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TÜV SÜD ISO 9001
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AVANT-GARDE
ENGINEERS AND CONSULTANTS (P) LTD.

GM®
G M ENGINEERING PVT LTD

# Ball Valve

One stop **solutions for** all types of **valve requirements**

# ABOUT US

G M Engineering offers you various range of industrial valves for all your process handling needs. G M Group's strength is quality products at affordable prices, prompt delivery and the unflinching commitment to excel. The products have been enjoying a sustained presence in the national for over last 20 years in chemical and process industries.

G M Engineering's Products are widely used in chemical & Process industries, Refineries, Petrochemicals & Fertilizer Plants, Pharmaceuticals, Oil Exploration, Thermal & Nuclear Plants, Food & Beverage industries, Effluent Treatment & Sewerage Plants, Water Treatment, Cooling water & Water supply plants, Mining Industries etc.

The Company was founded in Year 1996. G M Engineering achieved reputation and trust within a very short span. Thanks to our user friendly direct marketing, far sighted & honest business policy.

We are having vast experience in the field of valve manufacturing. Strict Quality control norms are maintained at various levels of production and full fledged testing facility through latest technology ensures constant quality.

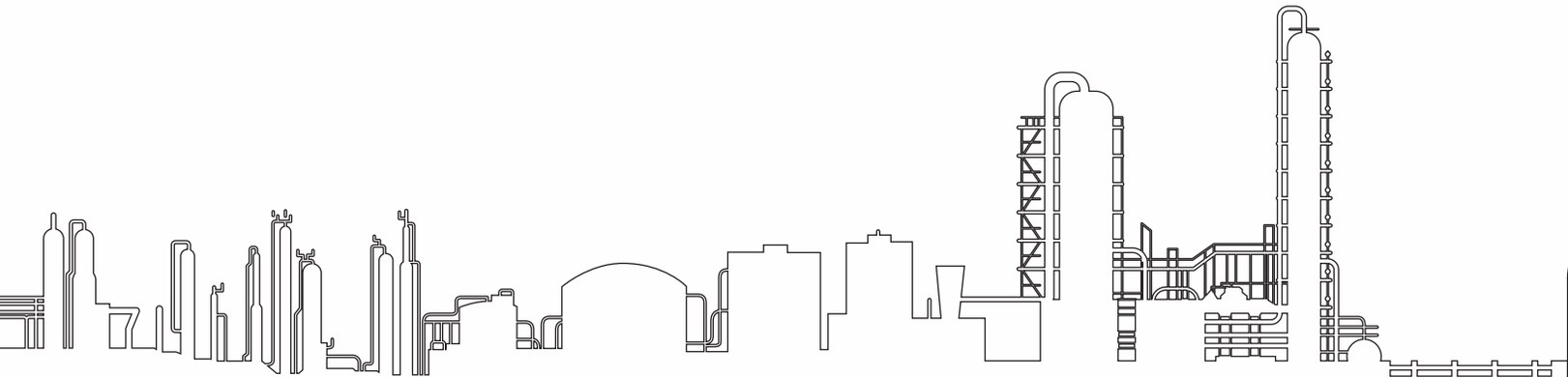
Continuous development & products improvement is our motto. G M Group has continually worked to develop innovative and quality products and has earned a reputation for technical excellence in the valve industry and accredited with ISO 9001:2008 Certification by TUV Suddeutschland.

G M Engineering is certified by American Petroleum Institute to use API 6D Monogram. Research and development work continually made by G M Group Focusing at an advanced technology of environmental compatibility has resulted in a product range that warrants safe and reliable operation in compliance with virtually all and any requirements.

G M Engineering Offers design and technical assistance in developing varieties of products. G M Engineering is always ready to assist customers in developing products that can be mutual benefit and ensure GM as an ideal partner at all time. GM Continually strives to uphold the company objective to "Build a reputation in the field by providing proven in terms of perfection, Precision and Innovative Products Design with best possible quality / competitive price ratio".

## The Company's Core competence lies in unabated support from Group Company

M/s. Jagdish Technocast Pvt. Ltd., an ISO 9001:2000 Certified foundry to produce 500 TPA of Investment Casting & Sand Casting in various materials like Cast Steel, Alloy Steel, Stainless Steel and other Materials.



# OUR STRENGTH

product range upto
**120”**

capacity
**30,000**
nos./month

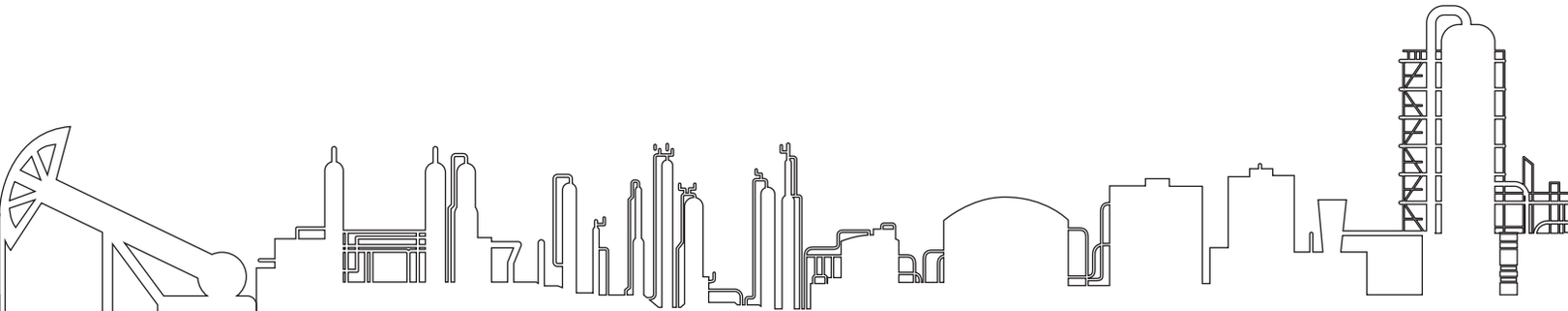
class upto
**2500#**

export to
**15**
countries

number of employees
**250**

constructed area
**7500**
sq.m

factory area
**13750**
sq.m



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# Technical Features of **Ball Valve**

GM trunnion mounted ball valves have been designed for severe service and generally used in the Petrochemical, Refining, Upstream Oil and Gas, Power and Chemical applications. The designs incorporate many features which ensure reliable and repeatable shut off performance whilst providing the highest levels of safety as demanded by these Industries.

## KEY FEATURES

* Design, manufacture and materials conform to the essential requirements of API 6D, ISO 14313, ASME B16.34, ASME VIII.

* Certified Firesafe in accordance with API 607 / API 6FA.

* Body wall thickness is according to ASME B16.34, as a minimum.

* Full and reduced bore valves available.

* Bolted construction for ease of on-site maintenance.

* 2 or 3 piece body, end entry, pin trunnion mounted ball design.

* Anti-blow-out bottom entry stem shouldered to the body, not the bonnet or an intermediate part bolted to the valve.

* High integrity stem sealing system prevents atmospheric leakage.

* Low temperature and cryogenic service designs available.

* Stem seals are replaceable without the need to remove the valve from the pipeline or totally disassemble the valve.

* Guided stem (bearings) with hardness control between parts to minimise operational torques.

* Anti-static design (10Ω under 12 Volt).

* Positive seat sealing at high and low differential pressures.

* Bi-directional, double block & bleed design allowing the venting and draining of the body in the open & closed position.

* Pressure and spring assisted seat design is of the single piston effect.

* Positive cavity relief via spring loaded seat design to the low pressure side.

* Emergency sealant injection provision to seat and stem seal is available.

* Testing and marking to API 6D.

* Available with pneumatic, hydraulic, electric actuators, Gas over oil, Gas powered operated etc.

# Options and Variations

### OPERATION METHODS
GM range of valves may be manually operated by lever or gearbox depending on torque requirements, or by actuator (pneumatic, hydraulic or electric). Please refer to GM technical sales department to confirm torque requirements.

### SEALANT INJECTION
A sealant injection system may be specified as an optional feature, so that, in the event of damage being caused to the sealing face of the seat insert or primary o-ring seals, an emergency seal may be formed by injecting a PTFE based compound into the sealing area.

### EMERGENCY SHUT DOWN VALVES
The GM valves are ideal for ESD applications. Full details of the relevant specifications must be provided to our technical department so that compliance may be provided.

### LOW TEMPERATURE SERVICE
GM ball valves can be supplied for use in low temperature or cryogenic service.

Extended bonnet designs are of the fully enclosed vapour space type whereby stem seals are located at the top of the bonnet outside of the cold zone and fully maintainable without the need to remove the stem or valves from the pipeline.

