Terofox Valve

BALL VALVE

Catalogue

Business with Integrity

Delivering Quality First

TEROFOX.COM

WWW.

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Authorized Distributor

Terofox Valves Integrated Corporation

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COMPANY PROFILE

We are a Valve Manufacturer based in Taichung City, Taiwan. A dedicated team of professional sales / technical engineers and Q.C personnel work on our behalf at all points of manufacturing. All staff share one goal and one goal only: deliver Quality (Safety) first. Standardized and well-executed operation procedures enable Terofox staff to assure quality delivered to customers, fulfilling requirements in a spontaneous manner and monitoring customer experience with Terofox on a consistent basis. Terofox group currently owns two production lines respectively located in Taichung Taiwan and in Zhongshan China. In each workshop, we have Taiwan Q.C management work closely with the production team to implement what's been carried and passed down for decades. To further enforce quality control, we've built a long-term and steady cooperation with foundries (* with accumulated years of experience and certificated by EU PED Equipment Pressure of TÜV Germany & ISO 9001:2000 of DNV GL Assurance; more approvals available upon request). The mission is to assist our customers in obtaining the best possible solutions to their requirements, at most advantageous prices achievable, without compromising on delivery or quality. With this in mind, we believe in developing long terms relationships, based on mutual trust and honesty.

YARMOUTH RESEARCH AND TECHNOLOGY,LLC

Product Scope

Started by OEM manufacturing, in 20+ years participation in private label services, we have outgrown the ability of simply perfectly executing production orders, we have entered to the phase of IODM (Innovation + ODM) to achieve improvement in valve design and provide innovative solutions which best suit customers needs. Along with growth in brand reputation, our supply range expands to its scale today.

- API 608 Cast Steel Ball Valve (specializing in Stainless Steel 316)
- API 609 Category A - Concentric Butterfly Valve (Pin & Pinless design ; PTFE full lining)
- API 609 Category B - High Performance Double-offset Butterfly Valve (TFM1600 / Inconel seats)
- API 6D Trunnion Mounted Ball Valve
- API 594 Check Valve

Special Product Line showing what Terofox is capable of :

- API 607 6th Fire Safe approved in Ball valves & Eccentric Butterfly valves.
- Special Alloy Valve - Materials available like Alloy 20, Monel, Hastelloy, Duplex/ Super Duplex Stainless Steel, Titanium and more.
- Sanitary Valve
- Deadman Return Ball Valve : Spring return handle reducing torque for easy operation
- BS6364 Cryogenic Valve: used in transmission of extreme low temperature services
- Fugitive Emission ISO 15848-1 certified valves: being green and safe is the trend; our low emission valves meet ISO standard and successfully eliminate emission from valve.

Terofox aims at providing one-stop service for customers. Listen and care for customers. We also provide consolidated procurement service in diverse valve types (which are beyond our own production line) and Q.C mechanism for project deliveries in particular. With decades of networking with fellow manufacturers and dealing with various projects and applications, we know best possible solutions to provide. Tailored services make Terofox stand out among fellow manufacturers. We think, plan, and make advice for our customers. Most importantly, we make progress and add values to our own product. Our staff do the hard work without being asked; we make efforts to care for our customers. We are a manufacturer on a non-stop journey to excellence in consulting and supply. Our constant and periodical goals keep our team on the path to contributing to the mutual success.

International Sales Office & Ware House

With a firm belief in direct communication to customers, Terofox has set up offices overseas to provide customers accessible flow control consulting & maintenance services. Expansion in overseas service centers is part of our future blueprint.

Business Strategy & Blueprint
Firm & Steady to Success

• PED 2014/68/EU • Design assessment

• ISO 9001:2015 • DNV Foundry certificate

• API607 6th / ISO 10497

• ISO 15848-1:2015 CO3

Terofox Taiwan

- Head quarter for International sales.
- R & D (new product ; certification).

Terofox Australia

- Handle day-to-day urgent cases and project allocations.
- Specializes in complete flow control design.

Terofox China

- Cope with local demand: replacement and stock planning.
- Provide in person solution consulting.
- On-site maintenance and repair.

