6755 - Part II

Advanced Technical Features

Fire safe function

In-line easy maintenance

Low pressure drop

For gases
\[ \Delta P = P_1 \cdot \sqrt{P_1^2 - 2 \cdot dT \cdot \left( \frac{Q_g}{C_v} \right)^2} \]
\[ \Delta P = \text{Pressure drop : bar} \]
\[ P_1 = \text{Upstream pressure : bar} \]
\[ Q_g = \text{Volumetric flow of gas : m}^3/\text{h} \]
\[ d = \text{Specific gravity of gas in standard conditions} \]
\[ T = \text{Absolute temperature : K} \]
\[ C_v = \text{Flow coefficient} \]

For liquids
\[ \Delta P = d \left( \frac{Q_L}{K_v} \right)^2 \]
\[ \Delta P = \text{Pressure drop : bar} \]
\[ Q_L = \text{Flow of liquid : m}^3/\text{h} \]
\[ d = \text{Specific gravity of liquid} \]
\[ C_v = \text{Flow coefficient} = 1.16 \]
1600 m² dedicated to testing and inspection, including:

- alcohol test bench for pressure tests at ambient temperature.
- in-house cryogenic testing facility, including 2 nitrogen pools and a cryogenic bunker (for high pressure tests) for valve sizes up to 80" (DN 2000).
- all our tests are performed in accordance with the most stringent international standards.

Pioneer in development of cryogenic butterfly valves for LNG, liquefied gases and aerospace applications, VELAN is always keeping its valves on the cutting edge of technology to provide high performance valves to the great satisfaction of its clients as attested by numerous references.
Main Applications:
- LNG Liquefaction Plants
- LNG Receiving Terminals
- Air Separation Processes
- Petro-Chemical Processes
- Gas To Liquid (GTL)
- Aero-Space Storage Facilities

Main Fluids:

<table>
<thead>
<tr>
<th>Fluid</th>
<th>Boiling Point (°C)</th>
<th>Boiling Point (°F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Propylene</td>
<td>-47.60</td>
<td>-53.68</td>
</tr>
<tr>
<td>CO₂</td>
<td>-78.50</td>
<td>-109.30</td>
</tr>
<tr>
<td>Ethylene</td>
<td>-103.70</td>
<td>-154.66</td>
</tr>
<tr>
<td>LNG</td>
<td>-161.60</td>
<td>-258.88</td>
</tr>
<tr>
<td>Oxygen</td>
<td>-182.96</td>
<td>-297.33</td>
</tr>
<tr>
<td>Nitrogen</td>
<td>-195.80</td>
<td>-320.44</td>
</tr>
<tr>
<td>Hydrogen</td>
<td>-252.87</td>
<td>-423.17</td>
</tr>
</tbody>
</table>

VELAN’s Cryogenic Valves Range: