



Shanghai Changhao High Pressure Pipe Co., Ltd.

## Valve Manual



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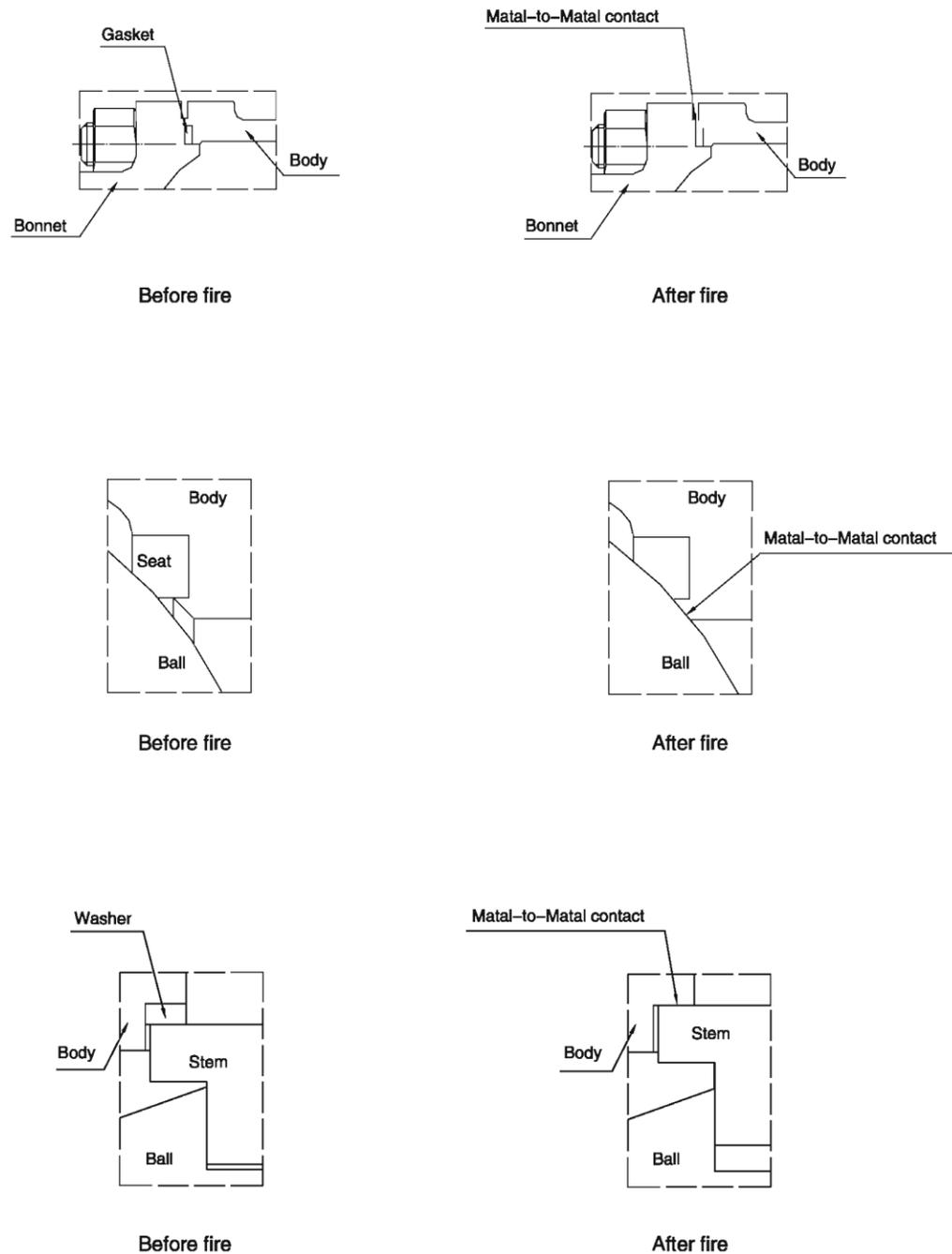
Web: [www.changhaopipe.com](http://www.changhaopipe.com)

Email: [sales2@changhaopipe.com](mailto:sales2@changhaopipe.com)

floating type ball valves are manufactured to BS 5351 specification, tested to BS 6755/API 598. The construction is the side entry type full port and end entry/side entry type reduced port. All valves are lever operated, the gear operator or the actuator are supplied at demand. The following are some of the major design features:

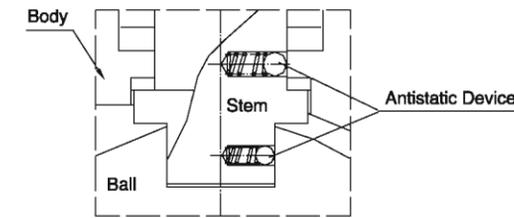
1. Fire Safe:

Designed and tested to BS 5146/API 607 to grant their operation suitability in case of fire.



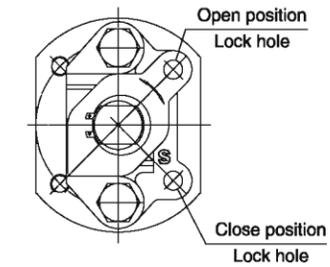
2. Antistatic:

Ametallic contact is always granted between ball and stem/body to discharge eventual statics build-up during service.



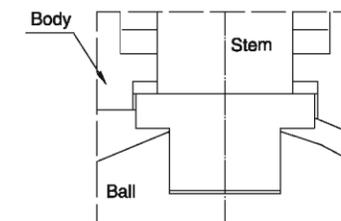
3. Locking Device:

To avoid misoperation, the valve may be locked by open or closed position locking device with popular padlock design. It's very important to lock the valve to prevent the valve from being operated by error, especially when the valve is installed in field or the valve should not be opened or closed during technical process.



4. Blowout Resistance of Stem:

To prevent stem from being blow out by the pressure entrapped in valve cavity when the fluid flows through the valve, the lower part of stem is incorporated with a raised collar. In this case, should the stem packing, thrust-washer be destroyed by fire or such damages cause by any other reason, the fluid pressure in valve body pushes stem's raised collar closely against the upper sealing surface of the body to avoid fluid leakage.



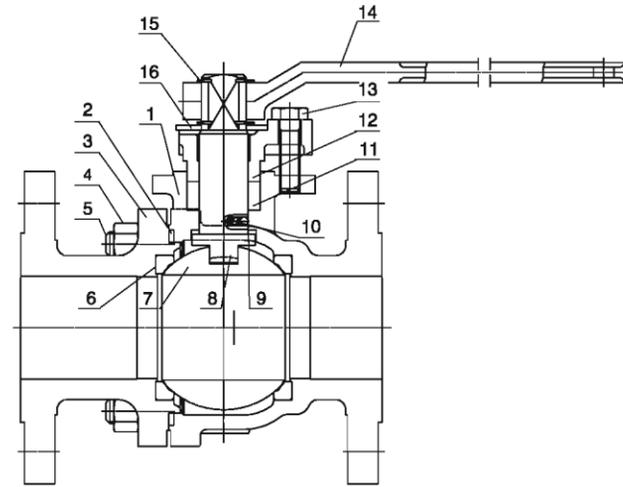
5. Easy Maintenance:

A very limited number of components and easily accessible.

6. Low Torque:

Although the seats are preloaded against the ball producing a friction between ball and seats with no pressure in the valve, as soon as the valve is pressurized such a friction decreases in a remarkable way since the ball is floated against the downstream seat freeing the upstream one

● Class150/300 Casting Steel Floating Ball Valve



● Technical Specification

Temp. & pressure: ASME B16.34、BS5351

Wall thickness: ASME B16.34、BS5351

Bore dimension: API 6D、BS5351

Face to face: ASME B16.10、BS2080

Flanges dimensions: ASME B16.5、BS1560

Test & inspection: API 598、API 6D、BS5146

Body material: WCB、LCB、LCC、CF8、CF8M、CF3、CF3M

● Form of Major Part Material

| Parts No. | Parts Name        | Materials        |                   |                     |
|-----------|-------------------|------------------|-------------------|---------------------|
|           |                   | Carbon Steel     | Low Temp. Steel   | Stainless Steel     |
| 1         | Body              | ASTM A216-WCB    | ASTM A352-LCB/LCC | ASTM A351-CF8/CF8M  |
| 2         | Gasket            | 304+Graphite     | 304+Graphite      | 304+Graphite        |
| 3         | Bonnet            | ASTM A216-WCB    | ASTM A352-LCB/LCC | ASTM A351-CF8/CF8M  |
| 4         | Nut               | ASTM A194-2H/2HM | ASTM A194 4       | ASTM A194-2HM/8     |
| 5         | Stud              | ASTM A193-B7/B7M | ASTM A320 L7      | ASTM A193-B7M/B8    |
| 6         | Seat              | PTFE             | PTFE              | PTFE                |
| 7         | Ball              | ASTM A182-F304   | ASTM A182-F304    | ASTM A182-F304/F316 |
| 8         | Stem              | ASTM A182-F304   | ASTM A182-F304    | ASTM A182-F304/F316 |
| 9         | Gasket            | 304+PTFE         | 304+PTFE          | 304+PTFE            |
| 10        | Antistatic device | ASTM A182-F304   | ASTM A182-F304    | ASTM A182-F304/F316 |
| 11        | Packing           | PTFE/Graphit     | PTFE/Graphit      | PTFE/Graphit        |
| 12        | Packing gland     | ASTM A216-WCB    | ASTM A352-LCB/LCC | ASTM A351-CF8/CF8M  |
| 13        | Screw             | ASTM A193-B7/B7M | ASTM A320 L7      | ASTM A193-B7M/B8    |
| 14        | Lever             | ASTM A216-WCB    | ASTM A216-WCB     | ASTM A216-WCB       |
| 15        | Back stop         | Carbon Steel     | Carbon Steel      | Carbon Steel        |
| 16        | Stopper plate     | Carbon Steel     | Carbon Steel      | Carbon Steel        |

● Class150 Dimension Chart

|           |    | Unit(mm) |     |     |       |     |       |     |     |     |      |      |     |
|-----------|----|----------|-----|-----|-------|-----|-------|-----|-----|-----|------|------|-----|
| Norm.     | in | 1/2      | 3/4 | 1   | 1 1/2 | 2   | 2 1/2 | 3   | 4   | 5   | 6    | 8    | 10  |
| Di.       | mm | 15       | 20  | 25  | 40    | 50  | 65    | 80  | 100 | 125 | 150  | 200  | 250 |
| Ball Bore |    | 15       | 20  | 25  | 40    | 50  | 65    | 80  | 100 | 125 | 150  | 200  | 250 |
| L         |    | 108      | 117 | 127 | 165   | 178 | 190   | 203 | 229 | 356 | 394  | 457  | 533 |
| H         |    | 84       | 88  | 95  | 120   | 130 | 160   | 185 | 210 | 220 | 295  | 335  |     |
| W         |    | 130      | 130 | 140 | 250   | 250 | 400   | 400 | 450 | 450 | 1050 | 1500 |     |

|                                    |
|------------------------------------|
| 1/2" ~ 4": Lever operation         |
| 6" ~ 8": Optional gear operation   |
| 10": Gear operation                |
| Test pressure                      |
| Shell: Hydrostatic 3.10MPa(450psi) |
| Seat: Air 0.55MPa(80psi)           |
| Options                            |
| Packing and gasket                 |
| CF8M(316SS) ball and stem          |

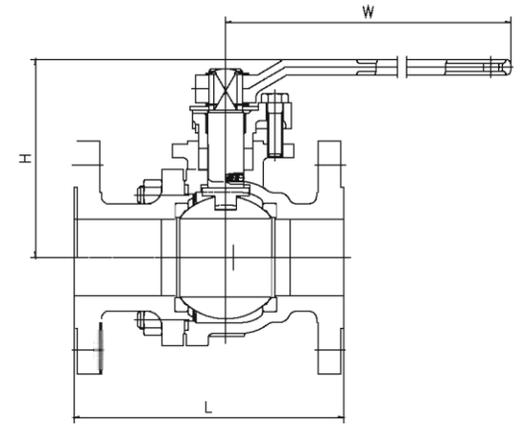
● Class300 Dimension Chart

|           |    | Unit(mm) |     |     |       |     |       |     |     |     |      |     |
|-----------|----|----------|-----|-----|-------|-----|-------|-----|-----|-----|------|-----|
| Norm.     | in | 1/2      | 3/4 | 1   | 1 1/2 | 2   | 2 1/2 | 3   | 4   | 5   | 6    | 8   |
| Di.       | mm | 15       | 20  | 25  | 40    | 50  | 65    | 80  | 100 | 125 | 150  | 200 |
| Ball Bore |    | 15       | 20  | 25  | 40    | 50  | 65    | 80  | 100 | 125 | 150  | 200 |
| L         |    | 140      | 152 | 165 | 191   | 216 | 241   | 283 | 305 | 381 | 403  | 502 |
| H         |    | 84       | 88  | 95  | 120   | 140 | 160   | 180 | 208 | 220 | 335  |     |
| W         |    | 130      | 130 | 140 | 250   | 250 | 400   | 400 | 450 | 450 | 1050 |     |

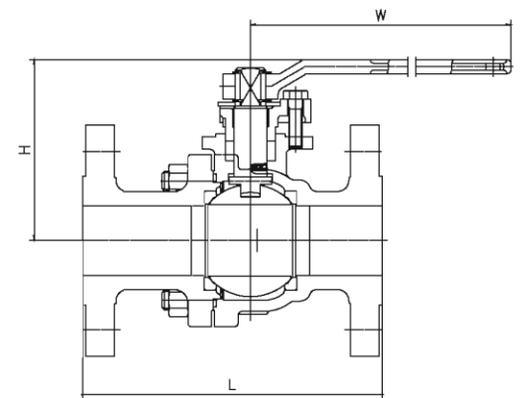
|                                     |
|-------------------------------------|
| 1/2" ~ 4": Lever operation          |
| 6" ~ 8": Optional gear operation    |
| 10": Gear operation                 |
| Test pressure                       |
| Shell: Hydrostatic 7.76MPa(1125psi) |
| Seat: Air 0.55MPa(80psi)            |
| Options                             |
| Packing and gasket                  |
| CF8M(316SS) ball and stem           |

● Gear operation Dimention

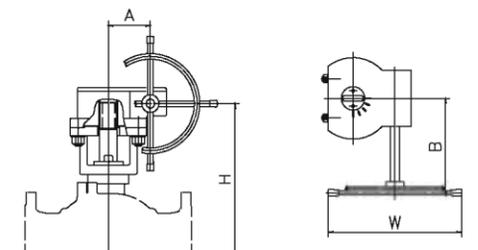
| Class             | 150 | 300 | Gear operator |     |     |     |
|-------------------|-----|-----|---------------|-----|-----|-----|
|                   |     |     | H             | W   | B   | A   |
| Valve size (inch) | 6   | 6   | 325           | 350 | 205 | 125 |
|                   | 8   | 8   | 415           | 355 | 320 | 185 |
|                   | 10  | -   | 475           | 365 | 340 | 360 |



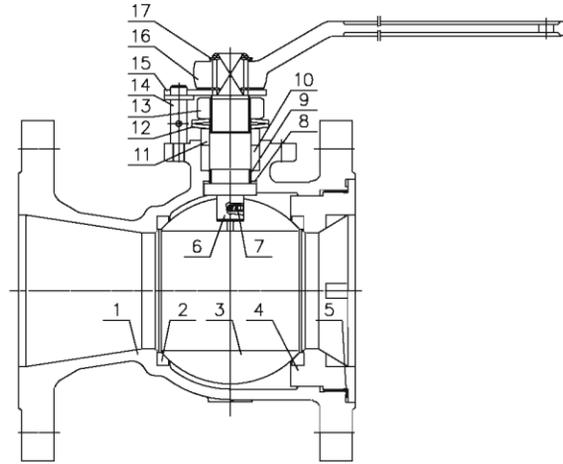
CLASS150



CLASS300



● Class150/300 Uni-body Floating Ball Valve



● Technical Specification

Temp. & pressure: ASME B16.34、BS5351

Wall thickness: ASME B16.34、BS5351

Bore dimension: API 6D、BS5351

Face to face: ASME B16.10、BS2080

Flanges dimensions: ASME B16.5、BS1560

Test & inspection: API 598、API 6D、BS5146

Body material: WCB、LCB、LCC、CF8、CF8M、CF3、CF3M

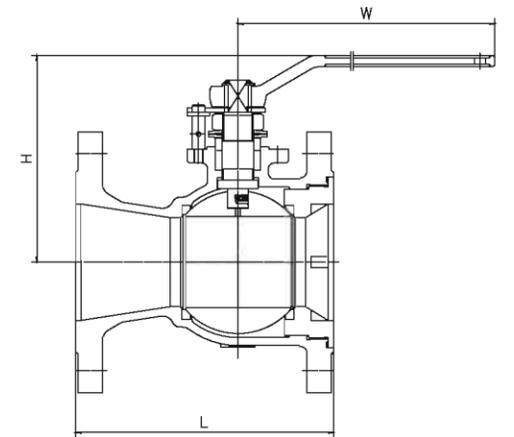
● Form of Major Part Material

| Parts No. | Parts Name        | Materials        |                   |                     |
|-----------|-------------------|------------------|-------------------|---------------------|
|           |                   | Carbon Steel     | Low Temp. Steel   | Stainless Steel     |
| 1         | Body              | ASTM A216-WCB    | ASTM A352-LCB/LCC | ASTM A351-CF8/CF8M  |
| 2         | Seat              | PTFE             | PTFE              | PTFE                |
| 3         | Ball              | ASTM A182-F6a    | ASTM A182-F304    | ASTM A182-F304/F316 |
| 4         | Bonnet            | ASTM A105        | ASTM A105         | ASTM A182-F304/F316 |
| 5         | Gasket            | 304+Graphite     | 304+Graphite      | 304+Graphite        |
| 6         | Stem              | ASTM A182-F6a    | ASTM A182-F304    | ASTM A182-F304/F316 |
| 7         | Antistatic device | ASTM A182-F304   | ASTM A182-F304    | ASTM A182-F304/F316 |
| 8         | Gasket            | 304+PTFE         | 304+PTFE          | 304+PTFE            |
| 9         | Stem bearing      | 304+PTFE         | 304+PTFE          | 304+PTFE            |
| 10        | Packing           | PTFE/Graphite    | PTFE/Graphite     | PTFE/Graphite       |
| 11        | Gland ring        | ASTM A182-F6a    | ASTM A182-F304    | ASTM A182 F304/F316 |
| 12        | Spring washer     | Stainless Steel  | Stainless Steel   | Stainless Steel     |
| 13        | Gland nut         | ASTM A194-2H/2HM | ASTM A194-2H/2HM  | ASTM A194-2H/2HM    |
| 14        | Stopper pin       | Stainless Steel  | Stainless Steel   | Stainless Steel     |
| 15        | Stopper plate     | Stainless Steel  | Stainless Steel   | Stainless Steel     |
| 16        | Lever             | ASTM A216-WCB    | ASTM A216-WCB     | ASTM A216-WCB       |
| 17        | Back stop         | Carbon Steel     | Carbon Steel      | Carbon Steel        |

● Class150 Dimension Chart

|           |    | Unit(mm) |      |     |       |     |     |     |     |      |      |
|-----------|----|----------|------|-----|-------|-----|-----|-----|-----|------|------|
| Norm.     | in | 1/2      | 3/4  | 1   | 1 1/2 | 2   | 3   | 4   | 6   | 8    | 10   |
| Dia.      | mm | 15       | 20   | 25  | 40    | 50  | 80  | 100 | 150 | 200  | 250  |
| Ball Bore |    | 10       | 12.5 | 17  | 30    | 38  | 58  | 76  | 114 | 144  | 187  |
| L         |    | 108      | 117  | 127 | 165   | 178 | 203 | 229 | 267 | 292  | 330  |
| H         |    | 103      | 106  | 115 | 135   | 120 | 155 | 170 | 260 | 300  | 355  |
| W         |    | 130      | 130  | 130 | 140   | 250 | 250 | 400 | 750 | 1050 | 1500 |

|                                    |
|------------------------------------|
| Valve operator                     |
| 1/2" ~ 10": Lever operation        |
| 6" ~ 10": Optional gear operation  |
| Test pressure                      |
| Shell: Hydrostatic 3.10MPa(450psi) |
| Seat: Air 0.55MPa(80psi)           |
| Options                            |
| Packing and gasket                 |
| CF8M(316SS) ball and stem          |

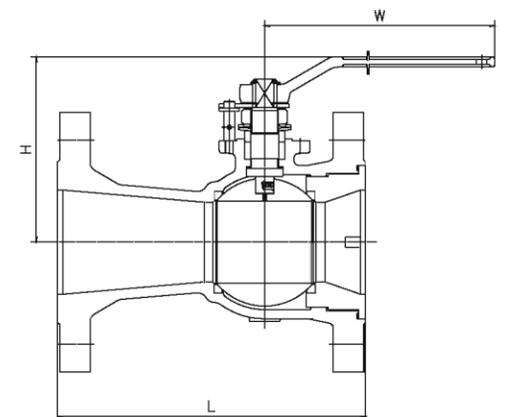


CLASS150

● Class300 Dimension Chart

|           |    | Unit(mm) |      |     |       |     |     |     |     |      |      |
|-----------|----|----------|------|-----|-------|-----|-----|-----|-----|------|------|
| Norm.     | in | 1/2      | 3/4  | 1   | 1 1/2 | 2   | 3   | 4   | 6   | 8    | 8    |
| Dia.      | mm | 15       | 20   | 25  | 40    | 50  | 80  | 100 | 150 | 200  | 200  |
| Ball Bore |    | 10       | 12.5 | 17  | 30    | 38  | 58  | 76  | 114 | 144  | 187  |
| L         |    | 140      | 152  | 165 | 190   | 216 | 283 | 305 | 403 | 419  | 457  |
| H         |    | 103      | 106  | 115 | 135   | 120 | 155 | 170 | 260 | 300  | 355  |
| W         |    | 130      | 130  | 130 | 140   | 250 | 250 | 400 | 750 | 1050 | 1500 |

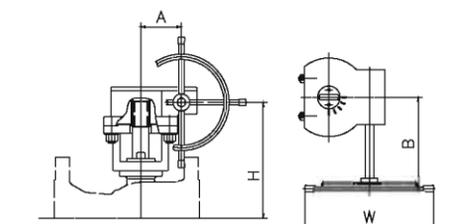
|                                     |
|-------------------------------------|
| Valve operator                      |
| 1/2" ~ 10": Lever operation         |
| 6" ~ 10": Optional gear operation   |
| Test pressure                       |
| Shell: Hydrostatic 7.76MPa(1125psi) |
| Seat: Air 0.55MPa(80psi)            |
| Options                             |
| Packing and gasket                  |
| CF8M(316SS) ball and stem           |



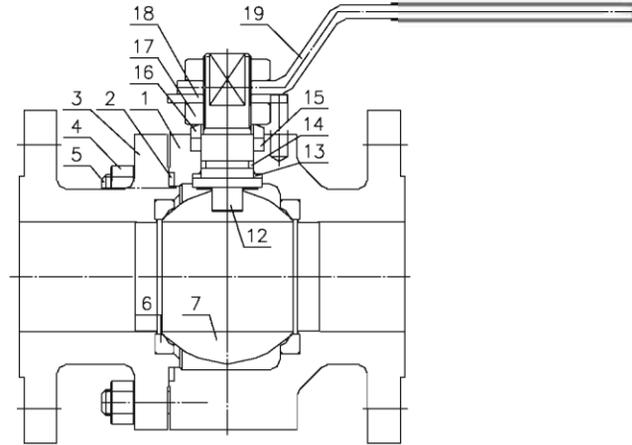
CLASS300

● Gear operation Dimention

| Class             | 150 | 300 | Gear operator |     |     |     |
|-------------------|-----|-----|---------------|-----|-----|-----|
|                   |     |     | H             | W   | B   | A   |
| Valve size (inch) | 6   | 6   | 257           | 350 | 205 | 125 |
|                   | 8   | 8   | 306           | 350 | 320 | 185 |
|                   | 10  | 10  | 365           | 400 | 320 | 185 |



● Class150/300 Forged Steel Floating Ball Valve



● Technical Specification

Temp. & pressure: ASME B16.34、BS5351

Wall thickness: ASME B16.34、BS5351

Bore dimension: API 6D、BS5351

Face to face: ASME B16.10、API 6D

Flanges dimensions: ASME B16.5、BS1560

Test & inspection: API 598、API 6D、BS5146

Body material: A105、LF2、F304、F316、F304L、F316L

● Form of Major Part Material

| Parts No. | Parts Name    | Materials        |                   |                  |
|-----------|---------------|------------------|-------------------|------------------|
|           |               | Carbon Steel     | Low Temp. Steel   | Stainless Steel  |
| 1         | Body          | ASTM A105        | ASTM A350 LF2     | ASTM A182 F316   |
| 2         | O-ring        | VITON            | VITON             | VITON            |
| 3         | Bonnet        | ASTM A105        | ASTM A350 LF2     | ASTM A182 F316   |
| 4         | Nut           | ASTM A194-2H/2HM | ASTM A194 4       | ASTM A194-2HM/8  |
| 5         | Stud          | ASTM A193-B7/B7M | ASTM A320 L7      | ASTM A193-B7M/B8 |
| 6         | Seat          | RPTFE            | RPTFE             | RPTFE            |
| 7         | Ball          | ASTM A105+ENP    | ASTM A350 LF2+ENP | ASTM A182 F316   |
| 12        | Stem          | ASTM A182-F6a    | ASTM A182-F6a     | ASTM A182 F316   |
| 13        | Stem washer   | 304+PTFE         | 304+PTFE          | 316 +PTFE        |
| 14        | O-ring        | VITON            | VITON             | VITON            |
| 15        | Packing       | PTFE/Graphite    | PTFE/Graphite     | PTFE/Graphite    |
| 16        | Packing gland | Carbon Steel     | Carbon Steel      | Stainless Steel  |
| 17        | Nut           | ASTM A194-2H/2HM | ASTM A194 4       | ASTM A194-2HM/8  |
| 18        | Stopper plate | Carbon Steel     | Carbon Steel      | Stainless Steel  |
| 19        | Lever         | Carbon Steel     | Carbon Steel      | Stainless Steel  |

● Class150 Dimension Chart

| Norm. Dia. | Unit(mm) |     |     |     |       |     |       |     |     |      |     |     |    |
|------------|----------|-----|-----|-----|-------|-----|-------|-----|-----|------|-----|-----|----|
|            | in       | 1/2 | 3/4 | 1   | 1 1/2 | 2   | 2 1/2 | 3   | 4   | 5    | 6   | 8   | 10 |
| mm         | 15       | 20  | 25  | 40  | 50    | 65  | 80    | 100 | 125 | 150  | 200 | 250 |    |
| Ball Bore  | 15       | 20  | 25  | 40  | 50    | 65  | 80    | 100 | 125 | 150  | 200 | 250 |    |
| L          | 108      | 117 | 127 | 165 | 178   | 190 | 203   | 229 | 356 | 394  | 457 | 533 |    |
| H          | 84       | 88  | 95  | 120 | 130   | 160 | 185   | 210 | 220 | 295  |     |     |    |
| W          | 130      | 130 | 140 | 250 | 250   | 400 | 400   | 450 | 450 | 1050 |     |     |    |

1/2" ~ 4": Lever operation

6" ~ 8": Optional gear operation

10": Gear operation

Test pressure

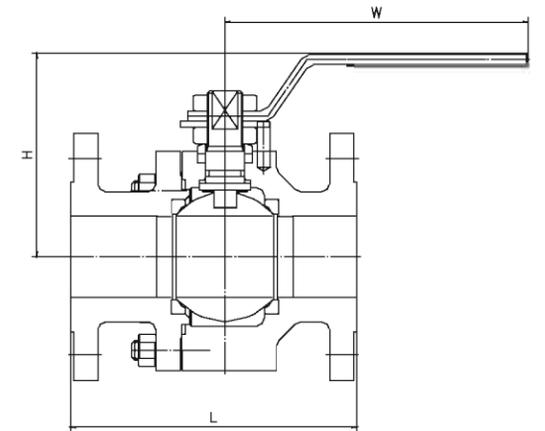
Shell: Hydrostatic 3.10MPa(450psi)

Seat: Air 0.55MPa(80psi)

Options

Packing and gasket

CF8M(316SS) ball and stem



CLASS150

● Class300 Dimension Chart

| Norm. Dia. | Unit(mm) |     |     |     |       |     |       |     |     |      |     |   |
|------------|----------|-----|-----|-----|-------|-----|-------|-----|-----|------|-----|---|
|            | in       | 1/2 | 3/4 | 1   | 1 1/2 | 2   | 2 1/2 | 3   | 4   | 5    | 6   | 8 |
| mm         | 15       | 20  | 25  | 40  | 50    | 65  | 80    | 100 | 125 | 150  | 200 |   |
| Ball Bore  | 15       | 20  | 25  | 40  | 50    | 65  | 80    | 100 | 125 | 150  | 200 |   |
| L          | 140      | 152 | 165 | 191 | 216   | 241 | 283   | 305 | 381 | 403  | 502 |   |
| H          | 84       | 88  | 95  | 120 | 140   | 160 | 180   | 208 | 220 | 335  |     |   |
| W          | 130      | 130 | 140 | 250 | 250   | 400 | 400   | 450 | 450 | 1050 |     |   |

1/2" ~ 4": Lever operation

6" ~ 8": Optional gear operation

10": Gear operation

Test pressure

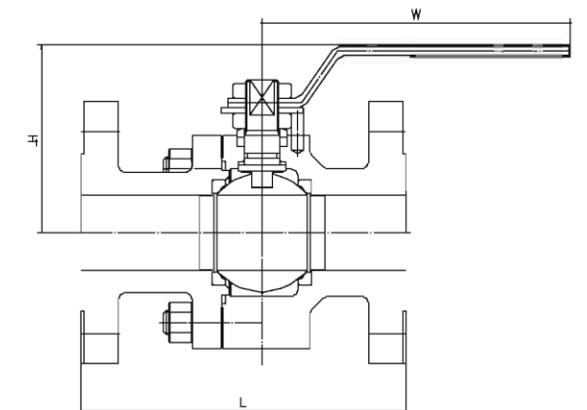
Shell: Hydrostatic 7.76MPa(1125psi)

Seat: Air 0.55MPa(80psi)

Options

Packing and gasket

CF8M(316SS) ball and stem

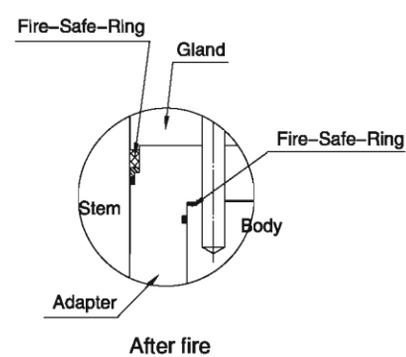
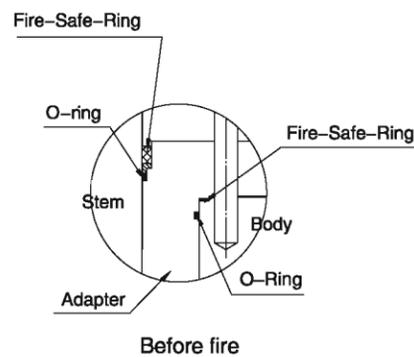
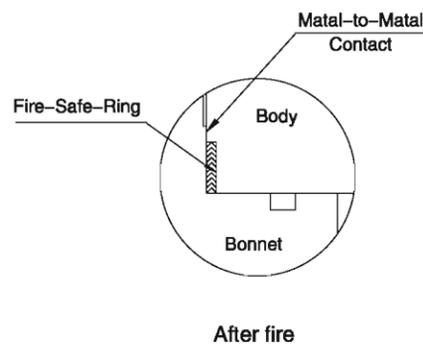
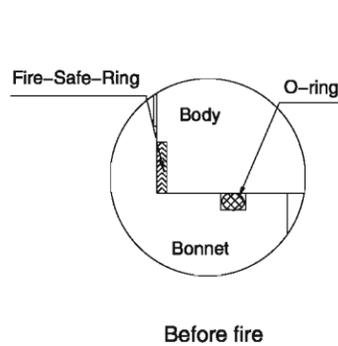
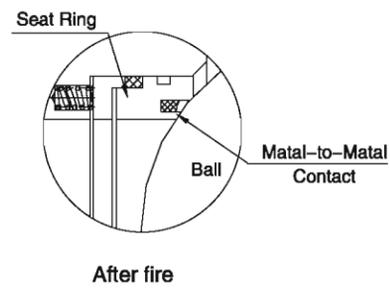
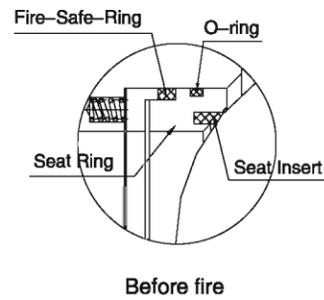


CLASS300

Trunnion mounted type ball valves are manufactured to API 6D specification and tested to API 598/API 607. The construction is side entry three pieces full and reduced port. The valves are lever operated and where recommended or when required are gear operated or actuated. The following are some of the major design features:

1. Fire-safe:

All size and pressure classes have been successfully fire-safetested according to the relevant API and BS specifications. Test certifications are available on request.

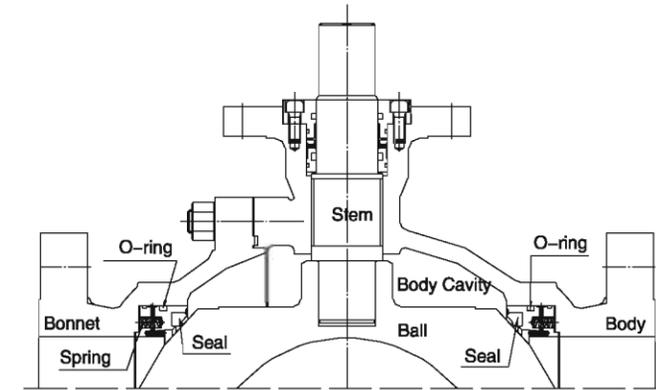


2. Antistatic:

Electrical continuity of all valve components, prevent static build-up.

3. Double Block & Bleed:

The body cavity is isolated when the ball is in either fully closed or fully opened position, the medium entrapped in it can easily be bled to avoid overpressure

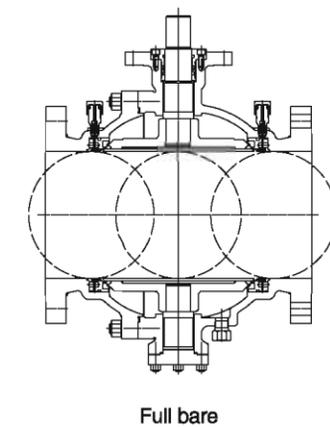
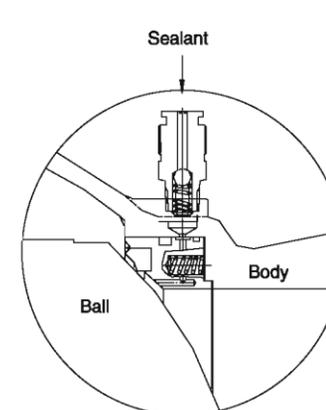
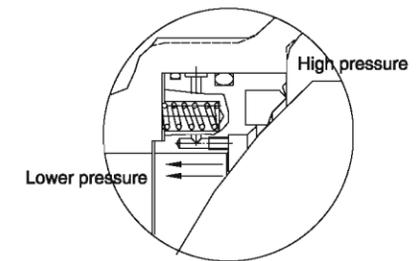
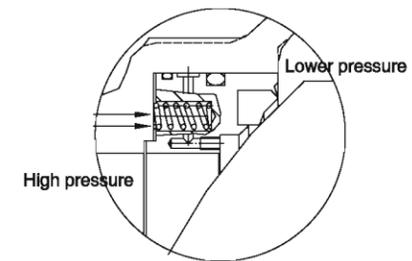


4. Seat Ring Sealing:

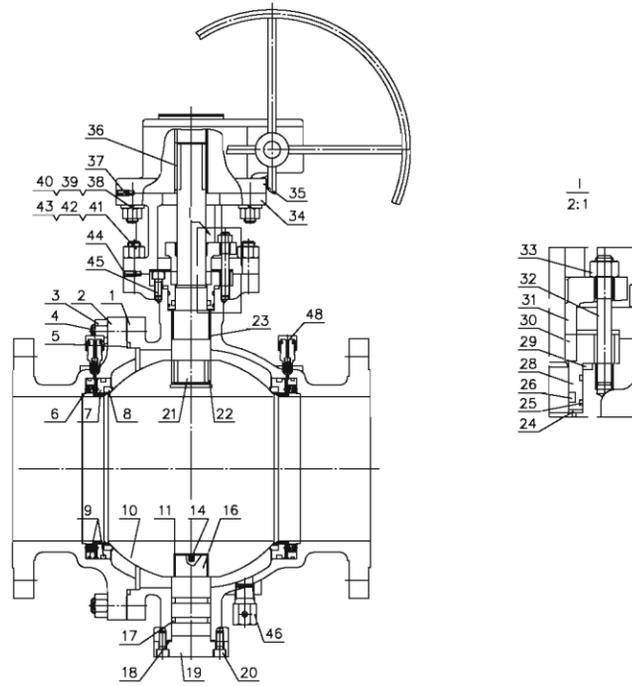
As line pressure increases, our seat design originates a piston effect forcing the sealing resilient insert against the ball. In absence of the pressure or with low pressures, the seats are forced against the ball by the set of preloaded springs. (see sketch)

5. Pressure relieving:

If excessive pressure builds up in the body cavity exceeding the seats spring pressure, the seat automatically relieves.