PROCEDURES

Lost Wax Casting Procedures

Workshop Procedures

OVERVIEW

Casting

Terofox would only cooperat with foundries who have ISO certificate to ensure the quality.

- Lost Wax Casting

  Lost wax casting, as known as investment casting, is the process by which a duplicate metal is cast from an original sculpture.

  (a) Intricate and complex shape & size can be easily cast will freedom of design.

  (b) Excellent surface finish and high degree of "as Cast" dimensional accuracy can be obtained.

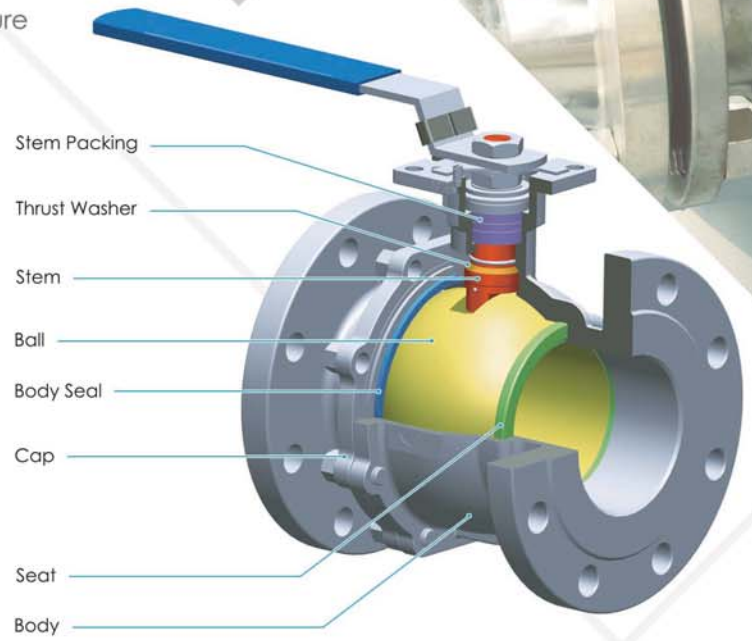
  (c) In general, components weight from 250 grams to 70 Kgs can be cast by this process.

  (d) The process gives a product which is essentially a near net shape wherein machining is either totally eliminated or reduced to a minimum. Accurate reproduction of fine details e.g slots, holes and case lettering is achieved.

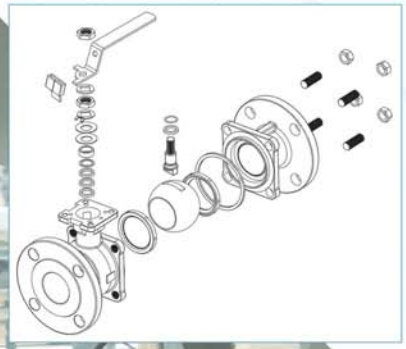
- Sand Casting

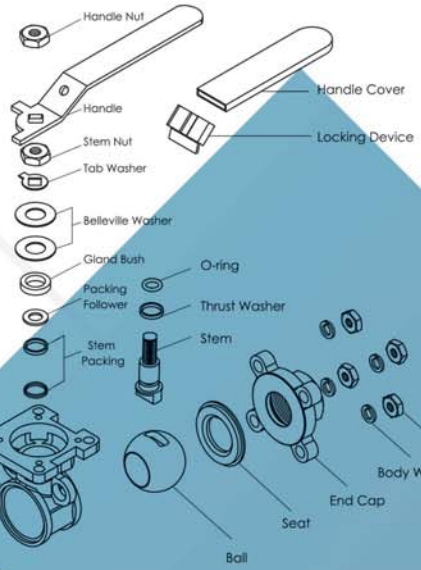
  Sand casting, as known as sand molded casting, is a metal casting process characterized by using sand as the mold material. Molds made of sand are relatively cheap, and sufficiently refractory even for steel foundry use. They are available in different dimensions and technical specifications as per the clients' requirements. Sand Castings are used to fabricate large parts and components used by automobile and engineering industry.

Structure



• 2-pc Flange Ball Valve Exploded View





• 3-pc Ball Valve Exploded View

Operation

Lever operated is most cost-efficient for ball valves. And according to different valve type, Terofox also are available with gear box, pneumatic acuator and electronic actuator.

