# Gate, Globe & Check Valves



ASME Class 150 - 2500, (2" - 72") 50mm - 1800mm
API 600 | API 623 | API 594 | ASME B16.34 | API 603

**Cast Steel Gate, Globe and Check Valves** have established themselves the world over for their quality, reliability and long service. The valves are manufactured to the latest international designs, using advanced manufacturing techniques and stringent quality control checks. The valves are regularly supplied to major Indian and international clients including oil refining companies and EPC contractors. A wide network of distributors ensures the availability of valv es anywhere in the world.

**Valves Limited** is a wholly owned subsidiary of Larsen & Toubro. Backed by an fifty-year track-record of excellence and world-leading innovation, the company provides engineered flow-control solutions for key sectors of the economy.

Valves Limited is synonymous with world-class manufacturing and quality assurance systems. Our plants have the agility and flexibility to deliver a wide variety of valves against time constraints and dynamic market demands. International safety, health and environment standards govern every phase of the manufacturing process.

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## QUALITY POLICY

L&T Valves Limited is committed to enhance value to customers by delivering best-in-class valves and flow-control solutions.

We achieve this by:

- Complying with codes, standards, customer specifications, statutory and regulatory requirements as applicable to our products
- Continually improving the effectiveness of Quality Management System through appropriate technologies, processes and total employee involvement
- Communicating, understanding, implementing and maintaining this Quality Policy at all levels

S KALYANARAMAN
Chief Executive

Date: 10 Jan 2021

# L&T Manufacturing Programme

| | | Valve type | End Conn. | ASME Class | 2 | 3 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 24 | 28 | 30 | 34 | 36 | 42 | 48 | 54 | 56 | 60 | 64 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DESIGN STANDARD & WALL THICKNESS | API 600 & BS 1414 | Gate Valves Bolted Bonnet | Flanged Buttweld ends | 150 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| | | | | 300 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| | | | | 600 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | |
| | | | | 900 | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | | | |
| | | | | 1500 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | | | |
| | | | | 2500 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | | | | | | | |
| | BS 1873 | Globe Valves Bolted Bonnet | Flanged Buttweld ends | 150 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | | | | | | | |
| | | | | 300 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | | | | | | | |
| | | | | 600 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | | | | | | | |
| | | | | 900 | | ● | ● | ● | ● | ● | ● | | | | | | | | | | | | | | | |
| | | | | 1500 | ● | ● | ● | ● | ● | ● | ● | | | | | | | | | | | | | | | |
| | BS 1868 | Check Valves Bolted Cover | Flanged Buttweld ends | 150 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | |
| | | | | 300 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | |
| | | | | 600 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | | | |
| | | | | 900 | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | | | | | | | |
| | | | | 1500 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | | | | | | | |
| | ASME B16.34 | Gate Valves Pr. Seal Bonnet | Flanged Buttweld ends | 600 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | | | |
| | | | | 900 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | | | |
| | | | | 1500 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | | | | | | | |
| | | | | 2500 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | | | | | | | |
| | | Globe Valves Pr. Seal Bonnet | Flanged Buttweld ends | 600 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | | | | | | | |
| | | | | 900 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | | | | | | | |
| | | | | 1500 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | | | | | | | | |
| | | | | 2500 | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | | | | | | | | | | |
| | | Check Valves Pr. Seal Bonnet | Flanged Buttweld ends | 600 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | | | |
| | | | | 900 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | | | |
| | | | | 1500 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | | | | | | | |
| | | | | 2500 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | | | | | | | |
| OTHER SPECIALS | CRYOGENIC | Cryogenic Gate Valves | | 150 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | |
| | | | | 300 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | |
| | | | | 600 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | | |
| | | | | 900 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | | | | | | | |
| | | | | 1500 | ● | ● | ● | ● | ● | ● | ● | | | | | | | | | | | | | | | |
| | | | | 2500 | ● | | | | | | | | | | | | | | | | | | | | | |
| | | Cryogenic Globe Valves | | 150 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | | | | | | | | |
| | | | | 300 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | | | | | | | | |
| | | | | 600 | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | | | | | | | | | | |
| | | | | 900 | ● | ● | ● | | | | | | | | | | | | | | | | | | | |
| | | | | 1500 | ● | ● | ● | | | | | | | | | | | | | | | | | | | |
| | | | | 2500 | ● | | | | | | | | | | | | | | | | | | | | | |
| | SPECIALS | Angle Globe Valves | | 150 | ● | ● | ● | ● | ● | ● | ● | | | | | | | | | | | | | | | |
| | | | | 300 | ● | ● | ● | ● | ● | ● | ● | | | | | | | | | | | | | | | |
| | | Soft-seated Gate Valves | | 150 | ● | ● | ● | ● | ● | ● | ● | | | | | | | | | | | | | | | |
| | | | | 300 | ● | ● | ● | ● | ● | ● | ● | | | | | | | | | | | | | | | |
| | | API 6D Gate Valves | | 150 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | |
| | | | | 300 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | | | |
| | | | | 600 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | | | | | | | |
| | | | | 900 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | | | | | | | |
| | | | | 1500 | ● | ● | ● | ● | ● | ● | ● | ● | ● | | | | | | | | | | | | | |

## Common Test / Inspection methods

| Test / Inspection | Method | Acceptance Criteria |
|---|---|---|
| Visual Inspection | | MSS SP55 |
| Chemical Analysis | ASTM E350 | Relevant ASTM |
| Mechanical Properties | ASTM A370 | Relevant ASTM |
| Radiographic Inspection | ASME B16.34 | ASME B16.34 |
| Magnetic Particle Inspection | ASTM E709 | ASME B16.34 |
| Liquid Penetrant Inspection | ASTM E165 | ASME B16.34 |
| Ultrasonic Inspection | ASTM A388 | ASME B16.34 |
| Positive Material Identification (PMI) | Vacuum emission spectrometer | Customer specification |
| Pressure Testing* | API 600/API 598/ BS 6755 Part I | API 600/API 598/ BS 6755 Part I |
| Dimensional Inspection | | Valve Standard |

*valves undergo a range of destructive and non-destructive tests according to the requirements of the Standard, service conditions and specific customer requirements.*

* Performed on all valves.
The pressure containing parts of all valves are marked with the foundry identification and heat numbers.

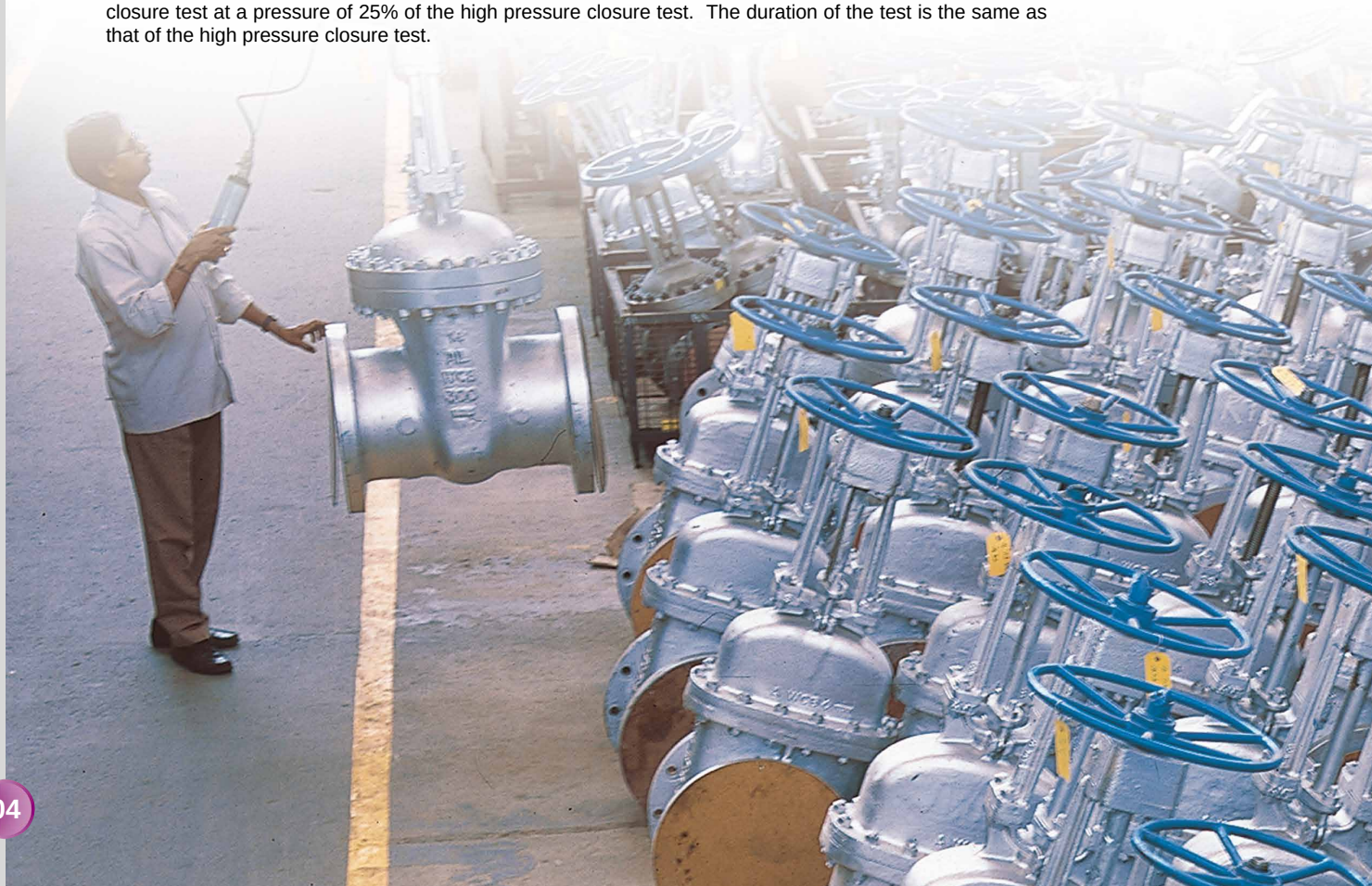
## Test Pressures for standard Carbon Steel Valves

Every individual valve manufactured, is inspected and pressure-tested to API 598 / BS 6755 Part I requirements, for which test certificates are provided.

| ASME Class | Hydrostatic Test Pressure in kg/cm² *(psig)* | | | Pneumatic low pressure closure test pressure in kg/cm² *(psig)* |
|---|---|---|---|---|
| | Shell | Back Seat | Closure | |
| 150 | 32 *(450)* | 22 *(315)* | 22 *(315)* | 7 *(100)* |
| 300 | 79 *(1125)* | 57 *(815)* | 57 *(815)* | 7 *(100)* |
| 600 | 156 *(2225)* | 115 *(1630)* | 115 *(1630)* | 7 *(100)* |
| 900 | 236 *(3350)* | 172 *(2445)* | 172 *(2445)* | 7 *(100)* |
| 1500 | 392 *(5575)* | 287 *(4080)* | 287 *(4080)* | 7 *(100)* |
| 2500 | 652 *(9275)* | 477 *(6790)* | 477 *(6790)* | 7 *(100)* |

**Low Pressure Test for Swing Check Valves**

In addition to the high pressure closure test, Swing Check Valves are subjected to low pressure hydrostatic closure test at a pressure of 25% of the high pressure closure test. The duration of the test is the same as that of the high pressure closure test.



## Compliance Standards

| Parameter | | Compliance |
|---|---|---|
| API 600 | Gate Valve | API 600 |
| | Globe Valve | BS 1873* |
| | Check Valve | BS 1868* |
| API 603 | Gate Valve | API 603 |
| ASME B16.34 Gate, Globe, Check Valves | | ASME B16.34 |
| Pressure-Temperature rating | | ASME B16.34 |
| Face-to-face / End-to-end dimension | | ASME B16.10 |
| End Flange dimensions | | ASME B16.5** |
| Butt-weld End dimensions | | ASME B16.25 |
| Valve Inspection & Testing | | API 600, API 598, BS 6755 Part I |

The valves also comply with applicable BS specifications.

* Shell wall thickness as per API 600

** For valves larger than 24" (600mm), the flange drilling shall be as per ASME B16.47 Series A (MSS SP 44) or Series B (API 605).

RTJ flanges are offered as optional for Class 600 and above.