Carbon Steel/Stainless Steel Ball Valve



Technical Specification

Temp. & pressure: ASME B16.34、BS5351  
 Wall thickness: ASME B16.34、BS5351  
 Bore dimension: API 6D、BS5351  
 Face to face: ASME B16.10、API 6D

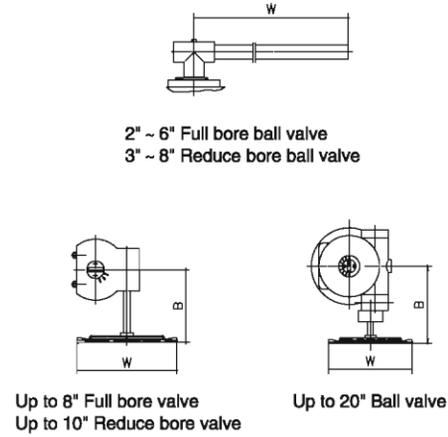
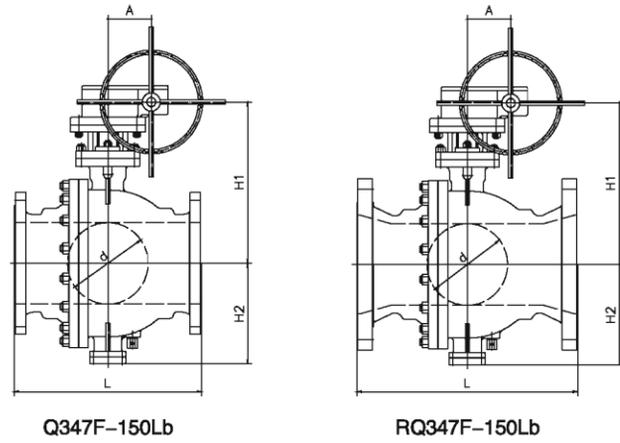
Flanges dimensions: ASME B16.5(MSS SP-44)、BS1560  
 Test & inspection: API 598、API 6D、BS5146  
 Body material: WCB、LCB、LCC、CF8、CF8M、CF3、CF3M

Form of Major Part Material

| Parts No. | Parts Name   | Materials        |                   |                     |
|-----------|--------------|------------------|-------------------|---------------------|
|           |              | Carbon Steel     | Low Temp. Steel   | Stainless Steel     |
| 1         | Body         | ASTM A216-WCB    | ASTM A352-LCB/LCC | ASTM A351-CF8/CF8M  |
| 2         | Bonnet       | ASTM A216-WCB    | ASTM A352-LCB/LCC | ASTM A351-CF8/CF8M  |
| 3         | Nut          | ASTM A194-2H/2HM | ASTM A194 4       | ASTM A194-2HM/8     |
| 4         | Bolt         | ASTM A193-B7/B7M | ASTM A320 L7      | ASTM A193-B7M/B8    |
| 5         | O-ring       | VITON            | VITON             | VITON               |
| 6         | Spring       | INCONELX-750     | INCONELX-750      | INCONELX-750        |
| 7         | Seat ring    | ASTM A105        | ASTM A182 G304    | ASTM A182 F304/F316 |
| 8         | Seat insert  | RPTFE            | RPTFE             | RPTFE               |
| 9         | O-ring       | VITON            | VITON             | VITON               |
| 10        | Ball         | ASTM A182-F6a    | ASTM A182-F304    | ASTM A182 F304/F316 |
| 11        | Stem bearing | 304+PTFE         | 304+PTFE          | 304+PTFE            |
| 14        | Spring       | ASTM A276-316    | ASTM A276-316     | ASTM A276-316       |
| 16        | Lower stem   | ASTM A182-F6a    | ASTM A182-F304    | ASTM A182 F304/F316 |

| Parts No. | Parts Name        | Materials        |                    |                     |
|-----------|-------------------|------------------|--------------------|---------------------|
|           |                   | Carbon Steel     | Low Temp. Steel    | Stainless Steel     |
| 17        | O-ring            | VITON            | VITON              | VITON               |
| 18        | Gasket            | 304+Graphite     | 304+Graphite       | 304+Graphite        |
| 19        | Bottom cover      | ASTM A105        | ASTM A182-F304     | ASTM A182-F304/F316 |
| 20        | Screw             | ASTM A193-B7/B7M | ASTM A320 L7       | ASTM A193-B7M/B8    |
| 21        | Upper stem        | ASTM A182-F6a    | ASTM A182-F304     | ASTM A182-F304/F316 |
| 22        | Key               | ANSI 1045        | ASTM A182-F304     | ASTM A182-F304/F316 |
| 23        | Radial bearing    | 304+PTFE         | 304+PTFE           | 304+PTFE            |
| 24        | Axial bearing     | 304+PTFE         | 304+PTFE           | 304+PTFE            |
| 25        | O-ring            | VITON            | VITON              | VITON               |
| 26        | O-ring            | VITON            | VITON              | VITON               |
| 28        | Gland             | ASTM A105        | ASTM A182-F304     | ASTM A182-F304/F316 |
| 29        | Gasket            | 304+Graphite     | 304+Graphite       | 304+Graphite        |
| 30        | Packing           | Graphite         | Graphite           | Graphite            |
| 31        | Packing gland     | ASTM A216-WCB    | ASTM A352-LCB /LCC | ASTM A351-CF8/CF8M  |
| 32        | Bolt              | ASTM A193-B7/B7M | ASTM A1320 L7      | ASTM A193-B7M/B8    |
| 33        | Nut               | ASTM A194-2H/2HM | ASTM A194 4        | ASTM A194-2HM/8     |
| 34        | Yoke              | ASTM A216-WCB    | ASTM A352-LCB /LCC | ASTM A182-F304/F316 |
| 35        | Gear box          | Cast iron        | Cast iron          | Cast iron           |
| 36        | Key               | ANSI 1045        | ANSI A182-F304     | ASTM A182-F304/F316 |
| 37        | Screw             | ASTM A193-B7/B7M | ASTM A320 L7       | ASTM A193-B7M/B8    |
| 38        | Nut               | ASTM A194-2H/2HM | ASTM A194 4        | ASTM A194-2HM/8     |
| 39        | Spring gasket     | 65Mn             | 65Mn               | 65Mn                |
| 40        | Bolt              | ASTM A193-B7/B7M | ASTM A320 L7       | ASTM A193-B7M/B8    |
| 41        | Nut               | ASTM A194-2H/2HM | ASTM A194 4        | ASTM A194-2HM/8     |
| 42        | Gasket            | 65Mn             | 65Mn               | 65Mn                |
| 43        | Bolt              | ASTM A193-B7/B7M | ASTM A320 L7       | ASTM A193-B7M/B8    |
| 44        | Screw             | ASTM A193-B7/B7M | ASTM A320 L7       | ASTM A193-B7M/B8    |
| 45        | Screw             | ASTM A193-B7/B7M | ASTM A320 L7       | ASTM A193-B7M/B8    |
| 46        | Drain plug        | ANSI 1045        | ASTM A182-F304     | ASTM A182-F304/F316 |
| 48        | Sealant injection | ANSI 1045        | ANSI 1045          | ASTM A182 F316      |

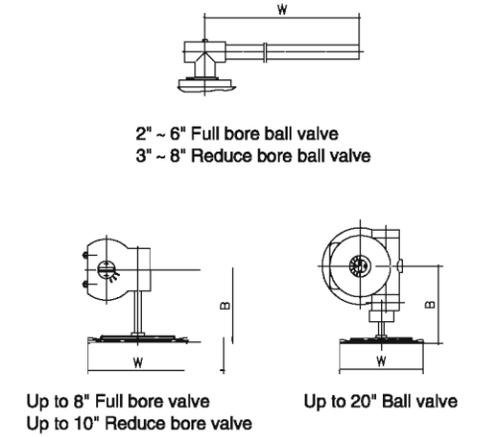
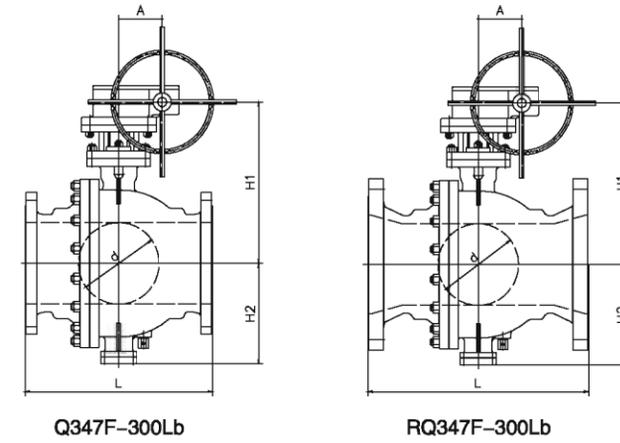
Class150 Carbon Steel/Stainless Steel Ball Valve



Dimension Chart

| NPS      | d     | L    | H <sub>1</sub> | H <sub>2</sub> | W     | A     | B     |
|----------|-------|------|----------------|----------------|-------|-------|-------|
| 2        | 2     | 7    | 6.94           | 3.74           | 13.78 | -     | -     |
| 3x2x3    | 2     | 8    | 6.94           | 3.74           | 13.78 | -     | -     |
| 3        | 3     | 8    | 8.46           | 4.72           | 15.75 | -     | -     |
| 4x3x4    | 3     | 9    | 8.46           | 4.72           | 15.75 | -     | -     |
| 4        | 4     | 9    | 10             | 5.59           | 19.69 | -     | -     |
| 6x4x6    | 4     | 15.5 | 10             | 5.59           | 19.69 | -     | -     |
| 6        | 6     | 15.5 | 13             | 8.66           | 41.34 | -     | -     |
| 8x6x8    | 6     | 18   | 13             | 8.66           | 41.34 | -     | -     |
| 8        | 8     | 18   | 17.63          | 10.20          | 11.81 | 4.13  | 7.48  |
| 10x8x10  | 8     | 21   | 17.63          | 10.20          | 11.81 | 4.13  | 7.48  |
| 10       | 10    | 21   | 19.88          | 12             | 13.78 | 4.92  | 8.07  |
| 12x10x12 | 10    | 24   | 19.88          | 12             | 13.78 | 4.92  | 8.07  |
| 12       | 12    | 24   | 21.89          | 13.70          | 15.75 | 7.28  | 12.59 |
| 14x12x14 | 12    | 27   | 21.89          | 13.70          | 15.75 | 7.28  | 12.59 |
| 14       | 13.25 | 27   | 24.40          | 15.55          | 19.69 | 7.68  | 13.78 |
| 16x14x16 | 13.25 | 30   | 24.40          | 15.55          | 19.69 | 7.68  | 13.78 |
| 16       | 15.25 | 30   | 27.55          | 17.71          | 19.69 | 7.68  | 13.78 |
| 18x16x18 | 15.25 | 34   | 27.55          | 17.71          | 19.69 | 7.68  | 13.78 |
| 18       | 17.25 | 34   | 29.52          | 19.09          | 19.69 | 8.46  | 14.96 |
| 20x18x20 | 17.25 | 36   | 29.52          | 19.09          | 19.69 | 8.46  | 14.96 |
| 20       | 19.25 | 36   | 31.69          | 20.67          | 19.69 | 8.46  | 14.96 |
| 22x18x22 | 17.25 | 40   | 29.52          | 19.09          | 19.69 | 8.46  | 14.96 |
| 22       | 21.25 | 40   | 35.04          | 24.21          | 19.69 | 8.46  | 14.96 |
| 24x20x24 | 19.25 | 42   | 31.69          | 20.67          | 19.69 | 8.46  | 14.96 |
| 24       | 23.25 | 42   | 43.70          | 26.77          | 19.69 | 11.02 | 18.11 |
| 26x22x26 | 21.25 | 45   | 35.04          | 24.21          | 19.69 | 8.46  | 14.96 |
| 26       | 25    | 45   | 44.88          | 28.15          | 19.69 | 11.02 | 18.11 |
| 28x24x28 | 23.25 | 49   | 43.70          | 26.77          | 19.69 | 11.02 | 18.11 |
| 28       | 27    | 49   | 46.45          | 29.52          | 19.69 | 11.02 | 18.11 |
| 30x24x30 | 23.25 | 51   | 43.70          | 26.77          | 19.69 | 11.02 | 18.11 |
| 30       | 29    | 51   | 48.03          | 33.46          | 19.69 | 11.02 | 18.11 |
| 32x26x32 | 25    | 54   | 44.88          | 28.15          | 19.69 | 11.02 | 18.11 |
| 32       | 30.75 | 54   | 49.21          | 36.22          | 19.69 | 11.02 | 18.11 |
| 34x28x34 | 27    | 58   | 46.45          | 29.52          | 19.69 | 11.02 | 18.11 |
| 34       | 32.75 | 58   | 51.18          | 38.78          | 19.69 | 11.02 | 18.11 |
| 36x30x36 | 29    | 60   | 48.03          | 33.46          | 19.69 | 11.02 | 18.11 |
| 36       | 34.5  | 60   | 53.15          | 43.34          | 25.59 | 7.87  | 25.20 |

Class300 Carbon Steel/Stainless Steel Ball Valve

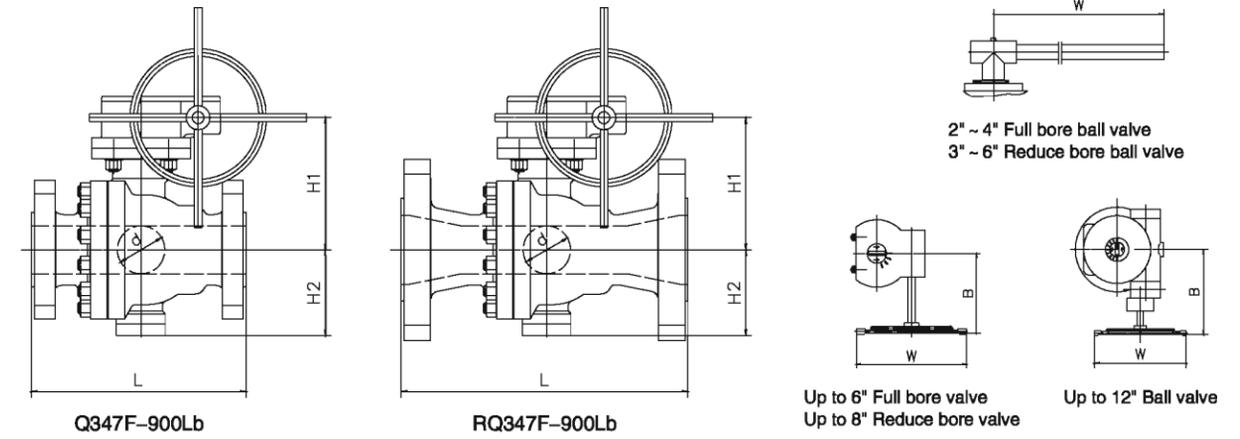
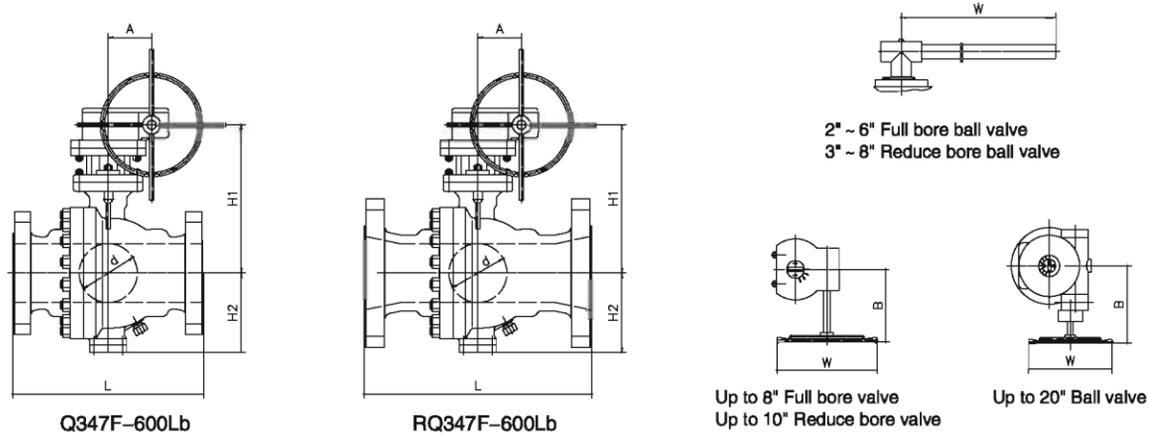


Dimension Chart

| NPS      | d     | L      | H <sub>1</sub> | H <sub>2</sub> | W     | A     | B     |
|----------|-------|--------|----------------|----------------|-------|-------|-------|
| 2        | 2     | 8.5    | 6.94           | 3.74           | 13.78 | -     | -     |
| 3x2x3    | 2     | 11.125 | 6.94           | 3.74           | 13.78 | -     | -     |
| 3        | 3     | 11.125 | 8.46           | 4.72           | 15.75 | -     | -     |
| 4x3x4    | 3     | 12     | 8.46           | 4.72           | 15.75 | -     | -     |
| 4        | 4     | 12     | 10             | 5.59           | 19.69 | -     | -     |
| 6x4x6    | 4     | 15.875 | 10             | 5.59           | 19.69 | -     | -     |
| 6        | 6     | 15.875 | 13             | 8.66           | 41.34 | -     | -     |
| 8x6x8    | 6     | 19.75  | 13             | 8.66           | 41.34 | -     | -     |
| 8        | 8     | 19.75  | 17.63          | 10.20          | 11.81 | 4.13  | 7.48  |
| 10x8x10  | 8     | 22.375 | 17.63          | 10.20          | 11.81 | 4.13  | 7.48  |
| 10       | 10    | 22.375 | 19.88          | 12             | 13.78 | 4.92  | 8.07  |
| 12x10x12 | 10    | 25.5   | 19.88          | 12             | 13.78 | 4.92  | 8.07  |
| 12       | 12    | 25.5   | 21.89          | 13.70          | 15.75 | 7.28  | 12.59 |
| 14x12x14 | 12    | 30     | 21.89          | 13.70          | 15.75 | 7.28  | 12.59 |
| 14       | 13.25 | 30     | 24.40          | 15.55          | 19.69 | 7.68  | 13.78 |
| 16x14x16 | 13.25 | 33     | 24.40          | 15.55          | 19.69 | 7.68  | 13.78 |
| 16       | 15.25 | 33     | 27.55          | 17.71          | 19.69 | 7.68  | 13.78 |
| 18x16x18 | 15.25 | 36     | 27.55          | 17.71          | 19.69 | 7.68  | 13.78 |
| 18       | 17.25 | 36     | 29.52          | 19.09          | 19.69 | 8.46  | 14.96 |
| 20x18x20 | 17.25 | 39     | 29.52          | 19.09          | 19.69 | 8.46  | 14.96 |
| 20       | 19.25 | 39     | 31.69          | 20.67          | 19.69 | 8.46  | 14.96 |
| 22x18x22 | 17.25 | 43     | 29.52          | 19.09          | 19.69 | 8.46  | 14.96 |
| 22       | 21.25 | 43     | 35.04          | 24.21          | 19.69 | 8.46  | 14.96 |
| 24x20x24 | 19.25 | 45     | 31.69          | 20.67          | 19.69 | 8.46  | 14.96 |
| 24       | 23.25 | 45     | 43.70          | 26.77          | 19.69 | 11.02 | 18.11 |
| 26x22x26 | 21.25 | 49     | 35.04          | 24.21          | 19.69 | 8.46  | 14.96 |
| 26       | 25    | 49     | 44.88          | 28.15          | 19.69 | 11.02 | 18.11 |
| 28x24x28 | 23.25 | 53     | 43.70          | 26.77          | 19.69 | 11.02 | 18.11 |
| 28       | 27    | 53     | 46.45          | 29.52          | 19.69 | 11.02 | 18.11 |
| 30x24x30 | 23.25 | 55     | 43.70          | 26.77          | 19.69 | 11.02 | 18.11 |
| 30       | 29    | 55     | 48.03          | 33.46          | 19.69 | 11.02 | 18.11 |
| 32x26x32 | 25    | 60     | 44.88          | 28.15          | 19.69 | 11.02 | 18.11 |
| 32       | 30.75 | 60     | 49.21          | 36.22          | 19.69 | 11.02 | 18.11 |
| 34x28x34 | 27    | 64     | 46.45          | 29.52          | 19.69 | 11.02 | 18.11 |
| 34       | 32.75 | 64     | 51.18          | 38.78          | 19.69 | 11.02 | 18.11 |
| 36x30x36 | 29    | 68     | 48.03          | 33.46          | 19.69 | 11.02 | 18.11 |
| 36       | 34.5  | 68     | 53.15          | 43.34          | 25.59 | 7.87  | 25.20 |

● Class600 Carbon Steel/Stainless Steel Ball Valve

● Class900 Carbon Steel/Stainless Steel Ball Valve



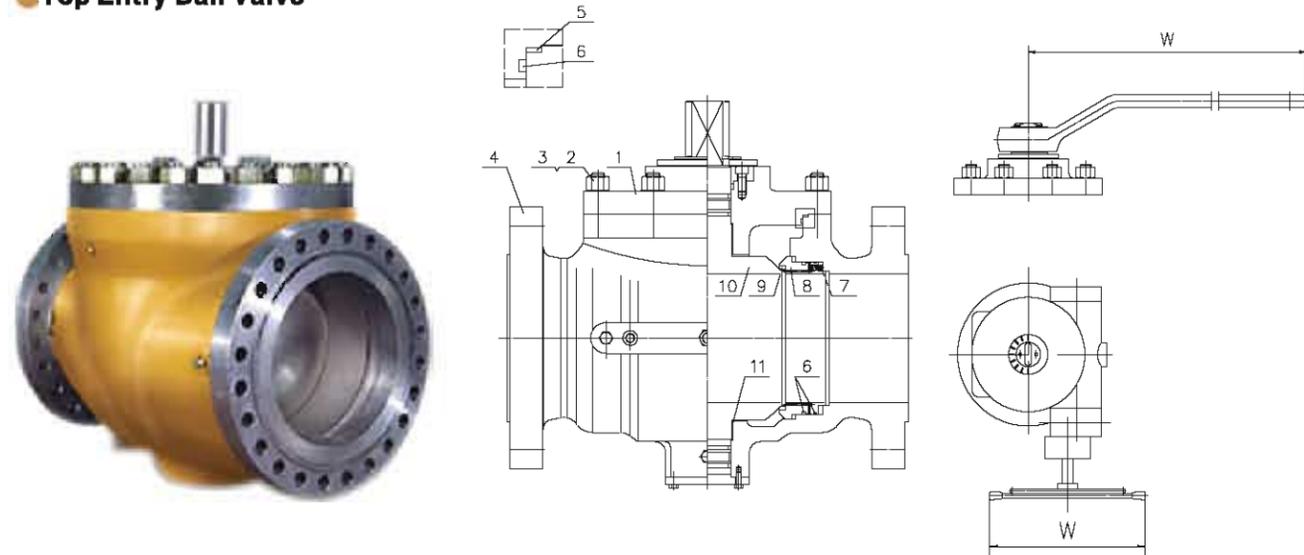
● Dimension Chart

| inch     |       |      |                |                |       |       |       | mm          |     |      |                |                |      |     |     |
|----------|-------|------|----------------|----------------|-------|-------|-------|-------------|-----|------|----------------|----------------|------|-----|-----|
| NPS      | d     | L    | H <sub>1</sub> | H <sub>2</sub> | W     | A     | B     | DN          | d   | L    | H <sub>1</sub> | H <sub>2</sub> | W    | A   | B   |
| 2        | 2     | 11.5 | 7.56           | 5.59           | 23.6  | -     | -     | 50          | 51  | 292  | 192            | 142            | 600  | -   | -   |
| 3x2x3    | 2     | 14   | 7.56           | 5.59           | 23.6  | -     | -     | 80x50x80    | 51  | 356  | 192            | 142            | 600  | -   | -   |
| 3        | 3     | 14   | 10.98          | 6.77           | 39.37 | -     | -     | 80          | 76  | 356  | 279            | 172            | 1000 | -   | -   |
| 4x3x4    | 3     | 17   | 10.98          | 6.77           | 39.37 | -     | -     | 100x80x100  | 76  | 432  | 279            | 172            | 1000 | -   | -   |
| 4        | 4     | 17   | 12.40          | 8.07           | 59.06 | -     | -     | 100         | 102 | 432  | 315            | 205            | 1500 | -   | -   |
| 6x4x6    | 4     | 22   | 12.40          | 8.07           | 59.06 | -     | -     | 150x100x150 | 102 | 559  | 315            | 205            | 1500 | -   | -   |
| 6        | 6     | 22   | 12.72          | 10.71          | 19.69 | 7.28  | 12.60 | 150         | 152 | 559  | 323            | 272            | 500  | 185 | 320 |
| 8x6x8    | 6     | 26   | 12.72          | 10.71          | 19.69 | 7.28  | 12.60 | 200x150x200 | 152 | 660  | 323            | 272            | 500  | 185 | 320 |
| 8        | 8     | 26   | 15.00          | 13.19          | 19.69 | 7.28  | 12.60 | 200         | 203 | 660  | 381            | 335            | 500  | 185 | 320 |
| 10x8x10  | 8     | 31   | 15.00          | 13.19          | 19.69 | 7.28  | 12.60 | 250x200x250 | 203 | 787  | 381            | 335            | 500  | 185 | 320 |
| 10       | 10    | 31   | 20.39          | 15.98          | 19.69 | 8.46  | 14.96 | 250         | 254 | 787  | 518            | 406            | 500  | 215 | 380 |
| 12x10x12 | 10    | 33   | 20.39          | 15.98          | 19.69 | 8.46  | 14.96 | 300x250x300 | 254 | 838  | 518            | 406            | 500  | 215 | 380 |
| 12       | 12    | 33   | 22.36          | 18.15          | 19.69 | 8.46  | 14.96 | 300         | 305 | 838  | 568            | 461            | 500  | 215 | 380 |
| 14x12x14 | 12    | 35   | 22.36          | 18.15          | 19.69 | 8.46  | 14.96 | 350x300x350 | 305 | 899  | 568            | 461            | 500  | 215 | 380 |
| 14       | 13.25 | 35   | 26.18          | 20.20          | 19.69 | 8.46  | 14.96 | 350         | 337 | 899  | 665            | 513            | 500  | 215 | 380 |
| 16x14x16 | 13.25 | 39   | 26.18          | 20.20          | 19.69 | 8.46  | 14.96 | 400x350x400 | 337 | 991  | 665            | 513            | 500  | 215 | 380 |
| 16       | 15.25 | 39   | 28.74          | 22.95          | 19.69 | 8.46  | 14.96 | 400         | 387 | 991  | 730            | 583            | 500  | 215 | 380 |
| 18x16x18 | 15.25 | 43   | 28.74          | 22.95          | 19.69 | 8.46  | 14.96 | 450x400x450 | 387 | 1092 | 730            | 583            | 500  | 215 | 380 |
| 18       | 17.25 | 43   | 31.30          | 25.43          | 19.69 | 8.46  | 14.96 | 450         | 438 | 1092 | 795            | 646            | 500  | 215 | 380 |
| 20x18x20 | 17.25 | 47   | 31.30          | 25.43          | 19.69 | 8.46  | 14.96 | 500x450x500 | 438 | 1194 | 795            | 646            | 500  | 215 | 380 |
| 20       | 19.25 | 47   | 32.48          | 27.80          | 24.02 | 8.46  | 14.96 | 500         | 489 | 1194 | 825            | 706            | 500  | 215 | 380 |
| 24x20x24 | 19.25 | 55   | 32.48          | 27.80          | 24.02 | 8.46  | 14.96 | 550x450x550 | 489 | 1397 | 825            | 706            | 500  | 215 | 380 |
| 24       | 23.25 | 55   | 38.31          | 32.72          | 24.02 | 11.02 | 18.11 | 600         | 591 | 1397 | 973            | 831            | 500  | 280 | 460 |
| 26x22x26 | 21.25 | 57   | 34.06          | 27.99          | 19.69 | 8.46  | 14.96 | 650x550x650 | 540 | 1448 | 865            | 711            | 500  | 215 | 380 |
| 26       | 25    | 57   | 37.20          | 32.48          | 24.02 | 11.81 | 19.69 | 650         | 635 | 1448 | 945            | 825            | 610  | 300 | 500 |
| 28x24x28 | 23.25 | 61   | 36.22          | 30.16          | 19.69 | 11.02 | 18.11 | 700x600x700 | 591 | 1549 | 920            | 766            | 500  | 280 | 460 |
| 28       | 27    | 61   | 40.78          | 35.04          | 24.02 | 11.81 | 19.69 | 700         | 686 | 1549 | 1038           | 890            | 610  | 300 | 500 |
| 30x24x30 | 23.25 | 65   | 38.31          | 32.72          | 19.69 | 11.02 | 18.11 | 750x600x750 | 591 | 1651 | 920            | 766            | 500  | 280 | 460 |
| 30       | 29    | 65   | 42.83          | 36.93          | 24.02 | 11.81 | 19.69 | 750         | 737 | 1651 | 1088           | 938            | 610  | 300 | 500 |

● Dimension Chart

| inch     |        |      |                |                |       |       |       | mm          |     |      |                |                |      |     |     |
|----------|--------|------|----------------|----------------|-------|-------|-------|-------------|-----|------|----------------|----------------|------|-----|-----|
| NPS      | d      | L    | H <sub>1</sub> | H <sub>2</sub> | W     | A     | B     | DN          | d   | L    | H <sub>1</sub> | H <sub>2</sub> | W    | A   | B   |
| 2        | 2      | 14.5 | 7.56           | 5.59           | 23.6  | -     | -     | 50          | 51  | 368  | 192            | 142            | 600  | -   | -   |
| 3x2x3    | 2      | 15   | 7.56           | 5.59           | 23.6  | -     | -     | 80x50x80    | 51  | 381  | 192            | 142            | 600  | -   | -   |
| 3        | 3      | 15   | 10.98          | 6.77           | 39.37 | -     | -     | 80          | 76  | 381  | 279            | 172            | 1000 | -   | -   |
| 4x3x4    | 3      | 18   | 10.98          | 6.77           | 39.37 | -     | -     | 100x80x100  | 76  | 457  | 279            | 172            | 1000 | -   | -   |
| 4        | 4      | 18   | 12.40          | 8.07           | 59.06 | -     | -     | 100         | 102 | 457  | 315            | 205            | 1500 | -   | -   |
| 6x4x6    | 4      | 24   | 12.40          | 8.07           | 59.06 | -     | -     | 150x100x150 | 102 | 610  | 315            | 205            | 1500 | -   | -   |
| 6        | 6      | 24   | 12.72          | 10.71          | 19.69 | 7.28  | 12.60 | 150         | 152 | 610  | 323            | 272            | 500  | 185 | 320 |
| 8x6x8    | 6      | 29   | 12.72          | 10.71          | 19.69 | 7.28  | 12.60 | 200x150x200 | 152 | 737  | 323            | 272            | 500  | 185 | 320 |
| 8        | 8      | 29   | 15.00          | 13.19          | 19.69 | 7.28  | 12.60 | 200         | 203 | 737  | 381            | 335            | 500  | 185 | 320 |
| 10x8x10  | 8      | 33   | 15.00          | 13.19          | 19.69 | 7.28  | 12.60 | 250x200x250 | 203 | 838  | 381            | 335            | 500  | 185 | 320 |
| 10       | 10     | 33   | 20.39          | 15.98          | 19.69 | 8.46  | 14.96 | 250         | 254 | 838  | 518            | 406            | 500  | 215 | 380 |
| 12x10x12 | 10     | 38   | 20.39          | 15.98          | 19.69 | 8.46  | 14.96 | 300x250x300 | 254 | 965  | 518            | 406            | 500  | 215 | 380 |
| 12       | 12     | 38   | 22.36          | 18.15          | 19.69 | 8.46  | 14.96 | 300         | 305 | 965  | 568            | 461            | 500  | 215 | 380 |
| 14x12x14 | 12     | 40.5 | 22.36          | 18.15          | 19.69 | 8.46  | 14.96 | 350x300x350 | 305 | 1029 | 568            | 461            | 500  | 215 | 380 |
| 14       | 12.75  | 40.5 | 26.18          | 20.20          | 19.69 | 8.46  | 14.96 | 350         | 324 | 1029 | 665            | 513            | 500  | 215 | 380 |
| 16x14x16 | 12.75  | 44.5 | 26.18          | 20.20          | 19.69 | 8.46  | 14.96 | 400x350x400 | 324 | 1130 | 665            | 513            | 500  | 215 | 380 |
| 16       | 14.75  | 44.5 | 28.74          | 22.95          | 19.69 | 8.46  | 14.96 | 400         | 375 | 1130 | 730            | 583            | 500  | 215 | 380 |
| 18x16x18 | 14.75  | 48   | 28.74          | 22.95          | 19.69 | 8.46  | 14.96 | 450x400x450 | 375 | 1219 | 730            | 583            | 500  | 215 | 380 |
| 18       | 16.75  | 48   | 31.30          | 25.43          | 19.69 | 8.46  | 14.96 | 450         | 426 | 1219 | 795            | 646            | 500  | 215 | 380 |
| 20x18x20 | 16.75  | 52   | 31.30          | 25.43          | 19.69 | 8.46  | 14.96 | 500x450x500 | 426 | 1321 | 795            | 646            | 500  | 215 | 380 |
| 20       | 18.625 | 52   | 32.48          | 27.80          | 24.02 | 8.46  | 14.96 | 500         | 473 | 1321 | 825            | 706            | 500  | 215 | 380 |
| 24x20x24 | 18.625 | 61   | 32.48          | 27.80          | 24.02 | 8.46  | 14.96 | 550x450x550 | 473 | 1549 | 825            | 706            | 500  | 215 | 380 |
| 24       | 22.5   | 61   | 38.31          | 32.72          | 24.02 | 11.02 | 18.11 | 600         | 572 | 1549 | 973            | 831            | 500  | 280 | 460 |

● Top Entry Ball Valve



● Technical Specification

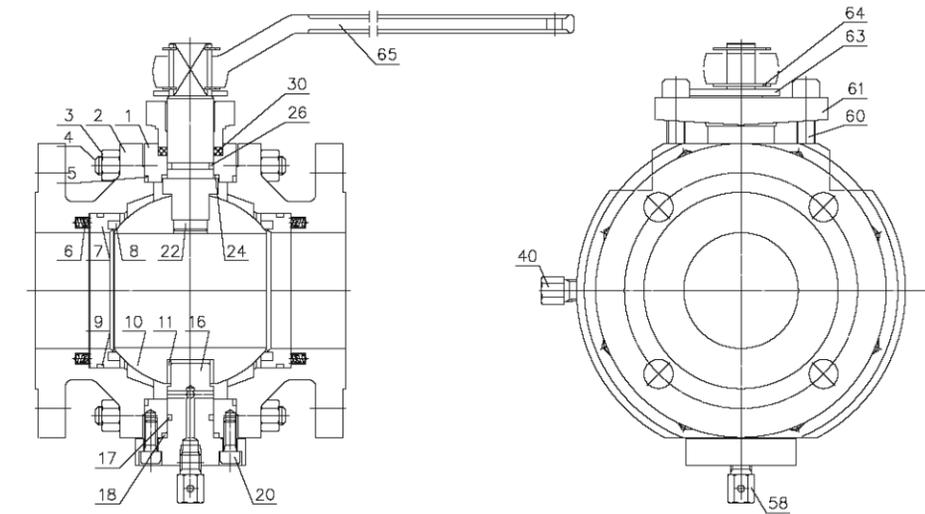
Temp. & pressure: ASME B16.34, BS5351  
 Wall thickness: ASME B16.34, BS5351  
 Bore dimension: API 6D  
 Face to face: ASME B16.10, API 6D  
 Flanges dimensions: ASME B16.5(MSS SP-44)  
 Test & inspection: API 598, API 6D, BS5146  
 Body material: WCB, LCB, LCC, CF8, CF8M, CF3, CF3M

● Form of Major Part Material

| Parts No. | Parts Name   | Materials        |                     |                     |
|-----------|--------------|------------------|---------------------|---------------------|
|           |              | Carbon Steel     | Low Temp. Steel     | Stainless Steel     |
| 1         | Body         | ASTM A216-WCB    | ASTM A352-LCB/LCC   | ASTM A351-CF8/CF8M  |
| 2         | Bonnet       | ASTM A216-WCB    | ASTM A352-LCB/LCC   | ASTM A351-CF8/CF8M  |
| 3         | Nut          | ASTM A194-2H/2HM | ASTM A194 4         | ASTM A194-2HM/8     |
| 4         | Bolt         | ASTM A193-B7/B7M | ASTM A320 L7        | ASTM A193-B7M/B8    |
| 5         | Gasket       | 304+PTFE         | 304+PTFE            | 304+PTFE            |
| 6         | O-ring       | VITON            | VITON               | VITON               |
| 7         | Spring       | INCONELX-750     | INCONELX-750        | INCONELX-750        |
| 8         | Seat ring    | ASTM A105        | ASTM A182 F304/F318 | ASTM A182 F304/F316 |
| 9         | Seat insert  | RPTFE            | RPTFE               | RPTFE               |
| 10        | Ball         | ASTM A182-F6a    | ASTM A182-F304      | ASTM A182 F304/F316 |
| 11        | Stem bearing | 304+PTFE         | 304+PTFE            | 304+PTFE            |

● Forged Trunnion Mounted Ball Valve

2" ~ 4" Class150/300, DN50 ~ 100 PN2.0 ~ 5.0



● Technical Specification

Temp. & pressure: ASME B16.34  
 Wall thickness: ASME B16.34  
 Bore dimension: API 6D  
 Face to face: ASME B16.10, API 6D

Flanges dimensions: ASME B16.5

Test & inspection: API 6D

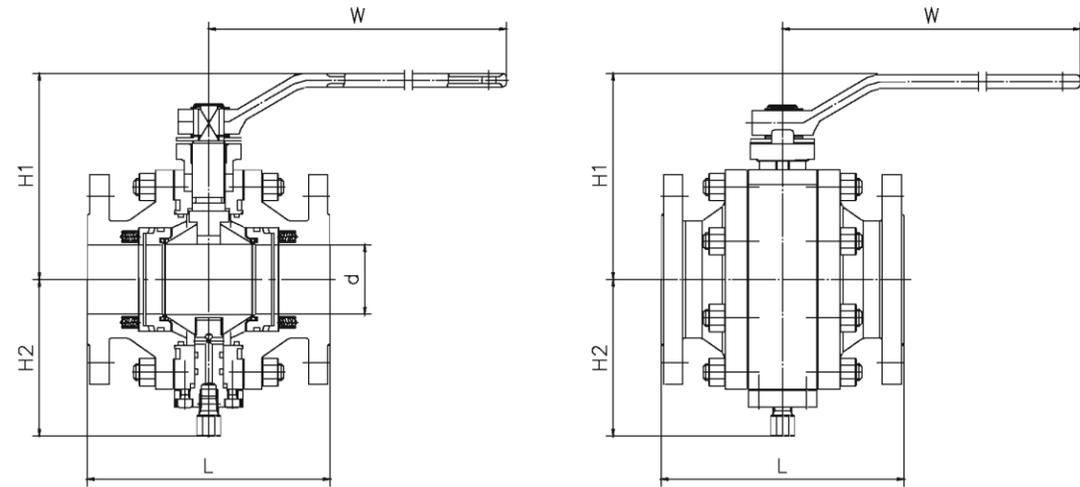
Body material: A105, LF2, LF3, F304, F316, F304L, F316L

● Form of Major Part Material

| Parts No. | Parts Name   | Materials        |                   |                     |
|-----------|--------------|------------------|-------------------|---------------------|
|           |              | Carbon Steel     | Low Temp. Steel   | Stainless Steel     |
| 1         | Body         | ASTM A105        | ASTM A350-LF2/LF3 | ASTM A182-F304/F316 |
| 2         | Bonnet       | ASTM A105        | ASTM A350-LF2/LF3 | ASTM A182-F304/F316 |
| 3         | Nut          | ASTM A194-2H/2HM | ASTM A194 4       | ASTM A194-2HM/8     |
| 4         | Bolt         | ASTM A193-B7/B7M | ASTM A320 L7      | ASTM A193-B7M/B8    |
| 5         | O-ring       | VITON            | VITON             | VITON               |
| 6         | Spring       | INCONELX-750     | INCONELX-750      | INCONELX-750        |
| 7         | Seat ring    | ASTM A105        | ASTM A350-LF2/LF3 | ASTM A182-F304/F316 |
| 8         | Seat insert  | RPTFE            | RPTFE             | RPTFE               |
| 9         | O-ring       | VITON            | VITON             | VITON               |
| 10        | Ball         | ASTM A105        | ASTM A182-F304    | ASTM A182-F304/F316 |
| 11        | Stem bearing | 304+PTFE         | 304+PTFE          | 304+PTFE            |
| 16        | Lower stem   | ASTM A105        | ASTM A182-F304    | ASTM A182-F304/F316 |
| 17        | O-ring       | VITON            | VITON             | VITON               |
| 18        | Gasket       | 304+Graphite     | 304+Graphite      | 304+Graphite        |
| 20        | Screw        | ASTM A193-B7/B7M | ASTM A320 L7      | ASTM A193-B7M/B8    |
| 22        | Stem         | ASTM A182-F6a    | ASTM A182-F304    | ASTM A182-F304/F316 |
| 24        | Stem washer  | 304+PTFE         | 304+PTFE          | 304+PTFE            |
| 26        | O-ring       | VITON            | VITON             | VITON               |
| 30        | Packing      | Graphite         | Graphite          | Graphite            |
| 58        | Drain valve  | Carbon steel     | Carbon steel      | Carbon steel        |
| 60        | Screw        | ASTM A193-B7/B7M | ASTM A320 L7      | ASTM A193-B7M/B8    |
| 61        | Gland flange | Carbon steel     | Carbon steel      | Carbon steel        |
| 63        | Stopper      | Carbon steel     | Carbon steel      | Carbon steel        |
| 64        | Snap ring    | Carbon steel     | Carbon steel      | Carbon steel        |
| 65        | Lever        | Carbon steel     | Carbon steel      | Carbon steel        |

● Forged Trunnion Mounted Ball Valve

2" ~ 4" Class150/300、DN50 ~ 100 PN2.0 ~ 5.0



● Class150/300 Dimention & Weight

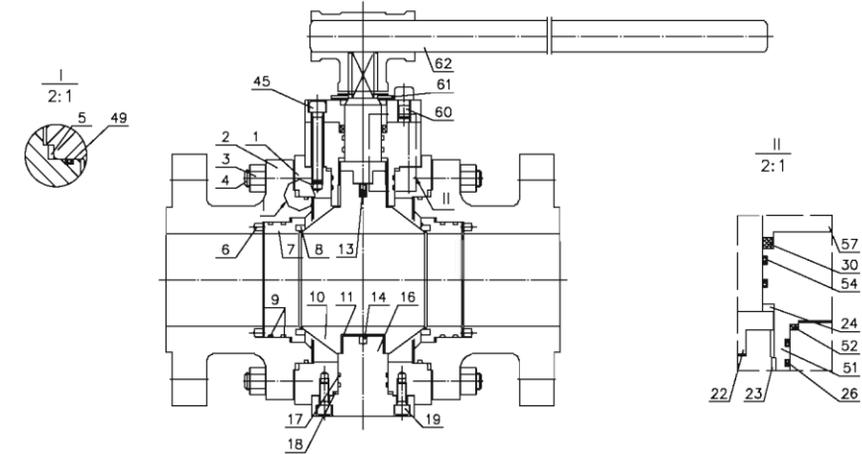
| Class | NPS | Dimensions(inch) |        |      |      |       | Weight (kg) |
|-------|-----|------------------|--------|------|------|-------|-------------|
|       |     | d                | L      | H1   | H2   | W     |             |
| 150Lb | 2   | 2                | 7      | 6.02 | 6.5  | 15.74 | 28          |
|       | 3   | 3                | 8      | 7.68 | 8.03 | 23.63 | 55          |
|       | 4   | 4                | 9      | 8.39 | 8.54 | 33.46 | 80          |
| 300Lb | 2   | 2                | 8.5    | 6.02 | 6.5  | 15.74 | 30          |
|       | 3   | 3                | 11.125 | 7.68 | 8.03 | 23.63 | 60          |
|       | 4   | 4                | 12     | 8.39 | 8.54 | 33.46 | 100         |

● PN2.0/PN5.0 Dimention & Weight

| PN     | DN  | Dimensions(mm) |       |     |     |     | Weight (kg) |
|--------|-----|----------------|-------|-----|-----|-----|-------------|
|        |     | d              | L     | H1  | H2  | W   |             |
| 2.0MPa | 50  | 50             | 177.8 | 153 | 165 | 400 | 28          |
|        | 80  | 76.2           | 203.2 | 195 | 205 | 600 | 55          |
|        | 100 | 101.6          | 228.6 | 215 | 220 | 850 | 80          |
| 5.0MPa | 50  | 50             | 215.9 | 153 | 165 | 400 | 30          |
|        | 80  | 76.2           | 282.6 | 195 | 205 | 600 | 60          |
|        | 100 | 101.6          | 304.8 | 215 | 220 | 850 | 100         |

● Forged Trunnion Mounted Ball Valve

2" ~ 4" Class600 ~ 1500、DN50 ~ 100 PN10.0 ~ 25.0



● Technical Specification

Temp. & pressure: ASME B16.34

Wall thickness: ASME B16.34

Bore dimension: API 6D

Face to face: ASME B16.10、API 6D

Flanges dimensions: ASME B16.5

Test & inspection: API 6D

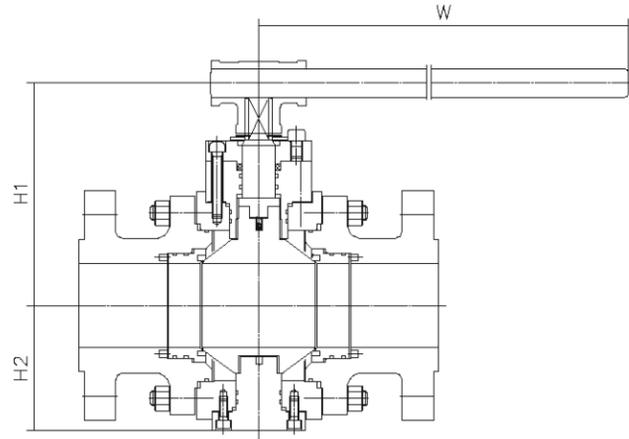
Body material: A105、LF2、LF3、F304、F316、F304L、F316L

● Form of Major Part Material

| Parts No. | Parts Name     | Materials        |                   |                     |
|-----------|----------------|------------------|-------------------|---------------------|
|           |                | Carbon Steel     | Low Temp. Steel   | Stainless Steel     |
| 1         | Body           | ASTM A105        | ASTM A350-LF2/LF3 | ASTM A182-304/316   |
| 2         | Bonnet         | ASTM A105        | ASTM A350-LF2/LF3 | ASTM A182-304/316   |
| 3         | Nut            | ASTM A194-2H/2HM | ASTM A194 4       | ASTM A194-2HM/8     |
| 4         | Bolt           | ASTM A193-B7/B7M | ASTM A320 L7      | ASTM A193-B7M/B8    |
| 5         | O-ring         | VITON            | VITON             | VITON               |
| 6         | Spring         | INCONELX-750     | INCONELX-750      | INCONELX-750        |
| 7         | Seat ring      | ASTM A105        | ASTM A350-LF2/LF3 | ASTM A182-F304/F316 |
| 8         | Seat insert    | RPTFE            | RPTFE             | RPTFE               |
| 9         | O-ring         | VITON            | VITON             | VITON               |
| 10        | Ball           | ASTM A105        | ASTM A182-F304    | ASTM A182-F304/F316 |
| 11        | Stem bearing   | 304+PTFE         | 304+PTFE          | 304+PTFE            |
| 13        | Spring         | ASTM A276-316    | ASTM A276-316     | ASTM A276-316       |
| 14        | Spring         | ASTM A276-316    | ASTM A276-316     | ASTM A276-316       |
| 16        | Lower stem     | ASTM A105        | ASTM A182-F304    | ASTM A182-F304/F316 |
| 17        | O-ring         | VITON            | VITON             | VITON               |
| 18        | Gasket         | 304+Graphite     | 304+Graphite      | 304+Graphite        |
| 19        | Screw          | ASTM A193-B7/B7M | ASTM A320 L7      | ASTM A193-B7M/B8    |
| 22        | Stem           | ASTM A182-F6a    | ASTM A182-F304    | ASTM A182-F304/316  |
| 23        | Ball bearing   | 304+PTFE         | 304+PTFE          | 304+PTFE            |
| 24        | Stem washer    | 304+PTFE         | 304+PTFE          | 304+PTFE            |
| 26        | O-ring         | VITON            | VITON             | VITON               |
| 30        | Packing        | Graphite         | Graphite          | Graphite            |
| 45        | Screw          | ASTM A193-B7/B7M | ASTM A320 L7      | ASTM A193-B7M/B8    |
| 49        | O-ring         | VITON            | VITON             | VITON               |
| 51        | Flange adapter | ASTM A105        | ASTM A182-F304    | ASTM A182-F304/316  |
| 52        | Gasket         | 304+Graphite     | 304+Graphite      | 304+Graphite        |
| 54        | O-ring         | VITON            | VITON             | VITON               |
| 57        | Gland          | ASTM A105        | ASTM A182-F304    | ASTM A182-F304/316  |
| 58        | Drain Valve    | Carbon steel     | Carbon steel      | Stainless steel     |
| 60        | Screw          | ASTM A193-B7/B7M | ASTM A320 L7      | ASTM A193-B7M/B8    |
| 61        | Stopper        | Carbon steel     | Carbon steel      | Carbon steel        |
| 62        | Lever          | Carbon steel     | Carbon steel      | Carbon steel        |