Extended bonnets are recommended for valves which are required to be operated (opened & closed) for service at temperatures below -50°C (-58°F) or above 200°C (392°F).

### SPECIAL COATINGS
The wear resistance and corrosion resistance of seat and seal areas may be enhanced by the use of weld overlays, electroless nickel coating, stellite deposition or other hard surface processes. Please consult with our technical department for specific requirements.

### METAL SEATED VALVES
GM are able to offer a comprehensive range of metal to metal seated ball valves for abrasive and elevated temperature applications, beyond the capability of soft seated valves.

### UNDERGROUND / BURIED SERVICE VALVES
Operator extensions may be specified where valves are to be installed in underground locations. Such extensions will also be fitted with the necessary piping to facilitate drain, vent and sealant injection or lubrication as required.

### SOUR SERVICE
Valves are available conforming to the requirements of the NACE specification MR 01-75 or MR 0103 for use on applications where the presence of wet H2S generates a risk of stress corrosion cracking. NACE compliance certificates are available on request.

### ALTERNATIVE MATERIALS

| | | |
|---|---|---|
| Body & Trim | CF3M / 316L | |
| | Duplex Stainless Steel | |
| | Inconel 625, Monel, Titanium | Other materials available on request. |
| Seats | Reinforced PTFE | Low temp. / low pressure. Suitable up to Class 600 only |
| | PEEK | High temp. / high pressure. |
| | PCTFE (KEL-F) | Low temp. / high pressure. |
| Primary Seals | Hydrogenated HNBR | Low temp. service. |
| | | Explosive decompression. |
| | | Methanol |
| | Fluorosilicon | Low temp. service. |
| | FKM GLT | Low temp. service. |
| | PTFE / Elgiloy | Low temp. / cryogenic service |
| | | Resistant to most chemicals |
| | Graphite | High temp. / low temp. |
| | | Resistant to most chemicals |

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# **Ball Valves** - API 6D Design Features & Applications

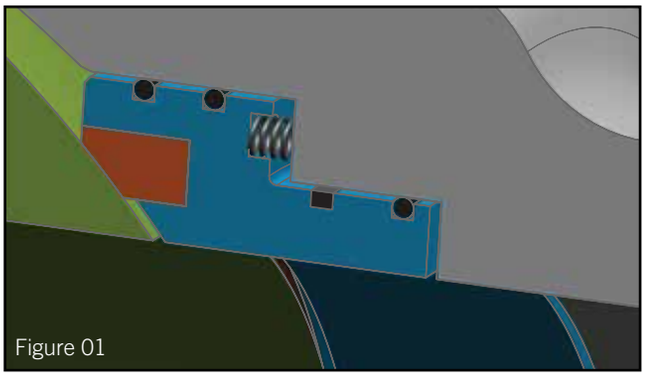


Figure 01

**Seal Feature**

GM ball valves are produced with spring-loaded seats. This spring load keeps the seat in contact with the ball even in absence of line pressure and makes very efficient seal at low line pressure. As line pressure increases, the seat area creates a piston effect which forces the seat against the ball, therefore a tight seal becomes effective. If the pressure is higher, the force exerted by the seat on the ball is increased by action of the pipeline pressure. Therefore, the higher the line pressure, the greater the piston action.

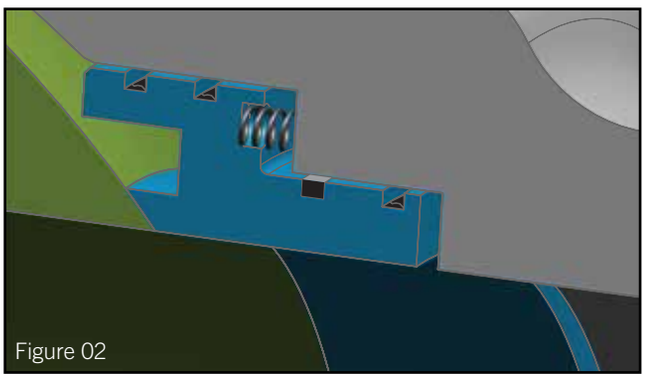


Figure 02

**Fire Safe Construction with Secondary Metal Seat**

GM's ball valves have been fire tested and can be supplied to API 6FA and API 607. The soft seat inserts, irrespective of their materials, will possibly fail when subjected to sudden high temperature conditions. GM provides a fire-safe design which may substantially prevent leakages through seals when damaged by high temperature. The function of the seats before and after the fire test is shown on the sketches. If the seat inserts are destroyed or burned out, a metal to metal seal is formed between the lower diameter of the seat and ball, while the seat to body seals, the stem packing and the end connections to body seals are designed to resist high temperature and will remain undamaged. (Figure 1 & 2)

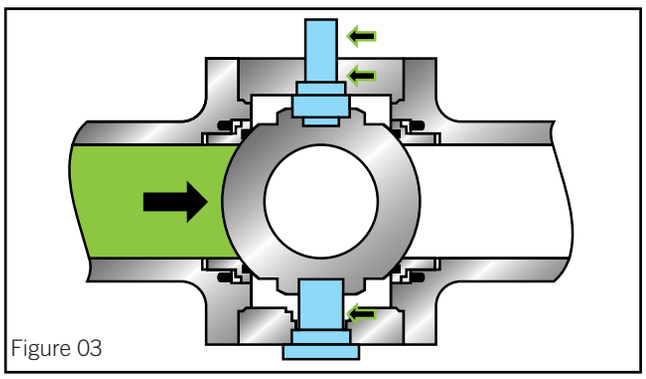


Figure 03

**Trunnion Mounting**

Trunnion mounted stems absorb the thrust from line pressure, preventing excess friction between the ball and seats, so even at full rated working pressure, operating torque stays low. (Figure 3)

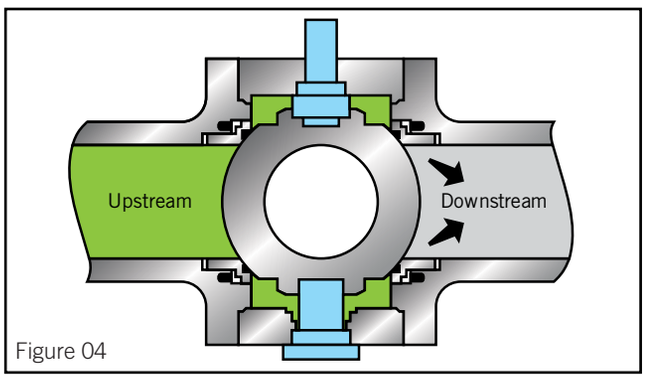



Figure 04

**Double Block and Bleed**

The seats are of both-side-sealing type, which means that they seal both on the upstream or downstream side of the ball valve and inside the valve. Whether in the open or closed position, pressure on each side of the ball is blocked from the body cavity by the seat rings engineered to self relieve. No pressure build up can occur in to body cavity. The body cavity can then be vented to the atmosphere or drained through the body port.

**Sealant Fitting**
Sealant lubrication fittings come as a standard with GM's design. In the event of seat insert or stem seal damage, external or internal leakage can occur. Emergency sealant injection can save the integrity of the valve by incorporating a sealant seal around the stem or between the seat and the ball until such time the valve may be properly serviced. (Figure 5)

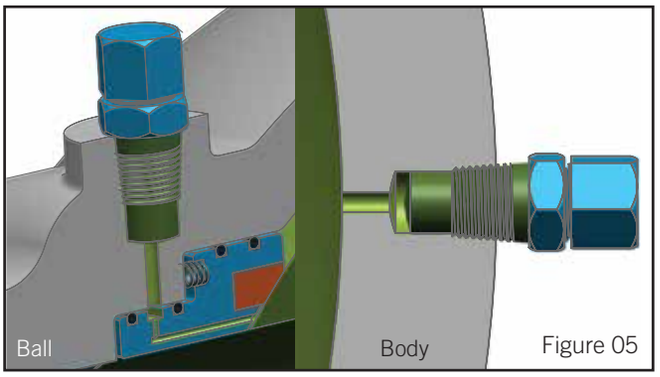


Figure 05

**Double Sealed**
Envelope Connections Double o-rings or a combination of an o-ring and firesafe gasket on body/adapter connections to ensure positive sealing.