L&T Valves has the distinction of having obtained a number of national and international approvals. Notable among these are:

- **ISO 9001:2008 certified Quality Management System**
- **Certified to use "CE" marking for supply to the European Union**
- **Specific company approvals from national and international oil majors and EPC contractors**
- **Indian Boiler Regulation (IBR) certification for all three plants.**

## Body / Bonnet Materials

Valves Cast Steel Gate, Globe and Check Valves are offered in a variety of body and bonnet materials to suit different requirements. These materials include Carbon Steel (standard), Alloy Steels and Stainless Steels. For other materials of construction, refer to L&T Valves.

| Material Classification | ASTM Specification | Working temperature* |
|---|---|---|
| Carbon Steel | ASTM A216 Gr. WCB | -29°C to 427°C (-20°F to 800°F) |
| 1¼ Cr - ½ Mo | ASTM A217 Gr. WC6 | -29°C to 593°C (-20°F to 1100°F) |
| 2¼ Cr - 1 Mo | ASTM A217 Gr. WC9 | -29°C to 593°C (-20°F to 1100°F) |
| 5 Cr - ½ Mo | ASTM A217 Gr. C5 | -29°C to 649°C (-20°F to 1200°F) |
| 9 Cr - 1 Mo | ASTM A217 Gr. C12 | -29°C to 649°C (-20°F to 1200°F) |
| 9 Cr - 1 Mo - ¼ V | ASTM A217 Gr. C12A | -29°C to 649°C (-20°F to 1200°F) |
| Low-temperature Steel | ASTM A352 Gr. LCB/LCC | -46°C to 343°C (-50°F to 650°F) |
| Austenitic Stainless Steel 18-8 (Type 304) | ASTM A351 Gr. CF8 | -196°C to 649°C (-320°F to 1200°F) |
| Austenitic Stainless Steel 16Cr - 12Ni - 2 Mo (Type 316) | ASTM A351 Gr. CF8M | -196°C to 649°C (-320°F to 1200°F) |

Other materials such as ASTM A351 Gr. CF3, ASTM A351 Gr. CF3M and Duplex SS are also offered.

* ASME pressure-temperature ratings on pages 26 & 27. Bolting & trim materials will influence the working temperature.



# Gate, Globe & Check Valves
## Bolted Bonnet / Cover design

**The API 600 / BS 1873 / BS 1868 family of L&T Gate, Globe and Swing Check Valves is exceptionally sturdy, rugged and durable, with a reputation for quality, integrity and long service. They are designed for tight sealing and ease of operation. The valves are available with flanged ends or butt-weld ends, in pressure ratings from ASME Class 150 to Class 1500, and in a variety of materials of construction.**

**Gate Valves are of flexible wedge, outside screw-and-yoke and bolted-bonnet construction. The valves conform to API 600.**

**Globe Valves feature a ball-type disc, outside screw-and-yoke and bolted-bonnet construction. They conform to BS 1873 and also meet the general requirements of API 600, including shell wall thickness and stuffing box dimensions.**

**Check Valves are of swing-type and bolted-cover construction. They conform to BS 1868 and also meet the general requirements of API 600, including shell wall thickness.**



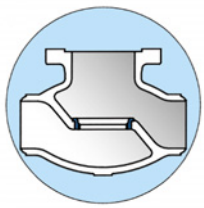
### Body and Bonnet

The body and bonnet are cast with uniform section and generous radius fillets to prevent stress concentration. The castings are precision-machined for high performance.

The gate valve body has a straight through port without recesses except at the seat area. This ensures minimum turbulence, erosion and resistance to flow. Long integral guide ribs in the body match with guide slots in the wedge for accurate alignment and guidance. Bonnet castings are of one-piece design, where the yoke is integral with the bonnet for gate valves of sizes up to 12" (300mm). This ensures accurate alignment of stem and a smooth operation.



In globe valves of larger sizes and for higher pressure classes of ASME Class 900 and above, the internal part of the body is machined to provide continuous guiding of the disc from the open to the closed position.



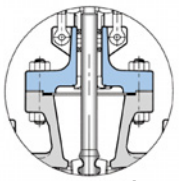
The check valve body provides a full port without pockets from inlet to the valve seat. On the downstream side, the body has generous proportions to facilitate full swing of the disc to reduce disc erosion and flow resistance.

### Body-Bonnet Joint

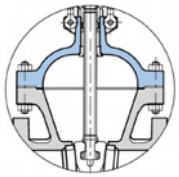
The body-bonnet joint for Class 150 gate valves is oval in shape, while for Class 300 and for globe valves, this joint is circular in shape. In 2" (50mm) valves, the body-bonnet joint has a square configuration.

Gate valves of Class 150 rating have a flat-face joint with a graphite gasket having metallic inserts. Those of Class 300 rating have a male-female type joint with a spirally-wound gasket. Gate valves of Class 600 rating and above have a Ring Type Joint (RTJ).

Globe and Check valves in Class 150 and 300 ratings have a male-female type joint with a spirally-wound gasket. Those of Class 600 rating and above have an RTJ.



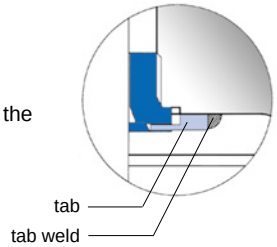
**Square Joint**



**Circular Joint**

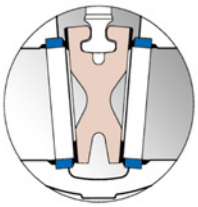
### Back Seat

In gate and globe valves, a precision-machined back-seat bush is threaded in the bonnet and is secured by a tab-weld.



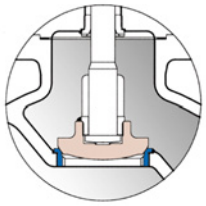

### Flexible Wedge

gate valves feature a one-piece cast flexible wedge that minimises stress concentration. Wedge flexibility ensures tight seating over a wide range of differential pressures and temperatures. It also adjusts to slight misalignments caused by pipeline deflections and thermal deformation. The stem-to-wedge thrust is applied close to the wedge centre. This reduces lateral stem loading and provides for more accurate wedge movement.



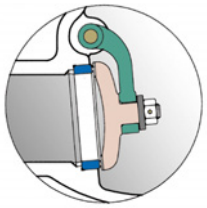
**Ball-type Disc**

globe valves feature a ball-type disc that provi des a fine grain surface on the taper seat. For severe services that demand hard-faced seat s, a plug-type disc is provided.



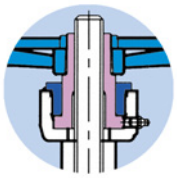
**Swing-type Disc Assembly**

The one-piece construction is securely fastened to the hinge by means of a lock nut and pin. The disc is free to rotate to avoid localized wear. The hinge pin offers excellent wear resistance properties.

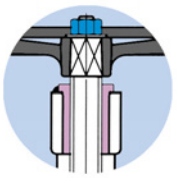


**Yoke Sleeve and Yoke Bush**

Cast in austenitic, copper-free ductile iron alloy to provide resistance to heat, corrosion and wear, the Yoke Sleeve in gate valves features a long thread engagement that assures accurate alignment of the stem. Moreover, it can be removed without replacing the bonnet. In gate valves of sizes 150mm and higher in Class 600 rating and above, the yoke sleeve is mounted on thrust bearings to facilitate easy operation.



The Yoke Bush of globe valves is also made from ductile iron alloy, and has a long thread engagement for accurate stem alignment. In Class 900 and 1500 ratings, the valves have a yoke sleeve to facilitate smooth operation.



**Seat Ring**

gate valves and check valves feature a seal-welded seat ring that offers a leakproof design as it eliminates the leakage path between the seat ring and the body. This design is superior to threaded seats which can loosen up due to temperature fluctuations, corrosion or vibration and result in leakage. Threaded seat rings are optional. For 50mm gate valves, the seat ring is flared into the body, while seal welding is optional.

L&T globe valves feature a shoulder type, threaded body seat ring which has a wide taper area that provides for ample seating. Slots on the seat ring allow easy in-situ removal for servicing. Threaded seat rings are additionally secured by a tab-weld. Welded seat rings are also availble in L&T Globe Valves.

**Stuffing Box**

The machined stuffing box chamber with a flat bottom allows correct sealing of the gland packing. Surface finish is controlled to required limits, to ensure low-emission performance. Stuffing boxes are provided with five numbers of gland packing to achieve correct compression of all packings and to ensure tight sealing.

Valves in Class 300 rating and above feature a provision for a lantern ring arrangement for conditions that demand that there be no leakage of service fluid to the atmosphere. The lantern ring has a leakoff plug which allows connection for liquid or grease seal. *See page 30 for more details on the lantern ring.*

**Stem**

gate and globe valves feature a stem of one-piece construction, ACME threaded and precision-machined with polished surfaces to reduce friction, minimise leakage and extend stem life.

In gate valves, the heavy forged T-head engages with the T-slot in the wedge. The stem also has an integral self-adjusting radial back-seat shoulder that matches with the back-seat bush in the bonnet.

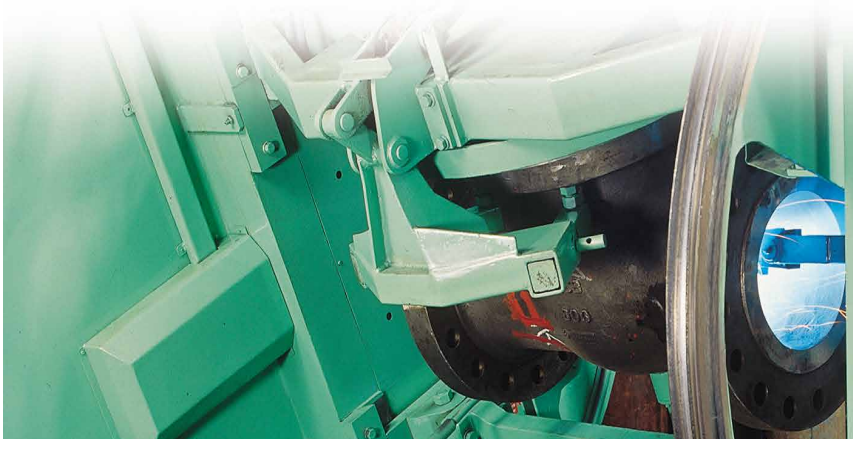
In globe valves, the stem is held to the disc by a stem nut that permits the disc to swivel. This free-floating design ensures uniform seating.

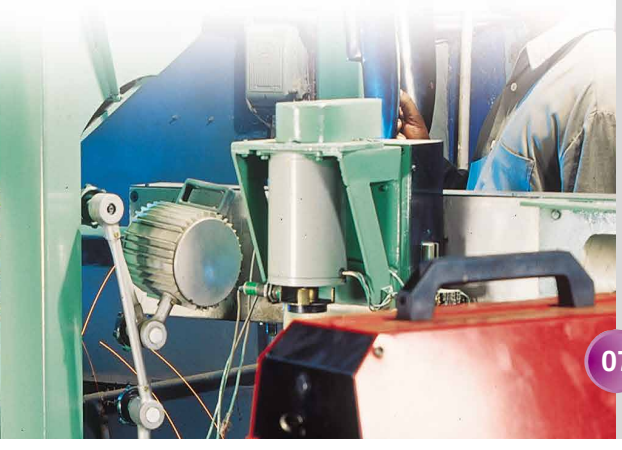


**Flange Drilling and Facing finish**

The standard range of flanged valves in sizes of up to 2 4” (600mm) is finished with end-flanges faced, drilled an d spot-faced (or backfaced) to ASME B16.5 Raised F ace (RF). Flanges in valves of sizes larger than 24” ( 600mm) are drilled as per ASME B16.47 Series A (MSS SP 44) or Series B (API 605). Valves in ASME Class 600 and above are offered with RTJ end flanges on request.