● Forged Trunnion Mounted Ball Valve

2" ~ 4" Class600 ~ 1500, DN50 ~ 100 PN10.0 ~ 25.0



● Class600~900 Dimention & Weight

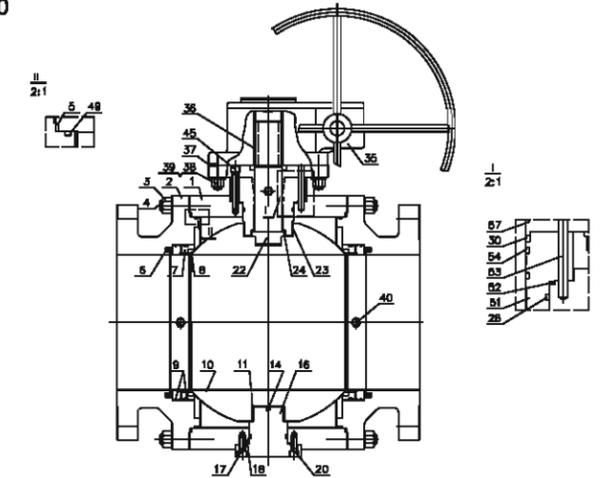
| Class  | NPS | Dimensions(Inch) |      |                |                |       | Weight (kg) |
|--------|-----|------------------|------|----------------|----------------|-------|-------------|
|        |     | d                | L    | H <sub>1</sub> | H <sub>2</sub> | W     |             |
| 600Lb  | 2   | 2                | 11.5 | 8.59           | 5.55           | 23.15 | 32          |
|        | 3   | 3                | 14   | 8.21           | 6.57           | 49.25 | 64          |
|        | 4   | 4                | 17   | 9.61           | 7.97           | 51.22 | 122         |
| 900Lb  | 2   | 2                | 14.5 | 8.59           | 5.55           | 23.15 | 48          |
|        | 3   | 3                | 15   | 8.21           | 6.57           | 49.25 | 78          |
| 1500Lb | 4   | 4                | 18   | -              | 7.97           | -     | 138         |
|        | 2   | 2                | 14.5 | 6.59           | 5.55           | 45.7  | 55          |
|        | 3   | 3                | 18.5 | 8.21           | 6.57           | 49.25 | 87          |
|        | 4   | 4                | 21.5 | -              | 7.97           | -     | 162         |

● PN10.0~PN25.0 Dimention & Weight

| PN      | DN  | Dimensions(mm) |       |                |                |      | Weight (kg) |
|---------|-----|----------------|-------|----------------|----------------|------|-------------|
|         |     | d              | L     | H <sub>1</sub> | H <sub>2</sub> | W    |             |
| 10.0MPa | 50  | 50             | 292   | 167.5          | 141            | 586  | 32          |
|         | 80  | 76.2           | 355.6 | 208.5          | 167            | 1251 | 64          |
|         | 100 | 101.6          | 431.8 | 244            | 202.5          | 1300 | 122         |
| 15.0MPa | 50  | 50             | 368.3 | 167.5          | 141            | 588  | 48          |
|         | 80  | 76.2           | 381   | 208.5          | 167            | 1251 | 78          |
|         | 100 | 101.6          | 457.2 | -              | 202.5          | -    | 138         |
| 25.0MPa | 50  | 50             | 388.3 | 167.5          | 141            | 1160 | 55          |
|         | 80  | 76.2           | 469.9 | 208.5          | 167            | 1251 | 97          |
|         | 100 | 101.6          | 546.1 | -              | 202.5          | -    | 162         |

● Forged Trunnion Mounted Ball Valve

6" ~ 40" Class150 ~ 900, DN150 ~ 1000 PN2.0 ~ 15.0



● Technical Specification

Temp. & pressure: ASME B16.34

Wall thickness: ASME B16.34

Bore dimension: API 6D

Face to face: ASME B16.10, API 6D

Flanges dimensions: ASME B16.5(MSS SP-44), BS1560

Test & inspection: API 6D, BS5146

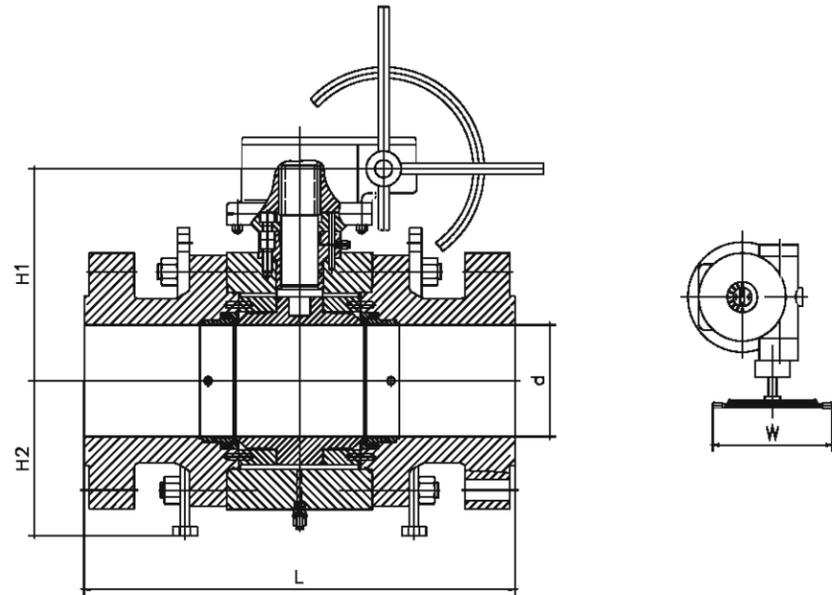
Body material: A105, LF2, LF3, F304, F316, F304L, F316L

● Form of Major Part Material

| Parts No. | Parts Name      | Materials        |                   |                     |
|-----------|-----------------|------------------|-------------------|---------------------|
|           |                 | Carbon Steel     | Low Temp. Steel   | Stainless Steel     |
| 1         | Body            | ASTM A105        | ASTM A350-LF2/LF3 | ASTM A182-304/316   |
| 2         | Bonnet          | ASTM A105        | ASTM A350-LF2/LF3 | ASTM A182-304/316   |
| 3         | Nut             | ASTM A194-2H/2HM | ASTM A194 4       | ASTM A194-2HM/8     |
| 4         | Bolt            | ASTM A193-B7/B7M | ASTM A320 L7      | ASTM A193-B7M/B8    |
| 5         | O-ring          | VITON            | VITON             | VITON               |
| 6         | Spring          | INCONELX-750     | INCONELX-750      | INCONELX-750        |
| 7         | Seat ring       | ASTM A105        | ASTM A350-LF2/LF3 | ASTM A182-F304/F316 |
| 8         | Seat insert     | RPTFE            | RPTFE             | RPTFE               |
| 9         | O-ring          | VITON            | VITON             | VITON               |
| 10        | Ball            | ASTM A105        | ASTM A350-LF2/LF3 | ASTM A182-F304/F316 |
| 11        | Stem bearing    | 304+PTFE         | 304+PTFE          | 304+PTFE            |
| 14        | Spring          | ASTM A276-316    | ASTM A276-316     | ASTM A276-316       |
| 16        | Lower stem      | ASTM A105        | ASTM A350-LF2/LF3 | ASTM A182-F304/F316 |
| 17        | O-ring          | VITON            | VITON             | VITON               |
| 18        | Gasket          | 304+Graphite     | 304+Graphite      | 304+Graphite        |
| 20        | Screw           | ASTM A193-B7/B7M | ASTM A320 L7      | ASTM A193-B7M/B8    |
| 22        | Upper stem      | ASTM A182-F6a    | ASTM A350-LF2/LF3 | ASTM A182-F304/F316 |
| 23        | Ball bearing    | 304+PTFE         | 304+PTFE          | 304+PTFE            |
| 24        | Axial bearing   | 304+PTFE         | 304+PTFE          | 304+PTFE            |
| 26        | O-ring          | VITON            | VITON             | VITON               |
| 30        | Packing         | Graphite         | Graphite          | Graphite            |
| 35        | Gear box        | Cast iron        | Cast iron         | Cast iron           |
| 36        | Key             | ANSI 1045        | ASTM A182-F304    | ASTM A182-F304/F316 |
| 37        | Screw           | ASTM A193-B7/B7M | ASTM A320 L7      | ASTM A193-B7M/B8    |
| 38        | Nut             | ASTM A194-2H/2HM | ASTM A194 4       | ASTM A194-2HM/8     |
| 39        | Spring gasket   | 65Mn             | 65Mn              | 65Mn                |
| 40        | Injection valve | Carbon steel     | Carbon steel      | Stainless steel     |
| 45        | Screw           | ASTM A193-B7/B7M | ASTM A320 L7      | ASTM A193-B7M/B8    |
| 49        | O-ring          | VITON            | VITON             | VITON               |
| 51        | Flange adapter  | ASTM A105        | ASTM A182-F304    | ASTM A182-F304/F316 |
| 52        | Gasket          | 304+Graphite     | 304+Graphite      | 304+Graphite        |
| 53        | Pin             | Carbon steel     | Carbon steel      | Stainless steel     |
| 54        | O-ring          | VITON            | VITON             | VITON               |
| 57        | Gland           | ASTM A105        | ASTM A182-F304    | ASTM A182-F304/F316 |
| 58        | Drain Valve     | Carbon steel     | Carbon steel      | Stainless steel     |

● **Forged Trunnion Mounted Ball Valve**

6" ~ 16" Class1500、DN150~400 PN25.0



● **Class1500 Dimention & Weight**

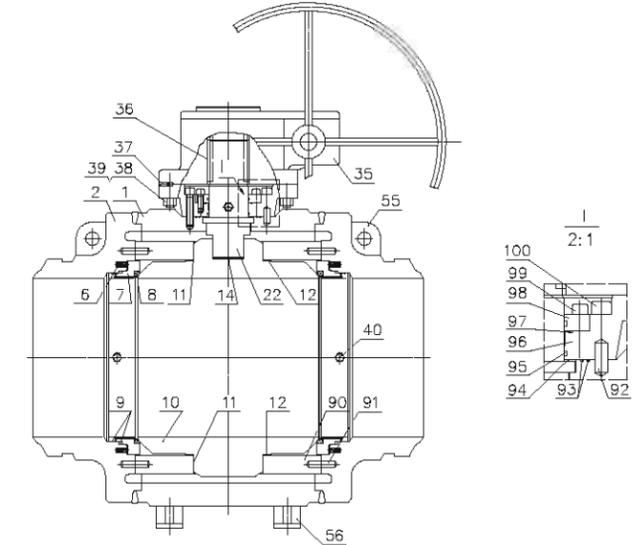
| Class  | NPS | Dimensions(inch) |       |                |                |      | Weight (kg) |
|--------|-----|------------------|-------|----------------|----------------|------|-------------|
|        |     | d                | L     | H <sub>1</sub> | H <sub>2</sub> | W    |             |
| 1500Lb | 6   | 5.75             | 27.75 | 14.98          | 9.85           | 31.5 | 592         |
|        | 8   | 7.625            | 32.75 | 19.29          | 13.78          | 31.5 | 935         |
|        | 10  | 9.5              | 39    | 20.07          | 14.96          | 31.5 | 1900        |
|        | 12  | 11.375           | 44.5  | 22.05          | 16.14          | 31.5 | 2285        |
|        | 14  | 12.5             | 49.5  | 25             | 16.69          | 31.5 | 3940        |
|        | 16  | 14.25            | 54.5  | 26.97          | 22.44          | 31.5 | 5430        |

● **PN10.0~PN25.0 Dimention & Weight**

| PN      | DN  | Dimensions(mm) |        |                |                |     | Weight (kg) |
|---------|-----|----------------|--------|----------------|----------------|-----|-------------|
|         |     | d              | L      | H <sub>1</sub> | H <sub>2</sub> | W   |             |
| 25.0MPa | 150 | 146            | 704.9  | 380            | 250            | 800 | 592         |
|         | 200 | 194            | 831.9  | 490            | 350            | 800 | 935         |
|         | 250 | 241            | 990.6  | 510            | 380            | 800 | 1900        |
|         | 300 | 289            | 1130.3 | 580            | 410            | 800 | 2285        |
|         | 350 | 317.5          | 1257.3 | 635            | 500            | 800 | 3940        |
|         | 400 | 362            | 1384.3 | 885            | 570            | 800 | 5430        |

● **Full Weld Ball Valve**

6" ~ 40" Class150 ~ 1500、DN150 ~ 1000 PN2.0 ~ 25.0



● **Technical Specification**

Temp. & pressure: ASME B16.34

Wall thickness: ASME B16.34

Bore dimension: API 6D

Face to face: ASME B16.10、API 6D

Flanges dimensions: ASME B16.25

Test & inspection: API 6D、BS5146

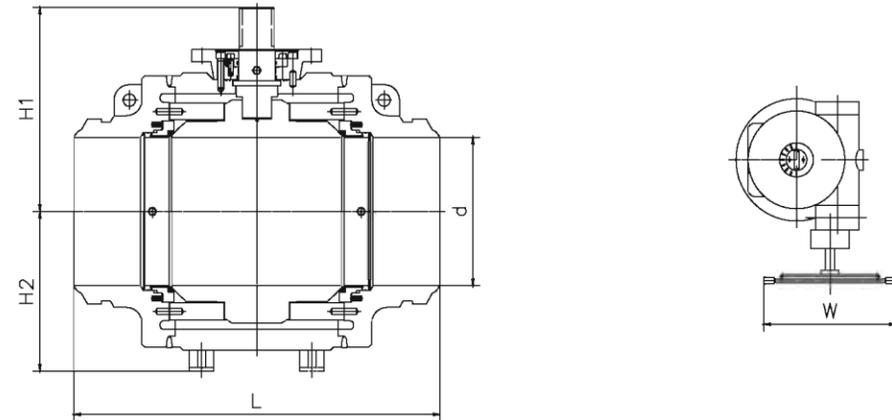
Body material: A105、LF2、LF3、F304、F316、F304L、F316L

● **Form of Major Part Material**

| Parts No. | Parts Name     | Materials        |  | Parts No. | Parts Name        | Materials        |  |
|-----------|----------------|------------------|--|-----------|-------------------|------------------|--|
|           |                | Carbon Steel     |  |           |                   | Carbon Steel     |  |
| 1         | Body           | ASTM A105        |  | 40        | Injection valve   | Carbon steel     |  |
| 2         | Bonnet         | ASTM A105        |  | 55        | Stationary plante | Carbon steel     |  |
| 6         | Spring         | INCONELX-750     |  | 56        | Support           | Carbon steel     |  |
| 7         | Seat ring      | ASTM A105        |  | 56        | Drain/Vent valve  | Carbon steel     |  |
| 8         | Seat insert    | RPTFE/VITON      |  | 90        | Trunnion          | ASTM A105        |  |
| 9         | O-ring         | VITON            |  | 91        | Parallel pin      | ANSI 1025        |  |
| 10        | Ball           | ASTM A105        |  | 92        | Pin               | ANSI 1025        |  |
| 11        | Radial bearing | 304+PTFE         |  | 93        | O-ring            | VITON            |  |
| 12        | Thust washer   | 304+PTFE         |  | 94        | Stem washer       | 304+PTFE         |  |
| 14        | Spring         | ASTM A278-316    |  | 95        | O-ring            | VITON            |  |
| 22        | Upper stem     | ASTM A182-F6a    |  | 96        | Gland             | ASTM A105        |  |
| 35        | Gear box       | Cast iron        |  | 97        | O-ring            | VITON            |  |
| 36        | Key            | ANSI 1045        |  | 98        | Backup ring       | ASTM A105        |  |
| 37        | Screw          | ASTM A193-B7/B7M |  | 99        | Screw             | ASTM A193-B7/B7M |  |
| 38        | Bolt           | ASTM A193-B7/B7M |  | 100       | Screw             | ASTM A193-B7/B7M |  |
| 39        | Hexagon nut    | ASTM A194-2H/2HM |  |           |                   |                  |  |

● Full Weld Ball Valve

6" ~ 40" Class150 ~ 600, DN150 ~ 800 PN2.0 ~ 10.0



● Class150~900 Dimention & Weight

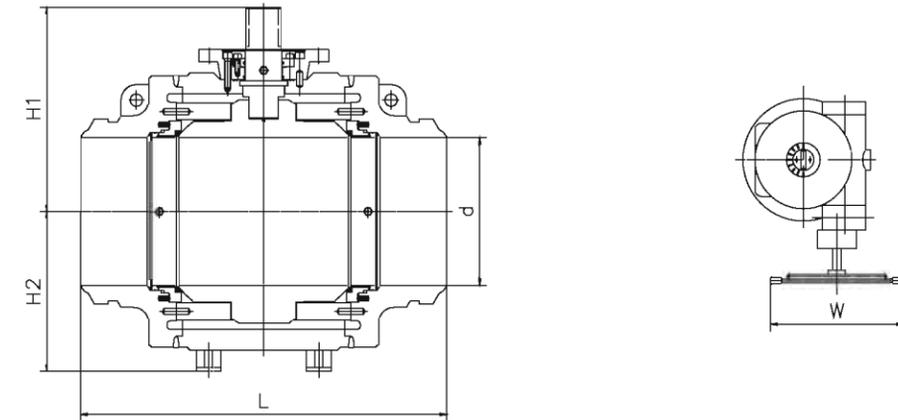
| Class          | NPS   | Dimensions(Inch) |       |                |                |      | Weight (kg) |
|----------------|-------|------------------|-------|----------------|----------------|------|-------------|
|                |       | d                | L     | H <sub>1</sub> | H <sub>2</sub> | W    |             |
| 150Lb<br>300Lb | 6     | 6                | 18    | 11.93          | 7.28           | 18.1 | 185         |
|                | 8     | 8                | 20.5  | 13.47          | 8.9            | 18.1 | 276         |
|                | 10    | 10               | 22    | 14.9           | 10.7           | 27.8 | 385         |
|                | 12    | 12               | 25    | 16.44          | 12.25          | 27.8 | 535         |
|                | 14    | 13.25            | 30    | 17.9           | 13.7           | 27.8 | 735         |
|                | 16    | 15.25            | 33    | 21.95          | 16.4           | 31.5 | 1585        |
|                | 18    | 17.25            | 36    | 23.54          | 17.83          | 31.5 | 2340        |
|                | 20    | 19.25            | 39    | 24.8           | 18.86          | 31.5 | 2520        |
|                | 24    | 23.25            | 45    | 27.79          | 23.11          | 31.5 | 3985        |
|                | 26    | 25               | 49    | 30.59          | 23.63          | 31.5 | 4800        |
|                | 28    | 27               | 53    | 31.49          | 25.59          | 31.5 | 5760        |
|                | 30    | 29               | 55    | 33.85          | 27.24          | 31.5 | 6715        |
| 32             | 30.75 | 60               | 35.75 | 28.98          | 31.5           | 8120 |             |
| 600Lb          | 6     | 6                | 22    | 12.17          | 9.65           | 18.1 | 230         |
|                | 8     | 8                | 26    | 14.1           | 11.81          | 27.8 | 445         |
|                | 10    | 10               | 31    | 16.1           | 13.38          | 27.8 | 658         |
|                | 12    | 12               | 33    | 18.68          | 15.35          | 31.5 | 952         |
|                | 14    | 13.25            | 35    | 19.75          | 16.85          | 31.5 | 1330        |
|                | 16    | 15.25            | 39    | 20.96          | 18.70          | 31.5 | 2040        |
|                | 18    | 17.25            | 43    | 25.04          | 21.45          | 31.5 | 2890        |
|                | 20    | 19.25            | 47    | 26.75          | 22.44          | 31.5 | 3350        |
| 22             | 21.25 | 51               | 28.56 | 24.72          | 31.5           | 4165 |             |
| 24             | 23.25 | 55               | 30.12 | 27.56          | 31.5           | 5650 |             |

● PN2.0~10.0 Dimention & Weight

| PN               | DN  | Dimensions(mm) |        |                |                |     | Weight (kg) |
|------------------|-----|----------------|--------|----------------|----------------|-----|-------------|
|                  |     | d              | L      | H <sub>1</sub> | H <sub>2</sub> | W   |             |
| 2.0MPa<br>5.0MPa | 150 | 152            | 457    | 303            | 185            | 460 | 185         |
|                  | 200 | 203            | 521    | 342            | 226            | 460 | 276         |
|                  | 250 | 254            | 559    | 378.5          | 272            | 705 | 385         |
|                  | 300 | 305            | 635    | 418            | 311            | 705 | 535         |
|                  | 350 | 337            | 762    | 455            | 348            | 705 | 735         |
|                  | 400 | 387            | 838    | 558            | 417            | 800 | 1585        |
|                  | 450 | 438            | 914    | 598            | 453            | 800 | 2340        |
|                  | 500 | 489            | 991    | 630            | 479            | 800 | 2520        |
|                  | 600 | 591            | 1143   | 705            | 587            | 800 | 3985        |
|                  | 650 | 635            | 1245   | 777            | 600            | 800 | 4800        |
|                  | 700 | 686            | 1346   | 800            | 650            | 800 | 5760        |
|                  | 750 | 737            | 1397   | 860            | 692            | 800 | 6715        |
| 10.0 MPa         | 150 | 152            | 558.8  | 309            | 245            | 460 | 230         |
|                  | 200 | 203            | 660.4  | 358            | 300            | 705 | 445         |
|                  | 250 | 254            | 787.4  | 409            | 340            | 705 | 658         |
|                  | 300 | 305            | 838.2  | 474.4          | 390            | 800 | 952         |
|                  | 350 | 337            | 889    | 502            | 428            | 800 | 1330        |
|                  | 400 | 387            | 990.6  | 532.3          | 475            | 800 | 2040        |
|                  | 450 | 438            | 1092.2 | 636            | 545            | 800 | 2890        |
|                  | 500 | 489            | 1193.8 | 674.8          | 570            | 800 | 3350        |
|                  | 550 | 540            | 1295.4 | 725            | 628            | 800 | 4165        |
|                  | 600 | 591            | 1397   | 765            | 700            | 800 | 5650        |

● Full Weld Ball Valve

6" ~ 24" Class900 ~ 1500, DN150 ~ 600 PN15.0 ~ 25.0



● Class900~1500 Dimention & Weight

| Class           | NPS    | Dimensions(Inch) |       |                |                |      | Weight (kg) |
|-----------------|--------|------------------|-------|----------------|----------------|------|-------------|
|                 |        | d                | L     | H <sub>1</sub> | H <sub>2</sub> | W    |             |
| 900Lb<br>1500Lb | 6      | 6                | 24    | 12             | 11.81          | 27.8 | 330         |
|                 | 8      | 8                | 29    | 15.6           | 15.74          | 31.5 | 595         |
|                 | 10     | 10               | 33    | 16.93          | 16.93          | 31.5 | 935         |
|                 | 12     | 12               | 38    | 18.3           | 17.91          | 31.5 | 1485        |
|                 | 14     | 12.75            | 40.5  | 21.45          | 21.45          | 31.5 | 1955        |
|                 | 16     | 14.75            | 44.5  | 24.21          | 24.21          | 31.5 | 2975        |
|                 | 18     | 16.75            | 48    | 26.97          | 25.39          | 31.5 | 4010        |
|                 | 20     | 18.625           | 52    | 29.52          | 26.97          | 31.5 | 4710        |
|                 | 24     | 22.5             | 61    | 35.23          | 30.51          | 31.5 | 8285        |
|                 | 6      | 5.75             | 27.75 | 14.96          | 11.81          | 31.5 | 503         |
|                 | 8      | 7.625            | 32.75 | 19.29          | 15.75          | 31.5 | 795         |
|                 | 10     | 9.5              | 39    | 20.07          | 16.93          | 31.5 | 1615        |
| 12              | 11.375 | 44.5             | 22.05 | 18.11          | 31.5           | 1945 |             |
| 14              | 12.5   | 49.5             | 25    | 21.65          | 31.5           | 3350 |             |
| 16              | 14.25  | 54.5             | 26.97 | 24.40          | 31.5           | 4615 |             |

● PN2.0~10.0 Dimention & Weight

| PN       | DN       | Dimensions(mm) |        |                |                |     | Weight (kg) |      |
|----------|----------|----------------|--------|----------------|----------------|-----|-------------|------|
|          |          | d              | L      | H <sub>1</sub> | H <sub>2</sub> | W   |             |      |
| 15.0 MPa | 150      | 152            | 609.6  | 305            | 300            | 705 | 330         |      |
|          | 200      | 203            | 736.6  | 395            | 400            | 800 | 595         |      |
|          | 250      | 254            | 838.2  | 430            | 430            | 800 | 935         |      |
|          | 300      | 305            | 965.2  | 465            | 455            | 800 | 1485        |      |
|          | 350      | 324            | 1028.7 | 545            | 545            | 800 | 1955        |      |
|          | 400      | 375            | 1130.3 | 615            | 615            | 800 | 2975        |      |
|          | 450      | 425.5          | 1219.2 | 685            | 645            | 800 | 4010        |      |
|          | 500      | 473            | 1320.8 | 750            | 685            | 800 | 4710        |      |
|          | 600      | 571.5          | 1549.4 | 895            | 775            | 800 | 8285        |      |
|          | 25.0 MPa | 150            | 146    | 704.9          | 380            | 300 | 800         | 503  |
|          |          | 200            | 194    | 831.9          | 490            | 400 | 800         | 795  |
|          |          | 250            | 241    | 990.6          | 510            | 430 | 800         | 1615 |
| 300      |          | 289            | 1130.3 | 560            | 460            | 800 | 1945        |      |
| 350      |          | 317.5          | 1257.3 | 635            | 550            | 800 | 3350        |      |
| 400      |          | 362            | 1384.3 | 685            | 620            | 800 | 4615        |      |

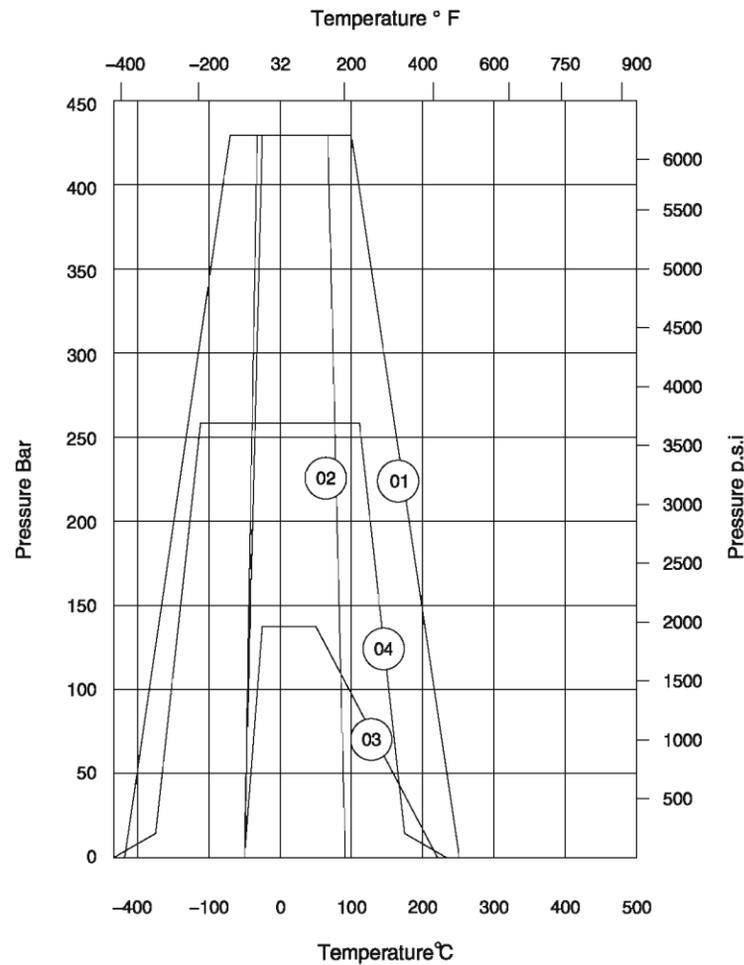
**● Pressure-temperature Rating**

The pressure-temperature ratings of ball valves are determined, not only by valve shell materials, but more essentially by sealing materials, used for ball seats, gland packing and gaskets. Sealing materials may be high molecule, asbestos, or rubber, but the choice is limited by the characteristics of the service fluid, working temperatures, working pressures, velocity of fluid, and operational frequency of valves.

As it is very difficult to predetermine the exact pressure-temperature rating for all kinds of fluid under all imaginable conditions. We have prepared general rating charts for nonshock fluid service here, base on our past experiences both in the field and in our laboratory.

In case of extraordinary service conditions as mentioned blow, conta

**● Seat Materil Pressure-temperature Limits**



- 01 Peek
- 02 Delrin
- 03 PTFE+15% Fiberglass
- 03 KEL-F

**● Technical Specification**

Design and Manufacture: Cast steel gate valve to API 600 (ISO 10434) or API 6D; Cast stainless steel gate valve to API 600; Forged steel gate valve to API 602.

Inspection and Test: API 598, API 600 or API 6D.

End flange dimension: ASME B16.5 (for NPS ≤ 24), ASME B16.47 series B, API 605 or ASME B16.47 series A, MSS SP-44 (for NPS > 24).

BW end dimension: ASME B16.25.

Socket-weld dimension: ASME B16.11.

Face to face and end to end: ASME B16.10.

Pressure-temperature ratings: ASME B16.34.

**● Design of Disc**

Gate Valves with NPS ≥ 2 are of wedge flexible gate; Gate valves with NPS < 2 are of wedge solid gate.

**● Body and Bonnet Connection**

The body and bonnet of Class 150 ~ Class 900 gate valves are usually connected with studs and nuts. And the body and bonnet of Class 1500 ~ Class 2500 gate valves are usually of pressurized seal design.

**● Gasket of Cover Flange**

Carbon steel or stainless steel + flexible graphite combined gasket is used for Class 150 gate valve; Stainless steel + flexible graphite wounded gasket is used for Class 300 gate valve; Stainless steel + flexible graphite wounded gasket is used for Class 600 gate valve, and ring joint gasket is also optional for Class 600 gate valve; Ring Joint gasket is used for Class 900 gate valve; Pressurized seal design is used for Class 1500 ~ Class 2500 gate valve.

**● Actuation**

Hand wheel or gear box is usually used for gate valve actuation. Chain wheel and electric actuator can be also used for gate valve actuation if being requested by the customers.

**● Packing Seal**

Molded flexible graphite is used for packing material. PTFE or combined packing material can be also used if being requested by the customer. The internal surface of the stuffing box, of which area is contacted with the packing, is of excellent finish (Ra 3.2 μm). The stem surface, contacting with the packing, should be rolled and pressed after being precisely machined, so as to reach to the high finish and compactness (Ra 0.8 μm) and ensure the reliable tightness of the stem area.

**● Belleville Spring Loaded Packing Impacting System**

If being requested by the customer, the Belleville spring loaded packing impacting system can be adopted for enhancing the durability and reliability of the packing seal.

**Back Seating Design**

All our gate valves have the back seating design. In most cases, the carbon steel gate valve is fitted with a renewable back seat. For stainless steel gate valve, the back seat is machined directly in the bonnet or is machined after welding. When the gate valve is at fully open position, the sealing of the back seat can be very reliable. However, as per the requirement of API 600, it is not advisable to add or change packing by the mean of back seating when the valve is pressure containing.

**Seat**

For carbon steel gate valve, the seat is usually forged steel. The sealing surface of the seat is spray welded with hard alloy specified by the customer. Renewable threaded seat is used for NPS ≤ 10 gate valves, and welded on seat can be also optional if being requested by the customer. Welded on seat is used for NPS ≤ 10 carbon steel gate valves. For Stainless steel gate valve, integral seat is usually adopted, or to weld hard alloy directly integrally. Threaded or welded on seat is also optional for stainless steel gate valve if being requested by the customer.

**Stem Design**

The stem is of integral forged design. The minimum diameter of the stem shall per the standard requirement. The connection of the stem and disc is T type. The strength of the connecting area is bigger than that of the T threaded part of the stem. The strength test of that area conforms to API 591.

**Stem Nut**

Usually, the stem nut is made of ASTM A439 D2. It is also can be made of copper ally if being requested by the customer. For large sized gate valves (NPS 10 for Class 150, NPS 6 for Class 300, NPS 6 for Class 600, NPS 5 for Class 900), rolling bearing is fitted at the two sides of the stem nut in order to minimize the open and close torque of the gate valve.

**Special Gate Valve**

Besides the common gate valves, Our Company also makes cryogenic gate valve, Jacketed Gate Valve, Bellow Sealed Gate Valve, EXTension Stem Gate Valve for underground application, Flat Gate Valve, etc.



Flat Gate Valve



Cryogenic Gate Valve



Bellow Sealed Gate Valve



Extension Stem Gate Valve for Underground Application

**Technical Specification**

Design and Manufacture: API 600 (ISO 10434) or API 6D

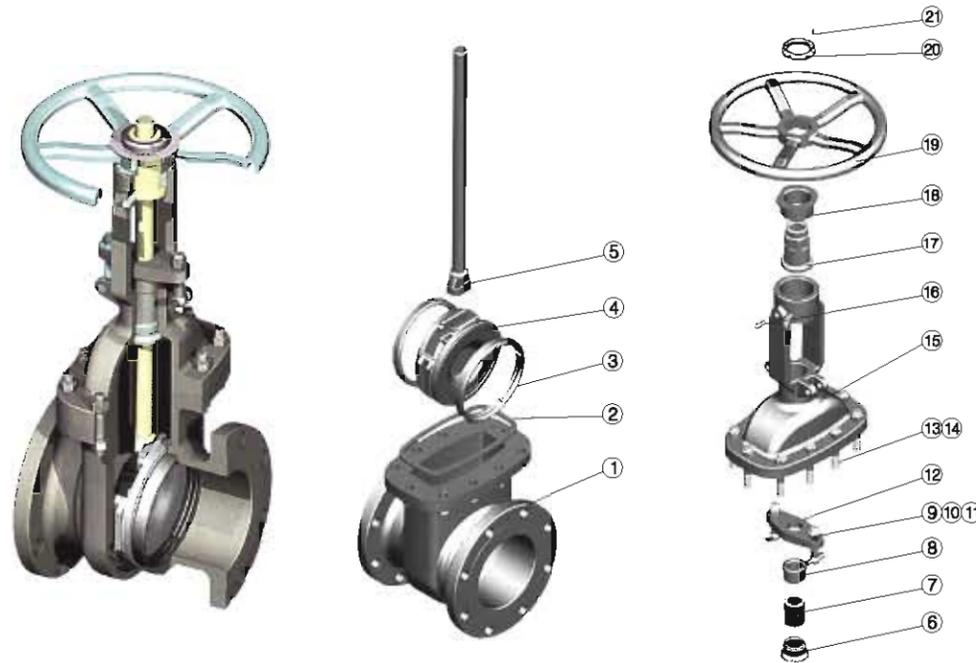
Inspection and Test: API 596, API 600 or API 6D

End flange dimension: ASME B16.5 (for NPS ≤ 24), ASME B16.47 series B, API 605 or ASME B16.47 series A, MSS SP-44 (for NPS > 24)

BW end dimension: ASME B16.25

Face to face and end to end: ASME B16.10

Pressure-temperature ratings: ASME B16.34

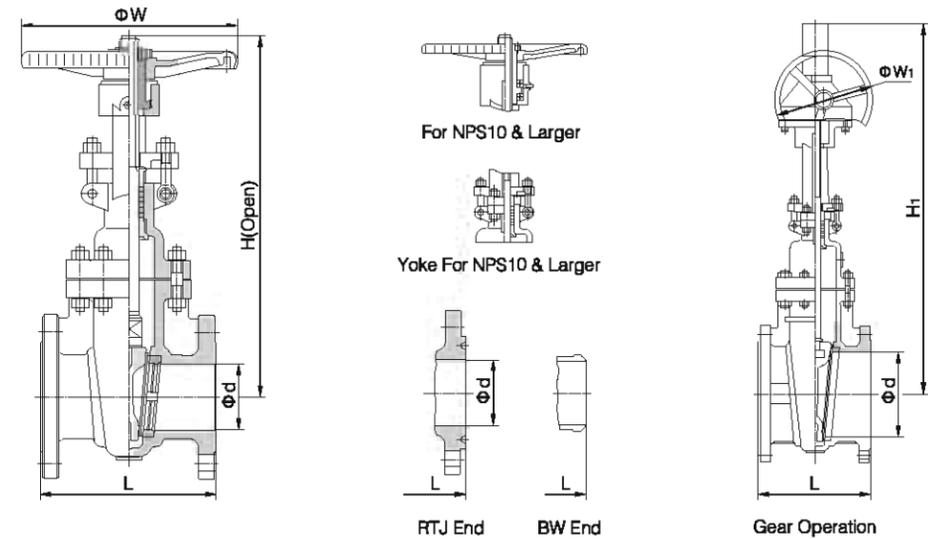


Form of Major Part Material

| Parts No. | Parts Name       | Materials                              |                     |                      |                |                |
|-----------|------------------|--|---------------------|----------------------|----------------|----------------|
|           |                  | WCB/Trim 1                             | WCB/Trim 5          | WCB/Trim 8           | CF8/304        | CF8M/316       |
| 1         | Body             | ASTM A216 WCB                          | ASTM A216 WCB       | ASTM A216 WCB        | ASTM A351 CF8  | ASTM A351 CF8M |
| 2         | Gasket           | Soft Iron + Graphite or 304 + Graphite |                     |                      | 304 + Graphite | 316 + Graphite |
| 3         | Seat ring        | A105 + 13Cr                            | A105 + STL          | A105 + STL           | ASTM A351 CF8  | ASTM A351 CF8M |
| 4         | Gate             | ASTM A216 WCB + 13Cr                   | ASTM A216 WCB + STL | ASTM A216 WCB + 13Cr | ASTM A351 CF8  | ASTM A351 CF8M |
| 5         | Stem             | ASTM A182 F6a                          | ASTM A182 F6a       | ASTM A182 F6a        | ASTM A182 F304 | ASTM A182 F316 |
| 6         | Backseat bushing | ASTM A182 F6a                          | ASTM A182 F6a       | ASTM A182 F6a        | ASTM A351 CF8  | ASTM A351 CF8M |
| 7         | Packing          | Graphite                               | Graphite            | Graphite             | Graphite       | Graphite       |
| 8         | Gland            | ASTM A182 F6a                          | ASTM A182 F6a       | ASTM A182 F6a        | ASTM A182 F304 | ASTM A182 F316 |
| 9         | Gland eyebolt    | ASTM A193 B7                           | ASTM A193 B7        | ASTM A193 B7         | ASTM A193 B8   | ASTM A193 B8M  |
| 10        | Eyebolt nut      | ASTM A194 2H                           | ASTM A194 2H        | ASTM A194 2H         | ASTM A194 8    | ASTM A194 8M   |
| 11        | Eyebolt pin      | ASTM A36                               | ASTM A36            | ASTM A36             | 304ss          | 316ss          |
| 12        | Gland flange     | ASTM A216 WCB                          | ASTM A216 WCB       | ASTM A216 WCB        | ASTM A351 CF8  | ASTM A351 CF8M |
| 13        | Bonnet bolt      | ASTM A193 B7                           | ASTM A193 B7        | ASTM A193 B7         | ASTM A193 B8   | ASTM A193 B8M  |
| 14        | Bonnet nut       | ASTM A194 2H                           | ASTM A194 2H        | ASTM A194 2H         | ASTM A194 8    | ASTM A194 8M   |
| 15        | Bonnet           | ASTM A216 WCB                          | ASTM A216 WCB       | ASTM A218 WCB        | ASTM A351 CF8  | ASTM A351 CF8M |
| 16        | Nipple           | Carbon steel                           | Carbon steel        | Carbon steel         | Carbon steel   | Carbon steel   |
| 17        | Stem nut         | ASTM A439 D2                           | ASTM A439 D2        | ASTM A439 D2         | ASTM A439 D2   | ASTM A439 D2   |
| 18        | Yoke sleeve nut  | Carbon steel                           | Carbon steel        | Carbon steel         | Carbon steel   | Carbon steel   |
| 19        | Hand wheel       | Ductile Iron                           | Ductile Iron        | Ductile Iron         | Ductile Iron   | Ductile Iron   |
| 20        | Hand wheel nut   | Carbon steel                           | Carbon steel        | Carbon steel         | Carbon steel   | Carbon steel   |
| 21        | Set screw        | ASTM A193 B7                           | ASTM A193 B7        | ASTM A193 B7         | ASTM A193 B7   | ASTM A193 B7   |

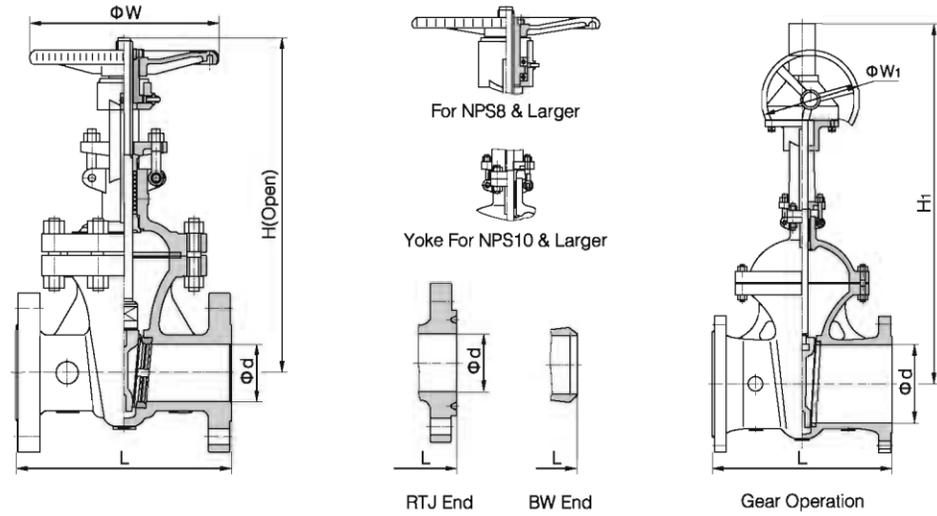
Note: The chart above only lists out some common composition of steel gate valve parts. We may provide other different parts material composition according to the customer's request or the actual valve working condition.