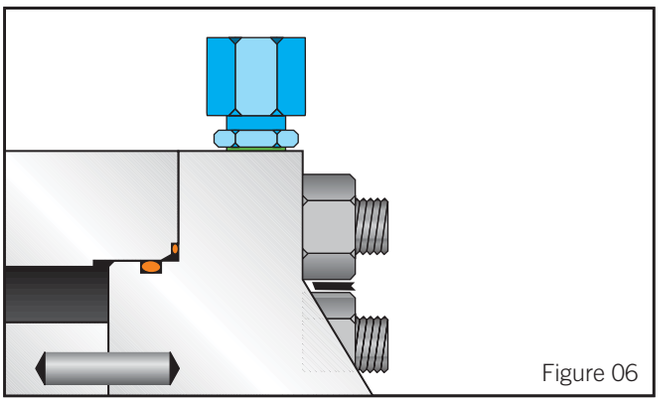


Figure 06

**Heavy Duty Bearings**
Trunnions are supported by heavy duty teflon coated steel bearings. Thrust load on the ball is supported by large trunnions mounted within captured trunnion blocks, resulting in low operating torque and seat wear.

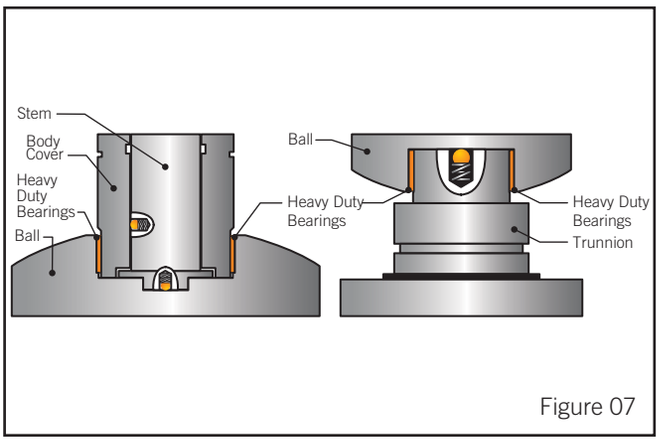


Figure 07

**Antistatic Device**
A spring between the trunnion and the ball or between the stem and the gland plate permits electrical continuity between all valve components.

**Stem Seal with Blow Out Proof Stem**
The stem is independent of the ball and is a blow-out proof design. As an integral part, a stem has a flange at its lower side. The stem flange prevents the stem from blowingout. This feature also allows replacement of stem packing while the valve is under pressure.The torque is transmitted to the ball by a generously proportioned mating joint, hence the stem is not affected by the side thrust.

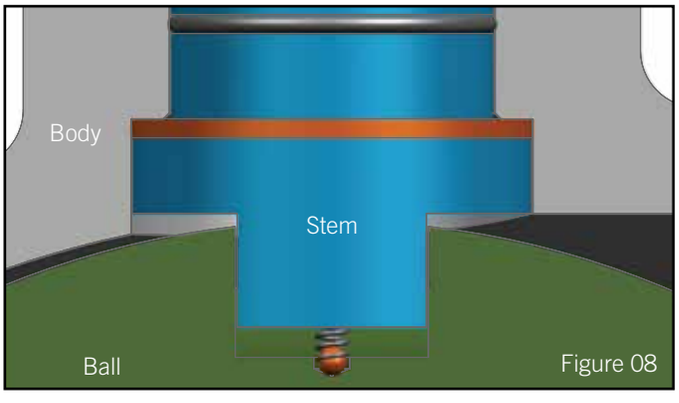


Figure 08

# **Ball Valves** - API 6D Design Features & Applications

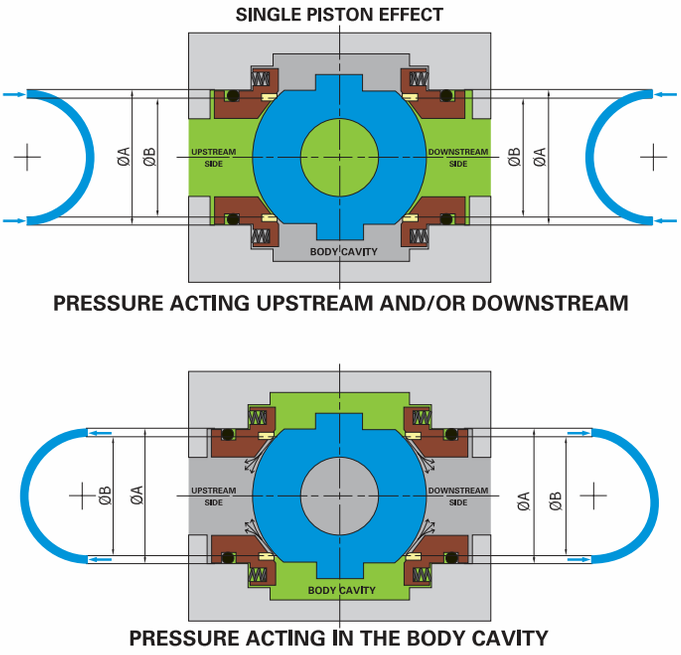



Figure 09

**Single piston effect (self-relieving seats)**

Fluid pressure, both upstream and downstream, creates a resultant thrust that pushes the seat rings against the ball. Fluid pressure acting in the body cavity creates a resultant thrust that pushes the seat rings away from the ball. The single piston design permits theautomatic release of any overpressure in the body cavity when the valve is in thefully open or fully closed position. Consequently,the seat rings are "self-relieving."

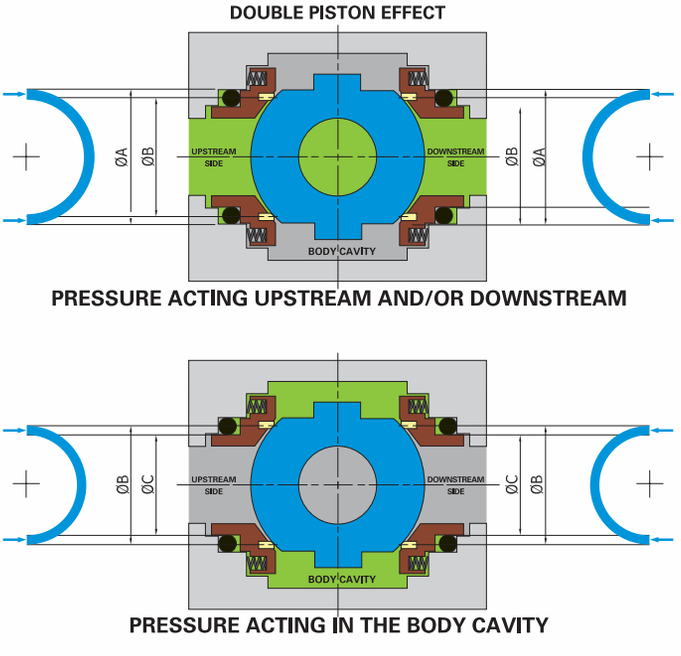


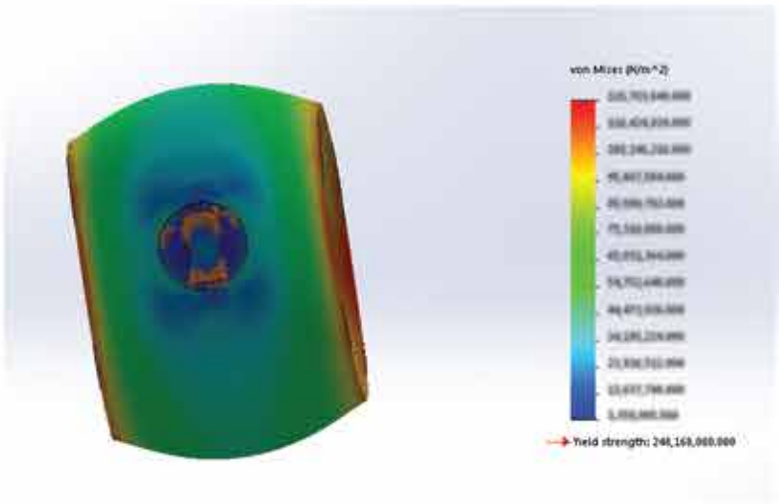

Figure 10

**Double piston effect**

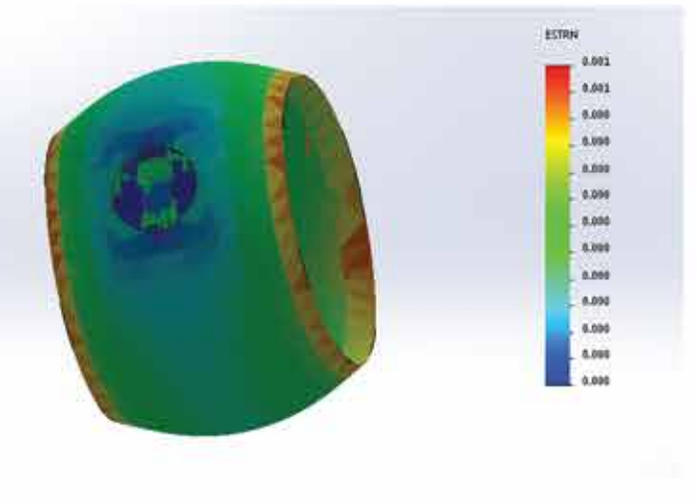
Fluid pressure,both upstream and down-stream as well as in the body cavity,creates a resultant thrust that pushes theseat rings towards the ball. Valves with double piston effect seat ringsrequire a relief valve to reduce the build-upof overpressure in the body cavity.