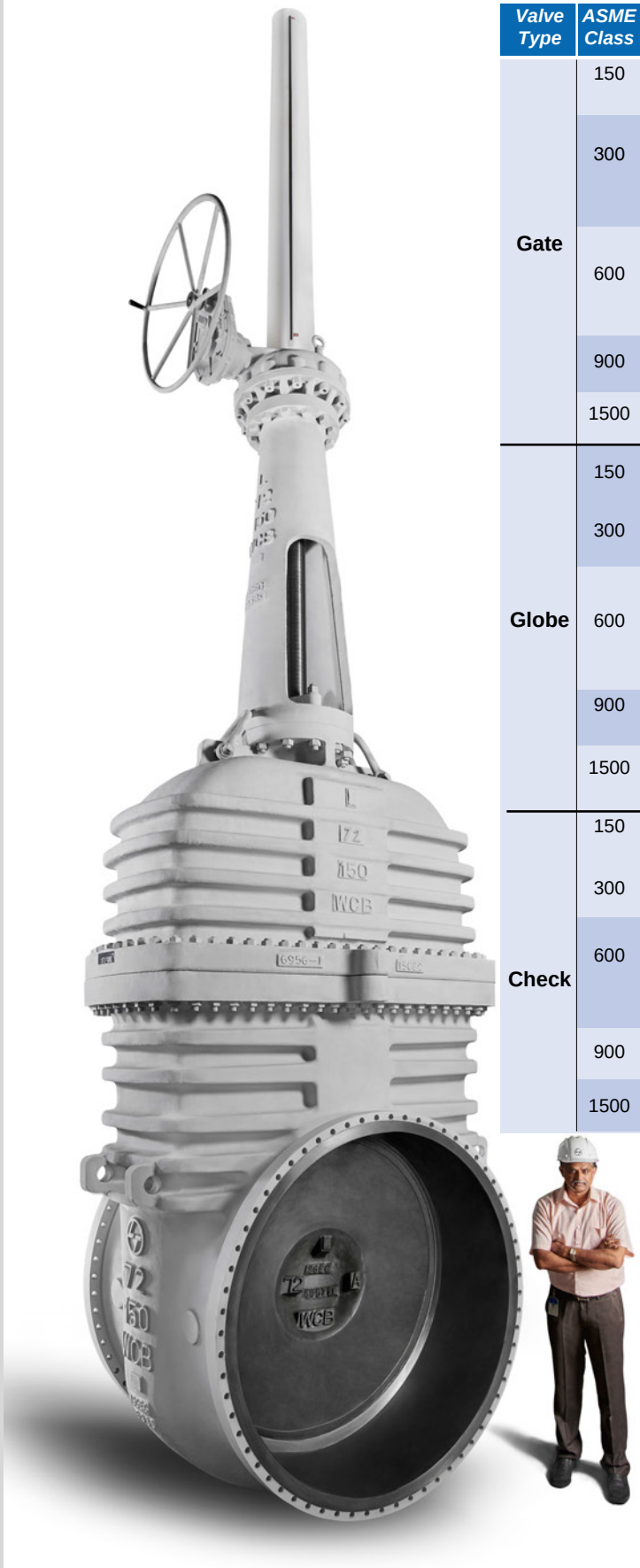
The standard finish offered on the raised faces is 125-250 microns in Ra (AARH) Spiral Serration. Other finishes can be offered on request.





## Bonnet Gaskets

| Valve Type | ASME Class | Typical | Optional |
|---|---|---|---|
| Gate | 150 | Graphite Gasket with SS 316 insert | Spirally-wound SS 304 / SS 316 with Graphite or PTFE filler |
| | 300 | Spirally-wound SS 304 with Graphite filler | Spirally-wound SS 316 with Graphite filler<br>Spirally-wound SS 304 / SS 316 with PTFE filler |
| | 600 | Spirally-wound SS 304 with Graphite filler | Octagonal Ring Type (RTJ) metal gasket in Soft Iron<br>Octagonal Ring Type (RTJ) metal gasket in SS 304 / SS 316 |
| | 900 | Octagonal Ring Type (RTJ) metal gasket in Soft Iron | Octagonal Ring Type (RTJ) metal gasket in SS 304 / SS 316 |
| | 1500 | Octagonal Ring Type (RTJ) metal gasket in Soft Iron | Octagonal Ring Type (RTJ) metal gasket in SS 304 / SS 316 |
| Globe | 150<br>300 | Spirally-wound SS 304 with Graphite filler | Spirally-wound SS 316 with Graphite filler<br>Spirally-wound SS 304 / SS 316 with PTFE filler |
| | 600 | Spirally-wound SS 304 with Graphite filler | Octagonal Ring Type (RTJ) metal gasket in Soft Iron<br>Octagonal Ring Type (RTJ) metal gasket in SS 304 / SS 316 |
| | 900 | Octagonal Ring Type (RTJ) metal gasket in Soft Iron | Octagonal Ring Type (RTJ) metal gasket in SS 304 / SS 316 |
| | 1500 | Octagonal Ring Type (RTJ) metal gasket in Soft Iron | Octagonal Ring Type (RTJ) metal gasket in SS 304 / SS 316 |
| Check | 150<br>300 | Spirally-wound SS 304 with Graphite filler | Spirally-wound SS 316 with Graphite filler<br>Spirally-wound SS 304 / SS 316 with PTFE filler |
| | 600 | Spirally-wound SS 304 with Graphite filler | Octagonal Ring Type (RTJ) metal gasket in Soft Iron<br>Octagonal Ring Type (RTJ) metal gasket in SS 304 / SS 316 |
| | 900 | Octagonal Ring Type (RTJ) metal gasket in Soft Iron | Octagonal Ring Type (RTJ) metal gasket in SS 304 / SS 316 |
| | 1500 | Octagonal Ring Type (RTJ) metal gasket in Soft Iron | Octagonal Ring Type (RTJ) metal gasket in SS 304 / SS 316 |




48-inch Class 150 Gate Valve

## Ordering Information

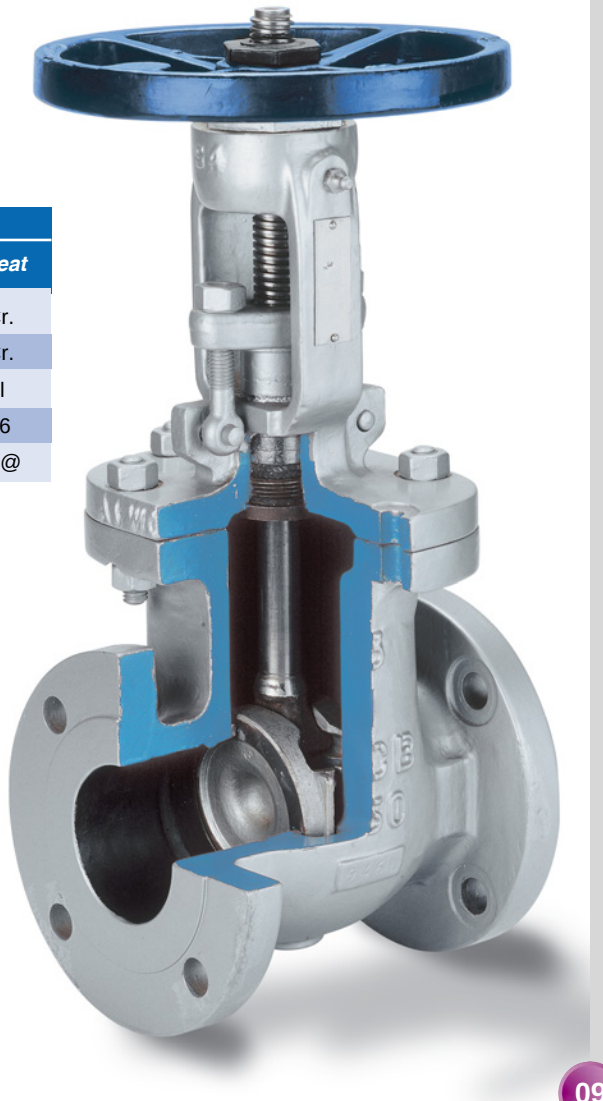
| Valve Size mm (in) | Valve Type | ASME Pr. Class | End Connection | – | Trim Number |
|---|---|---|---|---|---|
| 50 (2”) | **1** Gate | **1** Class 150 | **3** Flanged RF | | **1** |
| 65 (2½”) | **4** Globe | **3** Class 300 | **5** Flanged RTJ | | **2** |
| 80 (3”) | **7** Check | **6** Class 600 | **6** Butt-weld | | **5** |
| 100 (4”) | | **9** Class 900 | | | **8** |
| 125 (5”) | | **A** Class 1500 | | | **9** |
| 150 (6”) | | | | | **10** |
| 200 (8”) | | | | | **12** |
| 250 (10”) | | | | | **16** |
| 300 (12”) | | | | | |
| 350 (14”) | | | | | |
| 400 (16”) | | | | | |
| 450 (18”) | | | | | |
| 500 (20”) | | | | | |
| 600 (24”) | | | | | |
| 700 (28”) | | | | | |
| 750 (30”) | | | | | |
| 850 (34”) | | | | | |
| 900 (36”) | | | | | |
| 1050 (42”) | | | | | |
| 1200 (48”) | | | | | |
| 1500 (60”) | | | | | |
| 1600 (64”) | | | | | |

*Refer table below on Trim Materials*

As a standard, Valves are made in Carbon Steel to ASTM A216 Gr. WCB.
For valves in other materials and for accessories like gear operation and electrical actuators, suffix suitable abbreviations to the above ordering code such as:

**WC6** for ASTM A217 Gr. WC6
**WC9** for ASTM A217 Gr. WC9
**LCB** for ASTM A352 Gr. LCB
**LCC** for ASTM A352 Gr. LCC
**C5** for ASTM A217 Gr. C5
**C12** for ASTM A217 Gr. C12

**GO** for Gear Operation
**LA** for Locking Arrangement
**E** for Electrical Actuator
**EB** for Extended Bonnet (Cryogenic valves)
**ES** for Extension Spindle
**IBR** for IBR Certification
**FSJ** for Full Steam Jacket
**PSJ** for Partial Steam Jacket



## Trim Materials

| *L&T Trim #* | *API 600 Trim #* | *Material of Construction* | | | |
|---|---|---|---|---|---|
| | | *Stem* | *Seat Surface* | *Wedge / Disc Seating Surface* | *Back Seat* |
| 5 | 5 | 13% Cr. | HF* | HF* | 13% Cr. |
| 8 | 8 | 13% Cr. | HF* | 13% Cr. | 13% Cr. |
| 9 | 9 | Monel | Monel | Monel | Monel |
| 12 | 12 | SS 316 | HF* | SS 316 | SS 316 |
| 16 | 16 | SS 316 | HF* | HF* | SS 316@ |

Trim No. 16 will feature a back-seat of either SS 316 or SS 316 + HF** HF :
Hard-faced with Stellite #6 (Co-Cr-W alloy) or equivalent.

Trim 12 valves comply with NACE MR 01 75 for hardness and heat treatment requirements of wetted components.

Trim 8 valves can also be offered for NACE service on request.