Class150 Cast Steel Gate Valve

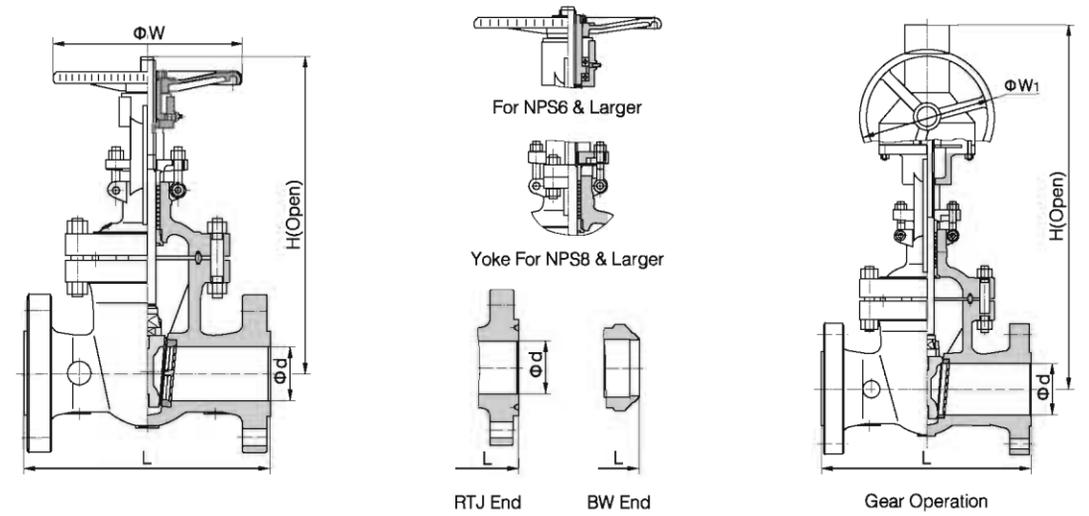


| Class    | Size  |     | Dimensions(mm) |      |     |     |      |      |     |     | Weight(kg) |      |
|----------|-------|-----|----------------|------|-----|-----|------|------|-----|-----|------------|------|
|          | NPS   | DN  | L              |      |     | d   | H    | H1   | W   | W1  | H.W        | G.O  |
|          |       |     | RF             | RTJ  | BW  |     |      |      |     |     |            |      |
| Class150 | 1/2   | 15  | 108            | 119  | 108 | 14  | 195  | -    | 120 | -   | 4          | -    |
|          | 3/4   | 20  | 117            | 130  | 117 | 19  | 210  | -    | 120 | -   | 5          | -    |
|          | 1     | 25  | 127            | 140  | 127 | 25  | 240  | -    | 140 | -   | 7          | -    |
|          | 1 1/4 | 32  | 140            | 153  | 140 | 32  | 300  | -    | 180 | -   | 10         | -    |
|          | 1 1/2 | 40  | 165            | 178  | 165 | 38  | 395  | -    | 200 | -   | 14         | -    |
|          | 2     | 50  | 178            | 191  | 216 | 51  | 400  | -    | 200 | -   | 19         | -    |
|          | 2 1/2 | 65  | 191            | 203  | 241 | 64  | 435  | -    | 200 | -   | 25         | -    |
|          | 3     | 80  | 203            | 216  | 283 | 76  | 515  | -    | 250 | -   | 33         | -    |
|          | 4     | 100 | 229            | 241  | 305 | 102 | 595  | -    | 280 | -   | 49         | -    |
|          | 5     | 125 | 254            | 267  | 381 | 127 | 725  | -    | 280 | -   | 62         | -    |
|          | 6     | 150 | 267            | 279  | 403 | 152 | 780  | 820  | 300 | 310 | 77         | 104  |
|          | 8     | 200 | 292            | 305  | 419 | 203 | 975  | 1020 | 350 | 310 | 123        | 150  |
|          | 10    | 250 | 330            | 343  | 457 | 254 | 1150 | 1200 | 400 | 310 | 188        | 215  |
|          | 12    | 300 | 356            | 368  | 502 | 305 | 1380 | 1430 | 450 | 310 | 288        | 315  |
|          | 14    | 350 | 381            | 394  | 572 | 337 | 1545 | 1580 | 500 | 310 | 385        | 435  |
|          | 18    | 400 | 406            | 419  | 610 | 387 | 1733 | 1780 | 500 | 460 | 500        | 552  |
|          | 18    | 450 | 432            | 445  | 680 | 438 | 1915 | 1990 | 500 | 460 | 801        | 653  |
|          | 20    | 500 | 457            | 470  | 711 | 489 | 2122 | 2220 | 600 | 460 | 764        | 816  |
|          | 24    | 600 | 508            | 521  | 813 | 591 | 2520 | 2600 | 600 | 460 | 1007       | 1185 |
|          | 26    | 650 | 559            | -    | 864 | 633 | -    | 2800 | -   | 600 | -          | 1550 |
|          | 28    | 700 | 610            | -    | 914 | 684 | -    | 3050 | -   | 600 | -          | 1880 |
| 30       | 750   | 610 | -              | 914  | 735 | -   | 3130 | -    | 600 | -   | 2300       |      |
| 32       | 800   | 711 | -              | 965  | 779 | -   | 3280 | -    | 600 | -   | 2550       |      |
| 34       | 650   | 762 | -              | 1016 | 830 | -   | 3500 | -    | 600 | -   | 2950       |      |
| 36       | 900   | 711 | -              | 1016 | 874 | -   | 3720 | -    | 600 | -   | 3390       |      |

● Class300 Cast Steel Gate Valve



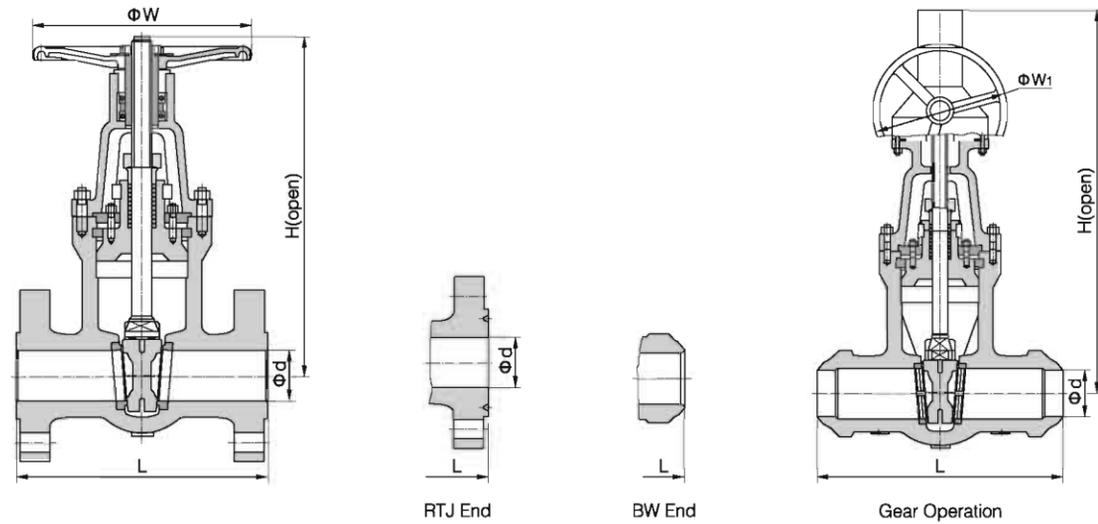
● Class600 & Class900 Cast Steel Gate Valve



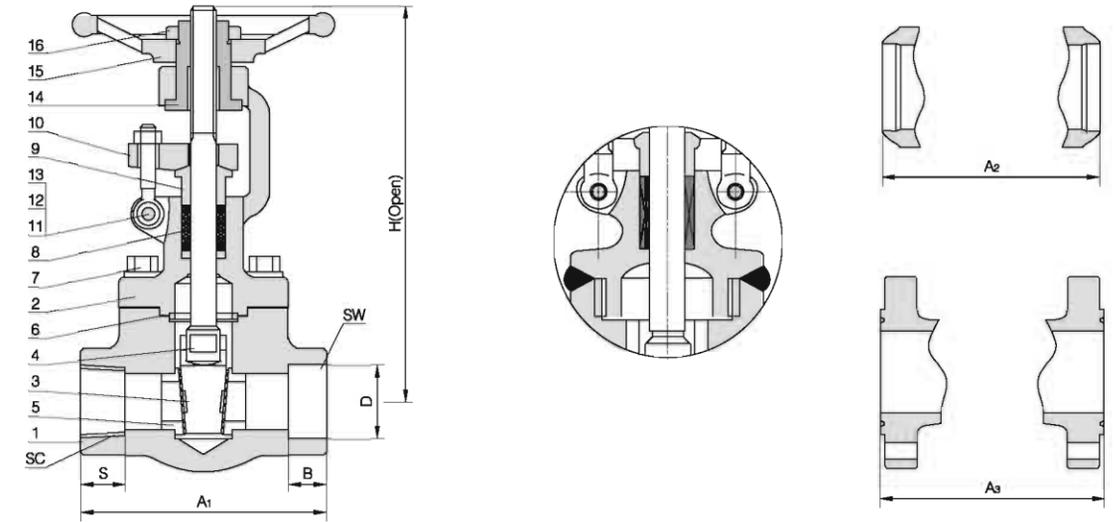
| Class    | Size  |      | Dimensions(mm) |      |     |      |      |                |     |                | Weight(kg) |      |
|----------|-------|------|----------------|------|-----|------|------|----------------|-----|----------------|------------|------|
|          | NPS   | DN   | L              |      |     | d    | H    | H <sub>1</sub> | W   | W <sub>1</sub> | H.W        | G.O  |
|          |       |      | RF             | RTJ  | BW  |      |      |                |     |                |            |      |
| Class300 | 1/2   | 15   | 140            | 151  | 140 | 14   | 198  | -              | 120 | -              | 6          | -    |
|          | 3/4   | 20   | 152            | 165  | 152 | 19   | 215  | -              | 140 | -              | 7          | -    |
|          | 1     | 25   | 165            | 178  | 165 | 25   | 245  | -              | 160 | -              | 10         | -    |
|          | 1 1/4 | 32   | 178            | 191  | 178 | 32   | 306  | -              | 180 | -              | 15         | -    |
|          | 1 1/2 | 40   | 190            | 203  | 190 | 38   | 400  | -              | 200 | -              | 21         | -    |
|          | 2     | 50   | 216            | 232  | 216 | 51   | 420  | -              | 200 | -              | 25         | -    |
|          | 2 1/2 | 65   | 241            | 257  | 241 | 64   | 446  | -              | 200 | -              | 30         | -    |
|          | 3     | 80   | 283            | 298  | 283 | 76   | 537  | -              | 250 | -              | 48         | -    |
|          | 4     | 100  | 305            | 321  | 305 | 102  | 619  | 650            | 280 | 310            | 73         | 100  |
|          | 5     | 125  | 381            | 397  | 381 | 127  | 722  | 750            | 300 | 310            | 99         | 126  |
|          | 6     | 150  | 403            | 419  | 403 | 152  | 806  | 835            | 350 | 310            | 130        | 186  |
|          | 8     | 200  | 419            | 435  | 419 | 203  | 1000 | 1030           | 400 | 310            | 208        | 235  |
|          | 10    | 250  | 457            | 473  | 457 | 254  | 1240 | 1280           | 450 | 310            | 334        | 386  |
|          | 12    | 300  | 502            | 518  | 502 | 305  | 1425 | 1460           | 500 | 310            | 450        | 502  |
|          | 14    | 350  | 762            | 778  | 762 | 337  | 1585 | 1620           | 600 | 460            | 704        | 756  |
|          | 16    | 400  | 838            | 854  | 838 | 387  | 1790 | 1830           | 500 | 460            | 923        | 965  |
|          | 18    | 450  | 914            | 930  | 914 | 438  | 1960 | 2000           | 650 | 460            | 1131       | 1224 |
|          | 20    | 500  | 991            | 1010 | 991 | 489  | 2158 | 2220           | 750 | 460            | 1345       | 1400 |
| 24       | 600   | 1143 | 1165           | 1143 | 591 | 2576 | 2620 | 900            | 600 | 2122           | 2385       |      |
| 26       | 650   | 1245 | 1270           | 1245 | 633 | -    | 2850 | -              | 600 | -              | 3000       |      |
| 28       | 700   | 1346 | 1372           | 1346 | 684 | -    | 3080 | -              | 600 | -              | 3300       |      |
| 30       | 750   | 1397 | 1422           | 1397 | 735 | -    | 3180 | -              | 600 | -              | 3550       |      |
| 32       | 800   | 1524 | 1553           | 1524 | 779 | -    | 3300 | -              | 600 | -              | 4400       |      |
| 34       | 850   | 1626 | 1654           | 1626 | 830 | -    | 3550 | -              | 600 | -              | 5200       |      |
| 36       | 900   | 1727 | 1756           | 1727 | 874 | -    | 3760 | -              | 600 | -              | 6050       |      |

| Class    | Size  |     | Dimensions(mm) |      |      |     |      |                |     |                | Weight(kg) |      |
|----------|-------|-----|----------------|------|------|-----|------|----------------|-----|----------------|------------|------|
|          | NPS   | DN  | L              |      |      | d   | H    | H <sub>1</sub> | W   | W <sub>1</sub> | H.W        | G.O  |
|          |       |     | RF             | RTJ  | BW   |     |      |                |     |                |            |      |
| Class600 | 2     | 50  | 292            | 295  | 292  | 51  | 444  | -              | 200 | -              | 32         | -    |
|          | 2 1/2 | 65  | 330            | 333  | 330  | 64  | 500  | -              | 250 | -              | 52         | -    |
|          | 3     | 80  | 356            | 359  | 356  | 76  | 558  | 585            | 280 | 310            | 60         | 87   |
|          | 4     | 100 | 432            | 435  | 432  | 102 | 665  | 695            | 300 | 310            | 107        | 134  |
|          | 5     | 125 | 508            | 511  | 508  | 127 | 760  | 790            | 350 | 310            | 175        | 227  |
|          | 6     | 150 | 559            | 562  | 559  | 152 | 868  | 900            | 450 | 310            | 216        | 268  |
|          | 8     | 200 | 660            | 664  | 660  | 203 | 1073 | 1110           | 500 | 310            | 399        | 451  |
|          | 10    | 250 | 787            | 791  | 787  | 254 | 1263 | 1300           | 650 | 460            | 605        | 657  |
|          | 12    | 300 | 838            | 841  | 838  | 305 | 1600 | 1650           | 700 | 460            | 851        | 893  |
|          | 14    | 350 | 889            | 892  | 889  | 337 | 1705 | 1750           | 900 | 460            | 1177       | 1232 |
|          | 16    | 400 | 991            | 994  | 991  | 387 | 1835 | 1900           | 900 | 460            | 1513       | 1568 |
|          | 18    | 450 | 1092           | 1095 | 1092 | 438 | -    | 2020           | -   | 600            | -          | 1980 |
| Class900 | 2     | 50  | 368            | 371  | 368  | 51  | 500  | -              | 280 | -              | 70         | -    |
|          | 2 1/2 | 65  | 419            | 422  | 419  | 64  | 550  | -              | 280 | -              | 110        | -    |
|          | 3     | 80  | 381            | 384  | 381  | 76  | 610  | 660            | 300 | 310            | 140        | 167  |
|          | 4     | 100 | 457            | 460  | 457  | 102 | 702  | 750            | 350 | 310            | 200        | 227  |
|          | 5     | 125 | 559            | 562  | 559  | 127 | 850  | 900            | 400 | 310            | 258        | 285  |
|          | 6     | 150 | 610            | 613  | 610  | 152 | 980  | 1060           | 500 | 460            | 358        | 410  |
|          | 8     | 200 | 737            | 740  | 737  | 203 | 1100 | 1140           | 650 | 460            | 550        | 600  |
|          | 10    | 250 | 838            | 841  | 838  | 254 | 1320 | 1370           | 700 | 460            | 1000       | 1100 |
|          | 12    | 300 | 965            | 968  | 965  | 305 | 1500 | 1560           | 900 | 460            | 1215       | 1310 |
|          | 14    | 350 | 1029           | 1038 | 1029 | 322 | 1900 | 1950           | 900 | 600            | 1600       | 1700 |
|          | 16    | 400 | 1130           | 1140 | 1130 | 373 | 2050 | 2100           | 900 | 600            | 2150       | 2330 |

● Class1500 & Class2500 Cast Steel Gate Valve



| Class      | Size  |      | Dimensions(mm) |      |      |      |      |                |     |                | Weight(kg) |      |
|------------|-------|------|----------------|------|------|------|------|----------------|-----|----------------|------------|------|
|            | NPS   | DN   | L              |      |      | d    | H    | H <sub>1</sub> | W   | W <sub>1</sub> | H.W        | G.O  |
|            |       |      | RF             | RTJ  | BW   |      |      |                |     |                |            |      |
| Class 1500 | 2     | 50   | 368            | 371  | 368  | 51   | 510  | -              | 280 | -              | 70         | -    |
|            | 2 1/2 | 65   | 419            | 422  | 419  | 64   | 560  | -              | 300 | -              | 110        | -    |
|            | 3     | 80   | 470            | 473  | 470  | 76   | 620  | 670            | 350 | 310            | 175        | 202  |
|            | 4     | 100  | 546            | 549  | 546  | 102  | 728  | 770            | 400 | 310            | 270        | 300  |
|            | 5     | 125  | 673            | 676  | 673  | 127  | 870  | 920            | 450 | 310            | 378        | 405  |
|            | 6     | 150  | 705            | 711  | 705  | 144  | 1000 | 1070           | 500 | 460            | 520        | 575  |
|            | 8     | 200  | 832            | 841  | 832  | 192  | 1130 | 1180           | 750 | 460            | 820        | 915  |
|            | 10    | 250  | 991            | 1000 | 991  | 239  | 1360 | 1410           | 900 | 600            | 1560       | 1750 |
| Class 2500 | 12    | 300  | 1130           | 1146 | 1130 | 287  | -    | 1620           | -   | 600            | -          | 2120 |
|            | 14    | 350  | 1257           | 1276 | 1257 | 315  | -    | 2020           | -   | 600            | -          | 2600 |
|            | 16    | 400  | 1384           | 1407 | 1384 | 360  | -    | 2180           | -   | 600            | -          | 3450 |
|            | 2     | 50   | 451            | 454  | 451  | 42   | 530  | 580            | 280 | 310            | 100        | 130  |
|            | 2 1/2 | 65   | 508            | 514  | 508  | 52   | 580  | 630            | 300 | 310            | 150        | 180  |
|            | 3     | 80   | 578            | 584  | 578  | 62   | 650  | 700            | 350 | 310            | 245        | 275  |
|            | 4     | 100  | 673            | 683  | 673  | 87   | 750  | 800            | 400 | 310            | 390        | 420  |
|            | 5     | 125  | 794            | 807  | 794  | 96   | 900  | 960            | 500 | 460            | 550        | 580  |
| 6          | 150   | 914  | 927            | 914  | 131  | 1040 | 1100 | 600            | 460 | 780            | 835        |      |
| 8          | 200   | 1022 | 1038           | 1022 | 179  | 1150 | 1200 | 750            | 460 | 1260           | 1355       |      |
| 10         | 250   | 1270 | 1292           | 1270 | 223  | 1400 | 1460 | 900            | 600 | 2380           | 2565       |      |
| 12         | 300   | 1422 | 1445           | 1422 | 265  | -    | 1660 | -              | 600 | -              | 3250       |      |



● Technical Specification

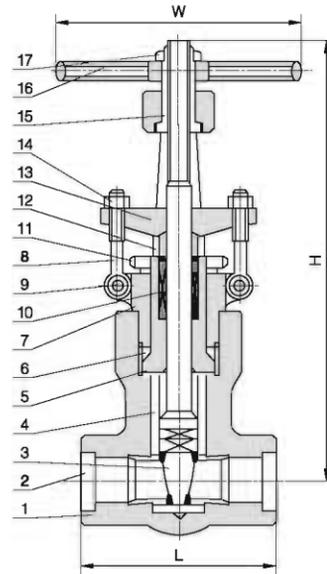
Steel Gate Valves, API 602  
 Steel Valves, ASME B16.34  
 Face to Face, Manufacturer Standard  
 Face to Face, Flanged, ASME B16.10  
 End Flanges, ASME B16.5  
 Buttwelding Ends, ASME B16.25  
 Socket-welding Ends, ASME B16.11  
 Screwed Ends, ASME B1.20.1  
 Inspection and Test, API 598

● Design Description

Outside Screw and Yoke (OS&Y)  
 Bolted Bonnet  
 Choice of WB, Welding Bonnet  
 Single Wedge, Fully Guided  
 Renewable Seat Rings  
 Yoke Integral with Bonnet  
 Rising Stem and Non-rising Handwheel  
 SW, Socket-welding Ends  
 SC, Screwed Ends  
 BW, Buttwelding Ends  
 Flanged Ends

● Form of Major Part Material

| No. | Part Name                           | ASTM Material  |                |                |                 |                 |                 |                 |                 |  |
|-----|-------------------------------------|----------------|----------------|----------------|-----------------|-----------------|-----------------|-----------------|-----------------|--|
|     |                                     | Carbon Steel   | 1.25Cr-0.5Mo   | 2.25Cr-1Mo     | 304 Type        | 316 Type        | 304L Type       | 316L Type       | 20 Alloy        |  |
| 1   | Body                                | A105           | A182 F11       | A182 F22       | A182 F304       | A182 F316       | A182 F304L      | A182 F316L      | 20-Alloy        |  |
| 2   | Bonnet                              | A105           | A182 F11       | A182 F22       | A182 F304       | A182 F316       | A182 F304L      | A182 F316L      | 20-Alloy        |  |
| 3   | Wedge                               | A105+13Cr *1   | A182 F11+HF    | A182 F22+HF    | A182 F304       | A182 F316       | A182 F304L      | A182 F316L      | 20-Alloy        |  |
| 4   | Stem                                | A182 F6a       | A182 F11       | A182 F22       | A182 F304       | A182 F316       | A182 F304L      | A182 F316L      | 20-Alloy        |  |
| 5   | Seat Ring                           | A105+13Cr *1   | A182 F11+HF    | A182 F22+HF    | NA              | NA              | NA              | NA              | Na              |  |
| 6   | Bonnet Gasket                       | 304+Graphit    | 304+Graphit    | 304+Graphit    | 304+Graphit     | 316+Graphit     | 304L+Graphit    | 316L+Graphit    | 316+Graphit     |  |
| 7   | Bonnet Bolt                         | A193 B7        | A193 B7        | A193 B16       | A193 B8         | A193 B8M        | A193 B8M        | A193 B8M        | A193 B8M        |  |
| 8   | Packing                             | Graphite       | Graphite       | Graphite       | Graphite *2     |  |
| 9   | Gland                               | A276 410       | A276 410       | A276 410       | A276 304        | A276 316        | A276 304L       | A276 316L       | 20-Alloy        |  |
| 10  | Gland Flange                        | A105           | A105           | A105           | A182 F304       | A182 F316       | A182 F304L      | A182 F316L      | 20-Alloy        |  |
| 11  | Eyebolt                             | Carbon Steel   | A193 B7        | A193 B7        | A193 B8         |  |
| 12  | Eyebolt Nut                         | Carbon Steel   | A194 2H        | A194 2H        | A194 8          |  |
| 13  | Eyebolt Pin                         | A276 410       | A276 410       | A276 412       | A276 304        |  |
| 14  | Stem Nut                            | Bronze         | Bronze *3      | Bronze *3      | Bronze          | Bronze          | Bronze          | Bronze          | Bronze          |  |
| 15  | Hand wheel                          | Malleable iron | Malleable iron | Malleable iron | Malleable iron  | Malleable iron  | Malleable iron  | Malleable iron  | Malleable iron  |  |
| 16  | Wheel Nut                           | Carbon Steel   | Carbon Steel   | Carbon Steel   | Carbon Steel+Zn |  |
| *1  | PN ≥ 600 Class seal face will be HF |                |                |                |                 |                 |                 |                 |                 |  |
| *2  | PTFE Optional                       |                |                |                |                 |                 |                 |                 |                 |  |
| *3  | Ductile Ni-Resist iron Optional     |                |                |                |                 |                 |                 |                 |                 |  |



**Technical Specification**

- Steel Gate Valves, API 602
- Steel Valves, ASME B16.34
- Face to Face, Manufacturer Standard
- Face to Face, Flanged, ASME B16.10
- End Flanges, ASME B16.5
- Buttwelding Ends, ASME B16.25
- Socket-welding Ends, ASME B16.11
- Screwed Ends, ASME B1.20.1
- Inspection and Test, API 598

**Design Description**

- Outside Screw and Yoke (OS&Y)
- Pressure Seal Bonnet
- Single Wedge, Fully Guided
- Renewable Seat Rings
- Rising stem and non-rising handwheel
- SW, Socket-welding Ends
- SC, Screwed Ends
- BW, Buttwelding Ends
- Flanged Ends

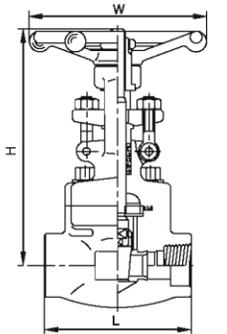
**Form of Major Part Material**

| No. | Part Name         | CS to ASTM        | AS to ASTM    | SS to ASTM       |                  |
|-----|-------------------|-------------------|---------------|------------------|------------------|
|     |                   | Type A 105N       | Type F22      | Type F304(L)     | Type F316(L)     |
| 1   | Body              | A105N             | A182 F22      | A182 F304(L)     | A182 F316(L)     |
| 2   | Seat Ring         | A276 420          | A276 304      | A276 304(L)      | A276 316(L)      |
| 3   | Wedge             | A182/F430+STL     | A182 F304+STL | A182 F304(L)+STL | A182 F316(L)+STL |
| 4   | Stem              | A182 F6a A276-410 | A182 F22      | A182 F304(L)     | A182 F316(L)     |
| 5   | From Seal Place   | A105N             | A182 F304     | A182 F304(L)     | F316(L)          |
| 6   | From Packing Ring | F182 F304         | A182 F304 F22 | A276 304(L)      | A276 316L        |
| 7   | Bonnet            | A105N             | A182 F22      | A182 F304(L)     | A182 F316(L)     |
| 8   | Gland Eyebolt     | A193 B7           | A193 B16      | A193 B8          | A193 B8M         |
| 9   | Cylindrical Pin   | A276 F420         | A276 F420     | A182 F304        | A182 F304        |
| 10  | Stem Packing      | Graphite+304      | Graphite+304  | Graphite+316     | Graphite+316     |
| 11  | Promotes the Nut  | A194 2H           | A194 4        | A194 8           | A194 8M          |
| 12  | Gland             | A276 F420         | A276 F420     | A182 F304        | A182 F304        |
| 13  | Gland Flange      | A105              | F22           | A182 F304        | A182 F304        |
| 14  | Gland Nut         | A194 2H           | A194 4        | A194 8           | A194 8M          |
| 15  | Yoke Nut          | A276-410          | A276-410      | A276 F410        | A276 F410        |
| 16  | Hand Wheel        | A197              | A197          | A197             | A197             |
| 17  | Lock Nut          | A194 2H           | A194 4        | A194 8           | A194 8M          |

**Class800 Main Outline Dimensions & Weight**

Bold fastening valve cover, outside screw stem & yoke (OS&Y)  
Designs according to API 602.

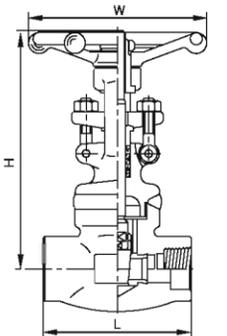
| R.P        | -   | 1/2  | 3/4  | 1    | 1 1/4 | 1 1/2 | 2     | 2 1/2 |
|------------|-----|------|------|------|-------|-------|-------|-------|
| F.P        | 1/4 | 3/8  | 1/2  | 3/4  | 1     | 1 1/4 | 1 1/2 | 2     |
| L          | 79  | 79   | 92   | 111  | 120   | 120   | 140   | 178   |
| W          | 100 | 100  | 100  | 125  | 160   | 160   | 180   | 200   |
| H          | 161 | 161  | 163  | 196  | 223   | 251   | 290   | 333   |
| d          | 8   | 10.5 | 13.5 | 18   | 24    | 29    | 36.5  | 45    |
| Weight(kg) | 2.3 | 2.22 | 2.39 | 4.24 | 5.7   | 7.05  | 10.9  | 16.8  |



**Class800 Main Outline Dimensions & Weight**

Weld joint valve cover, outside screw stem & yoke (OS&Y).  
Designs according to API 602.

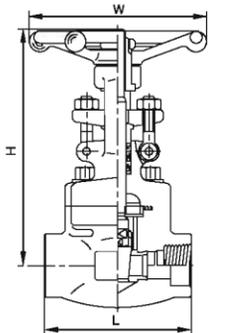
| R.P        | -   | 1/2  | 3/4  | 1   | 1 1/4 | 1 1/2 | 2     | 2 1/2 |
|------------|-----|------|------|-----|-------|-------|-------|-------|
| F.P        | 1/4 | 3/8  | 1/2  | 3/4 | 1     | 1 1/4 | 1 1/2 | 2     |
| L          | 79  | 79   | 92   | 111 | 120   | 120   | 140   | 178   |
| W          | 100 | 100  | 100  | 125 | 160   | 160   | 180   | 200   |
| H          | 161 | 161  | 163  | 196 | 223   | 251   | 290   | 333   |
| d          | 8   | 10.5 | 13.5 | 18  | 24    | 29    | 36.5  | 45    |
| Weight(kg) | 1.9 | 1.9  | 2.1  | 3.2 | 5.2   | 6.9   | 10.4  | 15.8  |



**Class800 Main Outline Dimensions & Weight**

Bold fastening valve cover, outside screw stem & yoke (OS&Y).  
Designs according to API 602.

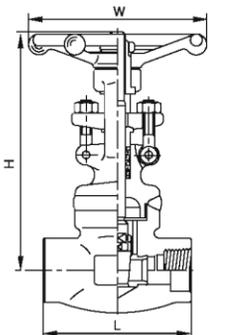
| R.P        | -   | 1/2  | 3/4  | 1   | 1 1/4 | 1 1/2 | 2     | 2 1/2 |
|------------|-----|------|------|-----|-------|-------|-------|-------|
| F.P        | 1/4 | 3/8  | 1/2  | 3/4 | 1     | 1 1/4 | 1 1/2 | 2     |
| L          | 92  | 111  | 111  | 120 | 120   | 140   | 178   | 180   |
| W          | 100 | 125  | 125  | 160 | 160   | 180   | 200   | 220   |
| H          | 191 | 191  | 192  | 219 | 243   | 296   | 316   | 370   |
| d          | 8   | 10.5 | 13.5 | 18  | 24    | 29    | 36.5  | 45    |
| Weight(kg) | 2.4 | 4.4  | 4.3  | 6   | 7.2   | 11.4  | 16    | 23    |



**Class800 Main Outline Dimensions & Weight**

Weld joint valve cover, outside screw stem & yoke (OS&Y).  
Designs according to API 602.

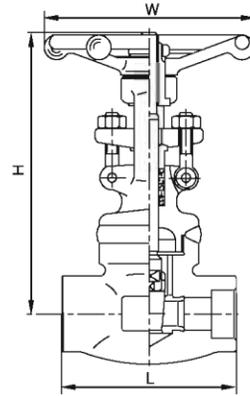
| R.P        | -   | 1/2  | 3/4  | 1   | 1 1/4 | 1 1/2 | 2     | 2 1/2 |
|------------|-----|------|------|-----|-------|-------|-------|-------|
| F.P        | 1/4 | 3/8  | 1/2  | 3/4 | 1     | 1 1/4 | 1 1/2 | 2     |
| L          | 92  | 111  | 111  | 120 | 120   | 140   | 178   | 180   |
| W          | 100 | 125  | 125  | 160 | 160   | 180   | 200   | 220   |
| H          | 171 | 207  | 207  | 240 | 258   | 330   | 355   | 370   |
| d          | 8   | 10.5 | 13.5 | 18  | 24    | 29    | 36.5  | 45    |
| Weight(kg) | 2.3 | 4    | 4    | 4.8 | 7.1   | 11    | 16    | 22.8  |



**Class2500 Main Outline Dimensions & Weight**

Weld joint valve cover, outside screw stem & yoke (OS&Y).  
Designs according to ASME B16.34

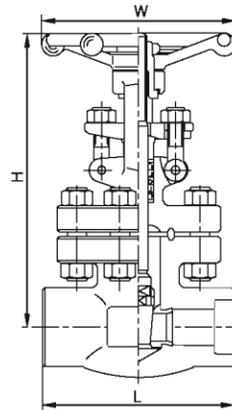
| NPS        | 3/8 | 1/2 | 3/4 | 1    | 1 1/4 |
|------------|-----|-----|-----|------|-------|
| L          | 111 | 120 | 120 | 120  | 140   |
| W          | 125 | 160 | 160 | 180  | 220   |
| H          | 215 | 218 | 220 | 238  | 281   |
| d          | 14  | 14  | 14  | 19   | 25    |
| Weight(kg) | 7   | 8.7 | 8.5 | 11.7 | 17    |



**Class1500~2500 Main Outline Dimensions & Weight**

Bolt fastening cover, outside screw stem & yoke (OS&Y).  
Designs according to ASME B16.34

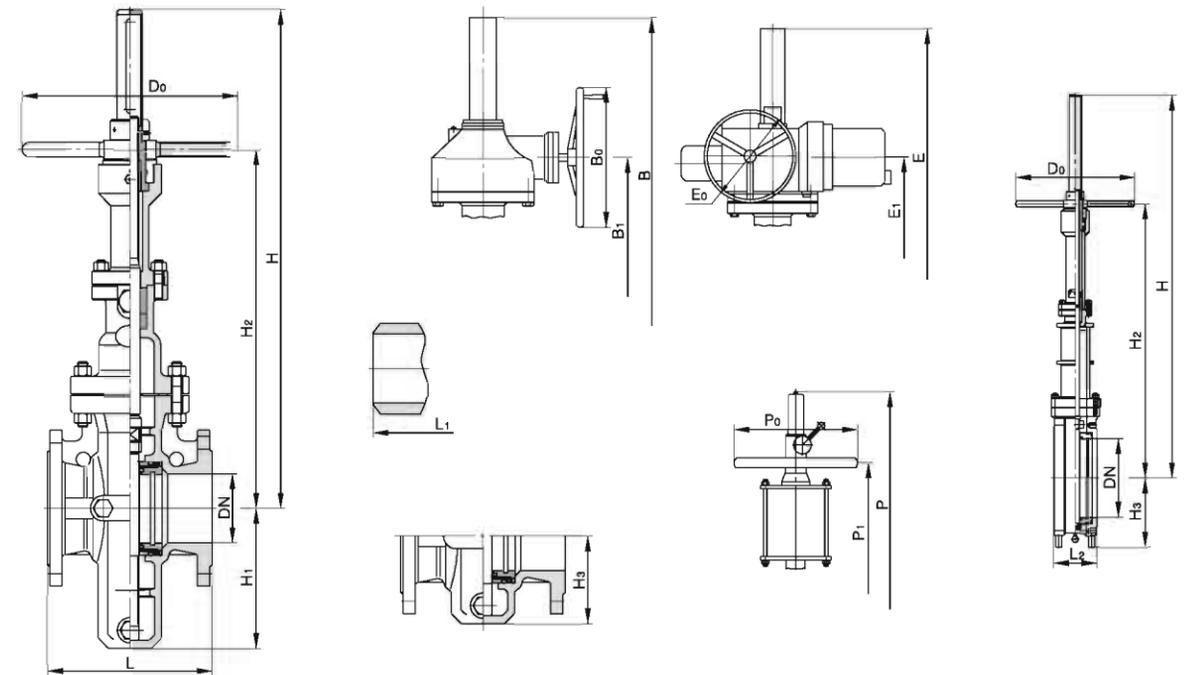
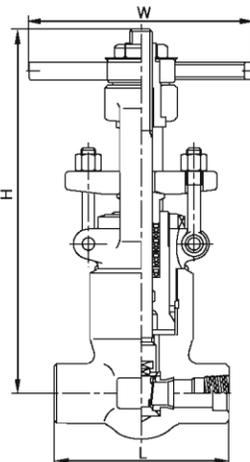
| NPS        | Class | 1/2 | 3/4  | 1    | 1 1/2 | 2   |
|------------|-------|-----|------|------|-------|-----|
| L          | 1500  | 110 | 150  | 150  | 210   | 235 |
|            | 2500  | 150 | 150  | 210  | 235   | 235 |
| W          | 1500  | 110 | 130  | 130  | 180   | 250 |
|            | 2500  | 130 | 130  | 250  | 300   | 300 |
| H          | 1500  | 277 | 300  | 390  | 400   | 435 |
|            | 2500  | 293 | 300  | 390  | 435   | 435 |
| d          | 1500  | 14  | 17   | 22   | 35    | 37  |
|            | 2500  | 14  | 14   | 14   | 25    | 30  |
| Weight(kg) | 1500  | 5.1 | 11   | 12.1 | 22    | 37  |
|            | 2500  | 11  | 11.3 | 22.4 | 38    | 38  |



**Class1500~2500 Main Outline Dimensions & Weight**

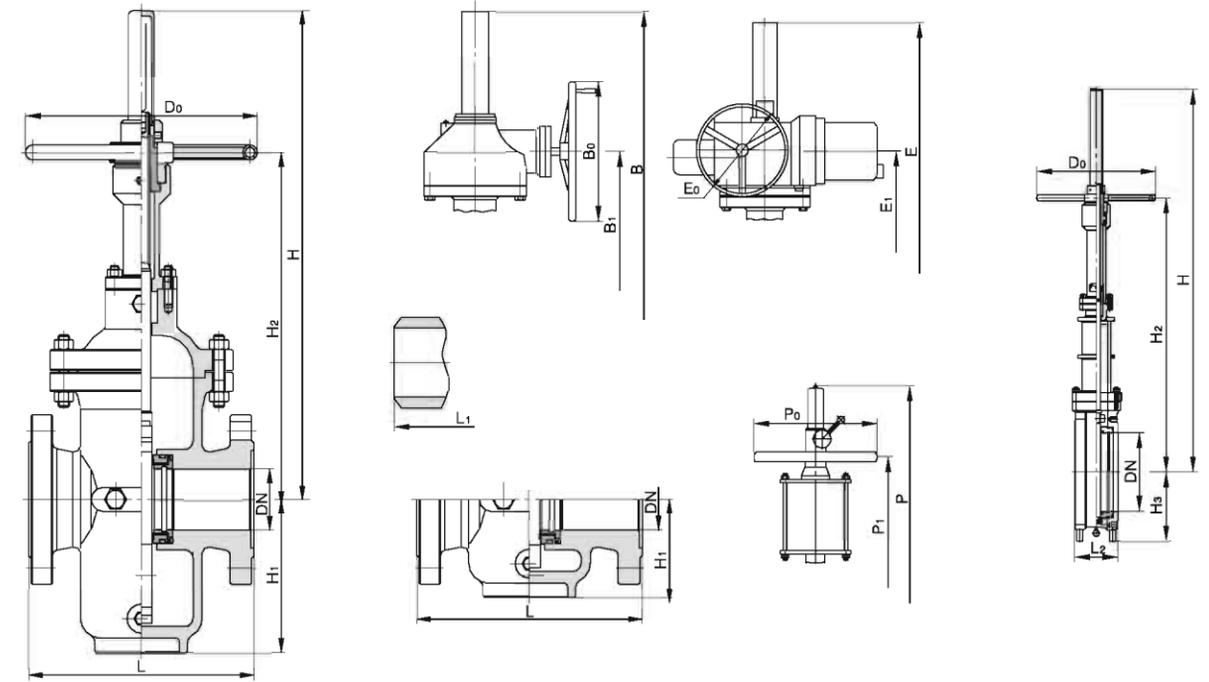
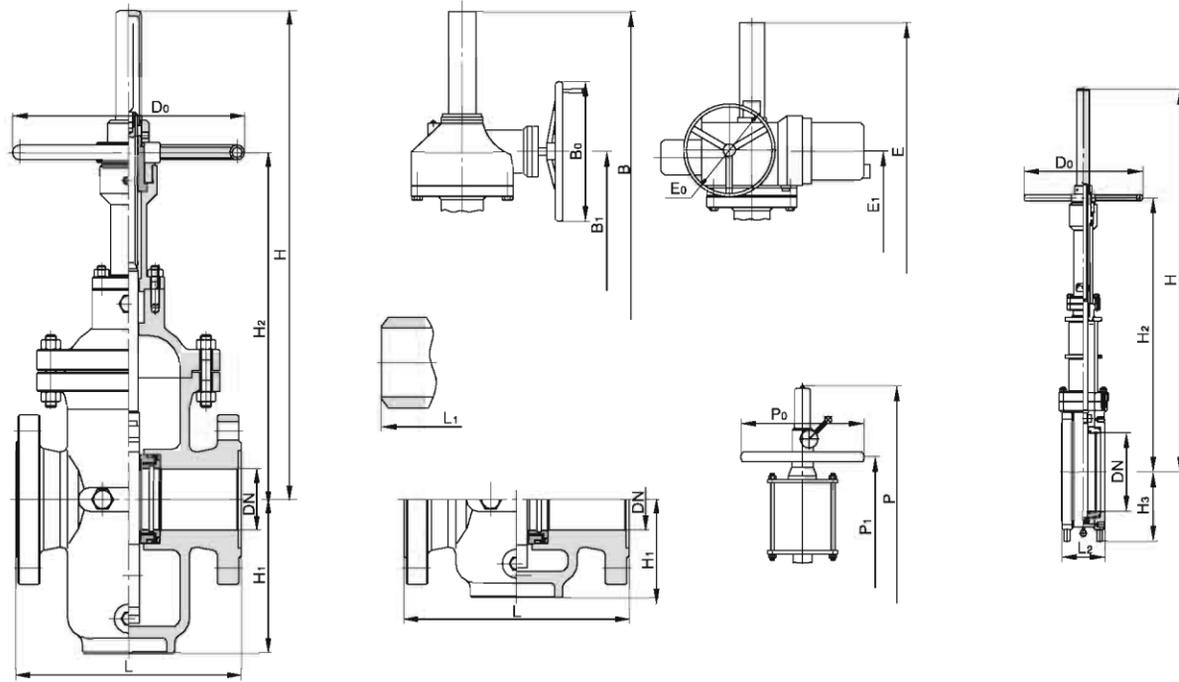
Pressure seal bonnet, outside screw stem & yoke (OS&Y).  
Designs according to ASME B16.34

| NPS        | Class    | 3/8  | 1/2  | 3/4  | 1    | 1 1/4 | 1 1/2 | 2    |
|------------|----------|------|------|------|------|-------|-------|------|
| L          | 900-1500 | 140  | 140  | 140  | 140  | 178   | 178   | 216  |
|            | 2500     | 186  | 186  | 186  | 186  | 232   | 232   | 279  |
| W          | 900-1500 | 200  | 200  | 200  | 200  | 280   | 280   | 300  |
|            | 2500     | 200  | 200  | 200  | 200  | 280   | 280   | 300  |
| H          | 900-1500 | 318  | 318  | 318  | 322  | 467   | 468   | 540  |
|            | 2500     | 325  | 325  | 325  | 327  | 467   | 468   | 540  |
| d          | 900-1500 | 14   | 14   | 14   | 19   | 25    | 30    | 36.5 |
|            | 2500     | 14   | 14   | 14   | 19   | 25    | 30    | 36.5 |
| Weight(kg) | 900-1500 | 11.5 | 11.5 | 10.8 | 10.5 | 19.6  | 21.0  | 55.4 |
|            | 2500     | 12.3 | 12.3 | 11.6 | 10.8 | 26.0  | 28.4  | 60.0 |