- Stainless Steel Handle
  Could be completewith locking device to avoid toching by accident.

- Cast Iron Handle
  Normally use on heavy type or trunnion mounted ball valve.

- Pneumatic Actuator
  Can offer both spring return type and double acting type as customer request.

- Electronic Actuator
  Can offer the specification and accessories as customer request.

- Tube Handle
  Replace flat SS handle for bigger size (over 5").

- Gear Box
  More effective to operate large size valve(over 12").

- Butterfly Handle

- Oval Handle

- Spring Return Handle
  Safety device by shutting off power when not held in place by user.

Handle Cover Color Identification

- Blue
  Terofox standard color.

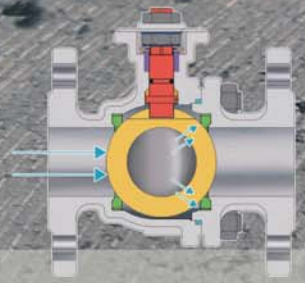
- Red
  API607 fire safe approval.

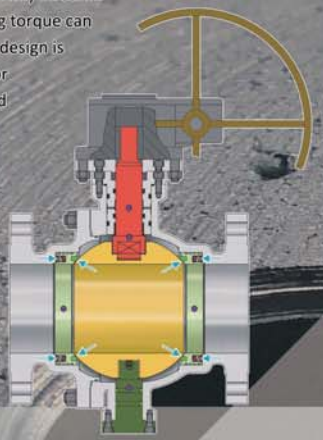
- Green
  ISO15848-1 fugitive emission.

Floating Ball and Trunnion Mounted Ball

- Floating ball valve
  As implied by the name, floating ball is floating in medium pressure function, the position of ball lean on two seat rings. The characteristic of floating ball valve is small volume, light weight, simple structure and cost-efficient.

- Trunnion mounted ball valve
  The ball is supported on its vertical rotation axis by a trunnion. The trunnion absorbs the pressure from the flow, therefore, the contact between the ball and the seat is not excessively stressed and the operating torque can remain low. This design is recommended for big diameters and high pressure.





End Connection

- **Threaded End**
  Upon request, we can provide following standards:
  ASME B1.20.1 NPT.
  BS 21 BSPT.
  BS 2779 BSPP.
  ISO 228-1.
  ISO 7-1 Rp.
  DIN 2999.

- **Socket Weld End/ Butt Weld End**
  Socket weld end conform to ASME B16.11. Butt weld end conform to ASME B36.10 (2" and below) and ASME B16.25 (above 2").

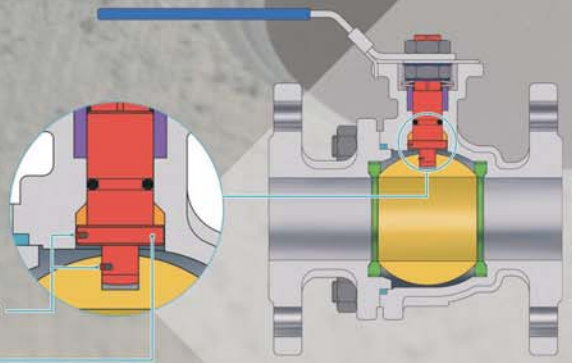
- **Flange End**
  Flange end conform to ASME B16.5. We offer RF (Raised face) flange as standard type, also can provide RTJ(Ring Type Joint) flange upon request.

- **T-clamp End / Tube Weld End**
  T-clamp end and tube weld end are used on sanitary valves. Terofox standard follow 3A, also can conform to DIN 11850 or ISO 1127 upon request.

Stem

Terofox standard stem is complete with blow-out-proof design, which protect against the failure under excess pressure.

Anti-static Device, means a metallic contact is always granted between ball and stem / body to discharge eventual statics building up druing service.



Stem Connected Type

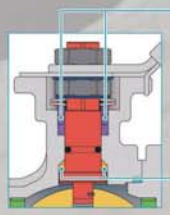
- **Double D Stem**
  Normally be used in floating ball valve.

- **Square Stem**
  Can be suitable to actuator assembling.