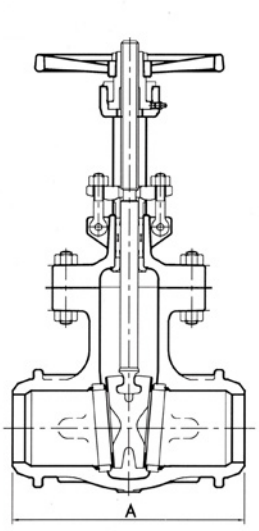
## Stem Packing

| *Construction* | *Max. temp.* |
|---|---|
| Die-formed flexible Graphite rings with braided Graphite top & bottom rings* | 649°C (1200°F) |
| Braided PTFE | 204°C (400°F) |

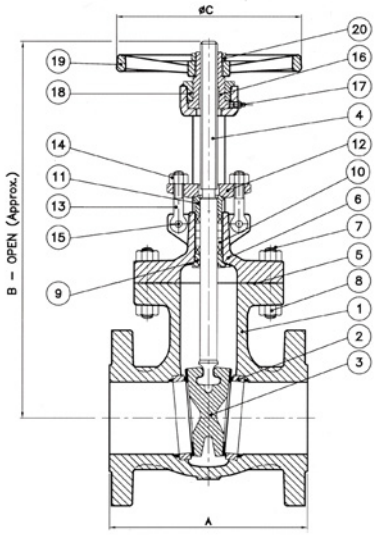
* L&T standard

# Gate Valves - ASME Classes 150, 300 & 600

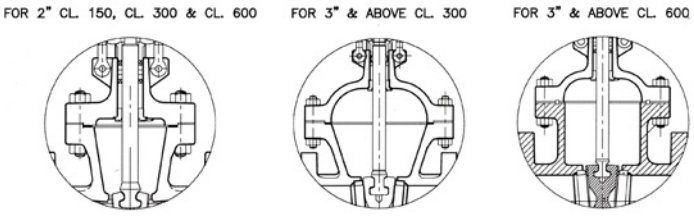
## *Figure Numbers 113-8, 133-8 & 163-8*




BUTT-WELD END




FLANGED END




## Standard Materials of Construction

| Sl. No. | Description | Material |
|---|---|---|
| 01 | Body | ASTM A216 Gr. WCB |
| 02 | Body Seat Ring | ASTM A105 + HF* |
| 03 | Wedge | ASTM A216 Gr. WCB + 13% Cr. Steel |
| 04 | Stem | ASTM A182 Gr. F6a |
| 05 | Gasket - Cl.150<br>Gasket - Cl.300 & 600 | ASTM A308<br>Spirally-wound SS 304 with graphite filler |
| 06 | Bonnet | ASTM A216 Gr. WCB |
| 07 | Stud | ASTM A193 Gr. B7 |
| 08 | Stud Nut | ASTM A194 Gr. 2H |
| 09 | Back-seat Bush | 13% Cr. Steel |
| 10 | Packing | Graphite with braided end rings |
| 11 | Gland | Steel |
| 12 | Gland Flange | ASTM A105 / ASTM A216 Gr. WCB |
| 13 | Eye Bolt | Cr. - Mo Steel |
| 14 | Eye Bolt Nut | ASTM A194 Gr. 2H |
| 15 | Groove Pin | Steel |
| 16 | Yoke Sleeve (Stem Nut) | ASTM A439 Type D2 |
| 17 | Grease Fitting | Steel |
| 18<br>19<br>20 | Retainer Nut<br>Handwheel<br>Handwheel Nut | Steel / Ductile Iron / Malleable Iron |
| | Nameplate | SS 304 |

* HF - Hard-Faced with Stellite #6 or equivalent
For other body / bonnet materials, refer page 5

## Dimensions (in mm, unless specified) & Weights (in kg)

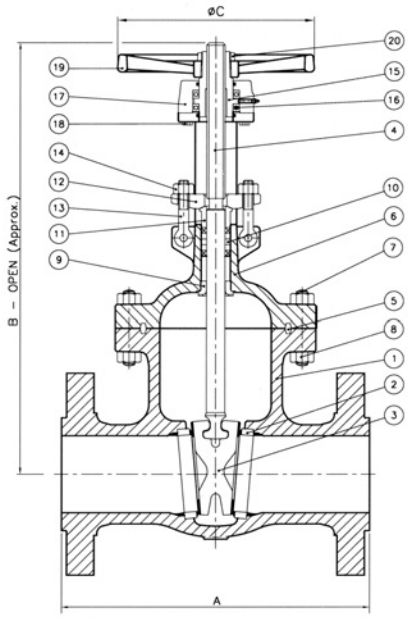
| Valve Size | Class 150 | | | | | | Class 300 | | | | | | Class 600 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | | B | C | Approx.Wt. | | A | | B | C | Approx.Wt. | | A | | B | C | Approx.Wt. | |
| | Fl. | B/W | | | Fl. | B/W | Fl. | B/W | | | Fl. | B/W | Fl. | B/W | | | Fl. | B/W |
| 50 (2") | 178 | 216 | 376 | 203 | 21 | 19 | 216 | 216 | 399 | 203 | 25 | 23 | 292 | 292 | 399 | 203 | 42 | 36 |
| 65 (2½") | 191 | 241 | 480 | 229 | 32 | 27 | 241 | 241 | 505 | 229 | 48 | 34 | - | - | - | - | - | |
| 80 (3") | 203 | 283 | 480 | 229 | 35 | 27 | 283 | 283 | 505 | 229 | 53 | 41 | 356 | 356 | 541 | 254 | 67 | 63 |
| 100 (4") | 229 | 305 | 584 | 254 | 53 | 43 | 305 | 305 | 604 | 254 | 78 | 55 | 432 | 432 | 635 | 305 | 119 | 112 |
| 125 (5") | 254 | 381 | 750 | 254 | 75 | 64 | 381 | 381 | 850 | 356 | 135 | 105 | - | - | - | - | - | - |
| 150 (6") | 267 | 403 | 790 | 305 | 87 | 77 | 403 | 403 | 850 | 356 | 158 | 111 | 559 | 559 | 874 | 457 | 252 | 225 |
| 200 (8") | 292 | 419 | 996 | 356 | 139 | 118 | 419 | 419 | 1039 | 406 | 234 | 186 | 660 | 660 | 1044 | 457 | 418 | 365 |
| 250 (10") | 330 | 457 | 1205 | 406 | 210 | 198 | 457 | 457 | 1265 | 457 | 355 | 284 | 787 | 787 | 1285 | 508 | 652 | 554 |
| 300 (12") | 356 | 502 | 1410 | 457 | 302 | 271 | 502 | 502 | 1460 | 508 | 495 | 400 | 838 | 838 | 1476 | 610 | 1100 | 984 |
| 350 (14") | 381 | 572 | 1539 | 508 | 410 | 365 | 762 | 762 | 1590 | 508 | 750 | 620 | 889 | 889 | 1565 | 610 | 1600 | 1465 |
| 400 (16") | 406 | 610 | 1752 | 508 | 520 | 490 | 838 | 838 | 1791 | 610 | 958 | 850 | 991 | 991 | 2062 | 762 | 1955 | 1760 |
| 450 (18") | 432 | 660 | 1956 | 610 | 690 | 665 | 914 | 914 | 2126 | 686 | 1310 | 1075 | 1092 | 1092 | 2062 | 762 | 2075 | 1840 |
| 500 (20") | 457 | 711 | 2159 | 610 | 900 | 865 | 991 | 991 | 2261 | 686 | 1640 | 1525 | 1194 | 1194 | 3048 | 762 | 2150 | 1960 |
| 600 (24") | 508 | 813 | 2565 | 686 | 1410 | 1375 | 1143 | 1143 | 2654 | 762 | 2460 | 2075 | 1397 | 1397 | 3150 | 762 | 3620 | 3180 |
| 700 (28") | 610 | 991 | 3160 | 762 | 2060 | 1750 | - | - | - | - | - | - | - | - | - | - | - | - |
| 750 (30") | 610 | 914 | 3429 | 762 | 3100 | 2850 | 1397 | 1397 | 4267 | 1016 | 4750 | - | - | - | - | - | - | - |
| 850 (34") | 711 | - | 3650 | 762 | 3350 | 2950 | - | - | - | - | - | - | - | - | - | - | - | - |
| 900 (36") | 711 | - | 3734 | 762 | 3980 | 3000 | 1727 | - | 3975 | - | - | - | - | - | - | - | - | - |
| 1050 (42") | 813 | 1118 | 4200 | - | * | 4500 | - | - | - | - | - | - | 2438 | - | 4420 | - | - | - |
| 1200 (48") | 864 | 1118 | 4990 | - | * | 6000 | - | - | - | - | - | - | - | - | - | - | - | - |
| 1500 (60") | 1143 | - | 6175 | - | * | - | - | - | - | - | - | - | - | - | - | - | - | - |

Fl. - Flanged ; B/W - Butt-weld. * Depends on flange dimensions. Intermediate sizes 22", 26", 32", 38", 40", 44", 46" in Class 150 are also offered.

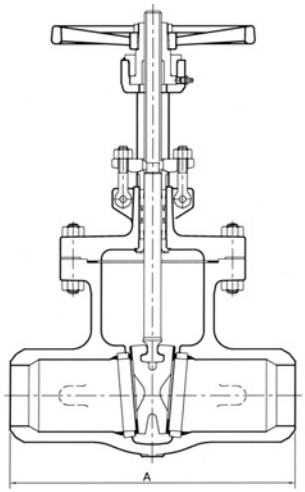
**Class 600 gate valves can also be given in pressure seal bonnet design, in sizes from 80mm (3") up to 300mm (12"). For details of pressure seal bonnet arrangement, see page 18.**

# Gate Valves - ASME Classes 900 & 1500

## *Figure Numbers 193-8 & 1A3-8*




**FLANGED END**

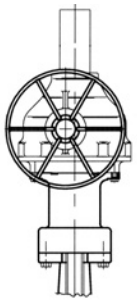



**BUTT-WELD END**

### Standard Materials of Construction

| Sl. No. | Description | Material |
|---|---|---|
| 01 | Body | ASTM A216 Gr. WCB |
| 02 | Body Seat Ring | ASTM A105 + HF* |
| 03 | Wedge | ASTM A216 Gr. WCB + 13% Cr. Steel |
| 04 | Stem | ASTM A182 Gr. F6a |
| 05 | Gasket RTJ | Soft Iron |
| 06 | Bonnet | ASTM A216 Gr. WCB |
| 07 | Stud | ASTM A193 Gr. B7 |
| 08 | Stud Nut | ASTM A194 Gr. 2H |
| 09 | Back-seat Bush | 13% Cr. Steel |
| 10 | Packing | Graphite with braided end rings |
| 11 | Gland | 13% Cr. Steel |
| 12 | Gland Flange | ASTM A105 / ASTM A216 Gr. WCB |
| 13 | Eye Bolt | 13% Cr. Steel |
| 14 | Eye Bolt Nut | ASTM A194 Gr. 2H |
| 15 | Yoke Sleeve (Stem Nut) | ASTM A439 Type D2 |
| 16 | Bearing | Steel |
| 17 | Yoke Cap | Ductile Iron |
| 18 | Screw | Steel |
| 19 | Handwheel | Steel / Ductile Iron / |
| 20 | Handwheel Nut | Malleable Iron |
| | Nameplate | SS 304 |

* HF - Hard-Faced with Stellite #6 or equivalent
For other body / bonnet materials, refer page 5



GEAR UNIT ASSEMBLY



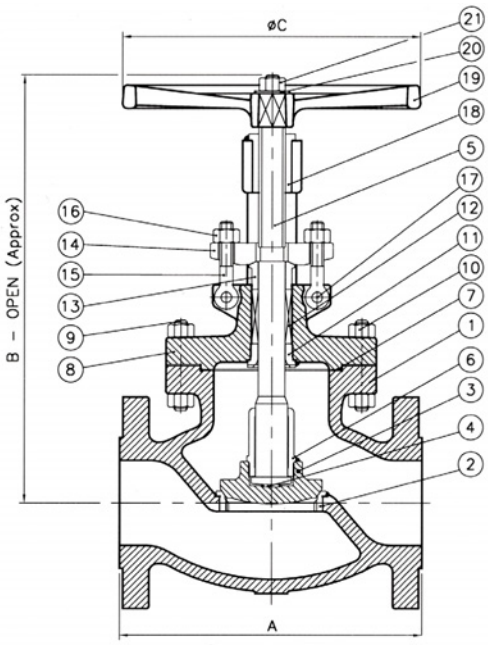
### Dimensions (in mm, unless specified) & Weights (in kg)

| Valve Size | Class 900 | | | | | | Class 1500 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | | B | C | Approx.Wt. | | A | | B | C | Approx.Wt. | |
| | Fl. | B/W | | | Fl. | B/W | Fl. | B/W | | | Fl. | B/W |
| 50 (2") | - | - | - | - | - | - | 368 | 368 | 570 | 229 | 128 | 115 |
| 80 (3") | 381 | 381 | 700 | 305 | 138 | 126 | 470 | 470 | 720 | 305 | 255 | 245 |
| 100 (4") | 457 | 457 | 800 | 356 | 216 | 196 | 546 | 546 | 850 | 356 | 315 | 285 |
| 150 (6") | 610 | 610 | 1100 | 508 | 426 | 375 | 705 | 705 | 1200 | 508 | 643 | 570 |
| 200 (8") | 737 | 737 | 1500 | 508 | 723 | 625 | 832 | 832 | 1600 | 508 | 1258 | 1120 |
| 250 (10") | 838 | 838 | 1800 | 762 | 1173 | 1040 | 991 | 991 | 1950 | 762 | 2008 | 1760 |
| 300 (12") | 965 | 965 | 2000 | 762 | 1792 | 1610 | 1130 | 1130 | 2150 | 762 | 2963 | 2580 |
| 400 (16") | 1130 | - | 2000 | 762 | 2535 | - | - | - | - | - | - | - |

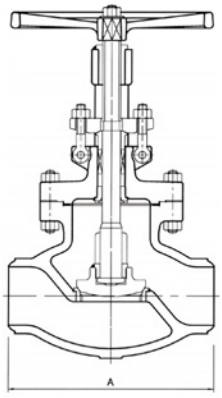
Fl. - Flanged ; B/W - Butt-weld.
Sizes 18", 20" and 24" are also offered.