**Class150 Main Size of Outside**

| NPS (in) | Flange L | Butt welding L1 | Light-duty L2 | Hand-operated |      |      | Geared driving |      |     | Geared driving | Air-operated and Fluid driving |      |     | Electric driving device |      |     | Electric driving device | Non-diversion hole type H3 | Diversion hole type H1 |
|----------|----------|-----------------|---------------|---------------|------|------|----------------|------|-----|----------------|--------------------------------|------|-----|-------------------------|------|-----|-------------------------|----------------------------|------------------------|
|          |          |                 |               | H             | H2   | D0   | B              | B1   | B0  |                | P                              | P1   | P0  | E                       | E1   | E0  |                         |                            |                        |
| 1        | 127      | 127             | -             | 360           | 250  | 180  | -              | -    | -   | -              | -                              | -    | -   | -                       | -    | -   | 60                      | 85                         |                        |
| 1 1/4    | 140      | 140             | -             | 375           | 260  | 180  | -              | -    | -   | -              | -                              | -    | -   | -                       | -    | -   | 71                      | 103                        |                        |
| 1 1/2    | 165      | 165             | -             | 410           | 290  | 250  | -              | -    | -   | -              | -                              | -    | -   | -                       | -    | -   | 75                      | 115                        |                        |
| 2        | 178      | 216             | -             | 450           | 315  | 250  | -              | -    | -   | -              | 525                            | 430  | 250 | -                       | -    | -   | 85                      | 122                        |                        |
| 2 1/2    | 190      | 241             | -             | 550           | 420  | 300  | -              | -    | -   | -              | 648                            | 560  | 300 | -                       | -    | -   | 91                      | 154                        |                        |
| 3        | 203      | 283             | -             | 610           | 428  | 300  | -              | -    | -   | -              | 730                            | 630  | 300 | -                       | -    | -   | 109                     | 169                        |                        |
| 4        | 229      | 305             | 150           | 700           | 494  | 300  | 770            | 650  | 310 | BA-0           | 850                            | 720  | 300 | 912                     | 790  | 200 | SMC-04                  | 121                        | 193                    |
| 6        | 267      | 403             | 150           | 895           | 625  | 350  | 965            | 800  | 310 | BA-0           | 1120                           | 920  | 350 | 1107                    | 920  | 500 | SMC-03                  | 178                        | 283                    |
| 8        | 292      | 419             | 180           | 1130          | 784  | 350  | 1200           | 960  | 310 | BA-0           | 1430                           | 1160 | 350 | 1390                    | 1120 | 500 | SMC-03                  | 211                        | 352                    |
| 10       | 330      | 457             | 180           | 1290          | 937  | 400  | 1360           | 1080 | 310 | BA-0           | 1665                           | 1380 | 400 | 1550                    | 1250 | 500 | SMC-03                  | 215                        | 440                    |
| 12       | 356      | 502             | 200           | 1480          | 1080 | 450  | 1560           | 1200 | 310 | BA-0           | 1930                           | 1550 | 450 | 1740                    | 1400 | 305 | SMC-00                  | 245                        | 514                    |
| 14       | 381      | 572             | 200           | 1660          | 1283 | 500  | 1740           | 1350 | 460 | BA-1           | 2185                           | 1750 | 450 | 1913                    | 1550 | 305 | SMC-00                  | 280                        | 602                    |
| 16       | 406      | 610             | 218           | 1850          | 1417 | 500  | 1930           | 1500 | 460 | BA-1           | 2450                           | 2000 | 500 | 2103                    | 1620 | 305 | SMC-00                  | 310                        | 678                    |
| 18       | 432      | 660             | 218           | 2080          | 1489 | 600  | 2160           | 1680 | 460 | BA-1           | 2755                           | 2250 | 500 | 2365                    | 1830 | 305 | SMC-0                   | 346                        | 785                    |
| 20       | 457      | 711             | 229           | 2300          | 1672 | 700  | 2420           | 1850 | 460 | BA-1           | 3050                           | 2450 | 600 | 2585                    | 1980 | 305 | SMC-0                   | 363                        | 855                    |
| 24       | 508      | 813             | 248           | 2680          | 2012 | 800  | 2800           | 2120 | 460 | BA-2           | 3580                           | 2900 | 800 | 2990                    | 2300 | 305 | SMC-1                   | 442                        | 1045                   |
| 28       | 610      | 914             | 286           | 3080          | 2250 | 800  | 3200           | 2450 | 460 | BA-2           | 4130                           | 3350 | 800 | 3390                    | 2600 | 305 | SMC-1                   | 505                        | 1190                   |
| 32       | 660      | 965             | 286           | 3491          | 2550 | 1000 | 3640           | 2800 | 460 | BA-2           | -                              | -    | -   | 3850                    | 2980 | 305 | SMC-1                   | 560                        | 1350                   |
| 36       | 711      | 1016            | -             | 3897          | 2850 | 1000 | 4050           | 3080 | 600 | BA-3           | -                              | -    | -   | 4260                    | 3200 | 458 | SMC-2                   | 610                        | 1510                   |
| 40       | 811      | -               | -             | 4317          | 3250 | 1200 | 4467           | 3400 | 600 | BA-3           | -                              | -    | -   | 4677                    | 3600 | 458 | SMC-2                   | 715                        | 1715                   |

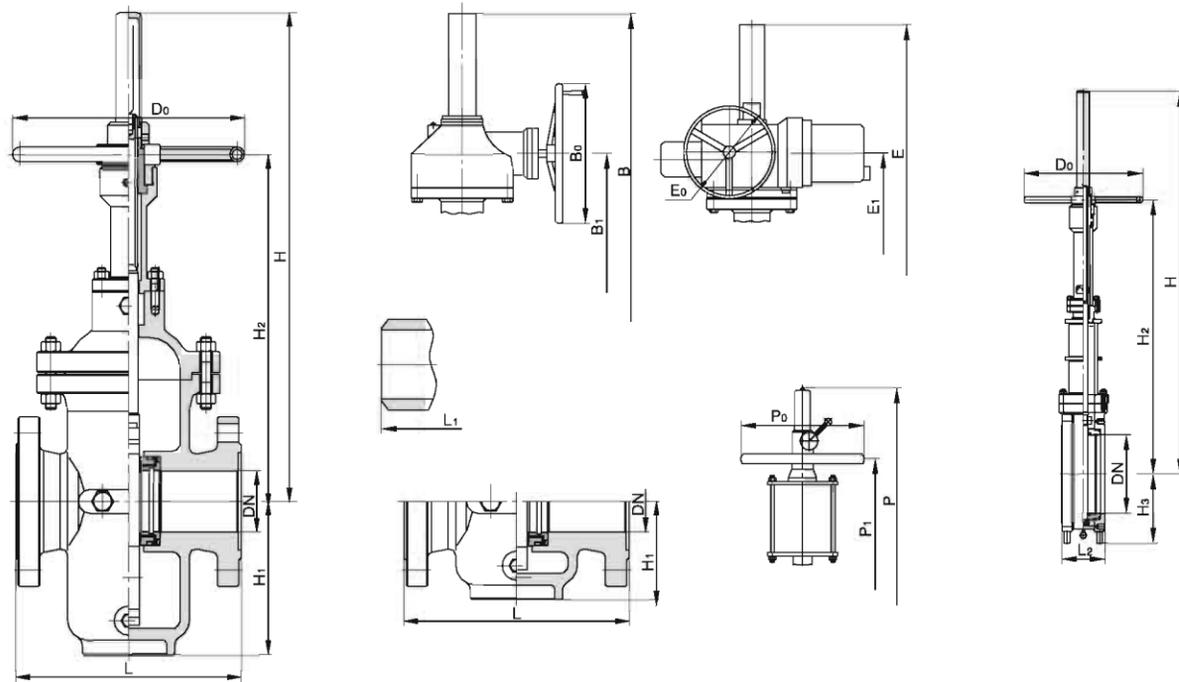


● Class300 Main Size of Outside

| NPS<br>(in) | Flange<br>L | Butt<br>welding<br>L1 | Light-<br>duty<br>L2 | Hand-operated |      |     | Geared driving |      |     |      | Air-operated<br>and Fluid driving |      |     | Electric<br>driving device |      |     | Non-diversion<br>hole type<br>H3 | Diversion<br>hole type<br>H1 |      |
|-------------|-------------|-----------------------|----------------------|---------------|------|-----|----------------|------|-----|------|-----------------------------------|------|-----|----------------------------|------|-----|----------------------------------|------------------------------|------|
|             |             |                       |                      | H             | H2   | D0  | B              | B1   | B0  | P    | P1                                | P0   | E   | E1                         | E0   |     |                                  |                              |      |
| 1           | 165         | 165                   | -                    | 370           | 260  | 180 | -              | -    | -   | -    | -                                 | -    | -   | -                          | -    | -   | 70                               | 90                           |      |
| 1 1/4       | 178         | 178                   | -                    | 385           | 270  | 180 | -              | -    | -   | -    | -                                 | -    | -   | -                          | -    | -   | 80                               | 115                          |      |
| 1 1/2       | 190         | 190                   | -                    | 420           | 300  | 250 | -              | -    | -   | -    | -                                 | -    | -   | -                          | -    | -   | 85                               | 130                          |      |
| 2           | 216         | 216                   | -                    | 458           | 325  | 250 | -              | -    | -   | -    | 533                               | 435  | 200 | -                          | -    | -   | 100                              | 137                          |      |
| 2 1/2       | 241         | 241                   | -                    | 555           | 420  | 300 | -              | -    | -   | -    | 653                               | 565  | 200 | -                          | -    | -   | 106                              | 169                          |      |
| 3           | 283         | 283                   | -                    | 615           | 430  | 300 | -              | -    | -   | -    | 735                               | 635  | 250 | -                          | -    | -   | 124                              | 184                          |      |
| 4           | 305         | 305                   | 150                  | 710           | 500  | 300 | 770            | 650  | 310 | BA-0 | 860                               | 730  | 250 | 912                        | 790  | 200 | SMC-04                           | 146                          | 218  |
| 6           | 403         | 403                   | 150                  | 900           | 625  | 350 | 965            | 800  | 310 | BA-0 | 1125                              | 925  | 350 | 1155                       | 960  | 500 | SMC-03                           | 206                          | 311  |
| 8           | 419         | 419                   | 180                  | 1135          | 790  | 350 | 1200           | 960  | 310 | BA-0 | 1435                              | 1165 | 350 | 1390                       | 1120 | 305 | SMC-00                           | 241                          | 382  |
| 10          | 457         | 457                   | 180                  | 1401          | 1040 | 400 | 1360           | 1090 | 310 | BA-0 | 1776                              | 1450 | 400 | 1543                       | 1240 | 305 | SMC-00                           | 251                          | 476  |
| 12          | 502         | 502                   | 200                  | 1580          | 1150 | 450 | 1560           | 1200 | 310 | BA-1 | 2030                              | 1620 | 450 | 1745                       | 1400 | 305 | SMC-0                            | 281                          | 545  |
| 14          | 762         | 762                   | 200                  | -             | -    | -   | 1740           | 1350 | 460 | BA-1 | 2305                              | 1900 | 500 | 1945                       | 1580 | 305 | SMC-0                            | 325                          | 645  |
| 16          | 838         | 838                   | 218                  | -             | -    | -   | 1930           | 1540 | 460 | BA-1 | 2558                              | 2100 | 600 | 2135                       | 1640 | 305 | SMC-0                            | 360                          | 728  |
| 18          | 914         | 914                   | 218                  | -             | -    | -   | 2160           | 1700 | 460 | BA-1 | 2835                              | 2320 | 700 | 2385                       | 1840 | 305 | SMC-1                            | 400                          | 800  |
| 20          | 991         | 991                   | 229                  | -             | -    | -   | 2420           | 1850 | 460 | BA-2 | 3120                              | 2510 | 800 | 2660                       | 2050 | 305 | SMC-1                            | 430                          | 930  |
| 24          | 1143        | 1143                  | 248                  | -             | -    | -   | 2800           | 2120 | 460 | BA-2 | 3670                              | 2980 | 900 | 3010                       | 2310 | 305 | SMC-1                            | 497                          | 1100 |
| 28          | 1346        | 1346                  | 286                  | -             | -    | -   | 3200           | 2460 | 460 | BA-2 | -                                 | -    | -   | 3480                       | 2680 | 458 | SMC-2                            | 560                          | 1260 |
| 32          | 1524        | 1524                  | 286                  | -             | -    | -   | 3640           | 2800 | 460 | BA-2 | -                                 | -    | -   | 3890                       | 3020 | 458 | SMC-2                            | 620                          | 1420 |
| 36          | 1727        | 1727                  | -                    | -             | -    | -   | 4050           | 3080 | 600 | BA-3 | -                                 | -    | -   | 4260                       | 3200 | 458 | SMC-2                            | 610                          | 1510 |

● Class400 Main Size of Outside

| NPS<br>(in) | Flange<br>L | Butt<br>welding<br>L1 | Hand-operated<br>H | Light-<br>duty<br>L2 | Hand-operated |      |      | Geared driving |      |      |      | Air-operated<br>and Fluid driving |      |      | Electric<br>driving device |        |     | Non-diversion<br>hole type<br>H3 | Diversion<br>hole type<br>H1 |
|-------------|-------------|-----------------------|--------------------|----------------------|---------------|------|------|----------------|------|------|------|-----------------------------------|------|------|----------------------------|--------|-----|----------------------------------|------------------------------|
|             |             |                       |                    |                      | H             | H2   | D0   | B              | B1   | B0   | P    | P1                                | P0   | E    | E1                         | E0     |     |                                  |                              |
| 2           | 292         | 292                   | 458                | 325                  | 300           | 505  | 430  | 310            | BA-0 | 533  | 435  | 200                               | 647  | 560  | 200                        | SMC-04 | 108 | 158                              |                              |
| 2 1/2       | 330         | 330                   | 555                | 420                  | 300           | 560  | 470  | 310            | BA-0 | 653  | 565  | 200                               | 702  | 610  | 200                        | SMC-04 | 125 | 190                              |                              |
| 3           | 356         | 356                   | 615                | 430                  | 350           | 610  | 510  | 310            | BA-0 | 735  | 635  | 250                               | 752  | 650  | 500                        | SMC-03 | 145 | 225                              |                              |
| 4           | 406         | 406                   | 710                | 500                  | 350           | 770  | 650  | 310            | BA-0 | 860  | 730  | 250                               | 912  | 790  | 500                        | SMC-03 | 165 | 255                              |                              |
| 6           | 495         | 495                   | 900                | 625                  | 400           | 965  | 800  | 310            | BA-0 | 1125 | 925  | 350                               | 1138 | 950  | 305                        | SMC-00 | 220 | 330                              |                              |
| 8           | 597         | 597                   | 1135               | 790                  | 500           | 1200 | 960  | 310            | BA-0 | 1435 | 1165 | 350                               | 1373 | 1100 | 305                        | SMC-00 | 280 | 410                              |                              |
| 10          | 673         | 673                   | 1401               | 1040                 | 500           | 1370 | 1090 | 460            | BA-1 | 1776 | 1450 | 400                               | 1575 | 1280 | 305                        | SMC-0  | 330 | 490                              |                              |
| 12          | 762         | 762                   | 1580               | 1150                 | 600           | 1560 | 1200 | 460            | BA-1 | 2030 | 1620 | 450                               | 1725 | 1390 | 305                        | SMC-0  | 380 | 570                              |                              |
| 14          | 826         | 826                   | -                  | -                    | -             | 1740 | 1350 | 460            | BA-1 | 2305 | 1900 | 500                               | 1930 | 1570 | 305                        | SMC-1  | 430 | 650                              |                              |
| 16          | 902         | 902                   | -                  | -                    | -             | 1970 | 1540 | 460            | BA-2 | 2558 | 2100 | 600                               | 2210 | 1700 | 305                        | SMC-1  | 480 | 735                              |                              |
| 18          | 978         | 978                   | -                  | -                    | -             | 2260 | 1700 | 460            | BA-2 | 2835 | 2320 | 700                               | 2500 | 1940 | 305                        | SMC-1  | 530 | 810                              |                              |
| 20          | 1054        | 1054                  | -                  | -                    | -             | 2420 | 1850 | 460            | BA-2 | 3120 | 2510 | 800                               | 2630 | 2020 | 458                        | SMC-2  | 580 | 905                              |                              |
| 24          | 1232        | 1232                  | -                  | -                    | -             | 2800 | 2120 | 600            | BA-3 | -    | -    | -                                 | 3050 | 2350 | 458                        | SMC-2  | 670 | 1070                             |                              |
| 28          | 1397        | 1397                  | -                  | -                    | -             | 3230 | 2460 | 600            | BA-3 | -    | -    | -                                 | 3480 | 2680 | 458                        | SMC-2  | 770 | 1230                             |                              |



● Class600 Main Size of Outside

| NPS (in) | Flange L | Butt welding L1 | Hand-operated |      |     | Geared driving |      |     | Geared driving | Air-operated and Fluid driving |      |     | Electric driving device |      |     | Electric driving device | Non-diversion hole type H3 | Diversion hole type H1 |
|----------|----------|-----------------|---------------|------|-----|----------------|------|-----|----------------|--------------------------------|------|-----|-------------------------|------|-----|-------------------------|----------------------------|------------------------|
|          |          |                 | H             | H2   | D0  | B              | B1   | B0  |                | P                              | P1   | P0  | E                       | E1   | E0  |                         |                            |                        |
| 2        | 292      | 292             | 468           | 335  | 300 | 505            | 430  | 310 | BA-0           | 543                            | 445  | 200 | 647                     | 560  | 200 | SMC-04                  | 108                        | 158                    |
| 2 1/2    | 330      | 330             | 565           | 430  | 300 | 560            | 470  | 310 | BA-0           | 663                            | 570  | 200 | 702                     | 610  | 200 | SMC-04                  | 125                        | 190                    |
| 3        | 356      | 356             | 625           | 440  | 350 | 610            | 510  | 310 | BA-0           | 745                            | 640  | 250 | 752                     | 650  | 500 | SMC-03                  | 145                        | 225                    |
| 4        | 432      | 432             | 720           | 510  | 350 | 770            | 650  | 310 | BA-0           | 870                            | 740  | 250 | 950                     | 820  | 500 | SMC-03                  | 165                        | 255                    |
| 6        | 559      | 559             | 910           | 630  | 400 | 965            | 800  | 310 | BA-0           | 1135                           | 930  | 350 | 1138                    | 950  | 305 | SMC-0                   | 220                        | 330                    |
| 8        | 660      | 660             | 1145          | 800  | 500 | 1200           | 960  | 310 | BA-1           | 1445                           | 1170 | 350 | 1403                    | 1130 | 305 | SMC-0                   | 280                        | 410                    |
| 10       | 787      | 787             | 1411          | 1050 | 500 | 1370           | 1090 | 460 | BA-1           | 1786                           | 1460 | 400 | 1575                    | 1280 | 305 | SMC-0                   | 330                        | 490                    |
| 12       | 838      | 838             | 1590          | 1160 | 600 | 1560           | 1200 | 460 | BA-1           | 2040                           | 1630 | 450 | 1750                    | 1410 | 305 | SMC-1                   | 380                        | 570                    |
| 14       | 889      | 889             | -             | -    | -   | 1740           | 1350 | 460 | BA-2           | -                              | -    | -   | 1930                    | 1570 | 305 | SMC-1                   | 430                        | 650                    |
| 16       | 991      | 991             | -             | -    | -   | 1970           | 1540 | 460 | BA-2           | -                              | -    | -   | 2210                    | 1700 | 305 | SMC-1                   | 480                        | 735                    |
| 18       | 1092     | 1092            | -             | -    | -   | 2260           | 1700 | 460 | BA-2           | -                              | -    | -   | 2500                    | 1940 | 458 | SMC-2                   | 530                        | 810                    |
| 20       | 1194     | 1194            | -             | -    | -   | 2420           | 1850 | 460 | BA-2           | -                              | -    | -   | 2630                    | 2020 | 458 | SMC-2                   | 580                        | 905                    |

● Technical Specification

Design and Manufacture: Cast steel check valve to BS 1868, ASME B16.34 and API 6D; Forged steel check valve to API 602.

Inspection and Test: API 598 or API 6D.

End flange dimension: ASME B16.5 (for NPS ≤ 24), ASME B16.47 series B, API 605 or ASME B16.47 series A, MSS SP-44 (for NPS > 24).

BW end dimension: ASME B16.25.

Socket-weld dimension: ASME B16.11.

Face to face and end to end: ASME B16.10.

Pressure-temperature ratings: ASME B16.34.

Wall thickness dimension: API 600 and BS 1868.

● The Features of check Valve

Bolted Bonnet; Swing and lift disc; Metallic seating surfaces.

● Body and Bonnet Connection

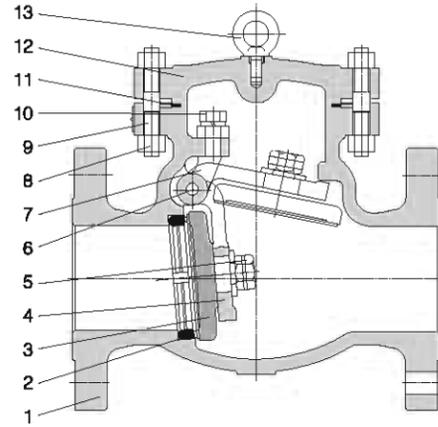
The body and bonnet of Class 150 ~ Class 900 check valves are usually with studs and nuts. And the body and bonnet of Class 1500 ~ Class 2500 check valves are usually of pressurized seal design.

● Body-To-Bonnet Joint

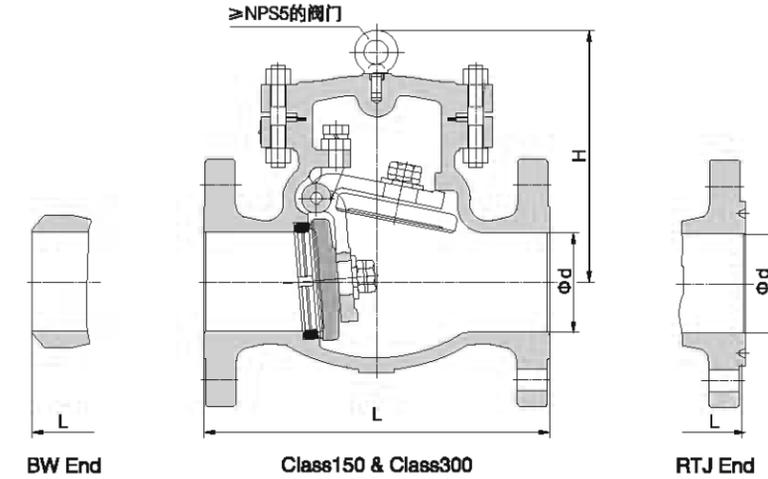
Stainless steel + flexible graphite wounded gasket is used for Class 150 and Class 300 check valve; Stainless steel + flexible graphite wounded gasket is used for Class 600 check valve, and joint gasket is also optional for Class 600 check valve; Ring Joint gasket is used for Class 900 check valve; Pressurized seal design is used for Class 1500 ~ Class 2500 check valve.

● Seat

For carbon steel check valve, the seat is usually forged steel. The sealing surface of the seat is spray welded with hard alloy specified by the customer. Renewable threaded seat is used for NPS ≤ 10 check valves, and welded on seat can be also optional if being requested by the customer. Welded on seat is used for NPS ≥ 12 carbon steel check valves. For Stainless steel check valve, integral seat is usually adopted, or to weld hard alloy directly integrally. Threaded or welded on seat is also optional for stainless steel check valve if being requested by the customer.



● Class 150 & Class 300 Cast Steel Swing Check Valve



● Technical Specification

Design and Manufacture: BS1868 or API 6D

Inspection and Test: API 598 or API 6D

End flange dimension: ASME B16.5、ASME B16.47 A、MSS SP-44; ASME B16.47 B、API 605

BW end dimension: ASME B16.25

Face to face and end to end: ASME B16.10

Pressure-temperature ratings: ASME B16.34

Wall thickness dimension: API 600 and BS 1868

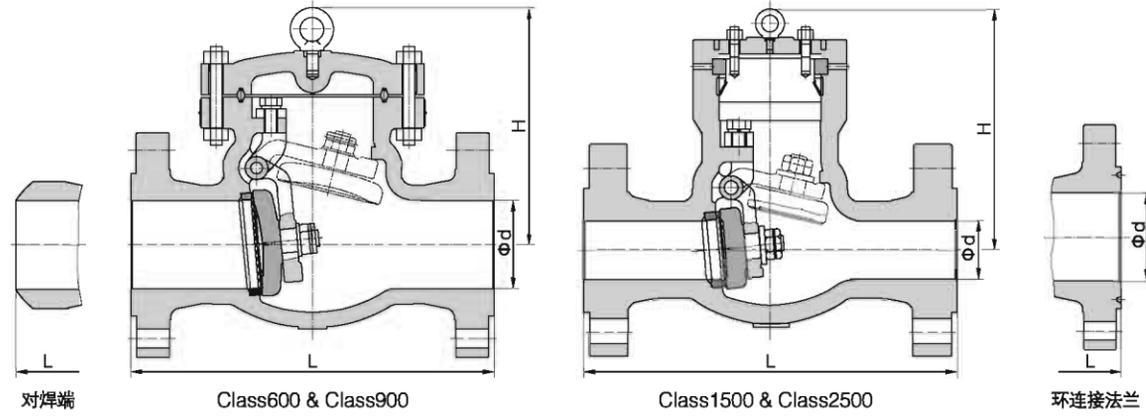
● Form of Major Part Material

| Parts No. | Parts Name  | Materials            |                      |                      |                |                |
|-----------|-------------|----------------------|----------------------|----------------------|----------------|----------------|
|           |             | WCB/Trim 1           | WCB/Trim 5           | WCB/Trim 8           | CF8/304        | CF8M/316       |
| 1         | Body        | ASTM A216 WCB        | ASTM A216 WCB        | ASTM A216 WCB        | ASTM A351 CF8  | ASTM A351 CF8M |
| 2         | Seat ring   | A105 + 13Cr          | A105 + STL           | A105 + STL           | ASTM A351 CF8  | ASTM A351 CF8M |
| 3         | Disc        | ASTM A216 WCB + 13Cr | ASTM A216 WCB + STL  | ASTM A216 WCB + 13Cr | ASTM A351 CF8  | ASTM A351 CF8M |
| 4         | Arm         | ASTM A216 WCB        | ASTM A216 WCB        | ASTM A216 WCB        | ASTM A351 CF8  | ASTM A351 CF8M |
| 5         | Nut         | ASTM A194 2H         | ASTM A194 2H         | ASTM A194 2H         | ASTM A194 8    | ASTM A194 8M   |
| 6         | Arm pin     | ASTM A182 F6a        | ASTM A182 F6a        | ASTM A182 F6a        | ASTM A182 F304 | ASTM A182 F318 |
| 7         | Yoke        | ASTM A216 WCB        | ASTM A216 WCB        | ASTM A216 WCB        | ASTM A351 CF8  | ASTM A351 CF8M |
| 8         | Bonnet nut  | ASTM A194 2H         | ASTM A194 2H         | ASTM A194 2H         | ASTM A194 8    | ASTM A194 8M   |
| 9         | Bonnet bolt | ASTM A193 B7         | ASTM A193 B7         | ASTM A193 B7         | ASTM A193 B8   | ASTM A193 B8M  |
| 10        | Bolt        | ASTM A193 B7         | ASTM A193 B7         | ASTM A193 B7         | ASTM A193 B8   | ASTM A193 B8M  |
| 11        | Gasket      | 304 sheet + Graphite | 304 sheet + Graphite | 304 sheet + Graphite | 304 + Graphite | 316 + Graphite |
| 12        | Bonnet      | ASTM A216 WCB        | ASTM A216 WCB        | ASTM A216 WCB        | ASTM A351 CF8  | ASTM A351 CF8M |
| 13        | Eye bolt    | ASTM A181            | ASTM A181            | ASTM A181            | ASTM A181      | ASTM A181      |

Note: The chart above only lists out some common composition of steel check valve parts. We may provide other different parts material composition according to the customer's request or the actual valve working condition.

| Size  |     | Class 150      |      |      |     |     |             | Class 300      |      |      |     |      |             |
|-------|-----|----------------|------|------|-----|-----|-------------|----------------|------|------|-----|------|-------------|
| NPS   | DN  | Dimensions(mm) |      |      |     |     | Weight (kg) | Dimensions(mm) |      |      |     |      | Weight (kg) |
|       |     | L              |      |      | d   | H   |             | L              |      |      | d   | H    |             |
| RF    | RTJ | BW             | RF   | RTJ  |     |     | BW          | RF             | RTJ  | BW   |     |      |             |
| 2     | 50  | 203            | 216  | 203  | 51  | 132 | 15          | 267            | 283  | 267  | 51  | 144  | 20          |
| 2 1/2 | 65  | 216            | 229  | 216  | 64  | 147 | 20          | 292            | 308  | 292  | 64  | 149  | 35          |
| 3     | 80  | 241            | 254  | 241  | 76  | 176 | 27          | 318            | 333  | 318  | 76  | 210  | 40          |
| 4     | 100 | 292            | 305  | 292  | 102 | 198 | 45          | 356            | 371  | 356  | 102 | 260  | 61          |
| 5     | 125 | 330            | 343  | 330  | 127 | 255 | 58          | 400            | 416  | 400  | 127 | 295  | 80          |
| 6     | 150 | 356            | 368  | 356  | 152 | 320 | 69          | 445            | 460  | 445  | 152 | 326  | 130         |
| 8     | 200 | 495            | 508  | 495  | 203 | 380 | 131         | 533            | 549  | 533  | 203 | 380  | 190         |
| 10    | 250 | 622            | 635  | 622  | 254 | 440 | 219         | 622            | 638  | 622  | 254 | 440  | 296         |
| 12    | 300 | 699            | 711  | 699  | 305 | 480 | 321         | 711            | 727  | 711  | 305 | 520  | 450         |
| 14    | 350 | 787            | 800  | 787  | 337 | 530 | 380         | 838            | 854  | 838  | 337 | 540  | 640         |
| 16    | 400 | 864            | 876  | 864  | 367 | 580 | 560         | 864            | 879  | 864  | 367 | 588  | 850         |
| 18    | 450 | 978            | 991  | 978  | 438 | 618 | 630         | 978            | 994  | 978  | 438 | 670  | 1030        |
| 20    | 500 | 978            | 991  | 978  | 489 | 657 | 770         | 1016           | 1035 | 1016 | 489 | 720  | 1330        |
| 24    | 600 | 1295           | 1308 | 1295 | 591 | 760 | 960         | 1346           | 1368 | 1346 | 591 | 850  | 1950        |
| 26    | 650 | 1285           | -    | 1285 | 633 | 840 | 1250        | 1346           | 1372 | 1348 | 633 | 920  | 2300        |
| 28    | 700 | 1448           | -    | 1448 | 684 | 920 | 1580        | 1499           | 1524 | 1499 | 684 | 1150 | 2600        |
| 30    | 750 | 1524           | -    | 1524 | 735 | 960 | 1950        | 1594           | 1619 | 1594 | 735 | 1280 | 3200        |

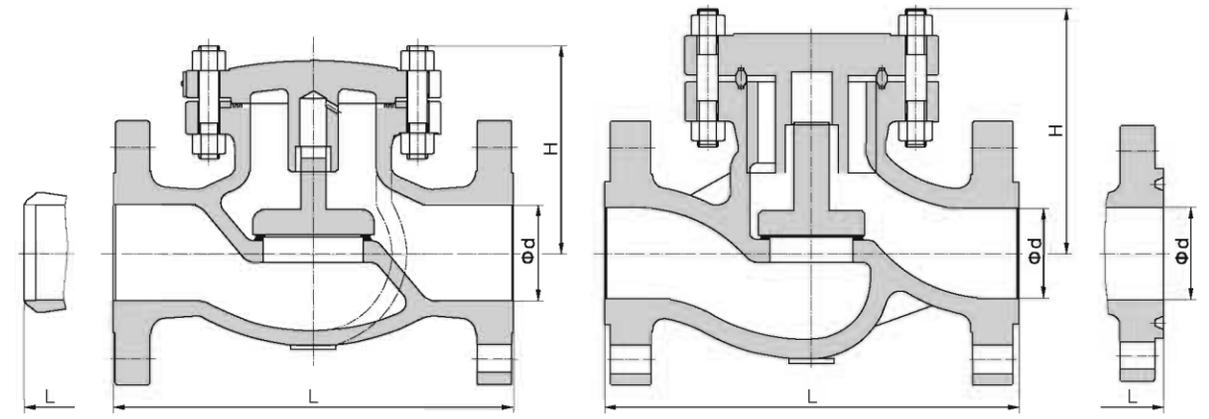
● Class 600~Class 2500 Cast Steel Swing Check Valve



| Size  |     | Class 600      |      |      |     |      |             | Class 900      |      |      |     |      |             |
|-------|-----|----------------|------|------|-----|------|-------------|----------------|------|------|-----|------|-------------|
| NPS   | DN  | Dimensions(mm) |      |      |     |      | Weight (kg) | Dimensions(mm) |      |      |     |      | Weight (kg) |
|       |     | L              |      |      | d   | H    |             | L              |      |      | d   | H    |             |
| RF    | RTJ | BW             | RF   | RTJ  |     |      | BW          | RF             | RTJ  | BW   |     |      |             |
| 2     | 50  | 292            | 295  | 292  | 51  | 170  | 28          | 368            | 371  | 368  | 51  | 200  | 48          |
| 2 1/2 | 65  | 330            | 333  | 330  | 64  | 178  | 40          | 419            | 422  | 419  | 64  | 220  | 75          |
| 3     | 80  | 356            | 359  | 356  | 76  | 246  | 68          | 381            | 384  | 381  | 76  | 280  | 95          |
| 4     | 100 | 432            | 435  | 432  | 102 | 290  | 117         | 457            | 460  | 457  | 102 | 320  | 135         |
| 5     | 125 | 508            | 511  | 508  | 127 | 320  | 155         | 559            | 562  | 559  | 127 | 360  | 200         |
| 6     | 150 | 559            | 562  | 559  | 152 | 360  | 192         | 610            | 613  | 610  | 152 | 400  | 264         |
| 8     | 200 | 660            | 664  | 660  | 203 | 430  | 340         | 737            | 740  | 737  | 203 | 480  | 424         |
| 10    | 250 | 787            | 791  | 787  | 254 | 502  | 515         | 838            | 841  | 838  | 254 | 560  | 730         |
| 12    | 300 | 838            | 841  | 838  | 305 | 554  | 750         | 965            | 968  | 965  | 305 | 632  | 1070        |
| 14    | 350 | 889            | 892  | 889  | 337 | 595  | 890         | 1029           | 1038 | 1029 | 322 | 680  | 1180        |
| 16    | 400 | 991            | 994  | 991  | 387 | 680  | 1303        | 1130           | 1140 | 1130 | 373 | 780  | 1790        |
| 18    | 450 | 1092           | 1095 | 1092 | 438 | 778  | 1800        | 1219           | 1232 | 1219 | 423 | 880  | 250         |
| 20    | 500 | 1194           | 1200 | 1194 | 489 | 970  | 2150        | 1321           | 1334 | 1321 | 471 | 1050 | 3080        |
| 24    | 600 | 1397           | 1407 | 1397 | 591 | 1100 | 3200        | 1549           | 1568 | 1549 | 522 | 1200 | 4600        |

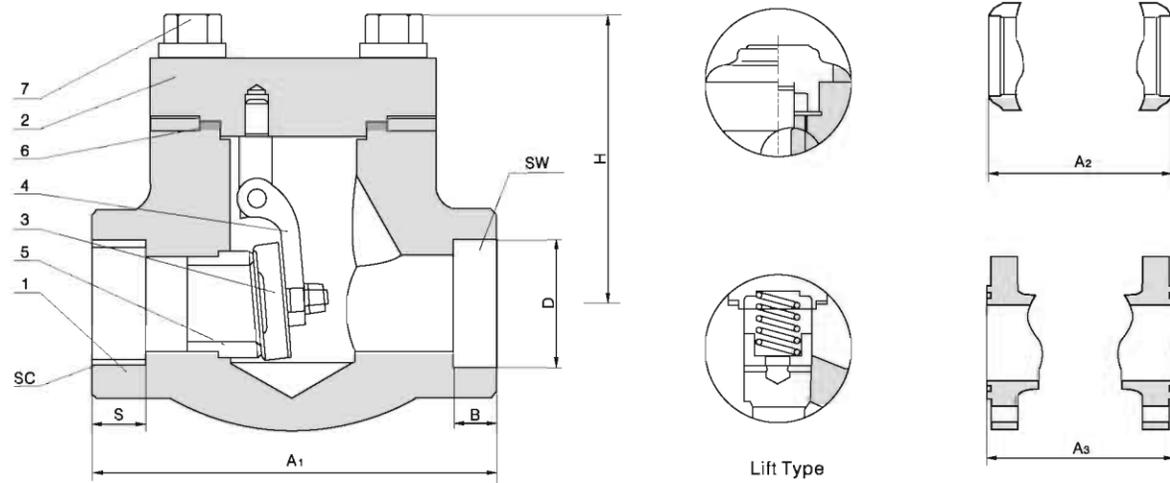
| Size  |     | Class 1500     |      |      |     |     |             | Class 2500     |      |      |     |     |             |
|-------|-----|----------------|------|------|-----|-----|-------------|----------------|------|------|-----|-----|-------------|
| NPS   | DN  | Dimensions(mm) |      |      |     |     | Weight (kg) | Dimensions(mm) |      |      |     |     | Weight (kg) |
|       |     | L              |      |      | d   | H   |             | L              |      |      | d   | H   |             |
| RF    | RTJ | BW             | RF   | RTJ  |     |     | BW          | RF             | RTJ  | BW   |     |     |             |
| 2     | 50  | 368            | 371  | 368  | 51  | 210 | 48          | 451            | 454  | 451  | 42  | 230 | 68          |
| 2 1/2 | 65  | 419            | 422  | 419  | 64  | 240 | 75          | 508            | 514  | 508  | 52  | 260 | 100         |
| 3     | 80  | 470            | 473  | 470  | 76  | 303 | 120         | 578            | 584  | 578  | 62  | 330 | 165         |
| 4     | 100 | 546            | 549  | 546  | 102 | 340 | 180         | 673            | 683  | 673  | 87  | 370 | 260         |
| 5     | 125 | 673            | 676  | 673  | 127 | 380 | 294         | 794            | 807  | 794  | 96  | 410 | 440         |
| 6     | 150 | 705            | 711  | 705  | 144 | 430 | 385         | 914            | 927  | 914  | 131 | 460 | 580         |
| 8     | 200 | 832            | 841  | 832  | 192 | 500 | 634         | 1022           | 1038 | 1022 | 179 | 530 | 970         |
| 10    | 250 | 991            | 1000 | 991  | 239 | 590 | 1140        | 1270           | 1292 | 1270 | 223 | 620 | 1700        |
| 12    | 300 | 1130           | 1146 | 1130 | 287 | 660 | 1650        | 1422           | 1445 | 1422 | 265 | 690 | 2600        |
| 14    | 350 | 1257           | 1276 | 1257 | 315 | 710 | 2000        | -              | -    | -    | -   | -   | -           |
| 16    | 400 | 1384           | 1407 | 1384 | 360 | 820 | 2700        | -              | -    | -    | -   | -   | -           |

● Class 150~Class 900 Cast Steel Lift Check Valve



| Size  |     | Class 150      |     |     |     |     |             | Class 300      |     |     |     |     |             |
|-------|-----|----------------|-----|-----|-----|-----|-------------|----------------|-----|-----|-----|-----|-------------|
| NPS   | DN  | Dimensions(mm) |     |     |     |     | Weight (kg) | Dimensions(mm) |     |     |     |     | Weight (kg) |
|       |     | L              |     |     | d   | H   |             | L              |     |     | d   | H   |             |
| RF    | RTJ | BW             | RF  | RTJ |     |     | BW          | RF             | RTJ | BW  |     |     |             |
| 1/2   | 15  | 108            | 119 | 108 | 13  | 76  | 3           | 152            | 162 | 152 | 13  | 78  | 5           |
| 3/4   | 20  | 117            | 130 | 117 | 19  | 76  | 4           | 178            | 191 | 178 | 19  | 82  | 6           |
| 1     | 25  | 127            | 140 | 127 | 25  | 98  | 5           | 203            | 216 | 203 | 25  | 102 | 8           |
| 1 1/4 | 32  | 140            | 153 | 140 | 32  | 102 | 7           | 216            | 229 | 216 | 32  | 106 | 11          |
| 1 1/2 | 40  | 165            | 178 | 165 | 38  | 115 | 8           | 229            | 242 | 229 | 38  | 118 | 13          |
| 2     | 50  | 203            | 216 | 203 | 51  | 140 | 15          | 267            | 283 | 267 | 51  | 140 | 26          |
| 2 1/2 | 65  | 216            | 229 | 216 | 64  | 162 | 22          | 292            | 308 | 292 | 64  | 164 | 33          |
| 3     | 80  | 241            | 254 | 241 | 76  | 168 | 28          | 318            | 333 | 318 | 76  | 178 | 50          |
| 4     | 100 | 292            | 305 | 292 | 102 | 194 | 42          | 356            | 371 | 356 | 102 | 195 | 86          |
| 5     | 125 | 356            | 368 | 356 | 127 | 210 | 60          | 400            | 416 | 400 | 127 | 223 | 120         |
| 6     | 150 | 406            | 419 | 406 | 152 | 226 | 75          | 445            | 460 | 445 | 152 | 245 | 180         |
| 8     | 200 | 495            | 508 | 495 | 203 | 250 | 118         | 533            | 549 | 533 | 203 | 280 | 220         |
| 10    | 250 | 622            | 635 | 622 | 254 | 275 | 194         | 622            | 638 | 622 | 254 | 336 | 310         |
| 12    | 300 | 699            | 711 | 699 | 305 | 332 | 320         | 711            | 727 | 711 | 305 | 380 | 510         |

| Size  |     | Class 600      |     |     |     |     |             | Class 900      |     |     |     |     |             |
|-------|-----|----------------|-----|-----|-----|-----|-------------|----------------|-----|-----|-----|-----|-------------|
| NPS   | DN  | Dimensions(mm) |     |     |     |     | Weight (kg) | Dimensions(mm) |     |     |     |     | Weight (kg) |
|       |     | L              |     |     | d   | H   |             | L              |     |     | d   | H   |             |
| RF    | RTJ | BW             | RF  | RTJ |     |     | BW          | RF             | RTJ | BW  |     |     |             |
| 2     | 50  | 292            | 295 | 292 | 51  | 152 | 32          | 368            | 371 | 368 | 50  | 180 | 50          |
| 2 1/2 | 65  | 330            | 333 | 330 | 64  | 167 | 45          | 419            | 422 | 419 | 64  | 200 | 65          |
| 3     | 80  | 356            | 359 | 356 | 76  | 178 | 68          | 381            | 384 | 381 | 74  | 235 | 88          |
| 4     | 100 | 432            | 435 | 432 | 102 | 215 | 98          | 457            | 460 | 457 | 100 | 270 | 140         |
| 5     | 125 | 508            | 511 | 508 | 125 | 240 | 155         | 559            | 562 | 559 | 125 | 300 | 210         |
| 6     | 150 | 559            | 562 | 559 | 152 | 279 | 230         | 610            | 613 | 610 | 150 | 350 | 300         |
| 8     | 200 | 660            | 664 | 660 | 200 | 328 | 300         | 737            | 740 | 737 | 200 | 400 | 390         |



Lift Type

**Technical Specification**

- Steel Check Valves, API 602
- Steel Valves, ASME B16.34
- Face to Face, Manufacturer Standard
- Face to Face, Flanged, ASME B16.10
- End Flanges, ASME B16.5
- Buttwelding Ends, ASME B16.25
- Socket-welding Ends, ASME B16.11
- Screwed Ends, ASME B1.20.1
- Inspection and Test, API 598

**Design Description**

- Bolted Bonnet Cap
- Choice of WB, Welding Bonnet
- Lift or Swing Type
- Seat Rings Integral with Body of Lift
- Horizontal or Vertical Service
- Socket Weld Ends
- SW, Socket-welding Ends
- SC, Screwed Ends
- BW, Buttwelding Ends
- Flanged Ends

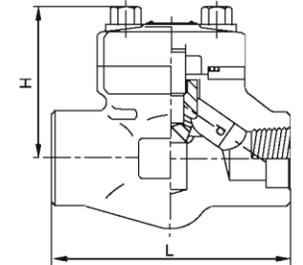
**Form of Major Part Material**

| No. | Part Name     | ASTM Material |             |             |             |             |              |              |             |
|-----|---------------|---------------|-------------|-------------|-------------|-------------|--------------|--------------|-------------|
|     |               | Carbon Steel  | F11         | F22         | 304 Type    | 316 Type    | 304L Type    | 316L Type    | 20 Alloy    |
| 1   | Body          | A105          | A182 F11    | A182 F22    | A182 F304   | A182 F316   | A182 F304L   | A182 F316L   | 20-Alloy    |
| 2   | Bonnet        | A105          | A182 F11    | A182 F22    | A182 F304   | A182 F316   | A182 F304L   | A182 F316L   | 20-Alloy    |
| 3   | Disc          | A182 F6a      | A182 F11+HF | A182 F22+HF | A182 F304   | A182 F316   | A182 F304L   | A182 F316L   | 20-Alloy    |
| 4   | Hinge         | A182 F6a      | A182 F11    | A182 F22    | A182 F304   | A182 F316   | A182 F304L   | A182 F316L   | 20-Alloy    |
| 5   | Seat          | A182 F6a      | A182 F11+HF | A182 F22+HF | A182 F304   | A182 F316   | A182 F304L   | A182 F316L   | 20-Alloy    |
| 6   | Bonnet Gasket | 304+Graphit   | 304+Graphit | 304+Graphit | 304+Graphit | 316+Graphit | 304L+Graphit | 316L+Graphit | 316+Graphit |
| 7   | Bonnet Bolt   | A193 B7       | A193 B7     | A193 B16    | A193 B8     | A193 B8M    | A193 B8      | A193 B8M     | A193 B8M    |

**Class800 Main Outline Dimensions & Weight**

Bold valve cover.  
Designs according to BS5,352.