- **Keyed Stem**
  Used in trunnion mounted ball valve. can be 1 or 2 keys to fix the operator.

Valve Seal Design

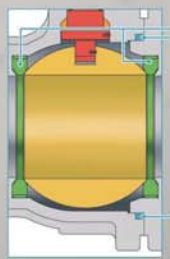
Terofox ball valves are available with a variety of seat & seal options to allow using in widely range of general or special applications. Soft seat ball valves are factory tested for tight shoutoff and perform an excellent life cycle testing. The most important factors affecting shutoff capability is the nature of media being handled. Service life is affected by all of the following factors: type of media, cycling frequency, velocity of the media, pressure, temperature, speed of valve operation. All of the factors are interrelated in actual service. Maximum service life, therefore, cna be gained by reducing the severity of any of these factors.



- Stem Packing
- Thrust Washer
  The seal between stem and body.

- Specific seat for partial 3-pc design model, it combine seat with body seal.

- Cavity-filled seat is used to decreasing residual media on valve cavity for reducing bacteria breeding. Can be used in sanitary ball valves upon client's request.



- Seat (left)
  The seal between ball and body.

- Body Seal (right)
  The seal between body and cap.

- Metal seat is used for high temperature and high pressure condition, also can be used in thick or high-hardness media.

Model Number

EB- | 3 | 1 | 0D | DA

• Valve Type

MN-	Mini valve
EB-	General ball valve
MW-	Multi-way ball valve
ST-	Sanitary ball valve
STM-	Multi-way sanitary ball valve
HPV-	High pressure ball valve
MS-	Metal seat ball valve
TF-	Flange ball valve
MWF-	Multi-way flange ball valve
EB-V	V-port ball valve
TF-V	V-port flange ball valve

• Body Type

1	1-pc body design
2	2-pc body design
3	3-pc body design / 3-way design
4	4-way design / Trunnion mounted design

• Pressure Rating (TF series exclude)

1	0~1999 W.O.G. / 10000 W.O.G.
2	2000~2999 W.O.G.
3	3000~3999 W.O.G.
6	6000~6999 W.O.G.

• Operation

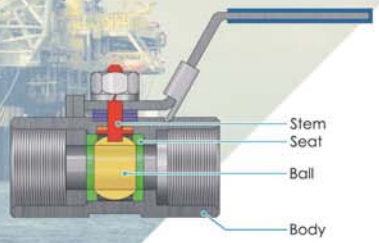
DA	Double acting pneumatic actuator
SR	Spring return pneumatic actuator
EL	Electric actuator
SRH	Spring return handle

Additional code for other specifications, please consult Terofox for further information .

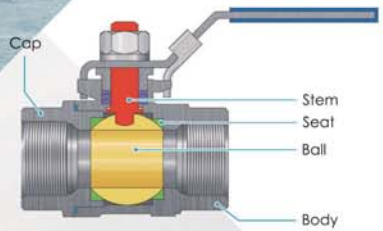
PRODUCTS

1000/2000 WOG Two Way Ball Valve

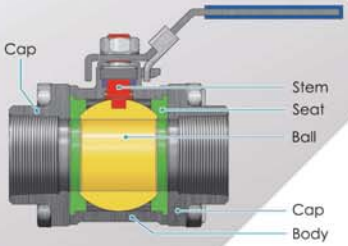
Industrial Valves are the commercial commodities for industrial, oil & gas, chemical, and petrochemical application. Providing a good diversity of valve types, connections, and wide range of pressure rating. Terofox offers good quality industrial valves with full inspection by air / hydraulic testing. Most of seats will be in soft seat such as PTFE, RTFE, Delrin, Peek as well as MG-1241, 50% S.S. + 50% PTFE, TFM1600 for different applications.



1-pc body design.



2-pc body design.



3-pc body design.

Material table

Part	Material	
Body / Cap	ASTM A216 WCB	ASTM A351 CF8M
	DIN 1.0619	DIN 1.4408
Ball	CF8M	
Stem	SS 316	
Seat	PTFE / RTFE	

• For other materials, please consult Terofox for your specific application.