# Globe Valves - ASME Class 150, 300 & 600

*Figure Numbers 413-8, 433-8 & 463-8*




**FLANGED END**




**BUTT-WELD END**

## Standard Materials of Construction

| Sl. No. | Description | Material |
|---|---|---|
| 01 | Body | ASTM A216 Gr. WCB |
| 02 | Body Seat Ring | ASTM A182 Gr. F6a+HF |
| 03 | Disc | ASTM A216 Gr. WCB + 13% Cr. Steel |
| 04 | Disc Washer | 13% Cr. Steel |
| 05 | Stem | ASTM A182 Gr. F6a |
| 06 | Disc Stem Nut | 13% Cr. Steel |
| 07 | Gasket | ASTM A308 |
| 08 | Bonnet | ASTM A216 Gr. WCB |
| 09 | Stud | ASTM A193 Gr. B7 |
| 10 | Stud Nut | ASTM A194 Gr. 2H |
| 11 | Back-seat Bush | 13% Cr. Steel |
| 12 | Packing | Graphite with braided end rings |
| 13 | Gland | 13% Cr. Steel |
| 14 | Gland Flange | ASTM A105 / ASTM A216 Gr. WCB |
| 15 | Eye Bolt | Cr. - Mo Steel |
| 16 | Eye Bolt Nut | ASTM A194 Gr. 2H |
| 17 | Groove Pin | Steel |
| 18 | Yoke Bush | ASTM A439 Type D2 |
| 19 | Handwheel | Steel / Ductile Iron / Malleable Iron |
| 20 | Washer | Steel |
| 21 | Handwheel Nut | ASTM A563 Gr. B |
| | Nameplate | SS 304 |

* HF - Hard-Faced with Stellite #6 or equivalent
For other body / bonnet materials, refer page 5

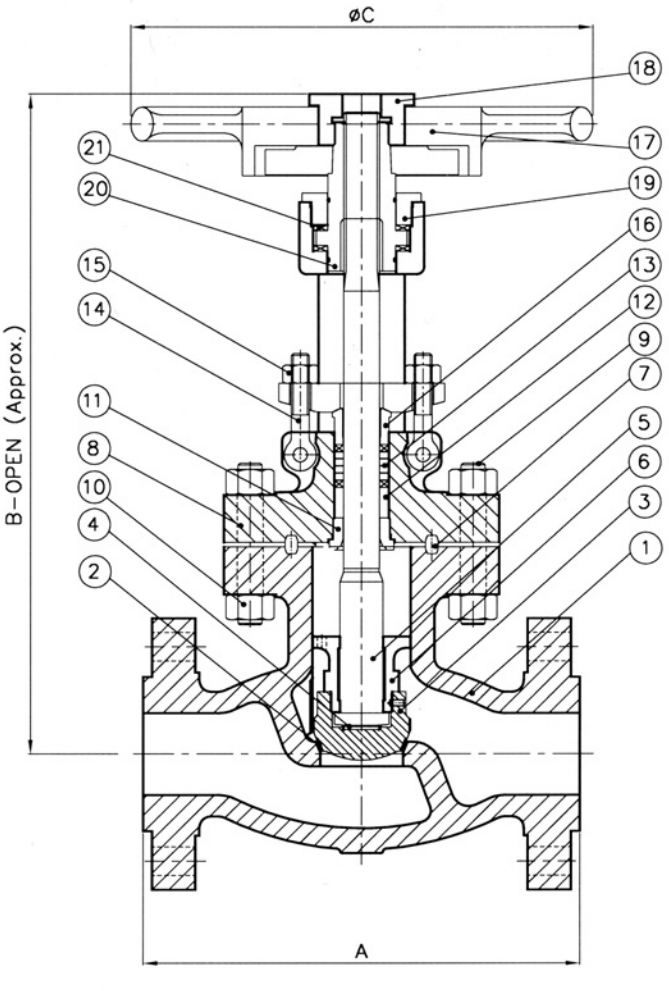
## Dimensions (in mm, unless specified) & Weights (in kg)

| Valve Size | Class 150 | | | | | | Class 300 | | | | | | Class 600 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | | B | C | Approx.Wt. | | A | | B | C | Approx.Wt. | | A | | B | C | Approx.Wt. | |
| | Fl. | B/W | | | Fl. | B/W | Fl. | B/W | | | Fl. | B/W | Fl. | B/W | | | Fl. | B/W |
| 50 (2") | 203 | 203 | 335 | 203 | 23 | 20 | 267 | 267 | 355 | 203 | 33 | 28 | 292 | 292 | 400 | 254 | 42 | 38 |
| 65 (2½") | 216 | - | 355 | 203 | 35 | - | 292 | - | 410 | 203 | 46 | - | - | - | - | - | - | - |
| 80 (3") | 242 | 242 | 421 | 254 | 41 | 38 | 317 | 317 | 457 | 254 | 58 | 50 | 356 | 356 | 560 | 356 | 75 | 60 |
| 100 (4") | 292 | 292 | 477 | 254 | 66 | 62 | 356 | 356 | 556 | 356 | 97 | 84 | 432 | 432 | 593 | 406 | 136 | 116 |
| 150 (6") | 406 | 406 | 575 | 356 | 118 | 110 | 445 | 445 | 668 | 457 | 186 | 164 | 559 | 559 | 837 | 610 | 245 | 195 |
| 200 (8") | 495 | 495 | 680 | 457 | 207 | 195 | 559 | 559 | 830 | 610 | 329 | 296 | 661 | 661 | 947 | 610 | 546 | 466 |
| 250 (10") | 623 | 623 | 895 | 356 | 335 | 320 | 623 | 623 | 1206 | 610 | 520 | 471 | 787 | 787 | 1285 | 762 | 756 | 656 |
| 300 (12") | 699 | 699 | 1215 | 610 | 495 | 470 | 711 | 711 | 1160 | 762 | 705 | 634 | 838 | 838 | 1560 | 762 | 1086 | 896 |

Fl. - Flanged ; B/W - Butt-weld.

# Globe Valves - ASME Class 900 & 1500

## *Figure Numbers 493-8 & 4A3-8*




**FLANGED END**

### Standard Materials of Construction

| Sl. No. | Description | Material |
|---|---|---|
| 01 | Body | ASTM A216 Gr. WCB |
| 02 | Body Seat | Integral Stellite #6 or eq. |
| 03 | Disc | ASTM A216 Gr. WCB + 13% Cr. Steel |
| 04 | Disc Washer | 13% Cr. Steel |
| 05 | Stem | ASTM A182 Gr. F6a |
| 06 | Disc Stem Nut | 13% Cr. Steel |
| 07 | Gasket RTJ | SS 316 |
| 08 | Bonnet | ASTM A216 Gr. WCB |
| 09 | Stud | ASTM A193 Gr. B7 |
| 10 | Stud Nut | ASTM A194 Gr. 2H |
| 11 | Back-seat Bush | 13% Cr. Steel |
| 12 | Spacer | 13% Cr. Steel |
| 13 | Packing | Graphite with braided end rings |
| 14 | Eye Bolt | ASTM A193 Gr. B7 |
| 15 | Eye Bolt Nut | ASTM A194 Gr. 2H |
| 16 | Gland | 13% Cr. Steel |
| 17 | Handwheel | Steel / Ductile Iron / Malleable Iron |
| 18 | Handwheel Nut | |
| 19 | Retainer Nut | |
| 20 | Yoke Sleeve | ASTM A439 Type D2 |
| 21 | Bearing | Steel |
| | Nameplate | SS 304 |

* HF - Hard-Faced with Stellite #6 or equivalent
For other body / bonnet materials, refer page 5

### Dimensions (in mm, unless specified) & Weights (in kg)

| Valve Size | Class 900 | | | | | | Class 1500 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | | B | C | Approx.Wt. | | A | | B | C | Approx.Wt. | |
| | Fl. | B/W | | | Fl. | B/W | Fl. | B/W | | | Fl. | B/W |
| 50 (2") | - | - | - | - | - | - | 368 | 368 | 590 | 305 | 110 | 85 |
| 80 (3") | 381 | 381 | 700 | 305 | 138 | 120 | 470 | 470 | 720 | 305 | 255 | 195 |
| 100 (4") | 457 | 467 | 800 | 356 | 216 | 180 | 546 | 546 | 850 | 356 | 315 | 265 |
| 150 (6") | 610 | 610 | 1100 | 508 | 426 | 395 | - | - | - | - | - | - |

Fl. - Flanged ; B/W - Butt-weld.

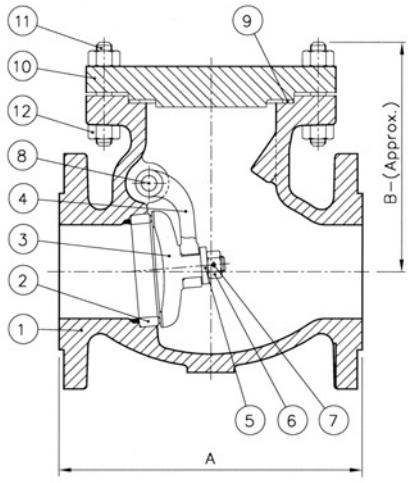
# Swing Check Valves - ASME Class 150, 300 & 600

## *Figure Numbers 713-8, 733-8 & 763-8*

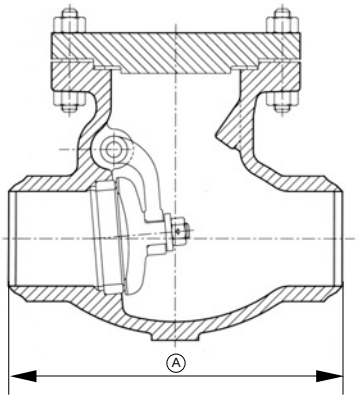
### Standard Materials of Construction

| Sl. No. | Description | Material |
|---|---|---|
| 01 | Body | ASTM A216 Gr. WCB |
| 02 | Body Seat Ring | ASTM A105 + HF* |
| 03 | Disc | ASTM A216 Gr. WCB + 13% Cr. Steel |
| 04 | Hinge | ASTM A216 Gr. WCB |
| 05 | Disc Washer | 13% Cr. Steel |
| 06 | Disc Nut | SS 304 |
| 07 | Disc Nut Pin | 13% Cr. Steel |
| 08 | Hinge Pin | 13% Cr. Steel |
| 09 | Gasket | ASTM A308 |
| 10 | Cover | ASTM A216 Gr. WCB |
| 11 | Stud | ASTM A193 Gr. B7 |
| 12 | Stud Nut | ASTM A194 Gr. 2H |
| | Hinge Pin Cover | ASTM A105 |
| | Hinge Pin Cover Bolt | ASTM A193 Gr. B7 |
| | Nameplate | SS 304 |

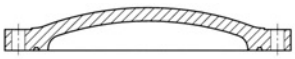
* HF - Hard-Faced with Stellite #6 or equivalent
For other body / cover materials, refer page 5



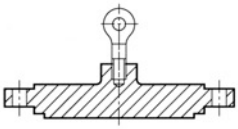

**FLANGED END**



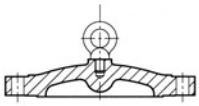

**BUTT-WELD END**



COVER FOR 3" VALVE (CLASS 600)



COVER & EYEBOLT ARRANGEMENT FOR 12" VALVE (CLASS 150)



COVER & EYEBOLT ARRANGEMENT FOR VALVES 14" & ABOVE (CLASS 150), VALVES 10" & ABOVE (CLASS 300) & VALVES 4" & ABOVE (CLASS 600)