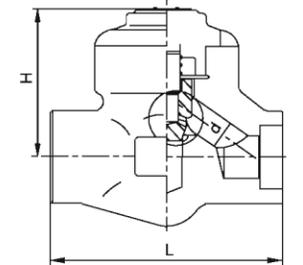
| R.P         |       | 1/2 | 3/4  | 1    | 1 1/4 | 1 1/2 | 2     |       |
|-------------|-------|-----|------|------|-------|-------|-------|-------|
| F.P         |       | 1/4 | 3/8  | 1/2  | 3/4   | 1     | 1 1/4 | 1 1/2 |
| L           | Lift  | 79  | 79   | 92   | 111   | 120   | 152   | 172   |
|             | Swing | 79  | 79   | 92   | 111   | 120   | 140   | 178   |
| H           | Lift  | 61  | 61   | 61   | 78    | 84    | 84    | 118   |
|             | Swing | 61  | 61   | 61   | 78    | 84    | 84    | 120   |
| d           | Lift  | 7   | 9    | 13   | 17.5  | 23    | 30    | 35    |
|             | Swing | 8   | 10.5 | 13.5 | 18    | 24    | 29    | 36.5  |
| Weight (kg) | Lift  | 1.2 | 1.5  | 1.7  | 3.3   | 4.2   | 4.2   | 10.5  |
|             | Swing | 1.4 | 15   | 1.7  | 3.3   | 4.2   | 4.2   | 8.5   |



**Class800 Main Outline Dimensions & Weight**

Weld valve cover.  
Designs according to BS5,352.

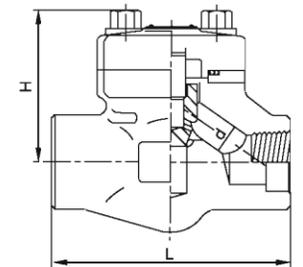
| R.P        |  | 1/2 | 3/4 | 1   | 1 1/4 | 1 1/2 | 2     | 2 1/2 |
|------------|--|-----|-----|-----|-------|-------|-------|-------|
| F.P        |  | 1/4 | 3/8 | 1/2 | 3/4   | 1     | 1 1/4 | 1 1/2 |
| L          |  | 79  | 79  | 92  | 111   | 120   | 152   | 172   |
| H          |  | 61  | 61  | 61  | 78    | 84    | 103   | 118   |
| d          |  | 7   | 9   | 13  | 17.5  | 23    | 30    | 35    |
| Weight(kg) |  | 1.2 | 1.3 | 1.5 | 3.0   | 3.9   | 6.0   | 10    |



**Class900~1500 Main Outline Dimensions & Weight**

Bold valve cover.  
Designs according to BS5,352.

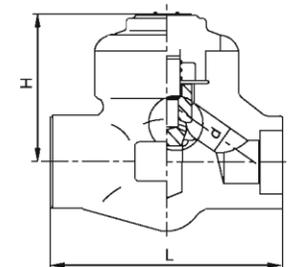
| R.P         |       | 1/2 | 3/4  | 1    | 1 1/4 | 1 1/2 | 2     |       |
|-------------|-------|-----|------|------|-------|-------|-------|-------|
| F.P         |       | 1/4 | 3/8  | 1/2  | 3/4   | 1     | 1 1/4 | 1 1/2 |
| L           | Lift  | 92  | 111  | 111  | 120   | 152   | 172   | 200   |
|             | Swing | 92  | 111  | 111  | 120   | 120   | 140   | 178   |
| H           | Lift  | 61  | 78   | 78   | 84    | 103   | 118   | 132   |
|             | Swing | 61  | 78   | 78   | 84    | 101   | 120   | 133   |
| d           | Lift  | 7   | 12   | 15   | 20    | 28    | 32    | 40    |
|             | Swing | 8   | 10.5 | 13.5 | 18.7  | 24    | 29    | 45    |
| Weight (kg) | Lift  | 1.5 | 3.4  | 3.3  | 4.2   | 6.3   | 10.5  | 12.5  |
|             | Swing | 1.5 | 3.4  | 3.3  | 4.2   | 5.0   | 8.5   | 10.9  |



**Class900~1500 Main Outline Dimensions & Weight**

Weld valve cover.  
Designs according to BS5,352.

| R.P        |  | 1/2 | 3/4 | 1   | 1 1/4 | 1 1/2 | 2     | 2 1/2 |
|------------|--|-----|-----|-----|-------|-------|-------|-------|
| F.P        |  | 1/4 | 3/8 | 1/2 | 3/4   | 1     | 1 1/4 | 1 1/2 |
| L          |  | 92  | 111 | 111 | 120   | 152   | 172   | 200   |
| H          |  | 61  | 78  | 78  | 84    | 103   | 118   | 132   |
| d          |  | 7   | 12  | 15  | 20    | 28    | 32    | 40    |
| Weight(kg) |  | 1.3 | 3.1 | 3.1 | 3.9   | 5.8   | 10.0  | 11.5  |





### ● Technical Specification

Design and Manufacture: Cast steel globe valve to BS 1873 and ASME B16.34; Forged steel globe valve to API 602.

Inspection and Test: API 598.

End flange dimension: ASME B16.5 .

BW end dimension: ASME B16.25.

Socket-weld dimension: ASME B16.11.

Face to face and end to end: ASME B16.10.

Pressure-temperature ratings: ASME B16.34.

### ● The features of globe valve

Bolted Bonnet; Outside Screw and Yoke; Rising stems; Metallic seating surfaces.

### ● Body and Bonnet Connection

The body and bonnet of Class 150 ~ Class 900 globe valves are usually with studs and nuts. And the body and bonnet of Class 1500 ~ Class 2500 globe valves are usually of pressurized seal design.

### ● Gasket of Cover Flange

Stainless steel + flexible graphite wounded gasket is used for Class 150 and Class 300 globe valve; Stainless steel + flexible graphite wounded gasket is used for Class 600, and ring joint gasket is also optional for Class 600. Ring joint gasket is used for Class 900 globe valve; Pressurized seal design is used for Class 1500 ~ Class 2500 globe valve.

### ● Actuation

Hand wheel, impact hand wheel & gear box is usually used for globe valve actuation. Chain wheel and electric actuator can be also used for globe valve actuation if being requested by the customers.

### ● Packing Seal

Molded flexible graphite is used for packing material. PTFE or combined packing material can be also used if being requested by the customer. The internal surface of the stuffing box, of which area is contacted with the packing, is of excellent finish (Ra 3.2  $\mu$  m). The stem surface, contacting with the packing, should be rolled and pressed after being precisely machined, so as to reach to the high finish and compactness (Ra 0.8  $\mu$  m) and ensure the relizble tightness of the stem area.

### ● Belleville Spring Loaded Packing Impacting System

If being requested by the customer, the Belleville spring loaded packing impacting system can be adopted for enhancing the durability and reliability of the packing seal.

### ● Back Seating Design

All our globe valves have the back seating design. In most cases, the carbon steel globe valve is fitted with a renewable back seat. For stainless steel globe valve, the back seat is machined directly in the bonnet or is machined after welding. When the globe valve is at fully open position, the sealing of the back seat can be very reliable. However, as per the requirement of API, it is not advisable to add or change packing by the mean of back seating when the valve is pressure containing.

### ● Seat

For carbon steel globe valve, the seat is usually forged steel. The sealing surface of the seat is spray welded with hard alloy specified by the customer. Renewable threaded seat is used for NPS  $\leq$  10 globe valves, and welded on seat can be also optional if being requested by the customer. Welded on seat is used for NPS  $\geq$  12 carbon steel globe valves. For Stainless steel globe valve, integral seat is usually adopted, or to weld hard alloy directly integrally. Threaded or welded on seat is also optional for stainless steel globe valve if being requested by the customer.

### ● Stem Design

The stem is of integral forged design. The minimum diameter of the stem shall per the standard requirement.

### ● Stem Nut

Usually, the stem nut is made of ASTM A439 D2. it is also can be made of copper ally if being requested by the customer. For large sized globe valve, rolling bearing is fitted at the two sides of stem nut in order to minimize the open and close torque of the globe valve.

### ● Special Gate Valve

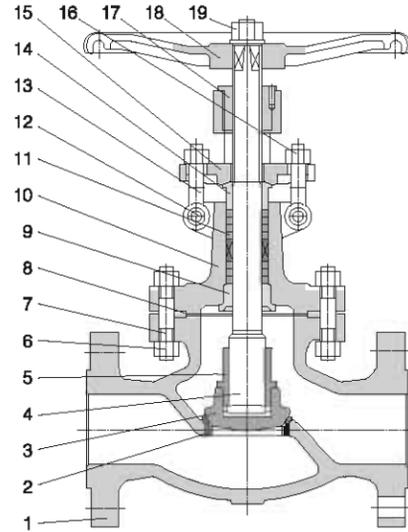
Besides the common globe valves, Our company also makes cryogenic globe valve, Bellow sealed globe valve, Jacketed globe valve, etc.



Bellow Sealed Globe Valve



Forged Steel Globe Valve



**Technical Specification**

Design and Manufacture: BS1873 or ASME B16.34  
 Inspection and Test: API 598  
 End flange dimension: ASME B16.5  
 BW end dimension: ASME B16.25

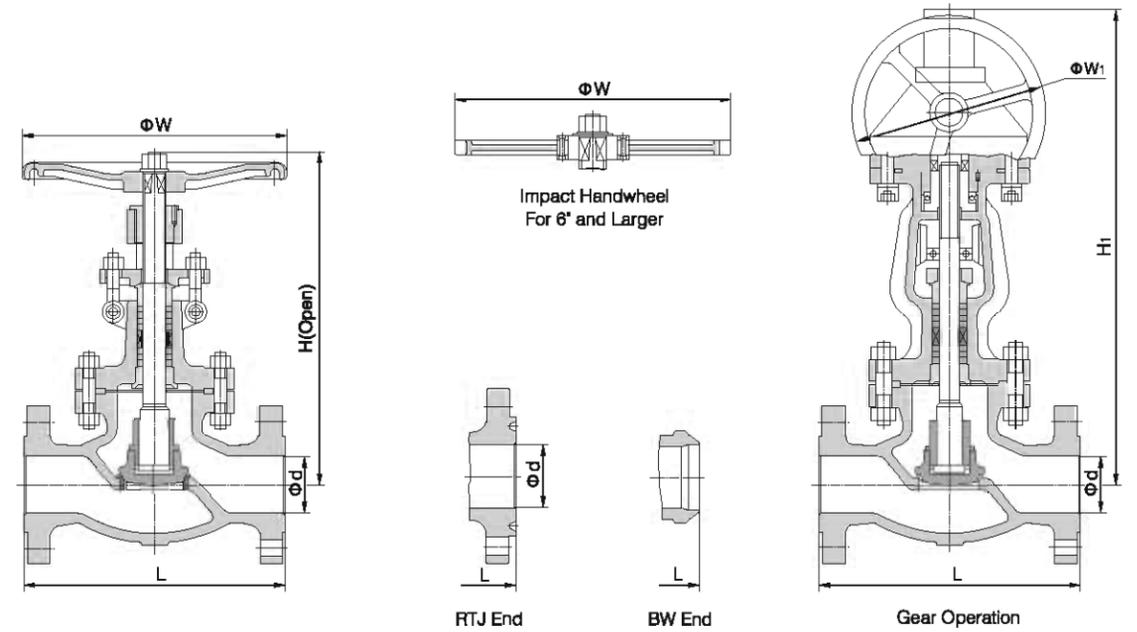
Socket-weld dimension: ASME B16.11  
 Face to face and end to end: ASME B16.10  
 Pressure-temperature ratings: ASME B16.34

**Form of Major Part Material**

| Parts No. | Parts Name       | Materials            |                      |                      |                |                |
|-----------|------------------|----------------------|----------------------|----------------------|----------------|----------------|
|           |                  | WCB/Trim 1           | WCB/Trim 5           | WCB/Trim 8           | CF8/304        | CF6M/316       |
| 1         | Body             | ASTM A216 WCB        | ASTM A216 WCB        | ASTM A216 WCB        | ASTM A351 CF8  | ASTM A351 CF8M |
| 2         | Seat ring        | A105+13Cr            | A105+STL             | A105+STL             | ASTM A351 CF8  | ASTM A351 CF8M |
| 3         | Disc             | ASTM A216 WCB + 13Cr | ASTM A216 WCB + STL  | ASTM A216 WCB + 13Cr | ASTM A351 CF6  | ASTM A351 CF8M |
| 4         | Stern            | ASTM A182 F6a        | ASTM A182 F6a        | ASTM A182 F6a        | ASTM A182 F304 | ASTM A182 F316 |
| 5         | Disc nut         | ASTM A216 WCB        | ASTM A216 WCB        | ASTM A216 WCB        | ASTM A351 CF8  | ASTM A351 CF8M |
| 6         | Bonnet nut       | ASTM A194 2H         | ASTM A194 2H         | ASTM A194 2H         | ASTM A194 8    | ASTM A194 8M   |
| 7         | Bonnet bolt      | ASTM A193 B7         | ASTM A193 B7         | ASTM A193 B7         | ASTM A193 B8   | ASTM A193 B8M  |
| 8         | Gasket           | 304 sheet + Graphite | 304 sheet + Graphite | 304 sheet + Graphite | 304 + Graphite | 316 + Graphite |
| 9         | Backseat bushing | ASTM A182 F6a        | ASTM A182 F6a        | ASTM A182 F6a        | ASTM A351 CF8  | ASTM A351 CF8M |
| 10        | Bonnet           | ASTM A216 WCB        | ASTM A216 WCB        | ASTM A216 WCB        | ASTM A351 CF8  | ASTM A351 CF8M |
| 11        | Packing          | Graphite             | Graphite             | Graphite             | Graphite       | Graphite       |
| 12        | Eyebolt pin      | ASTM A36             | ASTM A36             | ASTM A36             | 304ss          | 316ss          |
| 13        | Gland eyebolt    | ASTM A193 B7         | ASTM A193 B7         | ASTM A193 B7         | ASTM A193 B8   | ASTM A193 B8M  |
| 14        | Gland            | ASTM A182 F6a        | ASTM A182 F6a        | ASTM A182 F6a        | ASTM A182 F304 | ASTM A182 F316 |
| 15        | Gland flange     | ASTM A216 WCB        | ASTM A216 WCB        | ASTM A216 WCB        | ASTM A351 CF8  | ASTM A351 CF8M |
| 16        | Eyebolt nut      | ASTM A194 2H         | ASTM A194 2H         | ASTM A194 2H         | ASTM A194 8    | ASTM A194 8M   |
| 17        | Stern nut        | ASTM A439 D2         | ASTM A439 D2         | ASTM A439 D2         | ASTM A439 D2   | ASTM A439 D2   |
| 18        | Hand wheel       | Ductile Iron         | Ductile Iron         | Ductile Iron         | Ductile Iron   | Ductile Iron   |
| 19        | Hand wheel nut   | Carbon steel         | Carbon steel         | Carbon steel         | Carbon steel   | Carbon steel   |

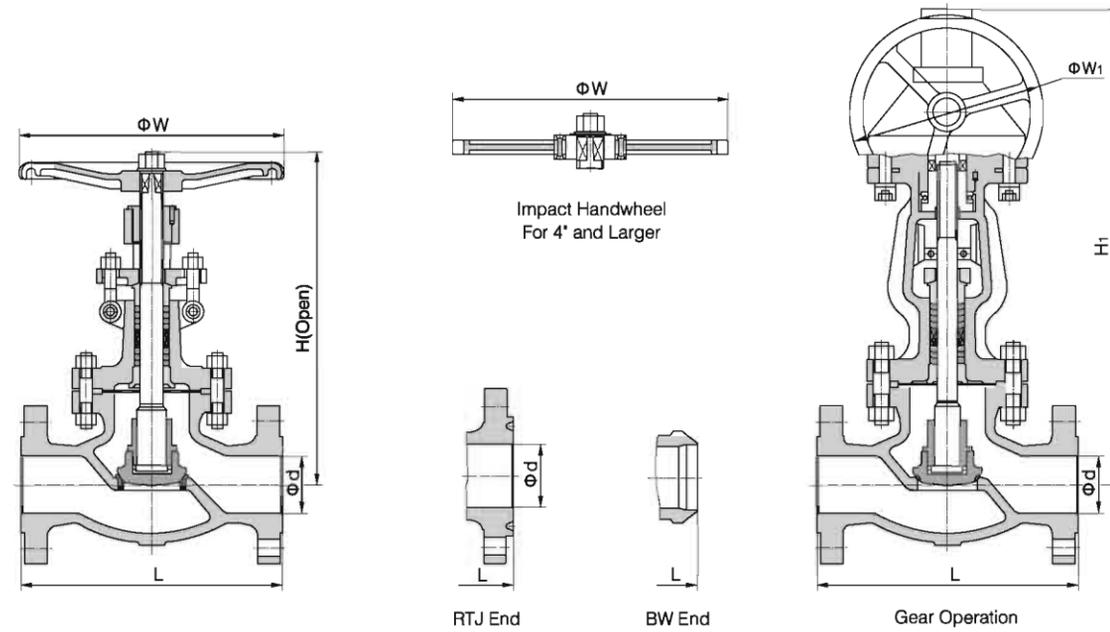
Note: The chart above only lists out some common composition of steel check valve parts. We may provide other different parts material composition according to the customer's request or the actual valve working condition.

**Cast Steel Globe Valve Class 150**

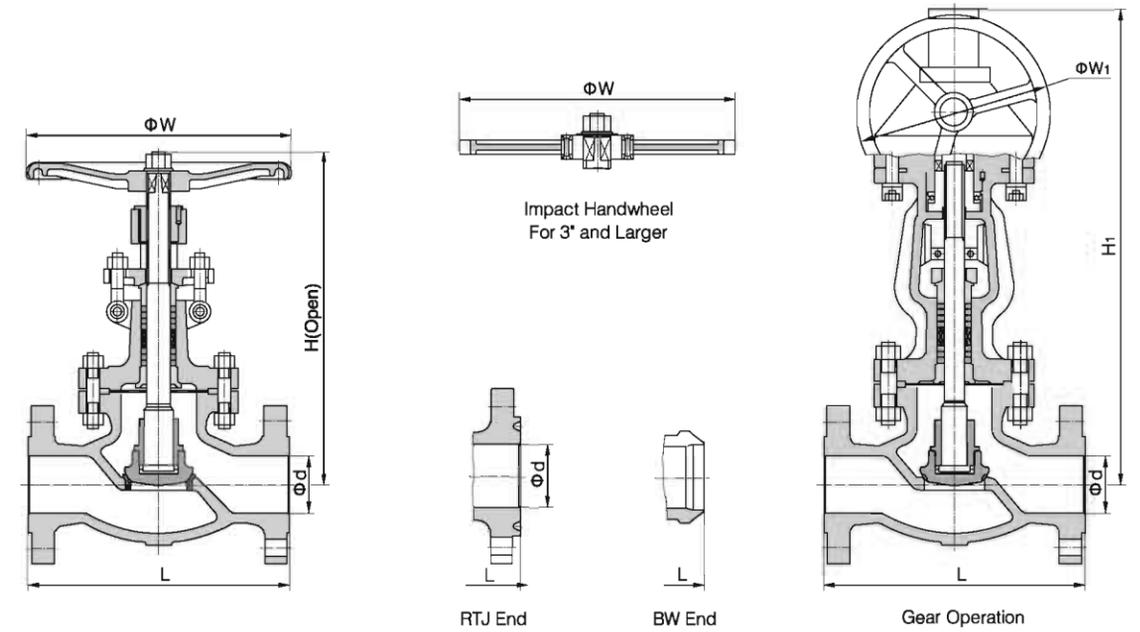


| Class | Size  |     | Dimensions(mm) |     |     |     |     |                |     | Weight(kg)     |     |     |
|-------|-------|-----|----------------|-----|-----|-----|-----|----------------|-----|----------------|-----|-----|
|       | NPS   | DN  | L              |     |     | d   | H   | H <sub>1</sub> | W   | W <sub>1</sub> | H.W | G.O |
|       |       |     | RF             | RTJ | BW  |     |     |                |     |                |     |     |
| 150   | 1/2   | 15  | 108            | 119 | 108 | 13  | 182 | -              | 100 | -              | 4   | -   |
|       | 3/4   | 20  | 117            | 130 | 117 | 19  | 193 | -              | 100 | -              | 6   | -   |
|       | 1     | 25  | 127            | 140 | 127 | 25  | 217 | -              | 100 | -              | 6   | -   |
|       | 1 1/4 | 32  | 140            | 152 | 140 | 32  | 235 | -              | 135 | -              | 12  | -   |
|       | 1 1/2 | 40  | 165            | 178 | 165 | 38  | 258 | -              | 135 | -              | 16  | -   |
|       | 2     | 50  | 203            | 218 | 203 | 51  | 330 | -              | 200 | -              | 25  | -   |
|       | 2 1/2 | 65  | 216            | 229 | 216 | 64  | 360 | -              | 250 | -              | 42  | -   |
|       | 3     | 80  | 241            | 254 | 241 | 76  | 390 | -              | 280 | -              | 46  | -   |
|       | 4     | 100 | 292            | 305 | 292 | 102 | 445 | -              | 300 | -              | 74  | -   |
|       | 5     | 125 | 356            | 369 | 356 | 127 | 480 | -              | 350 | -              | 111 | -   |
|       | 6     | 150 | 406            | 419 | 406 | 152 | 520 | 556            | 350 | 310            | 165 | 258 |
|       | 8     | 200 | 495            | 508 | 495 | 203 | 600 | 858            | 400 | 310            | 275 | 300 |
| 10    | 250   | 622 | 635            | 622 | 254 | 773 | 805 | 450            | 460 | 400            | 450 |     |
| 12    | 300   | 898 | 711            | 698 | 305 | 880 | 955 | 500            | 460 | 624            | 725 |     |

● Cast Steel Globe Valve Class 300

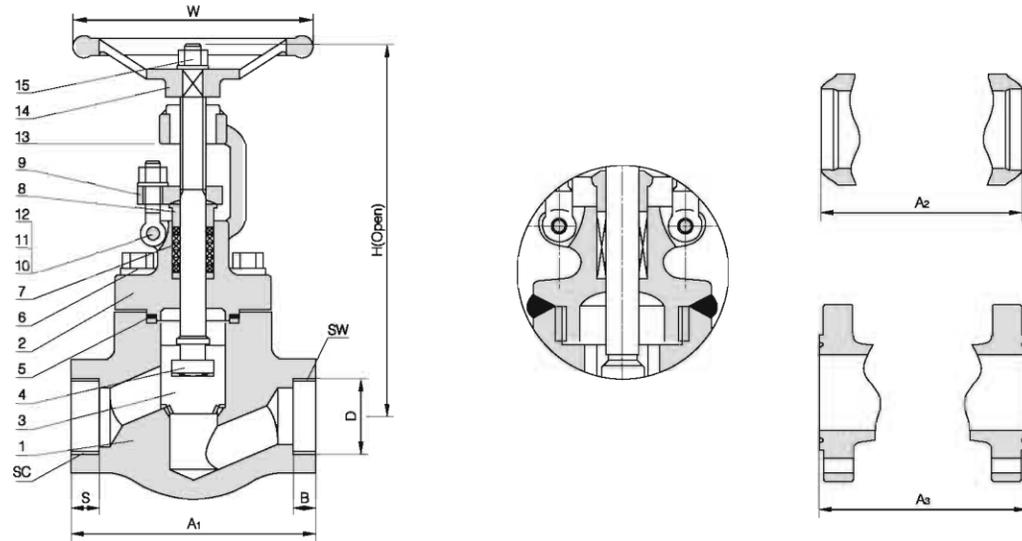


● Cast Steel Globe Valve Class 600/900



| Class | Size  |     | Dimensions(mm) |     |     |      |      |                |     |                | Weight(kg) |     |
|-------|-------|-----|----------------|-----|-----|------|------|----------------|-----|----------------|------------|-----|
|       | NPS   | DN  | L              |     |     | d    | H    | H <sub>1</sub> | W   | W <sub>1</sub> | H.W        | G.O |
|       |       |     | RF             | RTJ | BW  |      |      |                |     |                |            |     |
| 300   | 1/2   | 15  | 152            | 164 | 152 | 14   | 185  | -              | 100 | -              | 5          | -   |
|       | 3/4   | 20  | 178            | 191 | 178 | 19   | 195  | -              | 100 | -              | 7          | -   |
|       | 1     | 25  | 203            | 216 | 203 | 25   | 220  | -              | 135 | -              | 10         | -   |
|       | 1 1/4 | 32  | 216            | 229 | 216 | 32   | 240  | -              | 135 | -              | 14         | -   |
|       | 1 1/2 | 40  | 229            | 241 | 229 | 38   | 260  | -              | 160 | -              | 19         | -   |
|       | 2     | 50  | 267            | 283 | 267 | 51   | 385  | -              | 200 | -              | 25         | -   |
|       | 2 1/2 | 65  | 292            | 308 | 292 | 64   | 420  | -              | 200 | -              | 42         | -   |
|       | 3     | 80  | 318            | 333 | 318 | 76   | 440  | -              | 280 | -              | 46         | -   |
|       | 4     | 100 | 356            | 371 | 356 | 102  | 515  | -              | 350 | -              | 74         | -   |
|       | 5     | 125 | 400            | 416 | 400 | 127  | 580  | -              | 350 | -              | 111        | -   |
|       | 6     | 150 | 444            | 460 | 444 | 152  | 660  | 690            | 400 | 310            | 165        | 195 |
|       | 8     | 200 | 559            | 575 | 559 | 203  | 900  | 950            | 550 | 460            | 275        | 327 |
| 10    | 250   | 622 | 638            | 622 | 254 | 950  | 990  | 600            | 460 | 400            | 452        |     |
| 12    | 300   | 711 | 727            | 711 | 305 | 1030 | 1080 | 700            | 460 | 624            | 725        |     |

| Class | Size  |     | Dimensions(mm) |     |     |     |     |                |     |                | Weight(kg) |     |
|-------|-------|-----|----------------|-----|-----|-----|-----|----------------|-----|----------------|------------|-----|
|       | NPS   | DN  | L              |     |     | d   | H   | H <sub>1</sub> | W   | W <sub>1</sub> | H.W        | G.O |
|       |       |     | RF             | RTJ | BW  |     |     |                |     |                |            |     |
| 600   | 2     | 50  | 292            | 295 | 292 | 51  | 360 | -              | 250 | -              | 32         | -   |
|       | 2 1/2 | 65  | 330            | 333 | 330 | 64  | 410 | -              | 280 | -              | 42         | -   |
|       | 3     | 80  | 356            | 359 | 356 | 76  | 465 | -              | 300 | -              | 63         | -   |
|       | 4     | 100 | 432            | 435 | 432 | 102 | 545 | 575            | 400 | 310            | 107        | 138 |
|       | 5     | 125 | 508            | 511 | 508 | 127 | 625 | 660            | 500 | 310            | 185        | 215 |
|       | 6     | 150 | 559            | 562 | 559 | 152 | 785 | 820            | 550 | 460            | 290        | 342 |
|       | 8     | 200 | 660            | 664 | 660 | 200 | 930 | 960            | 650 | 460            | 540        | 645 |
|       | 2     | 50  | 368            | 371 | 368 | 51  | 480 | -              | 350 | -              | 55         | -   |
| 900   | 2 1/2 | 65  | 419            | 422 | 419 | 64  | 520 | -              | 350 | -              | 68         | -   |
|       | 3     | 80  | 381            | 384 | 381 | 76  | 564 | 630            | 400 | 310            | 95         | 128 |
|       | 4     | 100 | 457            | 460 | 457 | 102 | 685 | 720            | 450 | 310            | 160        | 210 |
|       | 5     | 125 | 559            | 562 | 559 | 127 | 780 | 840            | 550 | 460            | 270        | 325 |
|       | 6     | 150 | 610            | 613 | 610 | 152 | 950 | 1015           | 650 | 460            | 410        | 480 |



**Technical Specification**

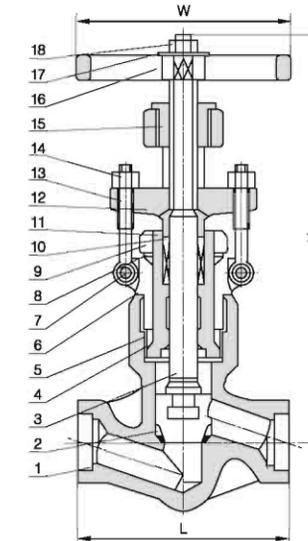
- Steel Globe Valves, API 602
- Steel Valves, ASME B16.34
- Face to Face, Manufacturer Standard
- Face to Face, Flanged, ASME B16.10
- End Flanges, ASME B16.5
- Buttwelding Ends, ASME B16.25
- Socket-welding Ends, ASME B16.11
- Screwed Ends, ASME B1.20.1
- Inspection and Test, API 598

**Design Description**

- Outside Screw and Yoke (OS&Y)
- Bolted Bonnet
- Choice of WB, Welding Bonnet
- Seat Rings Integral with Body
- Yoke Integral with Bonnet
- Rising Stem and Handwheel
- Horizontal Service
- SW, Socket-welding Ends
- SC, Screwed Ends
- BW, Buttwelding Ends

**Form of Major Part Material**

| No. | Part Name                           | ASTM Material  |                |                |                 |                 |                 |                 |                 |  |
|-----|-------------------------------------|----------------|----------------|----------------|-----------------|-----------------|-----------------|-----------------|-----------------|--|
|     |                                     | Carbon Steel   | F11            | F22            | 304 Type        | 316 Type        | 304L Type       | 316L Type       | 20 Alloy        |  |
| 1   | Body                                | A105           | A182 F11       | A182 F22       | A182 F304       | A182 F316       | A182 F304L      | A182 F316L      | 20-Alloy        |  |
| 2   | Bonnet                              | A105           | A182 F11       | A182 F22       | A182 F304       | A182 F316       | A182 F304L      | A182 F316L      | 20-Alloy        |  |
| 3   | Disc                                | A182 F6a       | A182 F11+HF    | A182 F22+HF    | A182 F304       | A182 F316       | A182 F304L      | A182 F316L      | 20-Alloy        |  |
| 4   | Stem                                | A182 F6a       | A182 F11       | A182 F22       | A182 F304       | A182 F316       | A182 F304L      | A182 F316L      | 20-Alloy        |  |
| 5   | Bonnet Gasket                       | 304+Graphit    | 304+Graphit    | 304+Graphit    | 304+Graphit     | 316+Graphit     | 304L+Graphit    | 316L+Graphit    | 316+Graphit     |  |
| 6   | Bonnet Bolt                         | A193 B7        | A193 B7        | A193 B16       | A193 B8         |  |
| 7   | Packing                             | Graphite       | Graphite       | Graphite       | Graphite *2     |  |
| 8   | Gland                               | A276 410       | A276 410       | A276 410       | A276 304        | A276 316        | A276 304L       | A276 316L       | 20-Alloy        |  |
| 9   | Gland Flange                        | A182 F6a       | A182 F11       | A182 F22       | A182 F304       |  |
| 10  | Eyebolt                             | Carbon Steel   | A193 B7        | A193 B7        | A193 B8         |  |
| 11  | Eyebolt Nut                         | Carbon Steel   | A194 2H        | A194 2H        | A194 8          |  |
| 12  | Eyebolt Pin                         | A276 410       | A276 410       | A276 410       | A276 304        |  |
| 13  | Yoke Sleeve                         | Bronze         | Bronze *3      | Bronze *3      | Bronze          | Bronze          | Bronze          | Bronze          | Bronze          |  |
| 14  | Hand wheel                          | Malleable iron | Malleable iron | Malleable iron | Malleable iron  | Malleable iron  | Malleable iron  | Malleable iron  | Malleable iron  |  |
| 15  | Wheel Nut                           | Carbon Steel   | Carbon Steel   | Carbon Steel   | Stainless Steel | Stainless Steel | Stainless Steel | Stainless Steel | Stainless Steel |  |
| *1  | PN ≥ 600 Class seal face will be HF |                |                |                |                 |                 |                 |                 |                 |  |
| *2  | PTFE Optional                       |                |                |                |                 |                 |                 |                 |                 |  |
| *3  | Ductile Ni-Resist iron Optional     |                |                |                |                 |                 |                 |                 |                 |  |
| Na  | Integral with vessel                |                |                |                |                 |                 |                 |                 |                 |  |



**Technical Specification**

- Steel Globe Valves, API 602
- Steel Valves, ASME B16.34
- Face to Face, Manufacturer Standard
- Face to Face, ASME B16.10
- Buttwelding Ends, ASME B16.25
- Socket-welding Ends, ASME B16.11
- Screwed Ends, ASME B1.20.1
- Inspection and Test, API 598

**Design Description**

- Outside Screw and Yoke (OS&Y)
- Pressure Seal Bonnet
- Choice of WB, Welding Bonnet
- Single wedge, Fully Guided
- Renewable Seat Rings
- Yoke Integral with Bonnet
- Rising Stem and Handwheel
- SW, Socket-welding Ends
- SC, Screwed Ends
- BW, Buttwelding Ends

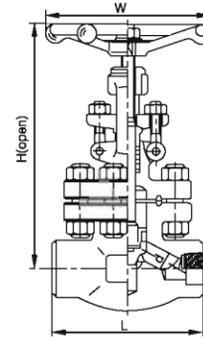
**Form of Major Part Material**

| No. | Part Name        | CS to ASTM            | AS to ASTM            | SS to ASTM            |                       |
|-----|------------------|-----------------------|-----------------------|-----------------------|-----------------------|
|     |                  | Type A 105N           | Type F22              | Type F304(L)          | Type F316(L)          |
| 1   | Body             | A105N                 | A182 F22              | A182 F304(L)          | A182 F316(L)          |
| 2   | Disc             | A276 420+STL          | A276 304+STL          | A276 304(L)+STL       | A276 316(L)+STL       |
| 3   | Stem             | A276-410              | A182 F22              | A182 F304(L)          | A182 F316(L)          |
| 4   | Seal Place       | A105                  | A182 F22              | A182 F304(L)          | A182 F316(L)          |
| 5   | Packing Ring     | A182 F304             | A182 F304             | A182 F304(L)          | F316(L)               |
| 6   | Bonnet           | A105N                 | A182 F22              | A182 F304(L)          | A182 F316(L)          |
| 7   | Pin              | A276 420              | A276 420              | A182 F304             | A182 F304             |
| 8   | Gasket           | A105N                 | A182 F22              | A182 F304(L)          | A182 F316(L)          |
| 9   | Promotes the Nut | A194 2H               | A194 4                | A194 8                | A194 8M               |
| 10  | Stem Packing     | Flexible graphite+304 | Flexible graphite+304 | Flexible graphite+316 | Flexible graphite+316 |
| 11  | Gland            | A276 420              | A276 420              | A182 F304             | A182 F304             |
| 12  | Gland Flange     | A105                  | A105                  | A182 F304             | A182 F304             |
| 13  | Gland Eyebolt    | A193 B7               | A193 B16              | A193 B8               | A193 B8M              |
| 14  | Gland Nut        | A194 2H               | A194 4                | A194 8                | A194 8M               |
| 15  | Yoke Nut         | A276 420              | A276 420              | A276 420              | A276 420              |
| 16  | Hand Wheel       | A197                  | A194 4                | A197                  | A197                  |
| 17  | Nameplate        | SS                    | SS                    | SS                    | SS                    |
| 18  | Stem Nut         | C.S                   | C.S                   | SS                    | SS                    |

**Class900~1500 Main Outline Dimensions & Weight**

Bold fastening valve cover(RJ), reduced port, outside screw stem & yoke (OS&Y).  
The terminal connection or receives for the thread inserts welds, designs according to BS5.352

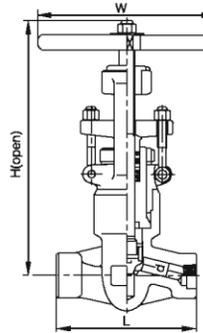
|            |     |     |     |       |     |       |
|------------|-----|-----|-----|-------|-----|-------|
| F.P        | 1/2 | 3/4 | 1   | 1 1/4 | 2   | 2 1/2 |
| L          | 110 | 110 | 150 | 150   | 210 | 235   |
| W          | 110 | 110 | 130 | 210   | 180 | 250   |
| H          | 227 | 227 | 300 | 307   | 40  | 448   |
| d          | 9   | 12  | 15  | 20    | 32  | 40    |
| Weight(kg) | 5   | 5   | 10  | 11.5  | 22  | 37    |



**Class900~1500 Main Outline Dimensions & Weight**

Pressure seal bonnet, reduced port, outside screw stem & yoke (OS&Y).BS 5352

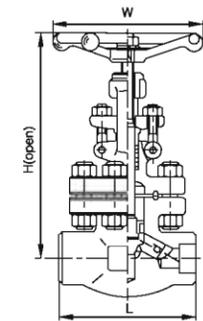
|            |      |      |      |       |       |      |
|------------|------|------|------|-------|-------|------|
| F.P        | 1/2  | 3/4  | 1    | 1 1/4 | 1 1/2 | 2    |
| L          | 140  | 140  | 140  | 178   | 178   | 216  |
| W          | 200  | 200  | 200  | 280   | 280   | 300  |
| H          | 320  | 320  | 320  | 440   | 440   | 490  |
| d          | 12   | 15   | 20   | 28    | 32    | 40   |
| Weight(kg) | 11.5 | 10.8 | 10.5 | 19.6  | 21.1  | 55.4 |



**Class2500 Main Outline Dimensions & Weight**

Bold fastening valve cover(RJ), full port (OS&Y).  
The terminal connection for receives inserts welds, designs according to ASME B16.34

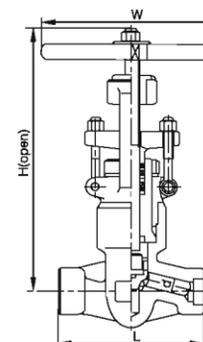
|            |     |      |      |       |     |
|------------|-----|------|------|-------|-----|
| F.P        | 1/2 | 3/4  | 1    | 1 1/2 | 2   |
| L          | 150 | 150  | 210  | 235   | 235 |
| W          | 130 | 130  | 250  | 300   | 300 |
| H          | 293 | 300  | 390  | 435   | 435 |
| d          | 11  | 14   | 19   | 28    | 35  |
| Weight(kg) | 10  | 10.3 | 22.4 | 38    | 38  |



**Class2500 Main Outline Dimensions & Weight**

Reduced port (OS&Y).  
The terminal connection for receives inserts welds, designs according to ASME B16.34

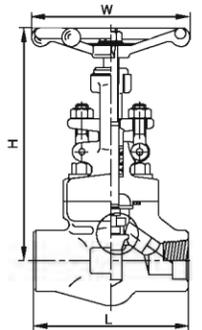
|            |      |      |      |       |       |     |
|------------|------|------|------|-------|-------|-----|
| F.P        | 1/2  | 3/4  | 1    | 1 1/4 | 1 1/2 | 2   |
| L          | 186  | 186  | 186  | 232   | 232   | 279 |
| W          | 200  | 200  | 200  | 280   | 280   | 300 |
| H          | 375  | 378  | 380  | 490   | 490   | 540 |
| d          | 11   | 14   | 19   | 25    | 28    | 35  |
| Weight(kg) | 12.3 | 11.6 | 10.8 | 26.0  | 28.4  | 60  |



**Class800 Main Outline Dimensions & Weight**

Bold fastening valve cover, outside screw stem & yoke (OS&Y).  
designs according to BS5,352.

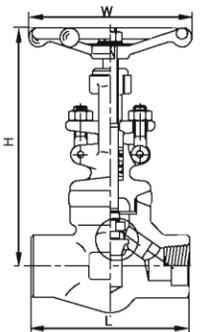
|            |     |      |      |      |       |       |       |       |
|------------|-----|------|------|------|-------|-------|-------|-------|
| R.P        | -   | 1/2  | 3/4  | 1    | 1 1/4 | 1 1/2 | 2     | 2 1/2 |
| F.P        | 1/4 | 3/8  | 1/2  | 3/4  | 1     | 1 1/4 | 1 1/2 | 2     |
| L          | 79  | 79   | 92   | 111  | 120   | 152   | 172   | 200   |
| W          | 100 | 100  | 100  | 125  | 160   | 160   | 180   | 200   |
| H          | 164 | 164  | 164  | 203  | 224   | 260   | 300   | 355   |
| d          | 7   | 9    | 13   | 17.5 | 23    | 30    | 35    | 46    |
| Weight(kg) | 1.9 | 2.28 | 2.37 | 4.3  | 5.75  | 7.8   | 12.5  | 17.5  |



**Class800 Main Outline Dimensions & Weight**

Weld joint valve cover, outside screw stem & yoke (OS&Y).  
Designs according to BS5,352.

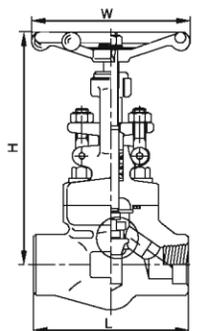
|            |     |     |     |      |       |       |       |       |
|------------|-----|-----|-----|------|-------|-------|-------|-------|
| R.P        | -   | 1/2 | 3/4 | 1    | 1 1/4 | 1 1/2 | 2     | 2 1/2 |
| F.P        | 1/4 | 3/8 | 1/2 | 3/4  | 1     | 1 1/4 | 1 1/2 | 2     |
| L          | 79  | 79  | 92  | 111  | 120   | 152   | 172   | 200   |
| W          | 100 | 100 | 100 | 125  | 160   | 160   | 180   | 200   |
| H          | 164 | 164 | 164 | 203  | 224   | 260   | 300   | 355   |
| d          | 7   | 9   | 13  | 17.5 | 23    | 30    | 35    | 46    |
| Weight(kg) | 1.7 | 1.7 | 1.9 | 3.3  | 5.2   | 6.8   | 10.6  | 13.8  |



**Class900~1500 Main Outline Dimensions & Weight**

Bold fastening valve cover, outside screw stem & yoke (OS&Y).  
Designs according to BS5,352.