MN-110

1-pc Design Mini Valve.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/8" ~ 3/4" (DN6 ~ DN10) - 1000 PSI (PN63 bar).
- End Connection : Threaded end.

MN-111

1-pc Design Mini Valve.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/8" ~ 3/4" (DN6 ~ DN10) - 1000 PSI (PN63 bar).
- End Connection : MALE x FEMALE Threaded end.

EB-110E

1-pc Design Reduce Bore Ball Valve.

- Economy type.
- Blow-out-proof stem.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/4" ~ 4" (DN8 ~ DN100) - 1000 PSI (PN63 bar).
- End Connection : Threaded end.

EB-110

1-pc Design Reduce Bore Ball Valve.

- Blow-out-proof stem.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/4" ~ 2" (DN8 ~ DN50) - 1000 PSI (PN63 bar).
- End Connection : Threaded end.

EB-110H

1-pc Design Reduce Bore Ball Valve.

- Hexagon body design.
- Blow-out-proof stem.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/4" ~ 2" (DN8 ~ DN50) - 1000 PSI (PN63 bar).
- End Connection : Threaded end.

EB-112H

1-pc Design Reduce Bore Ball Valve.

- Hexagon body design.
- Blow-out-proof stem.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/4" ~ 1" (DN8 ~ DN25) - 1000 PSI (PN63 bar).
- End Connection : MALE x FEMALE Threaded end.

EB-120

1-pc Design Reduce Bore Ball Valve.

- Blow-out-proof stem.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/4" ~ 1" (DN8 ~ DN25) - 2000 PSI (PN140 bar).
  1-1/4" ~ 2" (DN32 ~ DN50) - 1500 PSI (PN100 bar).
- End Connection : Threaded end.

EB-120H

1-pc Design Reduce Bore Ball Valve.

- Hexagon body design.
- Blow-out-proof stem.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/4" ~ 1" (DN8 ~ DN25) - 2000 PSI (PN140 bar).
  1-1/4" ~ 2" (DN32 ~ DN50) - 1500 PSI (PN100 bar).
- End Connection : Threaded end.

EB-210E

2-pc Design Full Bore Ball Valve.

- Economy type.
- Blow-out-proof stem.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/4" ~ 2" (DN8 ~ DN50) - 1000 PSI (PN63 bar).
  2-1/2" ~4" (DN65 ~ DN100) - 800 PSI (PN40 bar).
- End Connection : Threaded end / Socket weld end.

EB-210

2-pc Design Full Bore Ball Valve.

- Blow-out-proof stem.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
- 1/4" ~ 2" (DN8 ~ DN50) - 1000 PSI (PN63 bar).
  2-1/2" ~ 3" (DN65 ~ DN80) - 800 PSI (PN40 bar).
- End Connection : Threaded end / Socket weld end.

EB-210LM

2-pc Design Full Bore Ball Valve.

- Blow-out-proof stem.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/4" ~ 2" (DN8 ~ DN50) - 1000 PSI (PN63 bar).
  2-1/2" ~ 3" (DN65 ~ DN80) - 800 PSI (PN40 bar).
- End Connection : Threaded end / Socket weld end.
- Face-to-Face in compliance with DIN3202 M3.

EB-210DLM

2-pc Design Full Bore Ball Valve.

- Blow-out-proof stem and anti-static design.
- ISO 5211 direct-mounted pad.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/4" ~ 2" (DN8 ~ DN50) - 1000 PSI (PN63 bar).
- End Connection : Threaded end / Socket weld end.
- Face-to-Face in compliance with DIN3202 M3.

EB-213DLM

2-pc Design Full Bore Ball Valve.

- Blow-out-proof stem.
- ISO 5211 direct-mounted pad.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/4" ~ 2" (DN8 ~ DN50) - 1000 PSI (PN63 bar).
- End Connection : Threaded end.
- Face-to-Face in compliance with DIN3202 M3.

EB-210D

2-pc Design Full Bore Ball Valve.

- Blow-out-proof stem and anti-static design.
- ISO 5211 direct-mounted pad.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/4" ~ 2" (DN8 ~ DN50) - 1000 PSI (PN63 bar).
  2-1/2" ~ 3" (DN65 ~ DN80) - 800 PSI (PN40 bar).
- End Connection : Threaded end / Socket weld end.