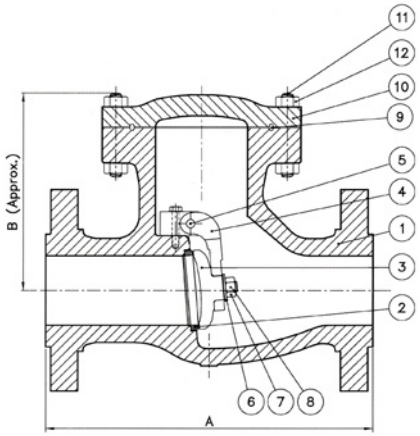
### Dimensions (in mm, unless specified) & Weights (in kg)

| Valve Size | Class 150 | | | | | Class 300 | | | | | Class 600 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | | B | Approx.Wt. | | A | | B | Approx.Wt. | | A | | B | Approx.Wt. | |
| | Fl. | B/W | | Fl. | B/W | Fl. | B/W | | Fl. | B/W | Fl. | B/W | | Fl. | B/W |
| 50 (2") | 203 | 203 | 165 | 21 | 19 | 267 | 267 | 165 | 24 | 19 | 292 | 292 | 178 | 35 | 30 |
| 65 (2½") | 216 | 216 | 175 | 24 | 20 | - | - | - | - | - | - | - | - | - | - |
| 80 (3") | 241 | 241 | 181 | 34 | 30 | 317 | 317 | 190 | 45 | 36 | 356 | 356 | 203 | 55 | 46 |
| 100 (4") | 292 | 292 | 213 | 49 | 42 | 356 | 356 | 229 | 70 | 56 | 432 | 432 | 229 | 92 | 70 |
| 150 (6") | 356 | 356 | 273 | 88 | 79 | 444 | 444 | 279 | 151 | 129 | 559 | 559 | 365 | 204 | 161 |
| 200 (8") | 495 | 495 | 335 | 168 | 154 | 533 | 533 | 343 | 242 | 210 | 661 | 661 | 442 | 323 | 260 |
| 250 (10") | 622 | 622 | 406 | 280 | 260 | 622 | 622 | 368 | 333 | 284 | 787 | 787 | 450 | 550 | 455 |
| 300 (12") | 698 | 698 | 483 | 413 | 382 | 711 | 711 | 412 | 450 | 378 | 838 | 838 | 590 | 790 | 680 |
| 350 (14") | 788 | 788 | 515 | 509 | 466 | 839 | 839 | 559 | 659 | 556 | - | - | - | - | - |
| 400 (16") | 864 | 864 | 455 | 580 | 524 | 864 | 864 | 636 | 873 | 747 | - | - | - | - | - |
| 450 (18") | 978 | 978 | 500 | 635 | 583 | 978 | 978 | 562 | 1090 | 900 | - | - | - | - | - |
| 500 (20") | 978 | 978 | 675 | 925 | 855 | 1016 | 1016 | 675 | 1360 | 1176 | - | - | - | - | - |
| 600 (24") | 1295 | 1295 | 780 | 1500 | 1403 | 1346 | 1346 | 790 | 1850 | 1573 | - | - | - | - | - |

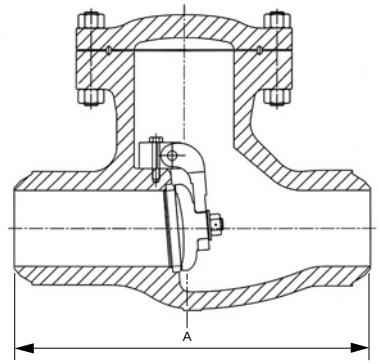
Fl. - Flanged ; B/W - Butt-weld.

# Swing Check Valves - ASME Class 900 & 1500

*Figure Numbers 793-8 & 7A3-8*




**FLANGED END**




**BUTT-WELD END**

## Standard Materials of Construction

| Sl. No. | Description | Material |
|---|---|---|
| 01 | Body | ASTM A216 Gr. WCB |
| 02 | Body Seat Ring | ASTM A105 + HF* |
| 03 | Disc | ASTM A216 Gr. WCB + 13% Cr. Steel |
| 04 | Hinge | ASTM A216 Gr. WCB |
| 05 | Hinge Pin | 13% Cr. Steel |
| 06 | Disc Washer | 13% Cr. Steel |
| 07 | Disc Nut | SS 304 |
| 08 | Disc Nut Pin | SS 304 |
| 09 | Gasket RTJ | Soft Iron |
| 10 | Cover | ASTM A216 Gr. WCB |
| 11 | Stud | ASTM A193 Gr. B7 |
| 12 | Stud Nut | ASTM A194 Gr. 2H |
| | Nameplate | SS 304 |

* HF - Hard-Faced with Stellite #6 or equivalent
For other body / cover materials, refer page 5

## Dimensions (in mm, unless specified) & Weights (in kg)

| Valve Size | Class 900 | | | | | Class 1500 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | A | | B | Approx.Wt. | | A | | B | Approx.Wt. | |
| | Fl. | B/W | | Fl. | B/W | Fl. | B/W | | Fl. | B/W |
| 50 (2”) | - | - | - | - | - | 368 | 368 | 250 | 69 | 53 |
| 65 (2½”) | - | - | - | - | - | - | - | - | - | - |
| 80 (3”) | 381 | 381 | 250 | 88 | 70 | 470 | 470 | 285 | 118 | 89 |
| 100 (4”) | 457 | 457 | 280 | 162 | 131 | 546 | 546 | 340 | 177 | 134 |
| 150 (6”) | 610 | 610 | 350 | 336 | 275 | 705 | 705 | 400 | 566 | 467 |
| 200 (8”) | 737 | 737 | 420 | 673 | 569 | 832 | 832 | 465 | 892 | 728 |
| 250 (10”) | 838 | 838 | 510 | 938 | 789 | 991 | 991 | 570 | 1730 | 1447 |
| 300 (12”) | 965 | 965 | 610 | 1480 | 1280 | 1130 | 1130 | 680 | 2580 | 2157 |

Fl. - Flanged ; B/W - Butt-weld



# ASME B16.34 L&T Gate, Y-Globe & Swing Check Valves

## Pressure Seal Bonnet design



**The ASME B16.34 family of L&T Gate, Y-Globe and Swing Check Valves features a pressure seal bonnet design for high pressure services. These valves are extensively used in high pressure and high temperature steam, oil, gas, chemical and water applications in thermal power plants, fertiliser plants, petrochemical plants and refineries. The valves are available with butt-weld ends in pressure ratings of Classes 900, 1500 and 2500, and come in carbon steel and alloy steel construction.**

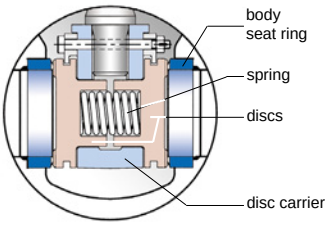
**Gate valves also meet the requirements of API 600 Style A.**

***GATE VALVES***

**Parallel Slide Disc Mechanism**

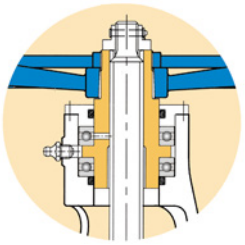
This mechanism consists of two independent discs held by a disc carrier. An alloy steel spring between the discs provides the initial loading to keep the discs pressed against the body seats. The disc faces are parallel to each other and seal on parallel seat rings in the body. Sealing takes place by utilizing the line pressure to provide tight seal on the downstream seat. As the two discs are independent and parallel, opening / closing torques are significantly lower than comparable wedge disc designs, thereby minimizing the possibility of jamming at high temperatures or pressures.

When the valve is operated, the discs are allowed to slide and rotate over the body seats. This helps wipe out foreign particles from the seat faces.



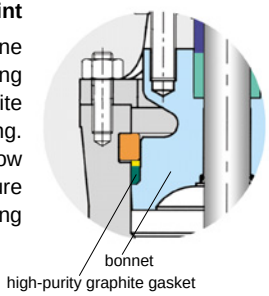

**Yoke Sleeve and Thrust Bearings**

The yoke sleeve is made of nodular Niresist Iron, supported by a set of bearings to reduce friction and the consequent torque required to operate the valves. Nodular Niresist Iron also withstands high temperatures. Weather seals, provided in the yoke sleeve, protect the bearing area against ingress of dirt and water.



**Pressure Seal arrangement for body-bonnet joint**

This pressure seal body-bonnet joint utilizes the line pressure to create a tight body-bonnet seal. Sealing is achieved by compressing a high-purity graphite gasket between the bonnet and the body retainer ring. Preloaded fasteners provide an initial tight seal at low line pressures. At higher pressures, the line pressure pushes up the bonnet against the gasket, compressing it further and providing a much tighter seal.




**Seat Rings**

Body seat rings are welded to the body to offer a leakproof design as they eliminate the leakage path betwen the seat ring and the body. This design is superior to screwed seats which can loosen up due to temperature fluctuations, corrosion or vibration and result in leakage.

**Trim**

Both the disc and the seat ring faces are hard-faced with Stellite #6 or equivalent.

**Back-seat**

The back-seat is in-situ hard-faced with Stellite #6 or equivalent.

**Stem and Gland Packing**

The valves feature a stem, made of 13% Cr. Steel - ACME threaded, precision-machined and ground to a high finish to ensure a smooth operation. The high-purity graphite gland packings, used for stem sealing, provide capability to withstand high temperatures and pressures, and also to resist many chemicals. The smooth-finish stuffing box ensures longer life for the packings.

**Accessories**

L&T Valves can be supplied with accessories such as bypass arrangement, drain plugs, live-loading and mountings like extension spindles, floor stands and chain wheel. The valves can also be supplied with gear units and electrical actuators.

***Y-GLOBE VALVES***

**By virtue of their Y-type configuration, L&T Y-Globe Valves have a relatively straight flow and a lower pressure drop compared to conventional globe valves. The valves are suitable for tight shutoff and throttling in high pressure and high temperature lines.**

**Some of the unique features of L&T Y-Globe Valves are :**

- Pressure Seal Bonnet
- Low operating torque due to use of thrust bearings
- Non-rotating stem
- Integrally-stellited body seats
- Fully-guided disc with Stellite seating and guiding surface
- Impactor handwheel in sizes of 6" (150mm) and above

***SWING CHECK VALVES***

**L&T Swing Check Valves feature a pressure-seal body-cover joint and seal-welded seat rings. The seating surfaces are hard-faced with Stellite #6 or equivalent.**

**Swing-type Disc**

The disc is of swing-type design and is opened by line velocity and the resultant pressure. When the flow stops, the disc is closed by gravity . Seating load and the resultant tightness are dependent on the back pressure.As the disc is internally hinged, there is no opening in the body of the valve. This ensures high integrity.

**Installation**

L&T Swing Check Valves are used to prevent the reversal of flow in vertical, horizontal or inclined pipelines. These valves are to be used o nly for upward or horizontal flow. Pulsating flows, as obtained at the outlet of a reciprocating pump, would cause disc chatter and henc e ought to be avoided.

**End Connection**

L&T Valves with butt-weld ends comply with ANSI B16.25 Fig. 2a or 3a, as applicable. For ANSI pipes, pipe schedule ought to be speci fied. For non-ANSI pipes, OD (or ID) and wall thickness ought to be furnished for end preparation.