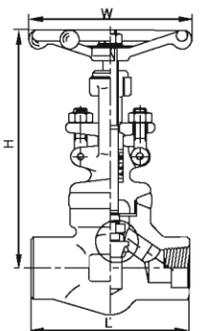
|            |     |     |     |     |       |       |       |       |
|------------|-----|-----|-----|-----|-------|-------|-------|-------|
| R.P        | -   | 1/2 | 3/4 | 1   | 1 1/4 | 1 1/2 | 2     | 2 1/2 |
| F.P        | 1/4 | 3/8 | 1/2 | 3/4 | 1     | 1 1/4 | 1 1/2 | 2     |
| L          | 92  | 111 | 111 | 120 | 152   | 172   | 200   | 220   |
| W          | 100 | 125 | 125 | 160 | 160   | 180   | 200   | 240   |
| H          | 171 | 207 | 207 | 240 | 258   | 330   | 355   | 370   |
| d          | 7   | 12  | 15  | 20  | 28    | 32    | 40    | 45    |
| Weight(kg) | 2.3 | 3.7 | 3.6 | 6.8 | 7.6   | 11.6  | 15    | 21.9  |

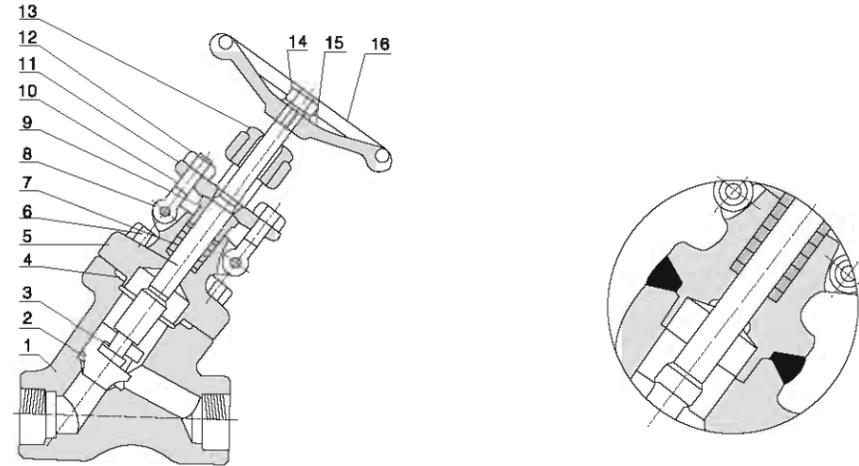


**Class900~1500 Main Outline Dimensions & Weight**

Weld joint valve cover, outside screw stem & yoke (OS&Y).  
Designs according to BS5,352.

|            |     |     |     |     |       |       |       |       |
|------------|-----|-----|-----|-----|-------|-------|-------|-------|
| R.P        | -   | 1/2 | 3/4 | 1   | 1 1/4 | 1 1/2 | 2     | 2 1/2 |
| F.P        | 1/4 | 3/8 | 1/2 | 3/4 | 1     | 1 1/4 | 1 1/2 | 2     |
| L          | 92  | 111 | 111 | 120 | 152   | 172   | 200   | 220   |
| W          | 100 | 125 | 125 | 160 | 160   | 180   | 200   | 240   |
| H          | 171 | 207 | 207 | 240 | 258   | 330   | 355   | 370   |
| d          | 7   | 12  | 15  | 20  | 28    | 32    | 40    | 45    |
| Weight(kg) | 2.0 | 3.4 | 3.3 | 6.0 | 5.6   | 10.3  | 14.2  | 18.5  |





**Technical Specification**

Steel Globe Valves, API 602  
 Steel Valves, ASME B16.34  
 Face to Face, Manufacturer Standard  
 Face to Face, Flanged, ASME B16.10  
 End Flanges, ASME B16.5  
 Buttwelding Ends, ASME B16.25  
 Socket-welding Ends, ASME B16.11  
 Screwed Ends, ASME B1.20.1  
 Inspection and Test, API 598

**Design Description**

Outside Screw and Yoke (OS&Y)  
 Bolted Bonnet  
 Choice of WB, Welding Bonnet  
 Loose Disc, Choice of Plug or Ball  
 Seat Rings Integral with Body  
 Yoke Integral with Bonnet  
 Rising Stem and Handwheel  
 Horizontal Service  
 SW, Socket-welding Ends  
 SC, Screwed Ends  
 BW, Buttwelding Ends

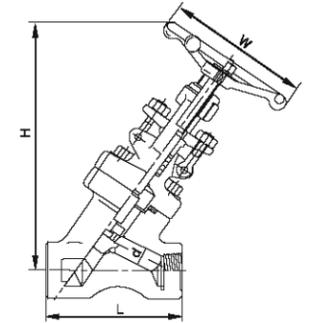
**Form of Major Part Material**

| No. | Components name | A105 F6a                   | A105 F6aHFS | LF2 304 | F11 F6aHF | F304(L) 304(L) | F316(L) 316(L) | F91 410HF |
|-----|-----------------|----------------------------|-------------|---------|-----------|----------------|----------------|-----------|
| 1   | Body            | A105                       | A105+HF     | LF2     | F11+HF    | F304(L)        | F316(L)        | F51       |
| 2   | Disc            | F6a                        | F6a         | F304    | F6aHF     | F304(L)        | F316(L)        | F51       |
| 3   | Stem            | 410                        | 410         | 304     | 410       | 304(L)         | 316(L)         | F51       |
| 4   | Gasket          | 304+Corrugated SS+Graphite |             |         |           |                |                |           |
| 5   | Bonnet          | A105                       | A105        | LF2     | F11       | F304(L)        | F316(L)        | F51       |
| 6   | Bolt            | B7                         | B7          | F7      | B16       | B8(M)          | B8(M)          | B8M       |
| 7   | Pin             | 410                        | 410         | 410     | 410       | 304            | 304            | 304       |
| 8   | Gland           | 410                        | 410         | 304     | 410       | 304            | 316            | F51       |
| 9   | Gland Eyebolt   | B7                         | B7          | L7      | B18       | B8(M)          | B8(M)          | B8M       |
| 10  | Gland           | A105                       | A105        | LF2     | F11       | F304           | F304           | F304      |
| 11  | Gland nut       | 2H                         | 2H          | 2H      | 2H        | 8(M)           | 8(M)           | BM        |
| 12  | Yoke Nut        | 410                        | 410         | 410     | 410       | 410            | 410            | 410       |
| 13  | Locks the nut   | 35                         | 35          | 35      | 35        | 35             | 35             | 35        |
| 14  | Name plate      | AL                         | AL          | AL      | AL        | AL             | AL             | AL        |
| 15  | Handwheel       | A197                       | A197        | A197    | A197      | A197           | A197           | A197      |

**Class800 Main Outline Dimensions & Weight**

Bolt fastening valve cover, outside screw stem & yoke (OS&Y).  
 Designs according to BS5,352.

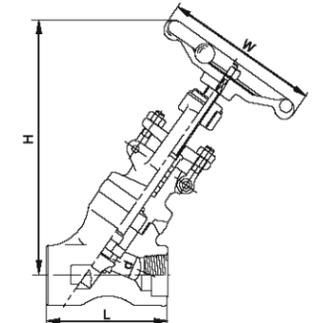
| R.P        | -   | 1/2 | 3/4 | 1    | 1 1/4 | 1 1/2 | 2     | 2 1/2 |
|------------|-----|-----|-----|------|-------|-------|-------|-------|
| F.P        | 1/4 | 3/8 | 1/2 | 3/4  | 1     | 1 1/4 | 1 1/2 | 2     |
| L          | 98  | 98  | 98  | 111  | 140   | 140   | 155   | 170   |
| W          | 100 | 100 | 100 | 125  | 160   | 160   | 180   | 200   |
| H          | 180 | 180 | 180 | 188  | 280   | 280   | 295   | 350   |
| d          | 7   | 9   | 13  | 17.5 | 23    | 30    | 35    | 46    |
| Weight(kg) | 2.6 | 2.6 | 3.8 | 4.6  | 9.3   | 9.3   | 14    | 19.6  |



**Class800 Main Outline Dimensions & Weight**

Weld joint valve cover, outside screw stem & yoke (OS&Y).  
 Designs according to BS5,352.

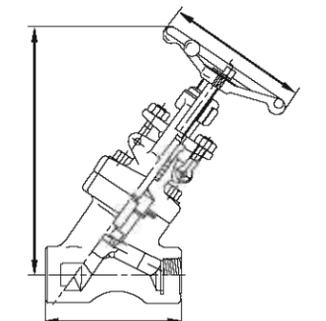
| R.P        | -   | 1/2 | 3/4 | 1    | 1 1/4 | 1 1/2 | 2     | 2 1/2 |
|------------|-----|-----|-----|------|-------|-------|-------|-------|
| F.P        | 1/4 | 3/8 | 1/2 | 3/4  | 1     | 1 1/4 | 1 1/2 | 2     |
| L          | 79  | 79  | 92  | 100  | 140   | 140   | 155   | 170   |
| W          | 100 | 100 | 100 | 125  | 160   | 160   | 180   | 200   |
| H          | 198 | 198 | 198 | 207  | 80    | 280   | 295   | 350   |
| d          | 7   | 9   | 13  | 17.5 | 23    | 30    | 35    | 46    |
| Weight(kg) | 1.8 | 1.8 | 2.0 | 3.5  | 8.0   | 8.0   | 12    | 16    |



**Class900~1500 Main Outline Dimensions & Weight**

Bolt fastening valve cover, outside screw stem & yoke (OS&Y).  
 Designs according to BS5,352.

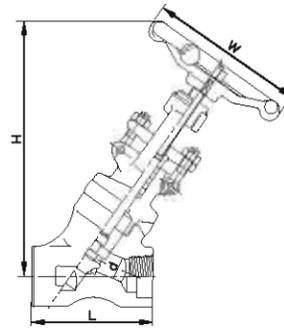
| F.P        | 3/8 | 1/2 | 3/4 | 1   | 1 1/4 | 1 1/2 | 2    |
|------------|-----|-----|-----|-----|-------|-------|------|
| L          | 98  | 111 | 111 | 140 | 140   | 155   | 170  |
| W          | 100 | 125 | 125 | 160 | 160   | 180   | 200  |
| H          | 175 | 175 | 215 | 216 | 254   | 305   | 350  |
| d          | 9   | 12  | 15  | 20  | 28    | 32    | 40   |
| Weight(kg) | 2.8 | 4.8 | 4.6 | 9.3 | 9.3   | 14    | 19.6 |



● **Class900~1500 Main Outline Dimensions & Weight**

Weld joint valve cover, outside screw stem & yoke (OS&Y).  
Designs according to BS5,352.

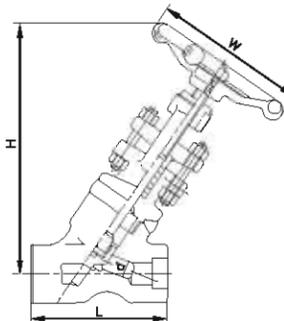
| F.P        | 3/8 | 1/2 | 3/4 | 1   | 1 1/4 | 1 1/2 | 2   |
|------------|-----|-----|-----|-----|-------|-------|-----|
| L          | 92  | 100 | 100 | 140 | 140   | 155   | 170 |
| W          | 100 | 125 | 125 | 160 | 160   | 180   | 200 |
| H          | 175 | 207 | 207 | 280 | 280   | 295   | 350 |
| d          | 9   | 12  | 15  | 20  | 28    | 32    | 40  |
| Weight(kg) | 1.8 | 3.5 | 3.5 | 8.0 | 8.0   | 12    | 16  |



● **Class2500 Main Outline Dimensions & Weight**

Weld joint valve cover, outside screw stem & yoke (OS&Y).  
Designs according to BS16.34

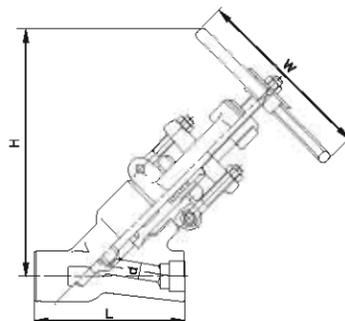
| F.P        | 3/8  | 1/2  | 3/4  | 1    | 1 1/4 | 1 1/2 | 2    |
|------------|------|------|------|------|-------|-------|------|
| L          | 188  | 186  | 186  | 186  | 232   | 232   | 310  |
| W          | 200  | 200  | 200  | 200  | 280   | 280   | 300  |
| H          | 329  | 329  | 329  | 329  | 350   | 350   | 383  |
| d          | 9    | 11   | 14   | 19   | 25    | 28    | 35   |
| Weight(kg) | 12.3 | 12.3 | 11.6 | 10.8 | 28.0  | 26.4  | 43.8 |



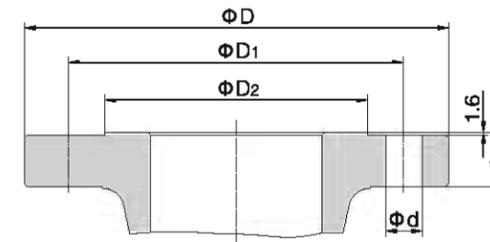
● **Class2500 Main Outline Dimensions & Weight**

Pressure seal bonnet, outside screw stem & yoke (OS&Y).  
Designs according to BS16.34

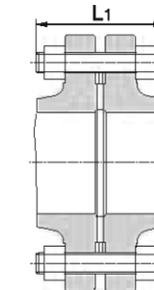
| F.P        | 3/8  | 1/2  | 3/4  | 1    | 1 1/4 | 1 1/2 | 2    |
|------------|------|------|------|------|-------|-------|------|
| L          | 188  | 186  | 186  | 186  | 232   | 232   | 310  |
| W          | 200  | 200  | 200  | 200  | 280   | 280   | 300  |
| H          | 333  | 333  | 333  | 333  | 406   | 406   | 383  |
| d          | 9    | 11   | 14   | 19   | 25    | 28    | 35   |
| Weight(kg) | 12.3 | 12.3 | 11.6 | 10.8 | 28.0  | 26.4  | 43.8 |



● **Steel Pipe Flanges ASME B 16.5 RF**



Class150 & Class300 RF Flanges



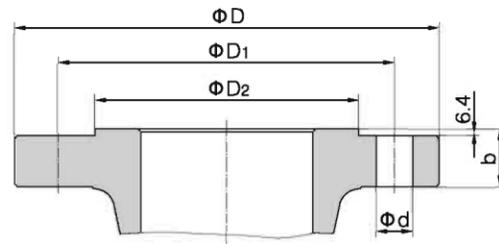
Length of Stud Bolt



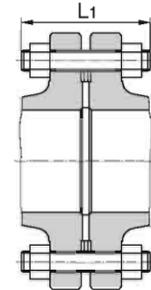
Length of Machine Bolt

| Class | Nominal Size |       | D     |       | D1    |       | D2    |      | b    |      | d    |    | Bolt   |       | L1   |      | L2   |     |
|-------|--------------|-------|-------|-------|-------|-------|-------|------|------|------|------|----|--------|-------|------|------|------|-----|
|       | NPS          | DN    | in    | mm    | in    | mm    | in    | mm   | in   | mm   | in   | mm | Number | Diarm | in   | mm   | in   | mm  |
| 150   | 1/2          | 15    | 3.50  | 90    | 2.35  | 60.5  | 1.38  | 35   | 0.38 | 10   | 0.62 | 16 | 4      | 1/2   | 2.25 | 57   | 2.00 | 51  |
|       | 3/4          | 20    | 3.88  | 100   | 2.75  | 69.9  | 1.69  | 43   | 0.41 | 10.5 | 0.62 | 16 | 4      | 1/2   | 2.50 | 64   | 2.00 | 51  |
|       | 1            | 25    | 4.25  | 110   | 3.12  | 79.2  | 2.00  | 51   | 0.44 | 11.5 | 0.62 | 16 | 4      | 1/2   | 2.50 | 64   | 2.25 | 57  |
|       | 1 1/4        | 32    | 4.62  | 120   | 3.50  | 88.9  | 2.50  | 64   | 0.50 | 13   | 0.62 | 16 | 4      | 1/2   | 2.75 | 70   | 2.25 | 57  |
|       | 1 1/2        | 40    | 5.00  | 130   | 3.88  | 98.6  | 2.88  | 73   | 0.56 | 14.5 | 0.62 | 16 | 4      | 1/2   | 2.75 | 70   | 2.50 | 64  |
|       | 2            | 50    | 6.00  | 150   | 4.75  | 120.7 | 3.62  | 92   | 0.62 | 16   | 0.75 | 19 | 4      | 5/8   | 3.25 | 83   | 2.75 | 70  |
|       | 2 1/2        | 65    | 7.00  | 180   | 5.50  | 139.7 | 4.12  | 105  | 0.69 | 18   | 0.75 | 19 | 4      | 5/8   | 3.50 | 89   | 3.00 | 76  |
|       | 3            | 80    | 7.50  | 190   | 6.00  | 152.4 | 5.00  | 127  | 0.75 | 19.5 | 0.75 | 19 | 4      | 5/8   | 3.50 | 89   | 3.00 | 76  |
|       | 4            | 100   | 9.00  | 230   | 7.50  | 190.5 | 6.19  | 157  | 0.94 | 24   | 0.75 | 19 | 8      | 5/8   | 3.50 | 89   | 3.00 | 76  |
|       | 5            | 125   | 10.00 | 255   | 8.50  | 215.9 | 7.31  | 188  | 0.94 | 24   | 0.88 | 22 | 6      | 3/4   | 3.75 | 95   | 3.25 | 83  |
|       | 6            | 150   | 11.00 | 280   | 9.50  | 241.3 | 8.50  | 216  | 1.00 | 25.5 | 0.88 | 22 | 8      | 3/4   | 4.00 | 102  | 3.25 | 83  |
|       | 8            | 200   | 13.50 | 345   | 11.75 | 298.5 | 10.62 | 270  | 1.12 | 29   | 0.88 | 22 | 8      | 3/4   | 4.25 | 108  | 3.50 | 89  |
|       | 10           | 250   | 16.00 | 405   | 14.25 | 362.0 | 12.75 | 324  | 1.19 | 30.5 | 1.00 | 25 | 12     | 7/8   | 4.50 | 114  | 4.00 | 102 |
|       | 12           | 300   | 19.00 | 485   | 17.00 | 431.8 | 15.00 | 381  | 1.25 | 32   | 1.00 | 25 | 12     | 7/8   | 4.75 | 121  | 4.00 | 102 |
|       | 14           | 350   | 21.00 | 535   | 18.75 | 476.3 | 16.25 | 413  | 1.38 | 35   | 1.12 | 28 | 12     | 1     | 5.25 | 133  | 4.50 | 114 |
|       | 16           | 400   | 23.50 | 595   | 21.25 | 539.8 | 18.50 | 470  | 1.44 | 37   | 1.12 | 28 | 18     | 1     | 5.25 | 133  | 4.50 | 114 |
| 18    | 450          | 25.00 | 635   | 22.75 | 577.9 | 21.00 | 533   | 1.56 | 40   | 1.25 | 32   | 16 | 1 1/8  | 5.75  | 146  | 5.00 | 127  |     |
| 20    | 500          | 27.50 | 700   | 25.00 | 635.0 | 23.00 | 584   | 1.69 | 43   | 1.25 | 32   | 20 | 1 1/8  | 6.25  | 159  | 5.50 | 140  |     |
| 24    | 600          | 32.00 | 815   | 29.50 | 749.3 | 27.25 | 692   | 1.88 | 48   | 1.38 | 35   | 20 | 1 1/4  | 6.75  | 171  | 8.00 | 152  |     |
| 300   | 1/2          | 15    | 3.75  | 95    | 2.82  | 67.0  | 1.38  | 35   | -    | -    | 0.62 | 16 | 4      | 1/2   | 2.50 | 64   | 2.25 | 57  |
|       | 3/4          | 20    | 4.62  | 120   | 3.25  | 83.0  | 1.69  | 43   | -    | -    | 0.75 | 19 | 4      | 5/8   | 3.00 | 76   | 2.50 | 64  |
|       | 1            | 25    | 4.88  | 125   | 3.50  | 89.0  | 2.00  | 51   | 0.69 | 18   | 0.75 | 19 | 4      | 5/8   | 3.00 | 76   | 2.50 | 64  |
|       | 1 1/4        | 32    | 5.25  | 135   | 3.88  | 99.0  | 2.50  | 64   | 0.75 | 19.5 | 0.75 | 19 | 4      | 5/8   | 3.25 | 83   | 2.75 | 70  |
|       | 1 1/2        | 40    | 6.12  | 155   | 4.50  | 114.0 | 2.88  | 73   | 0.81 | 21   | 0.88 | 22 | 4      | 3/4   | 3.50 | 89   | 3.00 | 76  |
|       | 2            | 50    | 6.50  | 165   | 5.00  | 127.0 | 3.62  | 92   | 0.88 | 22.5 | 0.75 | 19 | 8      | 5/8   | 3.50 | 89   | 3.00 | 76  |
|       | 2 1/2        | 65    | 7.50  | 190   | 5.88  | 149.4 | 4.12  | 105  | 1.00 | 25.5 | 0.88 | 22 | 6      | 3/4   | 4.00 | 102  | 3.25 | 83  |
|       | 3            | 80    | 8.25  | 210   | 6.82  | 168.1 | 5.00  | 127  | 1.12 | 29   | 0.88 | 22 | 8      | 3/4   | 4.25 | 108  | 3.50 | 89  |
|       | 4            | 100   | 10.00 | 255   | 7.88  | 200.2 | 6.19  | 157  | 1.25 | 32   | 0.88 | 22 | 8      | 3/4   | 4.50 | 114  | 3.75 | 95  |
|       | 5            | 125   | 11.00 | 280   | 9.25  | 235.0 | 7.31  | 188  | 1.38 | 35   | 0.88 | 22 | 8      | 3/4   | 4.75 | 121  | 4.25 | 108 |
|       | 6            | 150   | 12.50 | 320   | 10.62 | 269.7 | 8.50  | 216  | 1.44 | 37   | 0.88 | 22 | 12     | 3/4   | 4.75 | 121  | 4.25 | 108 |
|       | 8            | 200   | 15.00 | 380   | 13.00 | 330.2 | 10.62 | 270  | 1.62 | 41.5 | 1.00 | 25 | 12     | 7/8   | 5.50 | 140  | 4.75 | 121 |
|       | 10           | 250   | 17.50 | 445   | 15.25 | 387.4 | 12.75 | 324  | 1.88 | 48   | 1.12 | 28 | 18     | 1     | 6.25 | 159  | 5.50 | 140 |
|       | 12           | 300   | 20.50 | 520   | 17.75 | 450.9 | 15.00 | 381  | 2.00 | 51   | 1.25 | 32 | 16     | 1 1/8 | 6.75 | 171  | 5.75 | 146 |
|       | 14           | 350   | 23.00 | 585   | 20.25 | 514.4 | 16.25 | 413  | 2.12 | 54   | 1.25 | 32 | 20     | 1 1/8 | 7.00 | 178  | 6.25 | 159 |
|       | 16           | 400   | 25.50 | 650   | 22.50 | 571.5 | 18.50 | 470  | 2.25 | 57.5 | 1.38 | 35 | 20     | 1 1/4 | 7.50 | 191  | 8.50 | 165 |
| 18    | 450          | 28.00 | 710   | 24.75 | 628.7 | 21.00 | 533   | 2.38 | 60.5 | 1.38 | 35   | 24 | 1 1/4  | 7.75  | 197  | 6.75 | 171  |     |
| 20    | 500          | 30.50 | 775   | 27.00 | 685.8 | 23.00 | 584   | 2.50 | 83.5 | 1.38 | 35   | 24 | 1 1/4  | 8.00  | 203  | 7.25 | 184  |     |
| 24    | 600          | 36.00 | 915   | 32.00 | 812.8 | 27.25 | 692   | 2.75 | 70   | 1.62 | 41   | 24 | 1 1/2  | 9.00  | 229  | 8.00 | 203  |     |

Steel Pipe Flanges ASME B 16.5 RF



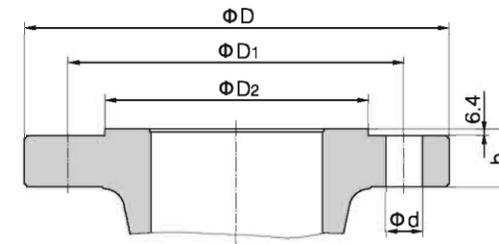
Class 600–Class 2500 RF Flanges



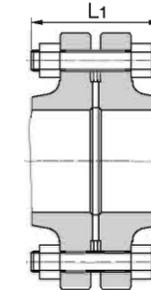
Length of Stud Bolt

| Class | Nominal Size |       | D     |       | D <sub>1</sub> |       | D <sub>2</sub> |      | b    |      | d    |    | Bolt   |       | L <sub>1</sub> |     |
|-------|--------------|-------|-------|-------|----------------|-------|----------------|------|------|------|------|----|--------|-------|----------------|-----|
|       | NPS          | DN    | in    | mm    | in             | mm    | in             | mm   | in   | mm   | in   | mm | Number | Diam  | in             | mm  |
| 600   | 1/2          | 15    | 3.75  | 95    | 2.62           | 66.5  | 1.38           | 35   | 0.56 | 14   | 0.62 | 16 | 4      | 1/2   | 3.00           | 76  |
|       | 3/4          | 20    | 4.62  | 120   | 3.25           | 82.6  | 1.69           | 43   | 0.62 | 16   | 0.75 | 19 | 4      | 5/8   | 3.50           | 89  |
|       | 1            | 25    | 4.88  | 125   | 3.50           | 88.9  | 2.00           | 51   | 0.69 | 18   | 0.75 | 19 | 4      | 5/8   | 3.50           | 89  |
|       | 1 1/4        | 32    | 5.25  | 135   | 3.88           | 98.6  | 2.50           | 64   | 0.81 | 21   | 0.75 | 19 | 4      | 5/8   | 3.75           | 95  |
|       | 1 1/2        | 40    | 6.12  | 155   | 4.50           | 114.3 | 2.88           | 73   | 0.88 | 22   | 0.88 | 22 | 4      | 3/4   | 4.25           | 108 |
|       | 2            | 50    | 6.50  | 165   | 5.00           | 127.0 | 3.62           | 92   | 1.00 | 25   | 0.75 | 19 | 8      | 5/8   | 4.25           | 108 |
|       | 2 1/2        | 65    | 7.50  | 190   | 5.88           | 149.4 | 4.12           | 105  | 1.12 | 28   | 0.88 | 22 | 8      | 3/4   | 4.75           | 121 |
|       | 3            | 80    | 8.25  | 210   | 6.62           | 168.1 | 5.00           | 127  | 1.25 | 32   | 0.88 | 22 | 8      | 3/4   | 5.00           | 127 |
|       | 4            | 100   | 10.75 | 275   | 8.50           | 215.9 | 6.19           | 157  | 1.50 | 38   | 1.00 | 25 | 8      | 7/8   | 5.75           | 146 |
|       | 5            | 125   | 13.00 | 330   | 10.50          | 266.7 | 7.31           | 186  | 1.75 | 44   | 1.12 | 28 | 8      | 1     | 6.50           | 165 |
|       | 6            | 150   | 14.00 | 355   | 11.50          | 292.1 | 8.50           | 216  | 1.88 | 48   | 1.12 | 28 | 12     | 1     | 6.75           | 171 |
|       | 8            | 200   | 16.50 | 420   | 13.75          | 349.3 | 10.62          | 270  | 2.19 | 56   | 1.25 | 32 | 12     | 1 1/8 | 7.50           | 191 |
|       | 10           | 250   | 20.00 | 510   | 17.00          | 431.8 | 12.75          | 324  | 2.50 | 63.5 | 1.38 | 35 | 16     | 1 1/4 | 8.50           | 216 |
|       | 12           | 300   | 22.00 | 560   | 19.25          | 489.0 | 15.00          | 381  | 2.62 | 67   | 1.38 | 35 | 20     | 1 1/4 | 8.75           | 222 |
|       | 14           | 350   | 23.75 | 605   | 20.75          | 527.1 | 16.25          | 413  | 2.75 | 70   | 1.50 | 38 | 20     | 1 1/4 | 9.25           | 235 |
|       | 16           | 400   | 27.00 | 685   | 23.75          | 603.3 | 18.50          | 470  | 3.00 | 76.5 | 1.62 | 41 | 20     | 1 1/2 | 10.00          | 254 |
| 18    | 450          | 29.25 | 745   | 25.75 | 654.1          | 21.00 | 533            | 3.25 | 83   | 1.75 | 44   | 20 | 1 5/8  | 10.75 | 273            |     |
| 20    | 500          | 32.00 | 815   | 28.50 | 723.9          | 23.00 | 584            | 3.50 | 89   | 1.75 | 44   | 24 | 1 5/8  | 11.25 | 286            |     |
| 24    | 600          | 37.00 | 940   | 33.00 | 838.2          | 27.25 | 692            | 4.00 | 102  | 2.00 | 51   | 24 | 1 7/8  | 13.00 | 330            |     |
| 900   | 1/2          | 15    | 4.75  | 120   | 3.25           | 82.6  | 1.38           | 35   | 0.88 | 22.5 | 0.88 | 22 | 4      | 3/4   | 4.25           | 108 |
|       | 3/4          | 20    | 5.12  | 130   | 3.50           | 88.9  | 1.69           | 43   | 1.00 | 25.5 | 0.88 | 22 | 4      | 3/4   | 4.50           | 114 |
|       | 1            | 25    | 5.88  | 150   | 4.00           | 101.6 | 2.00           | 51   | 1.12 | 29   | 1.00 | 25 | 4      | 7/8   | 5.00           | 127 |
|       | 1 1/4        | 32    | 6.25  | 160   | 4.38           | 111.3 | 2.50           | 64   | 1.12 | 29   | 1.00 | 25 | 4      | 7/8   | 5.00           | 127 |
|       | 1 1/2        | 40    | 7.00  | 180   | 4.88           | 124.0 | 2.88           | 73   | 1.25 | 32   | 1.12 | 28 | 4      | 1     | 5.50           | 140 |
|       | 2            | 50    | 8.50  | 215   | 6.50           | 165.1 | 3.62           | 92   | 1.50 | 38.5 | 1.00 | 25 | 8      | 7/8   | 5.75           | 146 |
|       | 2 1/2        | 65    | 9.62  | 245   | 7.50           | 190.5 | 4.12           | 105  | 1.62 | 41.5 | 1.12 | 28 | 8      | 1     | 6.25           | 159 |
|       | 3            | 80    | 9.50  | 245   | 7.50           | 190.5 | 5.00           | 127  | 1.50 | 38.5 | 1.00 | 25 | 8      | 7/8   | 5.75           | 146 |
|       | 4            | 100   | 11.50 | 290   | 9.25           | 235.0 | 6.19           | 157  | 1.75 | 44.5 | 1.25 | 32 | 8      | 1 1/8 | 6.75           | 171 |
|       | 5            | 125   | 13.75 | 350   | 11.00          | 279.4 | 7.31           | 186  | 2.00 | 51   | 1.38 | 35 | 8      | 1 1/4 | 7.50           | 191 |
|       | 6            | 150   | 15.00 | 380   | 12.50          | 317.5 | 8.50           | 216  | 2.19 | 56   | 1.25 | 32 | 12     | 1 1/8 | 7.50           | 191 |
|       | 8            | 200   | 18.50 | 470   | 15.50          | 393.7 | 10.62          | 270  | 2.50 | 63.5 | 1.50 | 38 | 12     | 1 3/8 | 8.75           | 222 |
|       | 10           | 250   | 21.50 | 545   | 18.50          | 469.9 | 12.75          | 324  | 2.75 | 70   | 1.50 | 38 | 16     | 1 3/8 | 9.25           | 235 |
|       | 12           | 300   | 24.00 | 610   | 21.00          | 533.4 | 15.00          | 381  | 3.12 | 79.5 | 1.50 | 38 | 20     | 1 3/8 | 10.00          | 254 |
|       | 14           | 350   | 25.25 | 640   | 22.00          | 558.8 | 16.25          | 413  | 3.38 | 86   | 1.62 | 41 | 20     | 1 1/2 | 10.75          | 273 |
|       | 16           | 400   | 27.75 | 705   | 24.25          | 616.0 | 18.50          | 470  | 3.50 | 89   | 1.75 | 44 | 20     | 1 5/8 | 11.25          | 286 |
| 18    | 450          | 31.00 | 785   | 27.00 | 685.8          | 21.00 | 533            | 4.00 | 102  | 2.00 | 51   | 20 | 1 7/8  | 12.75 | 324            |     |
| 20    | 500          | 33.75 | 855   | 29.50 | 749.3          | 23.00 | 584            | 4.25 | 108  | 2.12 | 54   | 20 | 2      | 13.75 | 349            |     |
| 24    | 600          | 41.00 | 1040  | 35.50 | 901.7          | 27.25 | 692            | 5.50 | 140  | 2.62 | 67   | 20 | 2 1/2  | 17.25 | 438            |     |

Steel Pipe Flanges ASME B 16.5 RF



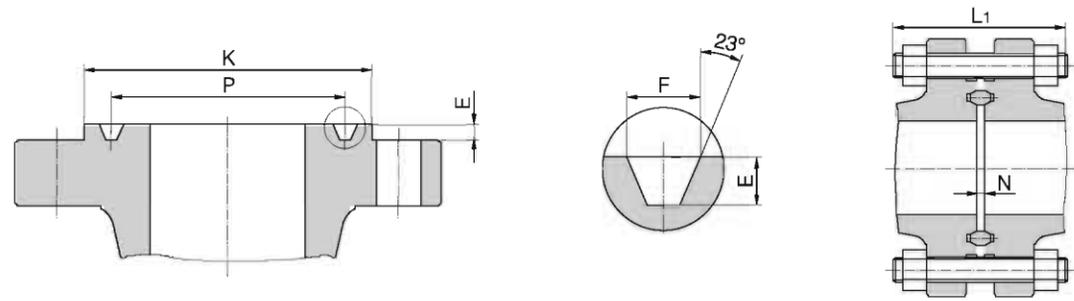
Class 600–Class 2500 RF Flanges



Length of Stud Bolt

| Class | Nominal Size |       | D     |       | D <sub>1</sub> |       | D <sub>2</sub> |      | b     |       | d    |    | Bolt   |       | L <sub>1</sub> |     |
|-------|--------------|-------|-------|-------|----------------|-------|----------------|------|-------|-------|------|----|--------|-------|----------------|-----|
|       | NPS          | DN    | in    | mm    | in             | mm    | in             | mm   | in    | mm    | in   | mm | Number | Diam  | in             | mm  |
| 1500  | 1/2          | 15    | 4.75  | 120   | 3.25           | 82.6  | 1.38           | 35   | 0.88  | 22.5  | 0.88 | 22 | 4      | 3/4   | 4.25           | 108 |
|       | 3/4          | 20    | 5.12  | 130   | 3.50           | 88.9  | 1.69           | 43   | 1.00  | 25.5  | 0.88 | 22 | 4      | 3/4   | 4.50           | 114 |
|       | 1            | 25    | 5.88  | 150   | 4.00           | 101.6 | 2.00           | 51   | 1.12  | 29    | 1.00 | 25 | 4      | 7/8   | 5.00           | 127 |
|       | 1 1/4        | 32    | 6.25  | 160   | 4.38           | 111.3 | 2.50           | 64   | 1.12  | 29    | 1.00 | 25 | 4      | 7/8   | 5.00           | 127 |
|       | 1 1/2        | 40    | 7.00  | 180   | 4.88           | 124.0 | 2.88           | 73   | 1.25  | 32    | 1.12 | 28 | 4      | 1     | 5.50           | 140 |
|       | 2            | 50    | 8.50  | 215   | 6.50           | 165.1 | 3.62           | 92   | 1.50  | 38.5  | 1.00 | 25 | 8      | 7/8   | 5.75           | 146 |
|       | 2 1/2        | 65    | 9.62  | 245   | 7.50           | 190.5 | 4.12           | 105  | 1.62  | 41.5  | 1.12 | 28 | 8      | 1     | 6.25           | 159 |
|       | 3            | 80    | 10.50 | 265   | 8.00           | 203.2 | 5.00           | 127  | 1.88  | 48    | 1.25 | 32 | 8      | 1 1/8 | 7.00           | 178 |
|       | 4            | 100   | 12.25 | 310   | 9.50           | 241.3 | 6.19           | 157  | 2.12  | 54    | 1.38 | 35 | 8      | 1 1/4 | 7.75           | 197 |
|       | 5            | 125   | 14.75 | 375   | 11.50          | 292.1 | 7.31           | 186  | 2.88  | 73.5  | 1.62 | 41 | 8      | 1 1/2 | 9.75           | 248 |
|       | 6            | 150   | 15.50 | 395   | 12.50          | 317.5 | 8.50           | 216  | 3.25  | 83    | 1.50 | 38 | 12     | 1 3/8 | 10.25          | 260 |
|       | 8            | 200   | 19.00 | 485   | 15.50          | 393.7 | 10.62          | 270  | 3.62  | 92    | 1.75 | 44 | 12     | 1 5/8 | 11.50          | 292 |
|       | 10           | 250   | 23.00 | 585   | 19.00          | 482.6 | 12.75          | 324  | 4.25  | 108   | 2.00 | 51 | 12     | 1 7/8 | 13.25          | 337 |
|       | 12           | 300   | 26.50 | 675   | 22.50          | 571.5 | 15.00          | 381  | 4.88  | 124   | 2.12 | 54 | 16     | 2     | 14.75          | 375 |
|       | 14           | 350   | 29.50 | 750   | 25.00          | 635.0 | 16.25          | 413  | 5.25  | 133.5 | 2.38 | 60 | 16     | 2 1/4 | 16.00          | 406 |
|       | 16           | 400   | 32.50 | 825   | 27.75          | 704.9 | 18.50          | 470  | 5.75  | 146.5 | 2.62 | 67 | 16     | 2 1/2 | 17.50          | 445 |
| 18    | 450          | 36.00 | 915   | 30.50 | 774.7          | 21.00 | 533            | 6.38 | 162   | 2.88  | 73   | 16 | 2 3/4  | 19.50 | 495            |     |
| 20    | 500          | 38.75 | 985   | 32.75 | 831.9          | 23.00 | 584            | 7.00 | 178   | 3.12  | 79   | 16 | 3      | 21.25 | 540            |     |
| 24    | 600          | 46.00 | 1170  | 39.00 | 990.6          | 27.25 | 692            | 8.00 | 203.5 | 3.62  | 92   | 16 | 3 1/2  | 24.25 | 616            |     |
| 2500  | 1/2          | 15    | 5.25  | 135   | 3.50           | 88.9  | 1.38           | 35   | 1.19  | 30.5  | 0.88 | 22 | 4      | 3/4   | 4.75           | 121 |
|       | 3/4          | 20    | 5.50  | 140   | 3.75           | 95.3  | 1.69           | 43   | 1.25  | 32    | 0.88 | 22 | 4      | 3/4   | 5.00           | 127 |
|       | 1            | 25    | 6.25  | 160   | 4.25           | 108.0 | 2.00           | 51   | 1.38  | 35    | 1.00 | 25 | 4      | 7/8   | 5.50           | 140 |
|       | 1 1/4        | 32    | 7.25  | 185   | 5.12           | 130.0 | 2.50           | 64   | 1.50  | 38.5  | 1.12 | 28 | 4      | 1     | 6.00           | 152 |
|       | 1 1/2        | 40    | 8.00  | 205   | 5.75           | 146.1 | 2.88           | 73   | 1.75  | 44.5  | 1.25 | 32 | 4      | 1 1/8 | 6.75           | 171 |
|       | 2            | 50    | 9.25  | 235   | 6.75           | 171.5 | 3.62           | 92   | 2.00  | 51    | 1.12 | 28 | 8      | 1     | 7.00           | 178 |
|       | 2 1/2        | 65    | 10.50 | 265   | 7.75           | 196.9 | 4.12           | 105  | 2.25  | 57.5  | 1.25 | 32 | 8      | 1 1/8 | 7.75           | 197 |
|       | 3            | 80    | 12.00 | 305   | 9.00           | 228.6 | 5.00           | 127  | 2.62  | 67    | 1.38 | 35 | 8      | 1 1/4 | 8.75           | 222 |
|       | 4            | 100   | 14.00 | 355   | 10.75          | 273.1 | 6.19           | 157  | 3.00  | 76.5  | 1.62 | 41 | 8      | 1 1/2 | 10.00          | 254 |
|       | 5            | 125   | 16.50 | 420   | 12.75          | 323.9 | 7.31           | 186  | 3.62  | 92.5  | 1.88 | 48 | 8      | 1 3/4 | 11.75          | 298 |
|       | 6            | 150   | 19.00 | 485   | 14.50          | 368.3 | 8.50           | 216  | 4.25  | 108   | 2.12 | 54 | 8      | 2     | 13.50          | 343 |
|       | 8            | 200   | 21.75 | 550   | 17.25          | 438.2 | 10.62          | 270  | 5.00  | 127   | 2.12 | 54 | 12     | 2     | 15.00          | 381 |
| 10    | 250          | 26.50 | 675   | 21.25 | 539.8          | 12.75 | 324            | 6.50 | 165.5 | 2.62  | 67   | 12 | 2 1/2  | 19.25 | 489            |     |
| 12    | 300          | 30.00 | 760   | 24.38 | 619.3          | 15.00 | 381            | 7.25 | 184.5 | 2.88  | 73   | 12 | 2 3/4  | 21.25 | 540            |     |