# **Ball Valve** - Fixed deformation finite element analysis

Ball Valve Strength and Finite Element of Deformation




Class 600 - 30” Ball




Class 600 - 30” Ball

Safety assessment of structure strength of valve body under the composite function of medium pressure and external bending moment

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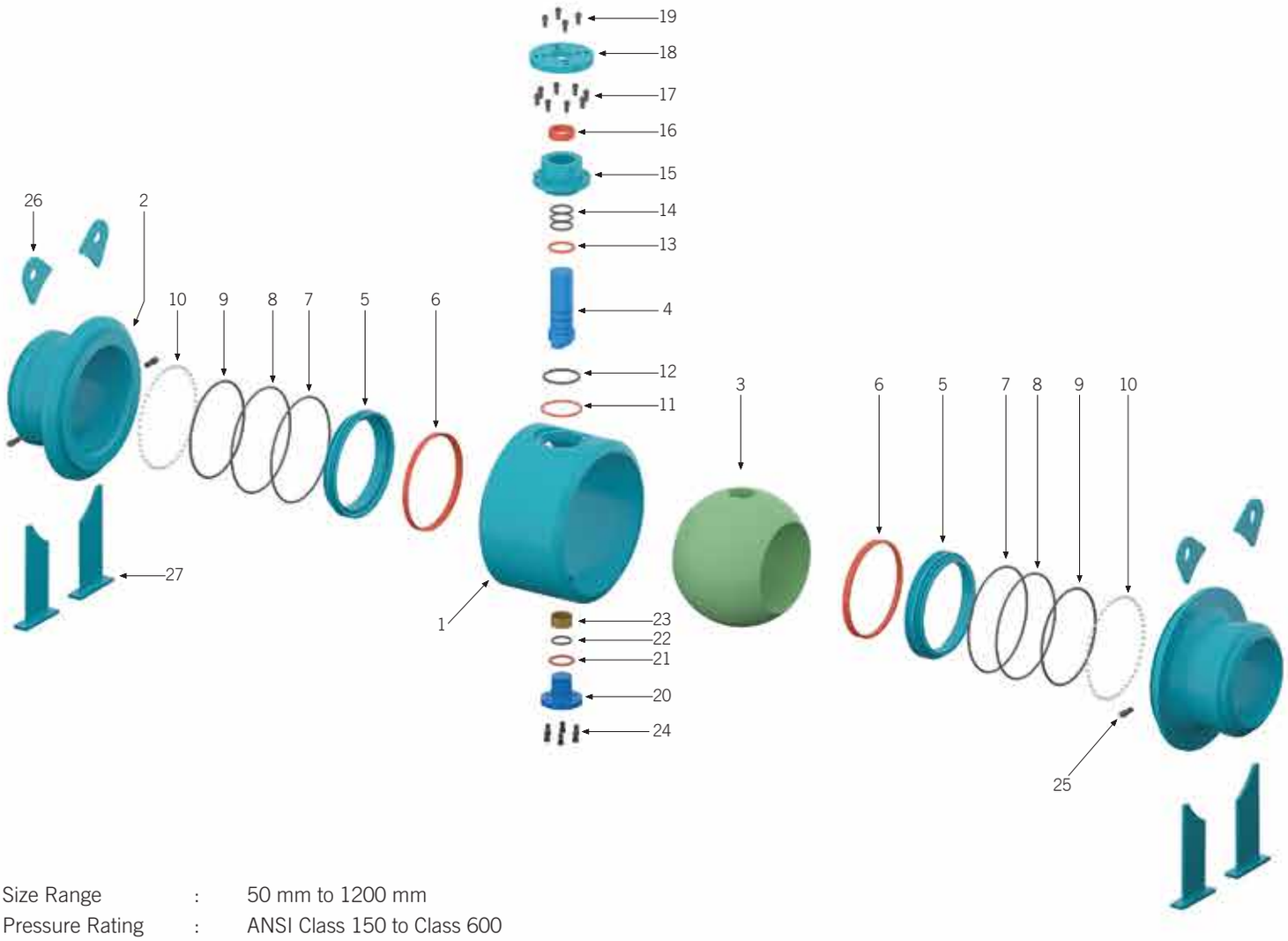
# **Ball Valve** - Fully Welded Construction




| | | |
|---|---|---|
| Size Range | : | 50 mm to 1200 mm |
| Pressure Rating | : | ANSI Class 150 to Class 600 |
| Connection | : | Flanged to ASME B16.5 ≤ 24" & Flange to ASME B16.47 ≥ 26" |
| | | Butt-weld ends to ASME B16.25 |
| | | Clamp ends on request. |
| Body Materials | : | A 105, LF2, LF6, F304, F316 |
| | | and other special alloys. |
| Temp. Range | : | -196°C + 200°C (-320°F to + 392°F) |
| Design | : | API 6D, ASME B16.34 |
| | : | ISO 14313, ASME VIII |
| Face to Face | : | ASME B16.10, API 6D |
| Fire Testing | : | API 607, API 6FA, BS EN ISO 10497 |
| Pressure Testing | : | API 6D |
| Certification** | : | EN 10204, ISO 10474 |
| | : | NACE MR 01-75, ISO 15156, MR 0103 |
| Quality Assurance | : | ISO 9001, API Monogram |

**NACE compliance available on request.

# Material

| SR. No. | COMPONENT | Standard Service -20°F to 180°F (-28°C to 82°C) | Sour Service NACE -20°F to 180°F (-28°C to 82°C) | Low Temp Service -50°F to 180°F (-45°C to 82°C) |
|---|---|---|---|---|
| 1 | BODY | ASTM A 105 | ASTM A 105 | ASTM A 350 GR. LF2 |
| 2 | SIDE PIECE | ASTM A 105 | ASTM A 105 | ASTM A 350 GR. LF2 |
| 3 | BALL | ASTM A 105 + 75 MICRON ENP COATING | ASTM A 105 + 75 MICRON ENP COATING | ASTM A 350 GR. LF2 + 75 MICRON ENP COATING |
| 4 | STEM | AISI 410 | AISI 410 | AISI 316 |
| 5 | RETAINER RING | AISI 410 | AISI 410 | AISI 316 |
| 6 | SEAT INSERT | CFT / RPTFE / DEVLON / VITON | CFT / RPTFE / DEVLON / VITON | CFT / RPTFE / DEVLON / VITON |
| 7 | O-RING 1 | VITON | VITON | LOW TEMPERATURE NITRILE |
| 8 | O-RING 2 | VITON / GRAFOIL | VITON / GRAFOIL | VITON / GRAFOIL |
| 9 | O-RING 3 | VITON | VITON | LOW TEMPERATURE NITRILE |
| 10 | SPRING | INNCONEL X750 | INNCONEL X750 | INNCONEL X750 |
| 11 | BODY COVER GASKET | PTFE / GLASS FILLED TFE | PTFE / GLASS FILLED TFE | PTFE / GLASS FILLED TFE |
| 12 | BODY COVER O-RING | VITON | VITON | LOW TEMPERATURE NITRILE |
| 13 | STEM SEAL | PTFE / GLASS FILLED TFE | PTFE / GLASS FILLED TFE | PTFE / GLASS FILLED TFE |
| 14 | STEM O-RING | VITON | VITON | LOW TEMPERATURE NITRILE |
| 15 | BODY COVER | AISI 410 | AISI 410 | AISI 316 |
| 16 | GLAND PACKING | PTFE / GLASS FILLED TFE | PTFE / GLASS FILLED TFE | PTFE / GLASS FILLED TFE |
| 17 | BODY COVER BOLT | ASTM A 193 B7 | ASTM A 193 B7M | ASTM A 320 GR L7 |
| 18 | MOUNTING PLATE | MILD STEEL | MILD STEEL | MILD STEEL |
| 19 | ALLEN KEY BOLT | ASTM 193 B7 | ASTM 193 B7M | ASTM A 320 GR L7 |
| 20 | TRUNNION | AISI 410 | AISI 410 | AISI 316 |
| 21 | TRUNNION GASKET | PTFE / GLASS FILLED TFE | PTFE / GLASS FILLED TFE | PTFE / GLASS FILLED TFE |
| 22 | TRUNNION O-RING | VITON | VITON | LOW TEMPERATURE NITRILE |
| 23 | TRUNNION BEARING BUSH | PTFE / PTFE COATED SS 316 | PTFE / PTFE COATED SS 316 | PTFE / PTFE COATED SS 316 |
| 24 | TRUNNION BOLT | ASTM A 193 B7 | ASTM A 193 B7M | ASTM A 320 GR L7 |
| 25 | SEALANT INJECTION | STAINLESS STEEL | STAINLESS STEEL | STAINLESS STEEL |
| 26 | SUPPORTING HOOK | MILD STEEL | MILD STEEL | MILD STEEL |
| 27 | SUPPORTING FOOT | MILD STEEL | MILD STEEL | MILD STEEL |