# Ordering Information

| Valve Size mm (in) | Valve Type | ASME Pr. Class | End Connection | Trim | Disc |
|---|---|---|---|---|---|
| 50 (2")<br>80 (3")<br>100 (4")<br>150 (6")<br>200 (8")<br>250 (10")<br>300 (12")<br>350 (14")<br>400 (16")<br>450 (18")<br>500 (20")<br>600 (24") | **3** Pressure Seal Bonnet / Cap | **Gate Valve**<br>**81** Class 900<br>**86** Class 1500<br>**91** Class 2500<br>**Globe Valve**<br>**61** Class 900<br>**66** Class 1500<br>**71** Class 2500<br>**Check Valve**<br>**80** Class 900<br>**85** Class 1500<br>**90** Class 2500 | **T2** Butt Weld<br>**F2** Flanged RF<br>Flanged RTJ | **U** Hard-faced | **P** Gate Valve<br>**F** Flexible Wedge Disc<br>**TDCV** Tilting Disc Check Valve |

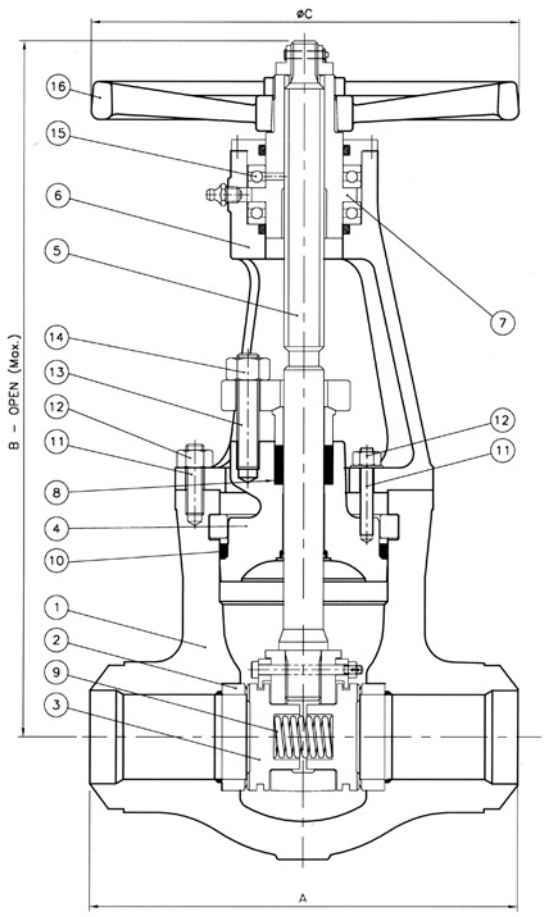
As a standard, L&T Valves are made in Carbon Steel to ASTM A216 Gr. WCB. For valves in other materials and for accesories like gear operation and electrical actuators, suffix suitable abbreviations to the above ordering code such as :

**WC6** for ASTM A217 Gr. WC6
**WC9** for ASTM A217 Gr. WC9
**C12A** for ASTM A217 Gr. C12A

**GO** for Gear Operation
**LA** for Locking Arrangement
**ACT** for Actuator
**BP** for Bypass
**IBR** for IBR-certified

# Pr. Seal Bonnet Gate Valves - ASME Class 900, 1500 & 2500

## *Figure Numbers 381 1/2UP, 386 1/2UP & 391 1/2UP*




### Standard Materials of Construction

| Sl. No. | Description | Material | | |
|---|---|---|---|---|
| 01 | Body | ASTM A216 Gr. WCB | ASTM A217 Gr. WC6 | ASTM A217 Gr. WC9 |
| 02 | Body Seat Ring | ASTM A216 Gr. WCB+HF* | ASTM A217 Gr. WC6+HF* | ASTM A217 Gr. WC9+HF* |
| 03 | Disc | ASTM A216 Gr. WCB+HF* | ASTM A217 Gr. WC6+HF* | ASTM A217 Gr. WC9+HF* |
| 04 | Bonnet | ASTM A216 Gr. WCB | ASTM A217 Gr. WC6 | ASTM A217 Gr. WC9 |
| 05 | Stem | 13% Cr. Steel | | |
| 06 | Yoke | ASTM A216 Gr. WCB | | |
| 07 | Yoke Sleeve | ASTM A439 Type D2 | | |
| 08 | Packing | Graphite with braided end rings | | |
| 09 | Spring | Inconel X750 / Nimonic 90 | | |
| 10 | Gasket | Graphite | | |
| 11 | Stud | ASTM A193 Gr. B7 | | |
| 12 | Stud Nut | ASTM A194 Gr. 2H | | |
| 13 | Gland Stud | ASTM A193 Gr. B7 | | |
| 14 | Gland Nut | ASTM A194 Gr. 2H | | |
| 15 | Thrust Ball Bearing | Steel | | |
| 16 | Handwheel | Steel / Malleable Iron / SG Iron | | |
| | Nameplate | SS 304 | | |

* HF - Hard-Faced with Stellite #6 or equivalent

**Class 900 and Class 1500 gate valves can also be offered in flexible wedge design for the full range. For details of flexible wedge arrangement, refer Page 6.**

### Dimensions (in mm, unless specified) & Weights (in kg)

| Valve Size | Class 900 | | | | Class 1500 | | | | Class 2500 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | B | C | Approx.Wt. | A | B | C | Approx.Wt. | A | B | C | Approx.Wt. |
| 50 (2") | 216 | 470 | 229 | 45 | 216 | 470 | 229 | 45 | 279 | 450 | 229 | 50 |
| 80 (3") | 305 | 580 | 305 | 55 | 305 | 580 | 305 | 60 | 368 | 710 | 457 | 120 |
| 100 (4") | 356 | 730 | 356 | 95 | 406 | 730 | 356 | 105 | 457 | 720 | 457 | 140 |
| 150 (6") | 508 | 890 | 508 | 190 | 559 | 890 | 508 | 230 | 610 | 925 | 610 | 305 |
| 200 (8") | 660 | 1040 | 686 | 350 | 711 | 1375 | 508 | 440 | 762 | 1370 | 762 | 685 |
| 250 (10") | 787 | 1540 | 762 | 710 | 864 | 1540 | 762 | 850 | 914 | 1490 | 762 | 1270 |
| 300 (12") | 914 | 1785 | 762 | 1000 | 991 | 1720 | 762 | 1045 | 1041 | 1690 | 762 | 1895 |
| 350 (14") | 991 | 1825 | 762 | 1145 | 1067 | 1730 | 762 | * | 1118 | 1850 | 762 | * |
| 400 (16") | 1092 | 2050 | 762 | * | 1194 | 2100 | 762 | * | 1245 | 2050 | 762 | * |
| 450 (18") | * | * | * | * | 1346 | 2150 | 762 | * | 1397 | 2300 | 762 | * |
| 500 (20") | * | * | * | * | 1473 | 2500 | 762 | * | * | * | * | * |
| 600 (24") | * | * | * | * | * | * | * | * | | | | |

* Refer to L&T

2" valves are in flexible wedge design.

Valves in sizes of 10" and above in Class 900 and, 8" and above in Classes 1500 and 2500 are supplied with gear unit.

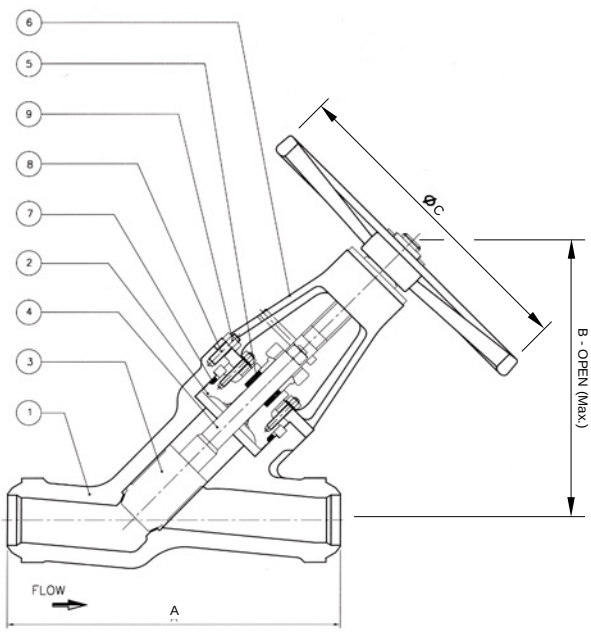
# Pr. Seal Bonnet Y-Globe Valves - ASME Class 1500

## *Figure No. 366 1/2US*

### Standard Materials of Construction

| Sl. No. | Description | Material | | |
|---|---|---|---|---|
| 01 | Body | ASTM A216 Gr. WCB+HF* | ASTM A217 Gr. WC6+HF* | ASTM A217 Gr. WC9+HF* |
| 02 | Bonnet | ASTM A216 Gr. WCB | ASTM A217 Gr. WC6 | ASTM A217 Gr. WC9 |
| 03 | Disc | SS 410 Hard-Faced with Stellite #6 or equiv. | | |
| 04 | Stem | ASTM A479 Type 410 | | |
| 05 | Packing | Graphite with braided end rings | | |
| 06 | Yoke | ASTM A216 Gr. WCB | | |
| 07 | Gasket | Graphite | | |
| 08 | Stud | ASTM A193 Gr. B7 | | |
| 09 | Stud Nut | ASTM A194 Gr. 2H | | |
| | Nameplate | SS 304 | | |

* HF - Seat Hard-Faced with Stellite #6 or equivalent




### Dimensions (in mm, unless specified)

| Valve Size | Class 1500** | | |
|---|---|---|---|
| | A | B | C |
| 80 (3”) | 470 | 650 | 508 |
| 100 (4”) | 546 | 875 | 508 |
| 150 (6”) | 705 | 1210 | 762 |
| 200 (8”) | 832 | 2000 | 762 |

** Refer to L&T for dimensions of 10” and 12” sizes and of Class 2500 valves.

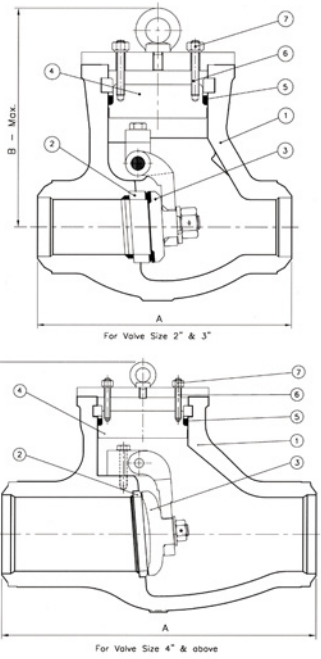
# Pr. Seal Cover Swing Check Valves - ASME Class 900, 1500 & 2500

## *Figure Nos. 380 1/2U, 385 1/2U & 390 1/2U*

### Standard Materials of Construction

| Sl. No. | Description | Material | | |
|---|---|---|---|---|
| 01 | Body | ASTM A216 Gr. WCB | ASTM A217 Gr. WC6 | ASTM A217 Gr. WC9 |
| 02 | Cover | | | |
| 03 | Disc | ASTM A216 Gr. WCB+HF* | ASTM A217 Gr. WC6+HF* | ASTM A217 Gr. WC9+HF* |
| 04 | Seat Ring | | | |
| 05 | Hinge Pin | 13% Cr. Steel | | |
| 06 | Gasket | Graphite | | |
| 07 | Stud | ASTM A193 Gr. B7 | | |
| 08 | Stud Nut | ASTM A194 Gr. 2H | | |
| | Nameplate | SS 304 | | |

* HF - Seat Hard-Faced with Stellite #6 or equivalent




### Dimensions (in mm, unless specified) & Weights (in kg)

| Valve Size | Class 900 | | | Class 1500 | | | Class 2500 | | |
|---|---|---|---|---|---|---|---|---|---|
| | A | B | Approx.Wt. | A | B | Approx.Wt. | A | B | Approx.Wt. |
| 50 (2”) | - | - | - | 216 | 240 | 35 | 279 | 240 | 40 |
| 80 (3”) | - | - | - | 305 | 275 | 45 | 368 | 240 | 55 |
| 100 (4”) | - | - | - | 406 | 275 | 62 | 457 | 300 | 80 |
| 150 (6”) | - | - | - | 559 | 310 | 110 | 610 | 360 | 180 |
| 200 (8”) | - | - | - | 711 | 415 | 250 | 762 | 485 | 320 |
| 250 (10”) | - | - | - | 864 | 500 | 435 | 914 | 615 | 945 |
| 300 (12”) | - | - | - | 991 | 605 | 600 | 1041 | 665 | 1135 |
| 350 (14”) | 991 | 630 | 780 | 1067 | 630 | 875 | * | * | * |
| 400 (16”) | - | - | - | 1194 | 750 | * | * | * | * |
| 500 (20”) | - | - | - | * | * | * | - | - | - |

* Refer to L&T

# Cryogenic Gate & Globe Valves

**Services that handle fluids at sub-zero temperatures present several technical challenges. specially-adopted, extended-bonnet gate and globe valves provid e the right solution for such low-temperature and cryogenic services.**

**L&T offers a range of gate and globe valves (as well as check valves) for low temperature and cryogenic services, used in processing, storage and transportation of liquefied gases such as Ethylene, LPG, LNG, Hydrogen, Helium, Oxygen, Nitrogen and Argon. Low temperature services of up to -46$^0$C are covered by low-temperature carbon steels like LCB and LCC materials. Cryogenic services at -196$^0$C are covered by stainless steel grades like CF8M and CF8.**

**Cryogenic Gate and Globe Valves are available in ASME Classes 150 to 1500.**
**Refer page 3 for detailed manufacturing programme.**



**Extended Bonnet**

Optional extended bonnet with vapour column length according to BS 6364 and / or customer specifications is furnished. The vapour column allows the stem packing to be functional by keeping it away from the cryogenic fluid.