Steel Pipe Flanges ASME B 16.5 RTJ

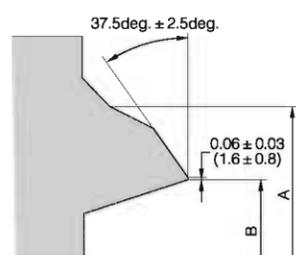


| Class | Nominal Size |     | Ring Number | P      |        | E     |       | F     |       | K     |      | N    |       | L1   |     |
|-------|--------------|-----|-------------|--------|--------|-------|-------|-------|-------|-------|------|------|-------|------|-----|
|       | NPS          | DN  |             | in     | mm     | in    | mm    | in    | mm    | in    | mm   | in   | mm    | in   | mm  |
| 150   | 1            | 25  | R15         | 1.875  | 47.63  | 0.25  | 6.35  | 0.344 | 8.74  | 2.50  | 64   | 0.16 | 4     | 3.00 | 76  |
|       | 1 1/4        | 32  | R17         | 2.250  | 57.15  | 0.25  | 6.35  | 0.344 | 8.74  | 2.88  | 73   | 0.16 | 4     | 3.25 | 83  |
|       | 1 1/2        | 40  | R19         | 2.562  | 65.07  | 0.25  | 6.35  | 0.344 | 8.74  | 3.25  | 83   | 0.16 | 4     | 3.25 | 83  |
|       | 2            | 50  | R22         | 3.250  | 82.55  | 0.25  | 6.35  | 0.344 | 8.74  | 4.00  | 102  | 0.16 | 4     | 3.75 | 95  |
|       | 2 1/2        | 65  | R25         | 4.000  | 101.60 | 0.25  | 6.35  | 0.344 | 8.74  | 4.75  | 121  | 0.16 | 4     | 4.00 | 102 |
|       | 3            | 80  | R29         | 4.500  | 114.30 | 0.25  | 6.35  | 0.344 | 8.74  | 5.25  | 133  | 0.16 | 4     | 4.00 | 102 |
|       | 4            | 100 | R36         | 5.875  | 149.23 | 0.25  | 6.35  | 0.344 | 8.74  | 6.75  | 171  | 0.16 | 4     | 4.00 | 102 |
|       | 5            | 125 | R40         | 6.750  | 171.45 | 0.25  | 6.35  | 0.344 | 8.74  | 7.62  | 194  | 0.16 | 4     | 4.25 | 108 |
|       | 6            | 150 | R43         | 7.625  | 193.68 | 0.25  | 6.35  | 0.344 | 8.74  | 8.62  | 219  | 0.16 | 4     | 4.50 | 114 |
|       | 8            | 200 | R48         | 9.750  | 247.65 | 0.25  | 6.35  | 0.344 | 8.74  | 10.75 | 273  | 0.16 | 4     | 4.75 | 121 |
|       | 10           | 250 | R52         | 12.000 | 304.80 | 0.25  | 6.35  | 0.344 | 8.74  | 13.00 | 330  | 0.16 | 4     | 5.00 | 127 |
|       | 12           | 300 | R56         | 15.000 | 381.00 | 0.25  | 6.35  | 0.344 | 8.74  | 16.00 | 406  | 0.16 | 4     | 5.25 | 133 |
|       | 14           | 350 | R59         | 15.625 | 396.88 | 0.25  | 6.35  | 0.344 | 8.74  | 16.75 | 425  | 0.12 | 3     | 5.75 | 146 |
|       | 16           | 400 | R64         | 17.875 | 454.03 | 0.25  | 6.35  | 0.344 | 8.74  | 19.00 | 483  | 0.12 | 3     | 5.75 | 146 |
|       | 18           | 450 | R68         | 20.375 | 517.53 | 0.25  | 6.35  | 0.344 | 8.74  | 21.50 | 546  | 0.12 | 3     | 6.25 | 159 |
|       | 20           | 500 | R72         | 22.000 | 558.80 | 0.25  | 6.35  | 0.344 | 8.74  | 23.50 | 597  | 0.12 | 3     | 6.75 | 171 |
| 24    | 600          | R76 | 26.500      | 673.10 | 0.25   | 6.35  | 0.344 | 8.74  | 28.00 | 711   | 0.12 | 3    | 7.25  | 184  |     |
| 300   | 1            | 25  | R16         | 2.000  | 50.80  | 0.25  | 6.35  | 0.344 | 8.74  | 2.75  | 70   | 0.16 | 4     | 3.50 | 89  |
|       | 1 1/4        | 32  | R18         | 2.375  | 60.33  | 0.25  | 6.35  | 0.344 | 8.74  | 3.12  | 79   | 0.16 | 4     | 3.75 | 95  |
|       | 1 1/2        | 40  | R20         | 2.688  | 68.28  | 0.25  | 6.35  | 0.344 | 8.74  | 3.56  | 90   | 0.16 | 4     | 4.00 | 102 |
|       | 2            | 50  | R23         | 3.250  | 82.55  | 0.312 | 7.92  | 0.469 | 11.91 | 4.25  | 108  | 0.22 | 6     | 4.00 | 102 |
|       | 2 1/2        | 65  | R26         | 4.000  | 101.60 | 0.312 | 7.92  | 0.469 | 11.91 | 5.00  | 127  | 0.22 | 6     | 4.50 | 114 |
|       | 3            | 80  | R31         | 4.875  | 123.83 | 0.312 | 7.92  | 0.469 | 11.91 | 5.75  | 146  | 0.22 | 6     | 4.75 | 121 |
|       | 4            | 100 | R37         | 5.875  | 149.23 | 0.312 | 7.92  | 0.469 | 11.91 | 6.88  | 175  | 0.22 | 6     | 5.00 | 127 |
|       | 5            | 125 | R41         | 7.125  | 180.98 | 0.312 | 7.92  | 0.469 | 11.91 | 8.25  | 210  | 0.22 | 6     | 5.25 | 133 |
|       | 6            | 150 | R45         | 8.312  | 211.12 | 0.312 | 7.92  | 0.469 | 11.91 | 9.50  | 241  | 0.22 | 6     | 5.50 | 140 |
|       | 8            | 200 | R49         | 10.625 | 269.88 | 0.312 | 7.92  | 0.469 | 11.91 | 11.88 | 302  | 0.22 | 6     | 6.00 | 152 |
|       | 10           | 250 | R53         | 12.750 | 323.85 | 0.312 | 7.92  | 0.469 | 11.91 | 14.00 | 356  | 0.22 | 6     | 6.75 | 171 |
|       | 12           | 300 | R57         | 15.000 | 381.00 | 0.312 | 7.92  | 0.469 | 11.91 | 16.25 | 413  | 0.22 | 6     | 7.25 | 184 |
|       | 14           | 350 | R61         | 16.500 | 419.10 | 0.312 | 7.92  | 0.469 | 11.91 | 18.00 | 457  | 0.22 | 6     | 7.50 | 191 |
|       | 16           | 400 | R65         | 18.500 | 469.90 | 0.312 | 7.92  | 0.469 | 11.91 | 20.00 | 508  | 0.22 | 6     | 8.00 | 203 |
|       | 18           | 450 | R69         | 21.000 | 533.40 | 0.312 | 7.92  | 0.469 | 11.91 | 22.62 | 575  | 0.22 | 6     | 8.25 | 210 |
|       | 20           | 500 | R73         | 23.000 | 584.20 | 0.375 | 9.53  | 0.531 | 11.91 | 25.00 | 635  | 0.22 | 6     | 8.75 | 222 |
| 24    | 600          | R77 | 27.250      | 692.15 | 0.438  | 11.13 | 0.656 | 11.91 | 29.50 | 749   | 0.25 | 6    | 10.00 | 254  |     |

| Class | Nominal Size |     | Ring Number | P      |        | E     |       | F     |       | K     |      | N    |       | L1    |     |
|-------|--------------|-----|-------------|--------|--------|-------|-------|-------|-------|-------|------|------|-------|-------|-----|
|       | NPS          | DN  |             | in     | mm     | in    | mm    | in    | mm    | in    | mm   | in   | mm    | in    | mm  |
| 600   | 1            | 25  | R16         | 2.000  | 50.80  | 0.250 | 6.35  | 0.344 | 8.74  | 2.75  | 70   | 0.16 | 4     | 3.50  | 89  |
|       | 1 1/4        | 32  | R18         | 2.375  | 60.33  | 0.250 | 6.35  | 0.344 | 8.74  | 3.12  | 79   | 0.16 | 4     | 3.75  | 95  |
|       | 1 1/2        | 40  | R20         | 2.688  | 68.28  | 0.250 | 6.35  | 0.344 | 8.74  | 3.56  | 90   | 0.16 | 4     | 4.25  | 108 |
|       | 2            | 50  | R23         | 3.250  | 82.55  | 0.312 | 7.92  | 0.469 | 11.91 | 4.25  | 108  | 0.19 | 5     | 4.25  | 108 |
|       | 2 1/2        | 65  | R26         | 4.000  | 101.60 | 0.312 | 7.92  | 0.469 | 11.91 | 5.00  | 127  | 0.19 | 5     | 4.75  | 121 |
|       | 3            | 80  | R31         | 4.875  | 123.83 | 0.312 | 7.92  | 0.469 | 11.91 | 5.75  | 146  | 0.19 | 5     | 5.00  | 127 |
|       | 4            | 100 | R37         | 5.875  | 149.23 | 0.312 | 7.92  | 0.469 | 11.91 | 6.88  | 175  | 0.19 | 5     | 5.75  | 146 |
|       | 5            | 125 | R41         | 7.125  | 180.98 | 0.312 | 7.92  | 0.469 | 11.91 | 8.25  | 210  | 0.19 | 5     | 6.50  | 165 |
|       | 6            | 150 | R45         | 8.312  | 211.12 | 0.312 | 7.92  | 0.469 | 11.91 | 9.50  | 241  | 0.19 | 5     | 6.75  | 171 |
|       | 8            | 200 | R49         | 10.625 | 269.88 | 0.312 | 7.92  | 0.469 | 11.91 | 11.88 | 302  | 0.19 | 5     | 7.75  | 197 |
|       | 10           | 250 | R53         | 12.750 | 323.85 | 0.312 | 7.92  | 0.469 | 11.91 | 14.00 | 356  | 0.19 | 5     | 8.50  | 216 |
|       | 12           | 300 | R57         | 15.000 | 381.00 | 0.312 | 7.92  | 0.469 | 11.91 | 16.25 | 413  | 0.19 | 5     | 8.75  | 222 |
|       | 14           | 350 | R61         | 16.500 | 419.10 | 0.312 | 7.92  | 0.469 | 11.91 | 18.00 | 457  | 0.19 | 5     | 9.25  | 235 |
|       | 16           | 400 | R65         | 18.500 | 469.90 | 0.312 | 7.92  | 0.469 | 11.91 | 20.00 | 508  | 0.19 | 5     | 10.00 | 254 |
|       | 18           | 450 | R69         | 21.000 | 533.40 | 0.312 | 7.92  | 0.469 | 11.91 | 22.62 | 575  | 0.19 | 5     | 10.75 | 273 |
|       | 20           | 500 | R73         | 23.000 | 584.20 | 0.375 | 9.53  | 0.531 | 13.49 | 25.00 | 635  | 0.19 | 5     | 11.50 | 292 |
| 24    | 600          | R77 | 27.250      | 692.15 | 0.438  | 15.88 | 0.656 | 26.97 | 29.50 | 749   | 0.22 | 6    | 13.25 | 337   |     |
| 900   | 1            | 25  | R16         | 2.000  | 50.80  | 0.250 | 6.35  | 0.344 | 8.74  | 2.81  | 71   | 0.16 | 4     | 5.00  | 127 |
|       | 1 1/4        | 32  | R18         | 2.375  | 60.33  | 0.250 | 6.35  | 0.344 | 8.74  | 3.19  | 81   | 0.16 | 4     | 5.00  | 127 |
|       | 1 1/2        | 40  | R20         | 2.688  | 68.28  | 0.250 | 6.35  | 0.344 | 8.74  | 3.62  | 92   | 0.16 | 4     | 5.50  | 140 |
|       | 2            | 50  | R24         | 3.750  | 82.55  | 0.312 | 7.92  | 0.469 | 11.91 | 4.88  | 124  | 0.12 | 3     | 5.75  | 146 |
|       | 2 1/2        | 65  | R27         | 4.250  | 101.60 | 0.312 | 7.92  | 0.469 | 11.91 | 5.38  | 137  | 0.12 | 3     | 6.25  | 159 |
|       | 3            | 80  | R31         | 4.875  | 123.83 | 0.312 | 7.92  | 0.469 | 11.91 | 6.12  | 155  | 0.16 | 4     | 5.75  | 146 |
|       | 4            | 100 | R37         | 5.875  | 149.23 | 0.312 | 7.92  | 0.469 | 11.91 | 7.12  | 181  | 0.16 | 4     | 6.75  | 171 |
|       | 5            | 125 | R41         | 7.125  | 180.98 | 0.312 | 7.92  | 0.469 | 11.91 | 8.50  | 216  | 0.16 | 4     | 7.50  | 191 |
|       | 6            | 150 | R45         | 8.312  | 211.12 | 0.312 | 7.92  | 0.469 | 11.91 | 9.50  | 241  | 0.16 | 4     | 7.75  | 197 |
|       | 8            | 200 | R49         | 10.625 | 269.88 | 0.312 | 7.92  | 0.469 | 11.91 | 12.12 | 308  | 0.16 | 4     | 8.75  | 222 |
|       | 10           | 250 | R53         | 12.750 | 323.85 | 0.312 | 7.92  | 0.469 | 11.91 | 14.25 | 362  | 0.16 | 4     | 9.25  | 235 |
|       | 12           | 300 | R57         | 15.000 | 381.00 | 0.312 | 7.92  | 0.469 | 11.91 | 16.50 | 419  | 0.16 | 4     | 10.00 | 254 |
|       | 14           | 350 | R62         | 16.500 | 419.10 | 0.438 | 11.13 | 0.656 | 16.66 | 18.38 | 467  | 0.16 | 4     | 11.00 | 279 |
|       | 16           | 400 | R66         | 18.500 | 469.90 | 0.438 | 11.13 | 0.656 | 16.66 | 20.62 | 524  | 0.16 | 4     | 11.50 | 292 |
|       | 18           | 450 | R70         | 21.000 | 533.40 | 0.500 | 12.70 | 0.781 | 19.84 | 23.38 | 594  | 0.19 | 5     | 13.25 | 337 |
|       | 20           | 500 | R74         | 23.000 | 584.20 | 0.500 | 12.70 | 0.781 | 19.84 | 25.50 | 648  | 0.19 | 5     | 14.25 | 362 |
| 24    | 600          | R78 | 27.250      | 692.15 | 0.625  | 15.88 | 1.062 | 26.97 | 30.38 | 772   | 0.22 | 6    | 18.00 | 457   |     |
| 1500  | 1            | 25  | R16         | 2.000  | 50.80  | 0.250 | 6.35  | 0.344 | 8.74  | 2.81  | 71   | 0.16 | 4     | 5.00  | 127 |
|       | 1 1/4        | 32  | R18         | 2.375  | 60.33  | 0.250 | 6.35  | 0.344 | 8.74  | 3.19  | 81   | 0.16 | 4     | 5.00  | 127 |
|       | 1 1/2        | 40  | R20         | 2.688  | 68.28  | 0.250 | 6.35  | 0.344 | 8.74  | 3.62  | 92   | 0.16 | 4     | 5.50  | 140 |
|       | 2            | 50  | R24         | 3.750  | 82.55  | 0.312 | 7.92  | 0.469 | 11.91 | 4.88  | 124  | 0.12 | 3     | 5.75  | 146 |
|       | 2 1/2        | 65  | R27         | 4.250  | 101.60 | 0.312 | 7.92  | 0.469 | 11.91 | 5.38  | 137  | 0.12 | 3     | 6.25  | 159 |
|       | 3            | 80  | R35         | 5.375  | 123.83 | 0.312 | 7.92  | 0.469 | 11.91 | 6.62  | 168  | 0.12 | 3     | 7.00  | 178 |
|       | 4            | 100 | R39         | 6.375  | 149.23 | 0.312 | 7.92  | 0.469 | 11.91 | 7.62  | 194  | 0.12 | 3     | 7.75  | 197 |
|       | 5            | 125 | R44         | 7.625  | 180.98 | 0.312 | 7.92  | 0.469 | 11.91 | 9.00  | 229  | 0.12 | 3     | 9.75  | 248 |
|       | 6            | 150 | R46         | 8.312  | 211.12 | 0.375 | 9.53  | 0.531 | 13.94 | 9.75  | 248  | 0.12 | 3     | 10.50 | 267 |
|       | 8            | 200 | R50         | 10.625 | 269.88 | 0.438 | 11.13 | 0.656 | 16.66 | 12.50 | 318  | 0.16 | 4     | 12.75 | 324 |
|       | 10           | 250 | R54         | 12.750 | 323.85 | 0.438 | 11.13 | 0.656 | 16.66 | 14.62 | 371  | 0.16 | 4     | 13.50 | 343 |
|       | 12           | 300 | R58         | 15.000 | 381.00 | 0.562 | 14.27 | 0.906 | 23.01 | 17.25 | 438  | 0.19 | 5     | 15.25 | 387 |
|       | 14           | 350 | R63         | 16.500 | 419.10 | 0.625 | 15.88 | 1.062 | 26.97 | 19.25 | 489  | 0.22 | 6     | 16.75 | 425 |
|       | 16           | 400 | R67         | 18.500 | 469.90 | 0.688 | 17.48 | 1.188 | 30.18 | 21.50 | 546  | 0.31 | 8     | 18.50 | 470 |
|       | 18           | 450 | R71         | 21.000 | 533.40 | 0.688 | 17.48 | 1.188 | 30.18 | 24.12 | 613  | 0.31 | 8     | 20.75 | 527 |
|       | 20           | 500 | R75         | 23.000 | 584.20 | 0.688 | 17.48 | 1.312 | 33.32 | 26.50 | 673  | 0.38 | 10    | 22.25 | 565 |
| 24    | 600          | R79 | 27.250      | 692.15 | 0.812  | 20.62 | 1.438 | 36.53 | 31.25 | 794   |      |      |       |       |     |

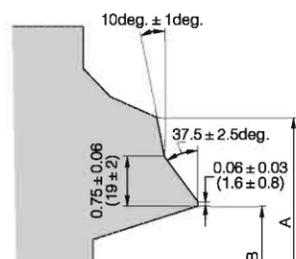
Butt-welding Ends

Butt-welding Ends



Welding end detail for joint Without Backing Ring

Welding end detail intended for use on 0.88in(22mm) and thinner nominal wall thicknesses



Welding end detail for joint Without Backing Ring

Note 1 Internal surface may be as formed or machined for dimension b at root face contour within the envelope shall be in accordance with section

| Nominal Pipe Size |     | Schedule Number or Wall | Outside Diameter             |       |                        |     | Nominal Inside Diameter |       | Machined Inside Diameter |        | Nominal Wall Thickness |      |
|-------------------|-----|-------------------------|------------------------------|-------|------------------------|-----|-------------------------|-------|--------------------------|--------|------------------------|------|
| NPS               | DN  |                         | Forging or Process module, A |       | Moulded steel Valve, A |     | B                       |       | C                        |        | T                      |      |
|                   |     |                         | inch                         | mm    | inch                   | mm  | inch                    | mm    | inch                     | mm     | inch                   | mm   |
| 2 1/2             | 50  | 40                      | 2.88                         | 73    | 2.96                   | 75  | 2.469                   | 62.7  | 2.479                    | 62.97  | 0.203                  | 5.2  |
|                   |     | 80                      |                              |       |                        |     | 2.323                   | 59.0  | 2.351                    | 59.72  | 0.276                  | 7.0  |
|                   |     | 160                     |                              |       |                        |     | 2.125                   | 54.0  | 2.178                    | 55.32  | 0.375                  | 9.5  |
|                   |     | XXS                     |                              |       |                        |     | 1.771                   | 45.0  | 1.868                    | 47.45  | 0.552                  | 14.0 |
| 3                 | 80  | 40                      | 3.5                          | 88.9  | 3.59                   | 91  | 3.068                   | 77.9  | 3.081                    | 78.26  | 0.216                  | 5.5  |
|                   |     | 80                      |                              |       |                        |     | 2.900                   | 73.7  | 2.934                    | 74.52  | 0.300                  | 7.6  |
|                   |     | 160                     |                              |       |                        |     | 2.624                   | 66.6  | 2.692                    | 68.38  | 0.438                  | 11.1 |
|                   |     | XXS                     |                              |       |                        |     | 2.300                   | 58.4  | 2.409                    | 61.19  | 0.600                  | 15.2 |
| 4                 | 100 | 40                      | 4.5                          | 114.3 | 4.62                   | 117 | 4.026                   | 102.3 | 4.044                    | 102.72 | 0.237                  | 6.0  |
|                   |     | 80                      |                              |       |                        |     | 3.826                   | 97.2  | 3.869                    | 98.27  | 0.337                  | 8.6  |
|                   |     | 120                     |                              |       |                        |     | 3.624                   | 92.0  | 3.692                    | 93.78  | 0.438                  | 11.1 |
|                   |     | 160                     |                              |       |                        |     | 3.438                   | 87.3  | 3.530                    | 89.66  | 0.531                  | 13.5 |
| 5                 | 125 | 40                      | 5.56                         | 141.3 | 5.69                   | 144 | 5.047                   | 128.2 | 5.070                    | 128.78 | 0.258                  | 6.6  |
|                   |     | 80                      |                              |       |                        |     | 4.813                   | 122.3 | 4.866                    | 123.60 | 0.375                  | 9.5  |
|                   |     | 120                     |                              |       |                        |     | 4.563                   | 115.9 | 4.647                    | 118.03 | 0.500                  | 12.7 |
|                   |     | 160                     |                              |       |                        |     | 4.313                   | 109.6 | 4.428                    | 112.47 | 0.625                  | 15.9 |
| 6                 | 150 | 40                      | 6.62                         | 168.3 | 6.78                   | 172 | 6.065                   | 154.1 | 6.094                    | 154.79 | 0.280                  | 7.1  |
|                   |     | 80                      |                              |       |                        |     | 5.761                   | 146.3 | 5.828                    | 148.03 | 0.432                  | 11.0 |
|                   |     | 120                     |                              |       |                        |     | 5.501                   | 139.7 | 5.600                    | 142.24 | 0.562                  | 14.3 |
|                   |     | 160                     |                              |       |                        |     | 5.187                   | 131.7 | 5.326                    | 135.28 | 0.719                  | 18.3 |
| 8                 | 200 | 40                      | 8.62                         | 219.1 | 8.78                   | 223 | 7.981                   | 202.7 | 8.020                    | 203.71 | 0.322                  | 8.2  |
|                   |     | 60                      |                              |       |                        |     | 7.813                   | 198.5 | 7.873                    | 199.97 | 0.406                  | 10.3 |
|                   |     | 80                      |                              |       |                        |     | 7.625                   | 193.7 | 7.709                    | 195.81 | 0.500                  | 12.7 |
|                   |     | 100                     |                              |       |                        |     | 7.437                   | 188.9 | 7.544                    | 191.62 | 0.594                  | 15.1 |
|                   |     | 120                     |                              |       |                        |     | 7.187                   | 182.5 | 7.326                    | 186.08 | 0.719                  | 18.3 |
|                   |     | 140                     |                              |       |                        |     | 7.001                   | 177.8 | 7.163                    | 181.94 | 0.812                  | 20.6 |
|                   |     | XXS                     |                              |       |                        |     | 6.875                   | 174.6 | 7.053                    | 179.15 | 0.875                  | 22.2 |
|                   |     | 160                     |                              |       |                        |     | 6.813                   | 173.1 | 6.998                    | 177.75 | 0.906                  | 23.0 |

| Nominal Pipe Size |     | Schedule Number or Wall | Outside Diameter             |       |                        |       | Nominal Inside Diameter |       | Machined Inside Diameter |        | Nominal Wall Thickness |      |
|-------------------|-----|-------------------------|------------------------------|-------|------------------------|-------|-------------------------|-------|--------------------------|--------|------------------------|------|
| NPS               | DN  |                         | Forging or Process module, A |       | Moulded steel Valve, A |       | B                       |       | C                        |        | T                      |      |
|                   |     |                         | inch                         | mm    | inch                   | mm    | inch                    | mm    | inch                     | mm     | inch                   | mm   |
| 10                | 250 | 40                      | 10.75                        | 273   | 10.94                  | 278   | 10.020                  | 254.5 | 10.070                   | 255.78 | 0.365                  | 9.3  |
|                   |     | 60                      |                              |       |                        |       | 9.750                   | 247.2 | 9.834                    | 249.78 | 0.500                  | 12.7 |
|                   |     | 80                      |                              |       |                        |       | 9.562                   | 242.9 | 9.670                    | 245.62 | 0.594                  | 15.1 |
|                   |     | 100                     |                              |       |                        |       | 9.312                   | 236.5 | 9.451                    | 240.06 | 0.719                  | 18.3 |
|                   |     | 120                     |                              |       |                        |       | 9.062                   | 230.2 | 9.232                    | 234.49 | 0.844                  | 21.4 |
|                   |     | 140                     |                              |       |                        |       | 8.750                   | 222.3 | 8.959                    | 227.56 | 1.000                  | 25.4 |
| 12                | 300 | STD                     | 12.75                        | 323.8 | 12.97                  | 329   | 12.000                  | 304.8 | 12.053                   | 306.15 | 0.375                  | 9.5  |
|                   |     | 40                      |                              |       |                        |       | 11.938                  | 303.2 | 11.999                   | 304.77 | 0.406                  | 10.3 |
|                   |     | XS                      |                              |       |                        |       | 11.750                  | 298.5 | 11.834                   | 300.58 | 0.500                  | 12.7 |
|                   |     | 60                      |                              |       |                        |       | 11.626                  | 295.3 | 11.725                   | 297.82 | 0.562                  | 14.3 |
|                   |     | 80                      |                              |       |                        |       | 11.374                  | 288.9 | 11.505                   | 292.23 | 0.688                  | 17.5 |
|                   |     | 100                     |                              |       |                        |       | 11.062                  | 281.0 | 11.232                   | 285.29 | 0.844                  | 21.4 |
| 14                | 350 | 120                     | 14.00                        | 355.6 | 14.25                  | 362.0 | 10.750                  | 273.1 | 10.959                   | 278.36 | 1.000                  | 25.4 |
|                   |     | 140                     |                              |       |                        |       | 10.500                  | 266.6 | 10.740                   | 272.80 | 1.125                  | 28.6 |
|                   |     | 160                     |                              |       |                        |       | 10.126                  | 257.7 | 10.413                   | 264.49 | 1.312                  | 33.3 |
|                   |     | STD                     |                              |       |                        |       | 13.250                  | 336.6 | 13.303                   | 337.90 | 0.375                  | 9.5  |
|                   |     | 40                      |                              |       |                        |       | 13.124                  | 333.3 | 13.192                   | 335.08 | 0.438                  | 11.1 |
|                   |     | XS                      |                              |       |                        |       | 13.000                  | 330.2 | 13.084                   | 332.33 | 0.500                  | 12.7 |
| 16                | 400 | 60                      | 16.00                        | 406.4 | 16.25                  | 412.8 | 12.812                  | 325.4 | 12.920                   | 328.17 | 0.594                  | 15.1 |
|                   |     | 80                      |                              |       |                        |       | 12.500                  | 317.5 | 12.646                   | 321.21 | 0.750                  | 19.1 |
|                   |     | 100                     |                              |       |                        |       | 12.124                  | 308.0 | 12.318                   | 312.88 | 0.938                  | 23.8 |
|                   |     | 120                     |                              |       |                        |       | 11.812                  | 300.0 | 12.044                   | 305.92 | 1.094                  | 27.8 |
|                   |     | 140                     |                              |       |                        |       | 11.500                  | 292.1 | 11.771                   | 298.98 | 1.250                  | 31.8 |
|                   |     | 160                     |                              |       |                        |       | 11.188                  | 284.2 | 11.498                   | 292.05 | 1.406                  | 35.7 |
| 16                | 400 | STD                     | 16.00                        | 406.4 | 16.25                  | 412.8 | 15.250                  | 387.4 | 15.303                   | 388.70 | 0.375                  | 9.5  |
|                   |     | 40                      |                              |       |                        |       | 15.000                  | 381.0 | 15.084                   | 383.13 | 0.500                  | 12.7 |
|                   |     | 60                      |                              |       |                        |       | 14.688                  | 373.1 | 14.811                   | 376.20 | 0.656                  | 16.7 |
|                   |     | 80                      |                              |       |                        |       | 14.312                  | 363.5 | 14.482                   | 367.84 | 0.844                  | 21.4 |
|                   |     | 100                     |                              |       |                        |       | 13.938                  | 354.0 | 14.155                   | 359.54 | 1.031                  | 26.2 |
|                   |     | 120                     |                              |       |                        |       | 13.562                  | 344.5 | 13.826                   | 351.18 | 1.219                  | 31.0 |
|                   |     | 140                     |                              |       |                        |       | 13.124                  | 333.3 | 13.442                   | 341.43 | 1.438                  | 36.5 |
|                   |     | 160                     |                              |       |                        |       | 12.812                  | 325.4 | 13.170                   | 334.52 | 1.594                  | 40.5 |

Butt-welding Ends

Material

| Nominal Pipe Size |        | Schedule Number or Wall | Outside Diameter             |        |                        |        | Nominal Inside Diameter |       | Machined Inside Diameter |        | Nominal Wall Thickness |       |        |       |        |        |       |      |
|-------------------|--------|-------------------------|------------------------------|--------|------------------------|--------|-------------------------|-------|--------------------------|--------|------------------------|-------|--------|-------|--------|--------|-------|------|
|                   |        |                         | Forging or Process module, A |        | Moulded steel Valve, A |        | B                       |       | C                        |        | T                      |       |        |       |        |        |       |      |
|                   |        |                         | inch                         | mm     | inch                   | mm     | inch                    | mm    | inch                     | mm     | inch                   | mm    |        |       |        |        |       |      |
| 18                | 450    | STD                     | 18.00                        | 457.2  | 18.28                  | 464.3  | 17.250                  | 438.2 | 17.303                   | 439.50 | 0.375                  | 9.5   |        |       |        |        |       |      |
|                   |        | XS                      |                              |        |                        |        | 17.000                  | 431.8 | 17.084                   | 433.93 | 0.500                  | 12.7  |        |       |        |        |       |      |
|                   |        | 40                      |                              |        |                        |        | 16.876                  | 428.7 | 16.975                   | 431.17 | 0.562                  | 14.3  |        |       |        |        |       |      |
|                   |        | 60                      |                              |        |                        |        | 16.500                  | 419.1 | 16.646                   | 422.81 | 0.750                  | 19.1  |        |       |        |        |       |      |
|                   |        | 80                      |                              |        |                        |        | 16.124                  | 409.5 | 16.318                   | 414.48 | 0.938                  | 23.8  |        |       |        |        |       |      |
|                   |        | 100                     |                              |        |                        |        | 15.688                  | 398.5 | 15.936                   | 404.77 | 1.156                  | 29.4  |        |       |        |        |       |      |
|                   |        | 120                     |                              |        |                        |        | 15.250                  | 387.4 | 15.553                   | 395.05 | 1.375                  | 34.9  |        |       |        |        |       |      |
|                   |        | 140                     |                              |        |                        |        | 14.876                  | 377.9 | 15.225                   | 386.72 | 1.562                  | 39.7  |        |       |        |        |       |      |
|                   |        | 160                     |                              |        |                        |        | 14.438                  | 366.7 | 14.842                   | 376.99 | 1.781                  | 45.2  |        |       |        |        |       |      |
|                   |        | 20                      |                              |        |                        |        | 500                     | STD   | 20.00                    | 508.0  | 20.31                  | 515.9 | 19.250 | 489.0 | 19.303 | 490.30 | 0.375 | 9.5  |
| XS                | 19.000 |                         | 482.6                        | 19.084 | 484.73                 | 0.500  |                         | 12.7  |                          |        |                        |       |        |       |        |        |       |      |
| 40                | 18.812 |                         | 477.8                        | 18.920 | 480.57                 | 0.594  |                         | 15.1  |                          |        |                        |       |        |       |        |        |       |      |
| 60                | 18.376 |                         | 466.8                        | 18.538 | 470.87                 | 0.812  |                         | 20.6  |                          |        |                        |       |        |       |        |        |       |      |
| 80                | 17.938 |                         | 455.6                        | 18.155 | 461.14                 | 1.031  |                         | 26.2  |                          |        |                        |       |        |       |        |        |       |      |
| 100               | 17.438 |                         | 443.0                        | 17.717 | 450.01                 | 1.281  |                         | 32.5  |                          |        |                        |       |        |       |        |        |       |      |
| 120               | 17.000 |                         | 431.8                        | 17.334 | 440.28                 | 1.500  |                         | 38.1  |                          |        |                        |       |        |       |        |        |       |      |
| 140               | 16.500 |                         | 419.1                        | 16.896 | 429.16                 | 1.750  |                         | 44.5  |                          |        |                        |       |        |       |        |        |       |      |
| 160               | 16.062 |                         | 408.0                        | 16.513 | 419.43                 | 1.969  |                         | 50.0  |                          |        |                        |       |        |       |        |        |       |      |
| 22                | 550    |                         | STD                          | 22.00  | 558.8                  | 22.34  |                         | 567.4 |                          |        |                        |       | 21.250 | 539.8 | 21.303 | 541.10 | 0.375 | 9.5  |
|                   |        | XS                      | 21.000                       |        |                        |        | 533.4                   |       | 21.084                   | 535.53 | 0.500                  | 12.7  |        |       |        |        |       |      |
|                   |        | 60                      | 20.250                       |        |                        |        | 514.4                   |       | 20.428                   | 518.87 | 0.875                  | 22.2  |        |       |        |        |       |      |
|                   |        | 80                      | 19.750                       |        |                        |        | 501.7                   |       | 19.990                   | 507.75 | 1.125                  | 28.6  |        |       |        |        |       |      |
|                   |        | 100                     | 19.250                       |        |                        |        | 489.0                   |       | 19.553                   | 496.65 | 1.375                  | 34.9  |        |       |        |        |       |      |
|                   |        | 120                     | 18.750                       |        |                        |        | 476.3                   |       | 19.115                   | 485.52 | 1.625                  | 41.3  |        |       |        |        |       |      |
|                   |        | 140                     | 18.250                       |        |                        |        | 463.6                   |       | 18.678                   | 474.42 | 1.875                  | 47.6  |        |       |        |        |       |      |
|                   |        | 160                     | 17.750                       |        |                        |        | 450.8                   |       | 18.240                   | 463.30 | 2.125                  | 54.0  |        |       |        |        |       |      |
|                   |        | 24                      | 600                          |        |                        |        | STD                     |       | 24.00                    | 609.6  | 24.38                  | 619.3 | 23.250 | 590.6 | 23.303 | 591.90 | 0.375 | 9.5  |
|                   |        |                         |                              |        |                        |        | XS                      |       |                          |        |                        |       | 23.000 | 584.2 | 23.084 | 586.33 | 0.500 | 12.7 |
| 30                | 22.876 |                         |                              | 581.1  | 22.975                 | 583.57 | 0.562                   | 14.3  |                          |        |                        |       |        |       |        |        |       |      |
| 40                | 22.624 |                         |                              | 574.6  | 22.755                 | 577.98 | 0.688                   | 17.5  |                          |        |                        |       |        |       |        |        |       |      |
| 60                | 22.062 |                         |                              | 560.4  | 22.263                 | 565.48 | 0.969                   | 24.6  |                          |        |                        |       |        |       |        |        |       |      |
| 80                | 21.562 |                         |                              | 547.6  | 21.826                 | 554.38 | 1.219                   | 31.0  |                          |        |                        |       |        |       |        |        |       |      |
| 100               | 20.938 |                         |                              | 531.8  | 21.280                 | 540.51 | 1.531                   | 38.9  |                          |        |                        |       |        |       |        |        |       |      |
| 120               | 20.376 |                         |                              | 517.6  | 20.788                 | 528.02 | 1.812                   | 46.0  |                          |        |                        |       |        |       |        |        |       |      |
| 140               | 19.876 |                         |                              | 504.9  | 20.350                 | 516.89 | 2.062                   | 52.4  |                          |        |                        |       |        |       |        |        |       |      |
| 160               | 19.312 |                         |                              | 490.5  | 19.857                 | 507.37 | 2.344                   | 59.5  |                          |        |                        |       |        |       |        |        |       |      |

| ASTM Code  | Chemical Compositions % |           |       |       |           |           |           |           |           |      |      |                | Mechanical   |              |          |               | Hardness Charpy |  |
|------------|-------------------------|-----------|-------|-------|-----------|-----------|-----------|-----------|-----------|------|------|----------------|--------------|--------------|----------|---------------|-----------------|--|
|            | C ≤                     | Mn ≤      | P ≤   | S ≤   | Si ≤      | Cr ≤      | Mo ≤      | Ni ≤      | Cu ≤      | V ≤  | Nb ≤ | Tensile MPa, ≥ | Yield MPa, ≥ | Elongation % | Reduce % | Brinell HB, ≤ | J, ≥            |  |
| A105       | 0.35                    | 0.60~1.05 | 0.035 | 0.040 | 0.10~0.35 | 0.30      | 0.12      | 0.4       | 0.40      | 0.08 | 0.02 | 485            | 250          | 30           | 30       | 187           |                 |  |
| A182 F11   | 0.05~0.15               | 0.30~0.60 | 0.030 | 0.030 | 0.50~1.00 | 1.00~1.50 | 1.44~0.65 |           |           |      |      | 415            | 205          | 20           | 45       | 121~174       |                 |  |
| A182 F22   | 0.05~0.15               | 0.30~0.60 | 0.040 | 0.040 | 0.50      | 2.00~2.50 | 0.87~1.13 |           |           |      |      | 415            | 205          | 20           | 35       | 170           |                 |  |
| A182 F304  | 0.08                    | 2.00      | 0.045 | 0.030 | 1.00      | 18.0~20.0 |           | 8.0~11.0  |           |      |      | 515            | 205          | 30           | 50       |               |                 |  |
| A182 F304L | 0.030                   | 2.00      | 0.045 | 0.030 | 1.00      | 18.0~20.0 |           | 8.0~13.0  |           |      |      | 485            | 170          | 30           | 50       |               |                 |  |
| A182 F316  | 0.08                    | 2.00      | 0.045 | 0.030 | 1.00      | 16.0~18.0 | 2.00~3.00 | 10.0~14.0 |           |      |      | 515            | 205          | 30           | 50       |               |                 |  |
| A182 F316L | 0.030                   | 2.00      | 0.045 | 0.030 | 1.00      | 16.0~18.0 | 2.00~3.00 | 10.0~15.0 |           |      |      | 485            | 170          | 30           | 50       |               |                 |  |
| A182 F51   | 0.030                   | 2.00      | 0.030 | 0.020 | 1.00      | 21.0~23.0 | 2.5~3.5   | 4.5~6.5   |           |      |      | 620            | 450          | 25           | 45       |               |                 |  |
| A182 F6a   | 0.15                    | 1.00      | 0.040 | 0.030 | 1.00      | 11.5~13.5 |           | 0.50      |           |      |      | 585            | 380          | 18           | 35       | 167~229       |                 |  |
| A193 B7    | 0.37~0.49               | 0.65~1.10 | 0.035 | 0.040 | 0.15~0.35 | 0.75~1.20 |           |           |           |      |      | 860            | 720          | 16           | 50       | 321           |                 |  |
| A193 B7M   | 0.37~0.49               | 0.65~1.10 | 0.035 | 0.040 | 0.15~0.35 | 0.75~1.20 | 0.15~0.25 |           |           |      |      | 690            | 550          | 18           | 50       | 235           |                 |  |
| A193 B8    | 0.08                    | 2.00      | 0.045 | 0.030 | 1.00      | 18.0~20.0 |           | 8.0~11.0  |           |      |      | 515            | 205          | 30           | 50       | 223           |                 |  |
| A193 B8M   | 0.08                    | 2.00      | 0.045 | 0.030 | 1.00      | 16.0~18.0 | 2.00~3.00 | 10.0~14.0 |           |      |      | 515            | 205          | 30           | 50       | 223           |                 |  |
| A193 B16   | 0.36~0.47               | 0.45~0.70 | 0.035 | 0.040 | 0.15~0.35 | 0.80~1.15 | 0.50~0.65 |           | 0.25~0.35 |      |      | 860            | 720          | 18           | 50       | 321           |                 |  |
| A194 2H    | ≥0.40                   | 1.00      | 0.040 | 0.050 | 0.04      |           |           |           |           |      |      |                |              |              |          |               |                 |  |
| A194 2HM   | ≥0.40                   | 1.00      | 0.040 | 0.050 | 0.04      |           |           |           |           |      |      |                |              |              |          |               |                 |  |
| A194 8     | 0.08                    | 2.00      | 0.045 | 0.030 | 1.00      | 18.0~20.0 |           | 8.0~11.0  |           |      |      |                |              |              |          |               |                 |  |
| A194 8M    | 0.08                    | 2.00      | 0.045 | 0.030 | 1.00      | 16.0~18.0 | 0.45~0.65 | 10.0~14.0 |           |      |      |                |              |              |          |               |                 |  |
| A216 WCB   | 0.30                    | 1.00      | 0.04  | 0.045 | 0.60      | 0.50      | 0.20      | 0.50      | 0.30      | 0.03 |      | 250            | 22           | 35           |          |               |                 |  |
| A216 WCC   | 0.25                    | 1.20      | 0.04  | 0.045 | 0.60      | 0.50      | 0.2       | 0.50      | 0.30      | 0.03 |      | 275            | 22           | 35           |          |               |                 |  |
| A217 C5    | 0.20                    | 0.40~0.70 | 0.04  | 0.045 | 0.75      | 4.00~6.50 | 0.45~0.65 | 0.50      | 0.50      |      |      | 415            | 18           | 35           |          |               |                 |  |
| A217 CA15  | 0.15                    | 1.00      | 0.040 | 0.040 | 1.50      | 11.5~14.0 | 0.50      | 1.00      |           |      |      | 450            | 18           | 30           |          |               |                 |  |
| A217 WC6   | 0.05~0.20               | 0.50~0.80 | 0.04  | 0.045 | 0.60      | 1.00~1.50 | 0.45~0.65 | 0.50      | 0.50      |      |      | 275            | 20           | 35           |          |               |                 |  |
| A217 WC9   | 0.05~0.18               | 0.40~0.70 | 0.04  | 0.045 | 0.60      | 2.00~2.75 | 0.90~1.20 |           | 0.50      |      |      | 275            | 20           | 35           |          |               |                 |  |
| A276 410   | 0.08~0.15               | 1.00      | 0.040 | 0.030 | 1.00      | 11.5~13.5 |           |           |           |      |      | 480            | 275          | 20           | 45       |               |                 |  |
| A276 420   | ≥0.15                   | 1.00      | 0.040 | 0.030 | 1.00      | 12.0~14.0 |           |           |           |      |      |                |              |              |          | 241           |                 |  |
| A320 L7    | 0.38~0.048              | 0.75~1.00 | 0.035 | 0.040 | 0.15~0.35 | 0.80~1.10 | 0.15~0.25 |           |           |      |      | 860            | 725          | 16           | 50       |               | Avg:27; min:20  |  |
| A320 L7M   | 0.38~0.048              | 0.75~1.00 | 0.035 | 0.040 | 0.15~0.35 | 0.80~1.10 | 0.15~0.25 |           |           |      |      | 690            | 550          | 18           | 50       | 235           | Avg:27; min:20  |  |
| A336 F22   | 0.05~0.15               | 0.30~0.60 | 0.025 | 0.025 | 0.50      | 2.00~2.50 | 0.90~1.10 |           |           |      |      | 310            | 19           | 40           |          |               |                 |  |
| A350 LF1   | 0.30                    | 0.60~1.35 | 0.035 | 0.040 | 0.15~0.30 | 0.30      | 0.12      | 0.40      | 0.40      | 0.08 | 0.02 | 205            | 28           | 38           |          |               | Avg:18; min:14  |  |
| A350 LF2   | 0.30                    | 0.60~1.35 | 0.035 | 0.040 | 0.15~0.30 | 0.30      | 0.12      | 0.40      | 0.40      | 0.08 | 0.02 | 250            | 30           | 30           |          |               | Avg:20; min:16  |  |
| A351 CF3   | 0.03                    | 1.50      | 0.040 | 0.040 | 2.00      | 17.0~21.0 | 0.50      | 8.0~12.0  |           |      |      | 485            | 205          | 35.0         |          |               |                 |  |
| A351 CF3M  | 0.03                    | 1.50      | 0.040 | 0.040 | 1.50      | 17.0~21.0 | 2.0~3.00  | 9.0~13.0  |           |      |      | 485            | 205          | 30.0         |          |               |                 |  |
| A351 CF8   | 0.08                    | 1.50      | 0.040 | 0.040 | 2.00      | 18.0~21.0 | 0.50      | 8.0~11.0  |           |      |      | 485            | 205          | 35.0         |          |               |                 |  |
| A351 CF8M  | 0.08                    | 1.50      | 0.040 | 0.040 | 1.50      | 18.0~21.0 | 2.0~3.00  | 9.0~12.0  |           |      |      | 485            | 205          | 30.0         |          |               |                 |  |
| A351 CF8C  | 0.08                    | 1.50      | 0.040 | 0.040 | 2.00      | 18.0~21.0 | 0.50      | 9.0~12.0  |           |      |      | 485            | 205          | 30.0         |          |               |                 |  |
| A351 CN7M  | 0.07                    | 1.50      | 0.040 | 0.040 | 1.50      | 19.0~22.0 | 2.0~3.00  | 27.5~30.5 | 3.0~4.0   |      |      | 425            | 170          | 35           |          |               |                 |  |
| A352 LC1   | 0.25                    | 0.50~0.80 | 0.04  | 0.045 | 0.60      |           | 0.45~0.65 |           |           |      |      | 450~620        | 240          | 24           | 35       |               | Avg:18; min:14  |  |
| A352 LC2   | 0.25                    | 0.50~0.80 | 0.04  | 0.045 | 0.60      |           |           | 2.00~3.00 |           |      |      | 485~655        | 275          | 24           | 35       |               | Avg:20; min:16  |  |
| A352 LC3   | 0.15                    | 0.50~0.80 | 0.04  | 0.045 | 0.60      |           |           | 3.00~4.00 |           |      |      | 485~655        | 275          | 24           | 35       |               | Avg:20; min:16  |  |
| A352 LCB   | 0.30                    | 1.00      | 0.04  | 0.045 | 0.60      | 0.50      | 0.20      | 0.50      | 0.30      | 0.03 |      | 450~620        | 240          | 24           | 35       |               | Avg:18; min:14  |  |
| A352 LCC   | 0.25                    | 1.20      | 0.04  | 0.045 | 0.60      | 0.50      | 0.20      | 0.50      |           | 0.03 |      | 485~655        | 275          | 22           | 35       |               | Avg:20; min:16  |  |
| A439 D2    | 3.00                    | 0.70~1.25 | 0.08  |       | 1.50~3.00 | 1.75~2.75 |           |           |           |      |      | 400            | 207          | 8.0          |          | 139~202       |                 |  |