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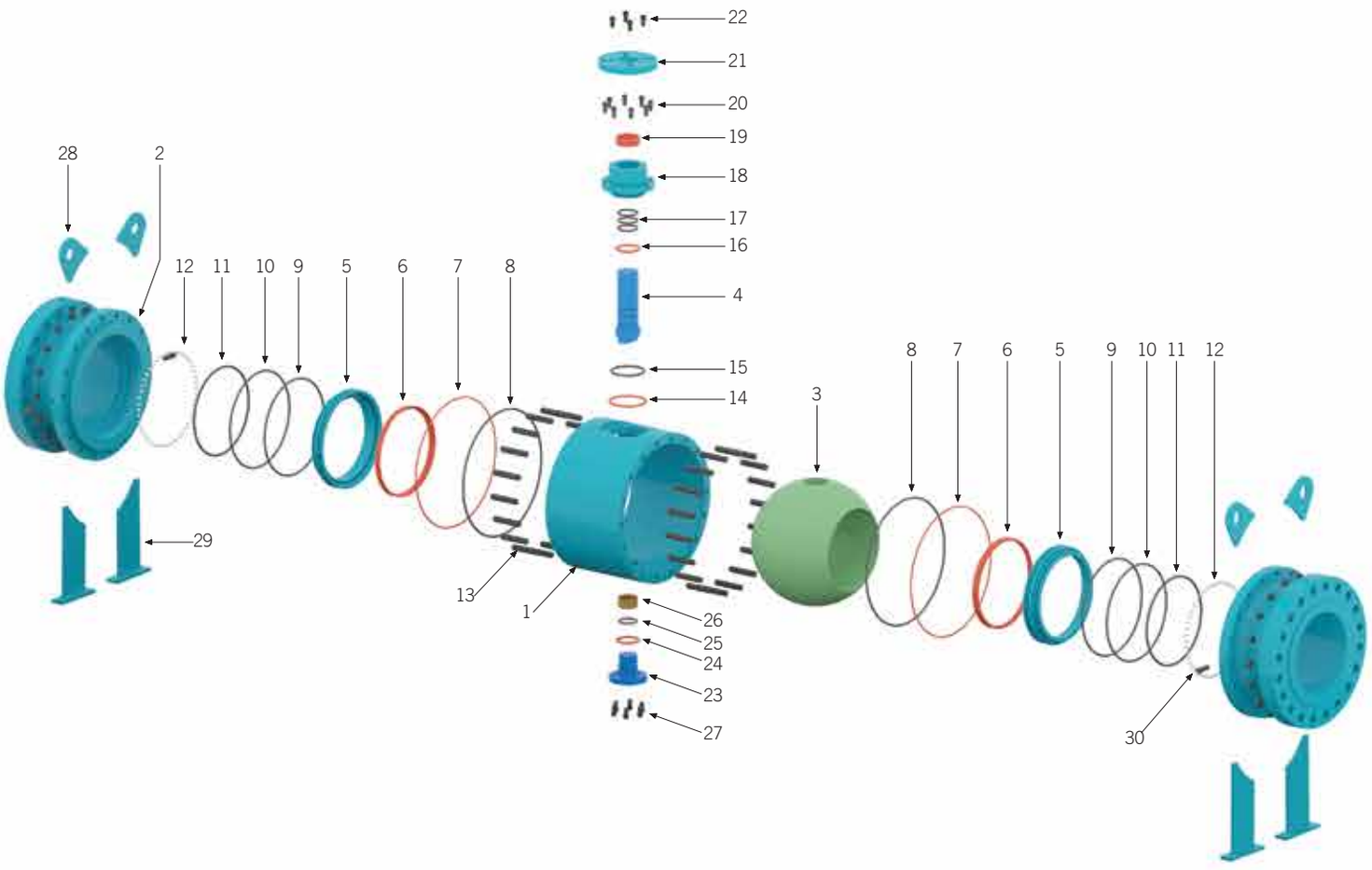
# **Ball Valve** - 3 Piece Forged Ball Valve




| | | |
|---|---|---|
| Size Range | : | 50 mm to 1200 mm |
| Pressure Rating | : | ANSI Class 150 to Class 600 |
| Connection | : | Flanged to ASME B16.5 ≤ 24" & Flange to ASME B16.47 ≥ 26" |
| | | Butt-weld ends to ASME B16.25 |
| | | Clamp ends on request. |
| Body Materials | : | A 105, LF2, LF6, F304, F316 |
| | | and other special alloys. |
| Temp. Range | : | -196°C + 200°C (-320°F to + 392°F) |
| Design | : | API 6D, ASME B16.34 |
| | : | ISO 14313, ASME VIII |
| Face to Face | : | ASME B16.10, API 6D |
| Fire Testing | : | API 607, API 6FA, BS EN ISO 10497 |
| Pressure Testing | : | API 6D |
| Certification** | : | EN 10204, ISO 10474 |
| | : | NACE MR 01-75, ISO 15156, MR 0103 |
| Quality Assurance | : | ISO 9001, API Monogram |

**NACE compliance available on request.

# Material

| SR. No. | COMPONENT | Standard Service -20°F to 180°F (-28°C to 82°C) | Sour Service NACE -20°F to 180°F (-28°C to 82°C) | Low Temp Service -50°F to 180°F (-45°C to 82°C) | Corrosive Service -20°F to 180°F (-28°C to 82°C) |
|---|---|---|---|---|---|
| 1 | BODY | ASTM A 105 | ASTM A 105 | ASTM A 350 GR. LF2 | ASTM A 182 F316 |
| 2 | SIDE PIECE | ASTM A 105 | ASTM A 105 | ASTM A 350 GR. LF2 | ASTM A 182 F316 |
| 3 | BALL | ASTM A 105 + 75 MICRON ENP COATING | ASTM A 105 + 75 MICRON ENP COATING | ASTM A 350 GR. LF2 + 75 MICRON ENP COATING | ASTM A 182 F316 |
| 4 | STEM | AISI 410 | AISI 410 | AISI 316 | AISI 316 |
| 5 | RETAINER RING | AISI 410 | AISI 410 | AISI 316 | AISI 316 |
| 6 | SEAT INSERT | CFT / RPTFE / DEVLON / VITON | CFT / RPTFE / DEVLON / VITON | CFT / RPTFE / DEVLON / VITON | CFT / RPTFE / DEVLON / VITON |
| 7 | BODY GASKET | SPW 304 + GRAFOIL FILLER | SPW 304 + GRAFOIL FILLER | SPW 304 + GRAFOIL FILLER | SPW 316 + GRAFOIL FILLER |
| 8 | BODY SEAL O-RING | VITON | VITON | LOW TEMPERATURE NITRILE | VITON |
| 9 | O-RING 1 | VITON | VITON | LOW TEMPERATURE NITRILE | VITON |
| 10 | O-RING 2 | VITON / GRAFOIL | VITON / GRAFOIL | VITON / GRAFOIL | VITON / GRAFOIL |
| 11 | O-RING 3 | VITON | VITON | LOW TEMPERATURE NITRILE | VITON |
| 12 | SPRING | INNCONEL X750 | INNCONEL X750 | INNCONEL X750 | INNCONEL X750 |
| 13 | BODY STUD-NUT | ASTM A 193 B7 / ASTM A 194 2H | ASTM A 193 B7M / ASTM A 194 2HM | ASTM A 320 L7 / ASTM A 194 7 | ASTM A 193 B8M / ASTM A 194 8M |
| 14 | BODY COVER GASKET | GLASS FILLED TFE / PTFE | GLASS FILLED TFE / PTFE | GLASS FILLED TFE / PTFE | GLASS FILLED TFE / PTFE |
| 15 | BODY COVER O-RING | VITON | VITON | LOW TEMPERATURE NITRILE | VITON |
| 16 | STEM SEAL | GLASS FILLED TFE / PTFE | GLASS FILLED TFE / PTFE | GLASS FILLED TFE / PTFE | GLASS FILLED TFE / PTFE |
| 17 | STEM O-RING | VITON | VITON | LOW TEMPERATURE NITRILE | VITON |
| 18 | BODY COVER | AISI 410 | AISI 410 | AISI 316 | AISI 316 |
| 19 | GLAND PACKING | PTFE / GLASS FILLED TFE | PTFE / GLASS FILLED TFE | PTFE / GLASS FILLED TFE | PTFE / GLASS FILLED TFE |
| 20 | BODY COVER BOLT | ASTM A 193 B7 | ASTM A 193 B7M | ASTM A 320 L7 | ASTM A 193 B8M |
| 21 | MOUNTING PLATE | MILD STEEL | MILD STEEL | MILD STEEL | STAINLESS STEEL |
| 22 | ALLEN KEY BOLT | ASTM 193 B7 | ASTM 193 B7M | ASTM A 320 L7 | ASTM 193 B8M |
| 23 | TRUNNION | AISI 410 | AISI 410 | AISI 316 | AISI 316 |
| 24 | TRUNNION GASKET | GLASS FILLED TFE / PTFE | GLASS FILLED TFE / PTFE | GLASS FILLED TFE / PTFE | GLASS FILLED TFE / PTFE |
| 25 | TRUNNION O-RING | VITON | VITON | LOW TEMPERATURE NITRILE | VITON |
| 26 | TRUNNION BEARING BUSH | PTFE/PTFE COATED SS 316 | PTFE/PTFE COATED SS 316 | PTFE/PTFE COATED SS 316 | PTFE/PTFE COATED SS 316 |
| 27 | TRUNNION BOLT | ASTM A 193 B7 | ASTM A 193 B7M | ASTM A 320 GR L7 | ASTM A 193 B8M |
| 28 | SUPPORTING HOOK | STAINLESS STEEL | STAINLESS STEEL | STAINLESS STEEL | STAINLESS STEEL |
| 29 | SUPPORTING FOOT | MILD STEEL | MILD STEEL | MILD STEEL | STAINLESS STEEL |
| 30 | SEALANT INJECTION | MILD STEEL | MILD STEEL | MILD STEEL | MILD STEEL |