**Testing and Standards**

L&T Cryogenic Valves are type-tested as per valve standards and specifications of leading oil companies as part of the design verification process.

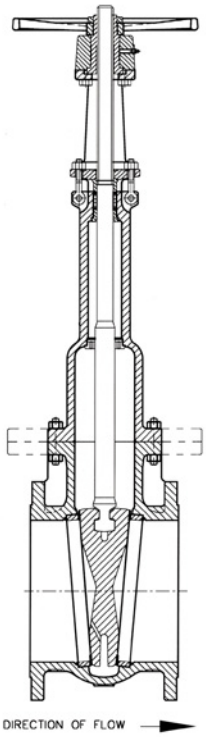


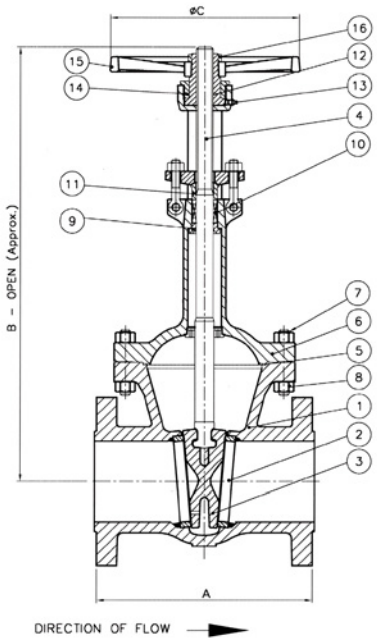
## Test facilities

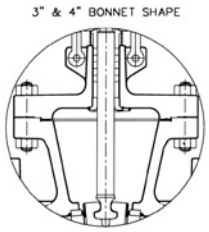
**Cryogenic test facilities for testing valves of temperatures as low as -196$^0$ in sizes from 50mm (2") to 1500mm (60"). This ranks one among the largest facilities worldwide.**



# Cryogenic Gate Valves - ASME Classes 150 to 1500




*For dimensions of **A** and **C**, refer page 10 for corresponding tables under API 600 range of valves.*

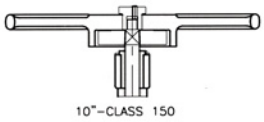
*Dimension **B** will be as per customer requirement.*

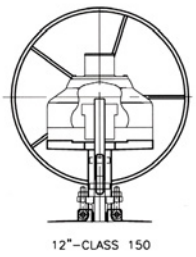
## Parts List

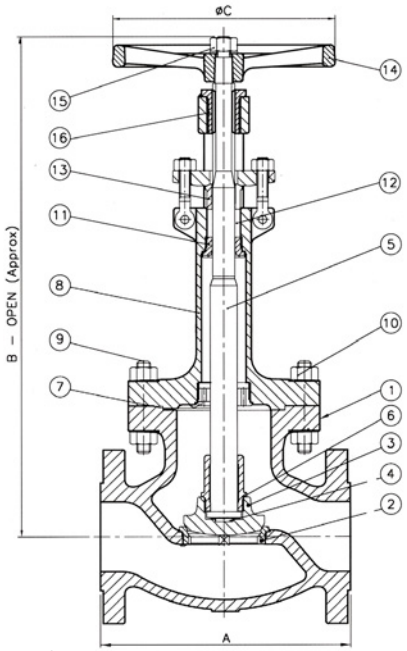
| Sl. No. | Description |
|---|---|
| 01 | Body |
| 02 | Body Seat Ring |
| 03 | Wedge |
| 04 | Stem |
| 05 | Gasket |
| 06 | Bonnet |
| 07 | Stud |
| 08 | Stud Nut |
| 09 | Back Seat |
| 10 | Packing |
| 11 | Gland |
| 12 | Yoke Sleeve |
| 13 | Grease Fitting |
| 14 | Retainer Nut |
| 15 | Handwheel |
| 16 | Handwheel Nut |
| | Nameplate |

Materials of construction are selected, based on the service fluid, temperature and customer specifications.

# Cryogenic Globe Valves - ASME Classes 150 to 1500




*For dimensions of **A** and **C**, refer page 12 for corresponding tables under API 600 range of valves.*

*Dimension **B** will be as per customer requirement.*

## Parts List

| Sl. No. | Description |
|---|---|
| 01 | Body |
| 02 | Body Seat Ring |
| 03 | Disc |
| 04 | Disc washer |
| 05 | Stem |
| 06 | Disc Stem Nut |
| 07 | Gasket |
| 08 | Bonnet |
| 09 | Stud |
| 10 | Stud Nut |
| 11 | Back Seat |
| 12 | Packing |
| 13 | Gland |
| 14 | Handwheel |
| 15 | Handwheel |
| 16 | Yoke Bush |
| | Nameplate |

Materials of construction are selected, based on the service fluid, temperature and customer specifications.

# Special Valves

## Live-loaded Valves

**The stem packing system in a valve prevents leakage of line fluid to the atmosphere. The effectiveness of the sealing performance of the stem / gland packing depends on several factors such as dimensional tolerance and surface finish of the stem and packing chamber, packing material and its resilience, and packing pressure.**

In a conventional valve, packing consolidation takes place and the packing pressure gets reduced in service, resulting in the possibility of leakage. Tightening of the gland nut restores the packing pressure and arrests possible leakage. This adjustment restores the effectiveness of the packing sealing.

In a live-loaded arrangement, the packing pressure or the load is maintained at a relatively constant level as the packing consolidates during service. Achieved by means of a set of Disc Springs or Belleville Springs that is installed between the gland flange and the gland stud, this creates additional elasticity in the gland loading system. The precompression load applied on the Disc Springs ensures that the load required for leak-tight sealing is exerted on the packing, even after relaxation or consolidation of packing. This continuous in-service self-adjustment results in superior stem sealing performance, particularly in services where pressure / temperature fluctuation or cycling is frequent.

## Soft-seated Valves

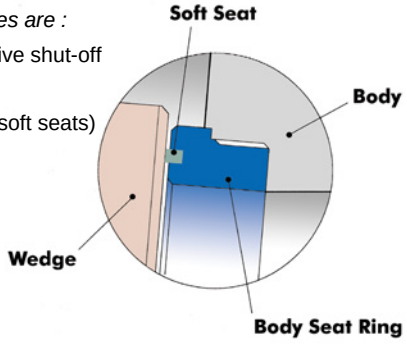
**In applications that require positive shut-off such as in chemical and petrochemical services, the L&T Soft-seated Gate Valve is a suitable solution.**

PTFE seat inserts provide the necessary soft-seating to ensure positive shut-off.

*Salient features of these valves are :*

- PTFE seat inserts for positive shut-off
- Block-and-Bleed capability
- Dual seating (metallic and soft seats)
- Intrinsically fire-safe
- Bubble-tight performance

All API 600 L&T gate valves can be offered with the option of soft-seating for sizes up to 10” (250mm).




## Low-emission Service Valves

**To comply with the requirements for Clean Air Act, L&T Cast Steel Valves have undergone extensive in-house testing, using Compressed Natural Gas (CNG) at the full-rated pressure as a test medium, as well as Helium in accordance with ISA standards.**

Based on proven experience over the years, L&T has established appropriate design parameters and manufacturing methods to offer valves that meet stringent fugitive emission norms as per industry practices.

*Salient features of these valves are :*

- Gland Packing of high-purity, flexible graphite, sandwiched between braided graphite end-rings with Inconel wire mesh reinforcement. On request, gland packing with conical / wedge-shaped configuration can also be offered.
- Bonnet gasket in valves of ASME Class 150 is made of graphite-SS 316 insert. Valves of ASME Class 300 feature gaskets of spirally-wound stainless steel with graphite filler. In valves of ASME Class 600 and higher, metallic ring gaskets are offered.
- The stem finish is 16-32 RMS, with a straightness of 0.001” - 0.005” over the length of the plain shank. Cylindricity is controlled as per L&T standards.
- The Stuffing Box surface finish is 180 RMS max., and its straightness is controlled as per L&T standards.
- The diametrical clearances between the stem, gland and the stuffing box are controlled to close tolerances to ensure compliance with emission norms.

## Valves for special services

**offers a wide variety of valves for special applications that call for additional design features and special testing.**

- Valves for Hydrogen service which are pressure tested with Helium
- Valves for Dowtherm service
- Valves for sour gas services, conforming to NACE specifications of different Indian and overseas customers and consultants
- Valves for Chlorine service, having special trims like Monel or Hastelloy C
- Valves for nuclear applications requiring designs to withstand seismic disturbances, quick operation and special features to avoid external leakage to atmosphere
- Bellow Seal Gate and Globe valves
- Y-type Stop Check Valves

# Valve Accessories



### GEAR OPERATORS

gate and globe valves are supplied with fully-enclosed bevel gear operators as a standard for sizes and class ratings as shown in the table below. Gear operators are available as an option in other sizes too.

| Valve Type | ASME Class | API 600 | | ASME B16.34 | |
|---|---|---|---|---|---|
| | | Standard | Optional | Standard | Optional |
| Gate | 150 | 24" & above | 14" - 20" | - | - |
| | 300 | 20" & above | 14" - 18" | - | - |
| | 600 | 16" & above | 8" -14" | - | - |
| | 900 | 8" & above | - | 10" & above | 6" & 8" |
| | 1500 | 6" & above | - | 10" & above | 6" & 8" |
| | 2500 | - | - | 8" & above | 6" |
| Globe | 150 | 10" & above | - | - | - |
| | 300 | 10" & above | - | - | - |
| | 600 | 6" & above | - | - | - |
| | 900 | - | - | - | - |
| | 1500 | - | - | - | - |

### ELECTRICAL ACTUATORS

Electrical Actuators may be used with L&T valves in all sizes and class ratings. The actuators can be operated in practically any position or location, and have a provision for manual operation. The actuators come in weatherproof enclosure as a standard, and in explosion-proof and such other special enclosures too. *For correct selection of actuator, please specify details of line pressure, differential pressure when closed, power supply requirements and actuator accessories.*



### BYPASS ARRANGEMENT

A bypass arrangement serves two purposes - first, in steam services, to warm up the line before opening the main valve, and secondly, in steam and other lines, to balance the pressure on both sides of the main valve wedge or disc to bring down the valve opening torque.

As an option, almost all L&T valves can be furnished with bypass arrangement. The bypass consists of a single Outside Screw & Yoke globe valve with a pressure/ temperature rating and corrosion resistance equal to or exceeding that of the main valve.

***Size Chart***

| Main valve | 2"to 4" | 5"to 8" | 10" or higher |
|---|---|---|---|
| Bypass valve | 1/2" | 3/4" | 1" |

The bypass valve is attached to the side of the main valve with the stems of both the valves in parallel and pointing upward.

Where service conditions warrant larger-than-standard bypasses, it is recommended that the installation of the bypasses be around the main valve.

### CHAIN WHEELS

Chain wheels are used for the valves located too far above the floor for convenient handwheel operation. Chain wheels are available for all types of L&T Cast Steel Valves and can be substituted in place of or used along with the existing handwheel. L&T chain wheels are equipped with guards or guides, not only to keep the chain from slipping off the wheel but also to hold the chain in close contact with a large portion of the circumference of the handwheel or the gear wheel.

### LANTERN RING

As mentioned earlier in page 7, a lantern ring is used to provide further integrity to the gland packing area in gate and globe valves, to prevent escape of service fluid to the atmosphere. This finds application in stringent environmental conditions or in the case of potentially harmful service fluids.

The lantern ring is provided between two sets of packing rings, with a leakoff plug that gives the option of removal of leakage, if any, from the lower packing rings. Alternatively, a sealing fluid can be introduced through the plug to prevent incidental leakage through the lower packing rings.

Lantern rings serve a useful purpose. But, since they are a possible source of shaft scoring, it is advisable to restrict their usage to essential applications.

### POSITION INDICATORS

Valves can be provided with position indicators as a visible means to indicate the **'open'** and **'closed'** positions. Typically, for gate valves, the indicator is in the form of a pointer travelling along a fixed scale.

### LOCKING DEVICES

Locking devices are used to secure a handwheel in a fixed position, to prevent accidental or unauthorized operation of a valve. The locking arrangement typically allows the use of chain and padlock to secure the valve.