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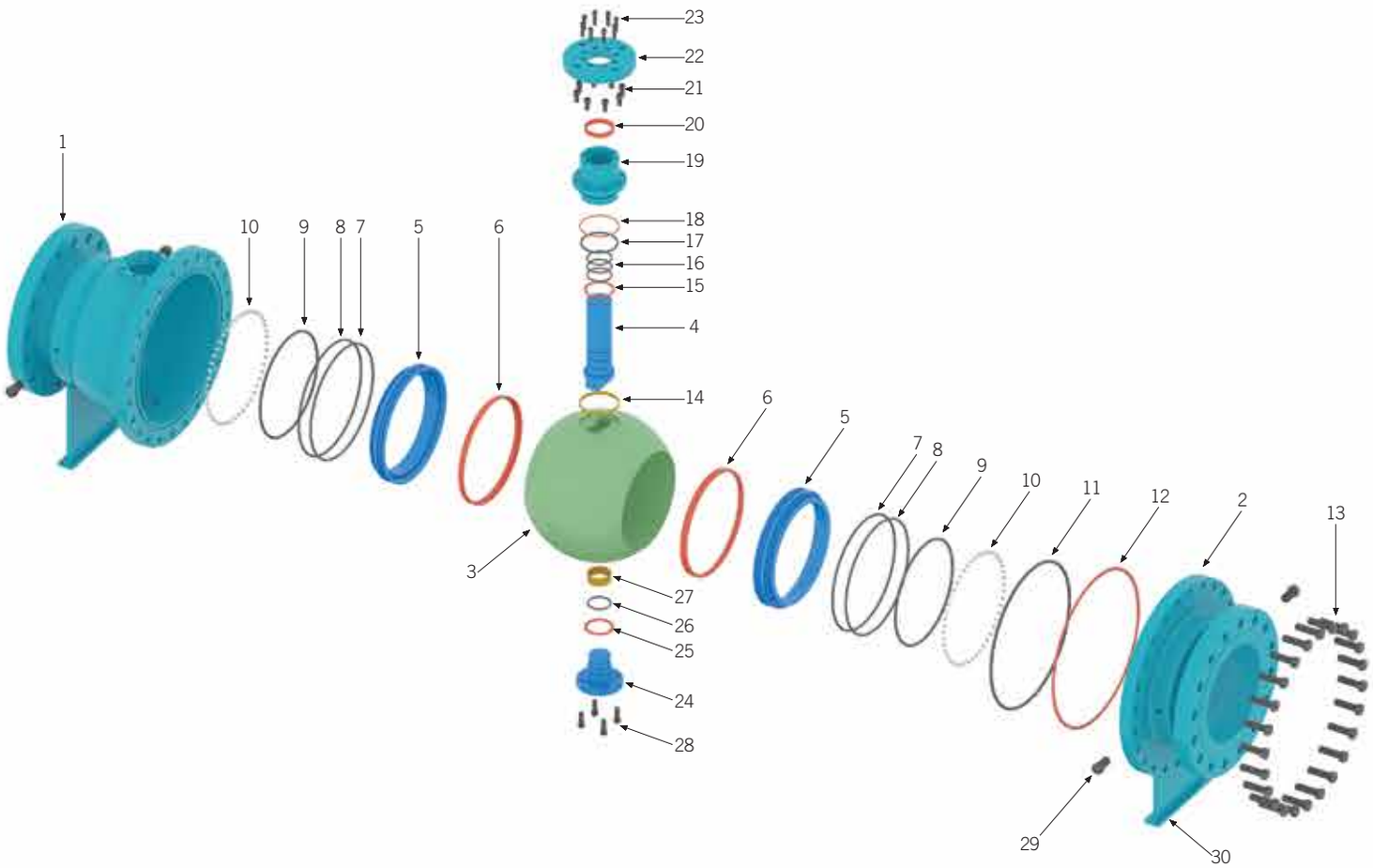
# **Ball Valve** - 2 Piece Cast Valve




| | | |
|---|---|---|
| Size Range | : | 50 mm to 600 mm |
| Pressure Rating | : | ANSI Class 150 to Class 600 |
| Connection | : | Flanged to ASME B16.5 ≤ 24" & Flange to ASME B16.47 ≥ 26"<br>Butt-weld ends to ASME B16.25<br>Clamp ends on request. |
| Body Materials | : | Carbon steel, ITCS, Stainless steel,<br>Duplex, Super Duplex, Inconel 625<br>and other special alloys. |
| Temp. Range | : | -196°C + 200°C (-320°F to + 392°F) |
| Design | : | API 6D, ASME B16.34 |
| | : | ISO 14313, ASME VIII |
| Face to Face | : | ASME B16.10, API 6D |
| Fire Testing | : | API 607, API 6FA, BS EN ISO 10497 |
| Pressure Testing | : | API 6D |
| Certification** | : | EN 10204, ISO 10474 |
| | : | NACE MR 01-75, ISO 15156, MR 0103 |
| Quality Assurance | : | ISO 9001, API Monogram |

**NACE compliance available on request.

# Material

| SR. No. | COMPONENT | Standard Service -20°F to 180°F (-28°C to 82°C) | Sour Service NACE -20°F to 180°F (-28°C to 82°C) | Low Temp Service -50°F to 180°F (-45°C to 82°C) | Corrosive Service -20°F to 180°F (-28°C to 82°C) |
|---|---|---|---|---|---|
| 1 | BODY | ASTM A 216 GR. WCB | ASTM A 216 GR. WCB | ASTM A 352 GR. LCB | ASTM A 351 GR. CF8M |
| 2 | SIDE PIECE | ASTM A 216 GR. WCB | ASTM A 216 GR. WCB | ASTM A 352 GR. LCB | ASTM A 351 GR. CF8M |
| 3 | BALL | ASTM A 216 GR. WCB + 75 MICRON ENP COATING | ASTM A 216 GR. WCB + 75 MICRON ENP COATING | ASTM A 352 GR. LCB + 75 MICRON ENP COATING | ASTM A 351 GR. CF8M |
| 4 | STEM | AISI 410 | AISI 410 | AISI 316 | AISI 316 |
| 5 | RETAINER RING | AISI 410 | AISI 410 | AISI 316 / ASTM A 182 GR F316 | AISI 316 / ASTM A 182 GR F316 |
| 6 | SEAT INSERT | CFT / RPTFE / DEVLON / VITON | CFT / RPTFE / DEVLON / VITON | CFT / RPTFE / DEVLON / VITON | CFT / RPTFE / DEVLON / VITON |
| 7 | O-RING 1 | VITON | VITON | LOW TEMPERATURE NITRILE | VITON |
| 8 | O-RING 2 | VITON / GRAFOIL | VITON / GRAFOIL | VITON / GRAFOIL | VITON / GRAFOIL |
| 9 | O-RING 3 | VITON | VITON | LOW TEMPERATURE NITRILE | VITON |
| 10 | SPRING | INNCONEL X750 | INNCONEL X750 | INNCONEL X750 | INNCONEL X750 |
| 11 | BODY SEAL O-RING | VITON | VITON | LOW TEMPERATURE NITRILE | VITON |
| 12 | BODY GASKET | SPW 304 + GRAFOIL FILLER | SPW 304 + GRAFOIL FILLER | SPW 304 + GRAFOIL FILLER | SPW 316 + GRAFOIL FILLER |
| 13 | BODY BOLT / STUD-NUT | ASTM A 193 B7 / ASTM A 194 2H | ASTM A 193 B7M / ASTM A 194 2HM | ASTM A 320 L7 / ASTM A 194 7 | ASTM A 193 B8M / ASTM A 194 GR.8M |
| 14 | BALL BEARING BUSH | PTFE COATED SS 316 | PTFE COATED SS 316 | PTFE COATED SS 316 | PTFE COATED SS 316 |
| 15 | STEM SEAL | CFT | CFT | CFT | CFT |
| 16 | STEM O-RING | VITON | VITON | LOW TEMPERATURE NITRILE | VITON |
| 17 | BODY COVER GASKET | PTFE / CFT | PTFE / CFT | PTFE / CFT | PTFE / CFT |
| 18 | BODY COVER O-RING | VITON | VITON | LOW TEMPERATURE NITRILE | VITON |
| 19 | BODY COVER | ASTM A 216 GR. WCB | ASTM A 216 GR. WCB | ASTM A 352 GR. LCB | ASTM A 351 GR. CF8M |
| 20 | GLAND PACKING | PTFE / GLASS FILLED TFE | PTFE / GLASS FILLED TFE | PTFE / GLASS FILLED TFE | PTFE / GLASS FILLED TFE |
| 21 | BODY COVER BOLT | MS HIGH TENSILE | MS HIGH TENSILE | MS HIGH TENSILE | MS HIGH TENSILE |
| 22 | MOUNTING PLATE | MILD STEEL | MILD STEEL | MILD STEEL | STAINLESS STEEL |
| 23 | ALLEN KEY BOLT | ASTM A 193 B7 | ASTM A 193 B7M | ASTM A 320 L7 | ASTM A 193 B8M |
| 24 | TRUNNION | AISI 410 | AISI 410 | AISI 316 | AISI 316 |
| 25 | TRUNNION GASKET | PTFE / GLASS FILLED TFE | PTFE / GLASS FILLED TFE | PTFE / GLASS FILLED TFE | PTFE / GLASS FILLED TFE |
| 26 | TRUNNION O-RING | VITON | VITON | VITON | VITON |
| 27 | TRUNNION BEARING BUSH | PTFE COATED SS 316 | PTFE COATED SS 316 | PTFE COATED SS 316 | PTFE COATED SS 316 |
| 28 | TRUNNION BOLT | ASTM A 193 B7 | ASTM A 193 B7M | ASTM A 320 GR L7 | ASTM A 193 B7 |
| 29 | SEALANT INJECTION | STAINLESS STEEL | STAINLESS STEEL | STAINLESS STEEL | STAINLESS STEEL |
| 30 | SUPPORTING FOOT | MILD STEEL | MILD STEEL | MILD STEEL | STAINLESS STEEL |

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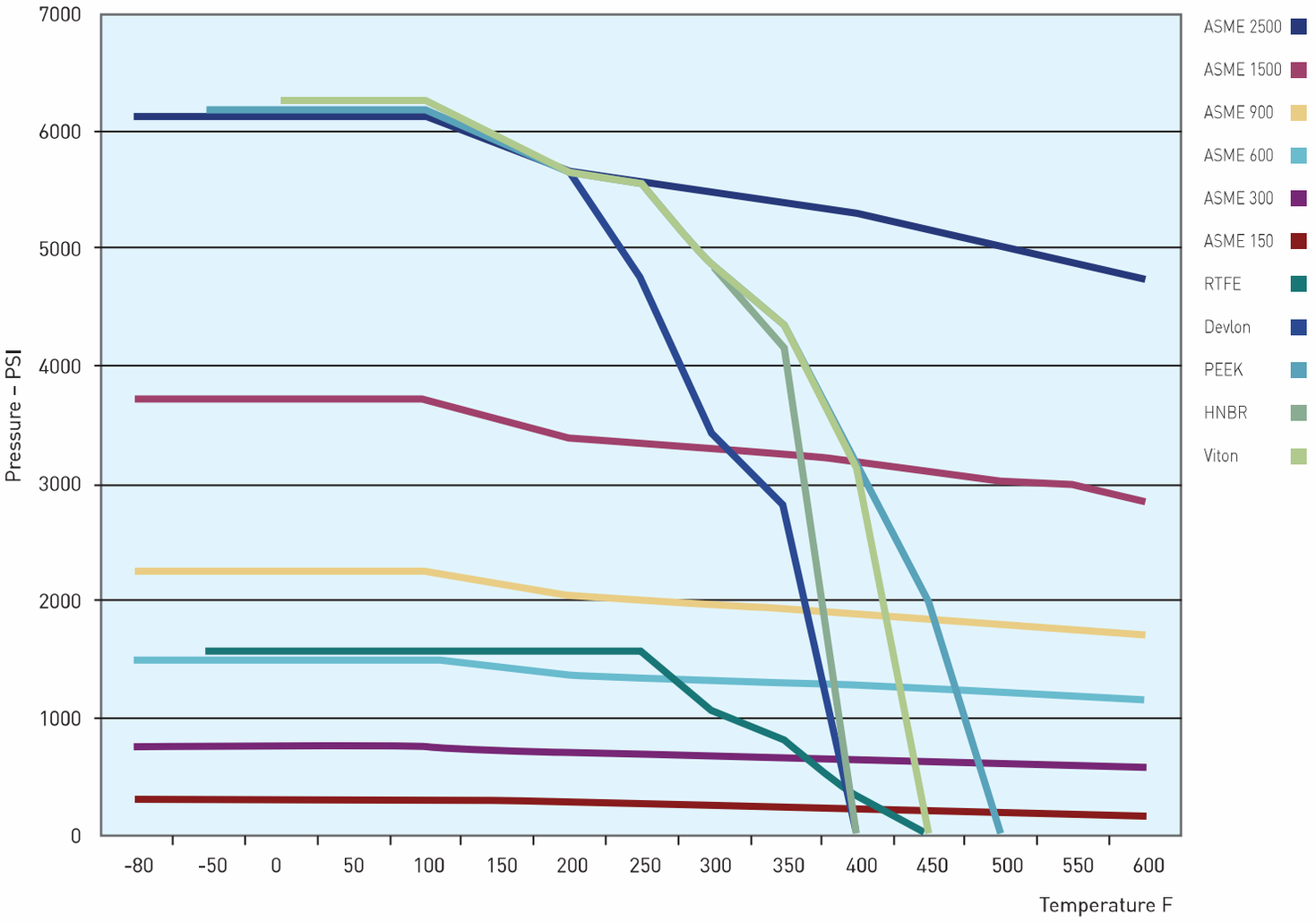
# Technical Data for Optional Seal Selections

| Material | Description |
|---|---|
| **DEVLON** | Devlon is a polyamide with additives which allo it to perform at -46C to 121C (-50F to +250F). This material covers a wide range of applications while having excellent wear properties, low friction, and improved impact strength. |
| **METAL (STELLITE)** | Metal seats hardfaced with Stellite 6 are recommended for use in high temperature fluid and gas applications. The temperature range of the material allows it to get up to the maximum temperature of the valve body material. |
| **METAL (TUNGSTEN CARBIDE)** | Metal seats hardfaced with Tungsten Carbide are recommended for use in high temperature fluid and gas applications. The temperature range of the material allows it to get up to the maximum temperature of the valve body material. |
| **NYLON** | Nylon is offered for thigh pressure applicatons. The material is ideal for use in high pressure air, oil, and other gas media but is not suitable for strong oxidizing agents. The temperature range of ths material is -34C to + 121C (-29F to + 250F). |
| **PEEK** | Peek offers a unique combination of chemical, mechanical, and thermal properties. This material is excellent for high temperatures up to +260C (+500F). |
| **TEFLON (VIRGIN PTFE)** | PTFE is a fluorocarbon based polymer offering a unique combination of physical and mechanical characteristics such as non flamability, chemical, resistance, and near zero moisture absorbtion. The temperature range of this material is from -240C to + 204C (-400F to + 400F). |
| **PTCFE** | Kel-F is a fluorocarbon based polymer offering a unique combination of physical and mechanical characteristics such as non flamability, chemical reisistance, and near zero moisture absorbtion. The temperature range of this material is from -240C to +204C (-400F to +400F). |
| **RPTFE** | PTFE's mechanical properties are enhanced by adding a percentage of filler material to provide improved strength, stability, and wear resistance. The temperature range of this materials is -46C to +232C (-50F to +450F). |
| **VITON** | Also called Fluorocarbon Rubber (FKM), this material is known for being excellent in condition up to +204C (+400F). Viton offers excellent resistence to aggressive fuels and chemicals. |
| **PTFE** | Teflon has excellent resistence to a wide range of chemicals. Its is excellent at pressure below 1500 PSI. It can withstand temperatures up to +204C (400F). |
| **GRAPHOIL** | Grafoil is chemicaly resistant to attack from nearly al organic and inorganic fluids with exception of highly oxidizing chemicals and highly concentrated oxidizing mineral acis. The material is good up to + 535C (+1000F) as well as at cryogenic temperatures. |

**Note:** Additional options available upon request

# Temperature Pressure Graph




# Flow Coefficients Cv Values

The flow coefficienty (Cv) of a valve is the rate of gallons per minute of water at 60 F through a fully opened valve at a pressure drop of 1 PSI across the valve.

| Size | 150 | 300 | 600 |
|---|---|---|---|
| 2" | 500 | 460 | 400 |
| 3" | 1350 | 1150 | 1050 |
| 4" | 2500 | 2200 | 1850 |
| 6" | 5300 | 5290 | 4460 |
| 8" | 10500 | 9600 | 8730 |
| 10" | 17500 | 16750 | 14250 |
| 12" | 26300 | 25500 | 22550 |
| 14" | 31850 | 30050 | 28400 |
| 16" | 43300 | 41700 | 38150 |
| 18" | 57300 | 55370 | 50950 |
| 20" | 74500 | 72300 | 65600 |
| 22" | 92600 | 88400 | 80300 |
| 24" | 112300 | 109150 | 98150 |
| 30" | 182800 | 176000 | 161900 |
| 36" | 265000 | 248900 | 226500 |
| 42" | 280000 | 255000 | 227000 |

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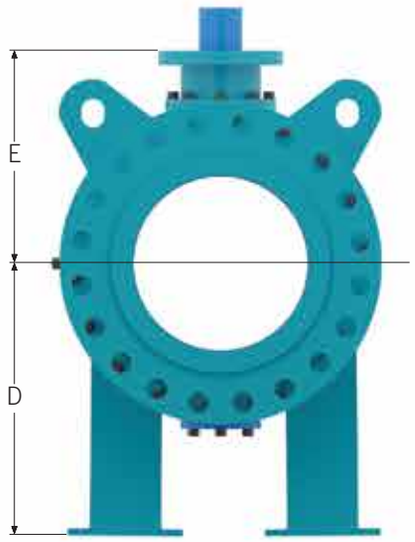
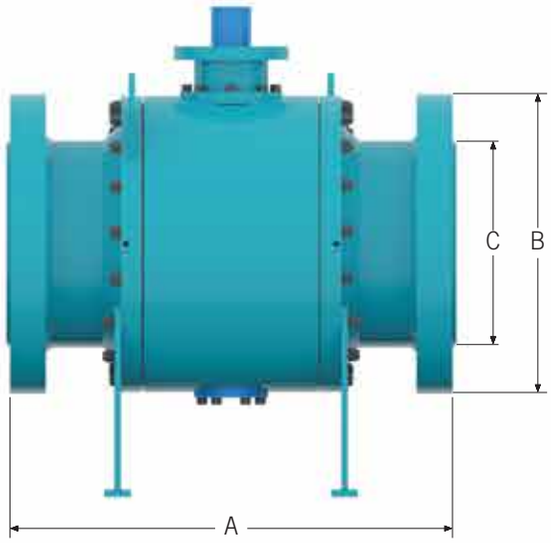
# Dimension Data




| Size (DN) | Dimension in INCH | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | | | | B | | | | C | | D | E |
| | 150 | 300 | 600 | 900 | 150 | 300 | 600 | 900 | RF | BW | | |
| 6" | 15.50 | 15.88 | 22.00 | 24.02 | 11.02 | 12.60 | 13.98 | 15.00 | 6.00 | * | 9.84 | 8.50 |
| 8" | 18.00 | 19.75 | 26.00 | 29.02 | 13.58 | 14.96 | 16.54 | 18.50 | 8.00 | * | 11.14 | 10.20 |
| 10" | 21.00 | 22.38 | 31.00 | 32.99 | 15.94 | 17.52 | 20.08 | 21.50 | 10.00 | * | 12.95 | 12.17 |
| 12" | 24.00 | 25.50 | 33.00 | 37.99 | 19.09 | 20.47 | 22.05 | 24.02 | 12.00 | * | 14.61 | 13.86 |
| 14" | 27.00 | 30.00 | 35.00 | 40.51 | 21.06 | 23.03 | 23.82 | 25.26 | 13.25 | * | 15.20 | 14.88 |
| 16" | 30.00 | 33.00 | 39.00 | 44.49 | 23.43 | 25.59 | 26.97 | 27.78 | 15.25 | * | 16.77 | 16.34 |
| 18" | 34.00 | 36.00 | 43.00 | 47.99 | 25.00 | 27.95 | 29.33 | 31.00 | 17.25 | * | 18.78 | 19.61 |
| 20" | 36.00 | 39.00 | 47.00 | 52.01 | 27.56 | 30.51 | 32.09 | 33.76 | 19.25 | * | 20.39 | 21.10 |
| 24" | 42.00 | 45.00 | 55.00 | 60.98 | 32.09 | 36.02 | 37.01 | 41.00 | 23.25 | * | 23.58 | 24.06 |
| 30" | 51.00 | 55.00 | 65.00 | 75.00 | 38.78 | 45.28 | 44.49 | 48.43 | 29.00 | * | 28.35 | 29.53 |
| 36" | 60.00 | 68.00 | 82.00 | 90.00 | 46.06 | 50.00 | 51.77 | 57.48 | 34.50 | * | 32.95 | 38.27 |
| 42" | 82.00 | 82.00 | 85.63 | - | 52.95 | 50.79 | 55.31 | 61.42 | 40.25 | * | 34.21 | 41.65 |

| Size (DN) | Dimension in MM | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | | | | B | | | | C | | D | E |
| | 150 | 300 | 600 | 900 | 150 | 300 | 600 | 900 | RF | BW | | |
| 150 | 394 | 403 | 559 | 610 | 280 | 320 | 355 | 381 | 152 | * | 250 | 216 |
| 200 | 457 | 502 | 660 | 737 | 345 | 380 | 420 | 470 | 201 | * | 283 | 259 |
| 250 | 533 | 569 | 787 | 838 | 405 | 445 | 510 | 546 | 254 | * | 329 | 309 |
| 300 | 610 | 648 | 838 | 965 | 485 | 520 | 560 | 610 | 305 | * | 371 | 352 |
| 350 | 686 | 762 | 889 | 1029 | 535 | 585 | 605 | 641.5 | 337 | * | 386 | 378 |
| 400 | 762 | 838 | 991 | 1130 | 595 | 650 | 685 | 705.5 | 387 | * | 426 | 415 |
| 450 | 864 | 914 | 1092 | 1219 | 635 | 710 | 745 | 787.5 | 438 | * | 477 | 498 |
| 500 | 914 | 991 | 1194 | 1321 | 700 | 775 | 815 | 857.5 | 489 | * | 518 | 536 |
| 600 | 1067 | 1143 | 1397 | 1549 | 815 | 915 | 940 | 1041.5 | 591 | * | 599 | 611 |
| 750 | 1295 | 1397 | 1651 | 1905 | 985 | 1150 | 1130 | 1230 | 737 | * | 720 | 750 |
| 900 | 1524 | 1727 | 2083 | 2286 | 1170 | 1270 | 1315 | 1460 | 876 | * | 837 | 972 |
| 1050 | 2083 | 2083 | 2175 | - | 1345 | 1290 | 1405 | 1560 | 1022 | * | 869 | 1058 |

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