EB-212

2-pc Design Reduce Bore Ball Valve.

- Blow-out-proof stem.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/4" ~ 2" (DN8 ~ DN50) - 1000 PSI (PN63 bar).
- End Connection : MALE x MALE Threaded end.

EB-217

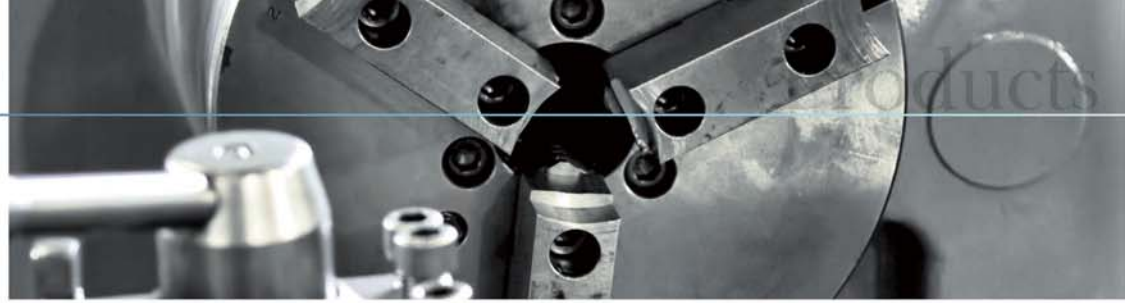
2-pc Design Full Bore Ball Valve.

- Exhaust device design.
- Blow-out-proof stem.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/4" ~ 2-1/2" (DN8 ~ DN65) - 1000 PSI (PN63 bar).
- End Connection : Threaded end / Socket weld end.

EB-219

2-pc Design Reduce Bore Ball Valve.

- Blow-out-proof stem.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/4" ~ 2" (DN8 ~ DN50) - 1000 PSI (PN63 bar).
- End Connection : MALE x FEMALE Threaded end.



EB-220

2-pc Design Reduce Bore Ball Valve.
- Blow-out-proof stem.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/4" ~ 1" (DN8 ~ DN25) - 2000 PSI (PN140 bar).
  1-1/4" ~ 2" (DN32 ~ DN50) - 1500 PSI (PN100 bar).
- End Connection : Threaded end / Socket weld end.

EB-221WB

2-pc Design Full Bore Ball Valve.
- Full welding design.
- Blow-out-proof stem.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/4" ~ 2" (DN8 ~ DN50) - 2000 PSI (PN140 bar).
- End Connection : Threaded end / Socket weld end.

EB-221LM

2-pc Design Full Bore Ball Valve.
- Blow-out-proof stem.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/4" ~ 1" (DN8 ~ DN25) - 2000 PSI (PN140 bar).
  1-1/4" ~ 2" (DN32 ~ DN50) - 1500 PSI (PN100 bar).
  2-1/2" ~ 3" (DN65 ~ DN80) - 1000 PSI (PN63 bar).
- End Connection : Threaded end / Socket weld end.
- Face-to-Face in compliance with DIN3202 M3.

EB-224M

2-pc Design Full Bore Ball Valve.
- Blow-out-proof stem.
- ISO 5211 mounted pad.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/4" ~ 2" (DN8 ~ DN50) - 2000 PSI (PN140 bar).
  2-1/2" ~ 4" (DN65 ~ DN100) - 1500 PSI (PN100 bar).
- End Connection : Threaded end / Socket weld end.

EB-224MWB

2-pc Design Full Bore Ball Valve.
- Full welding design.
- Blow-out-proof stem.
- ISO 5211 mounted pad.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/4" ~ 2" (DN8 ~ DN50) - 2000 PSI (PN140 bar).
  2-1/2" ~ 4" (DN65 ~ DN100) - 1500 PSI (PN100 bar).
- End Connection : Threaded end / Socket weld end.

EB-310E

3-pc Design Full Bore Ball Valve.
- Economy type.
- Blow-out-proof stem.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/4" ~ 2" (DN8 ~ DN50) - 1000 PSI (PN63 bar).
  2-1/2" ~ 4" (DN65 ~ DN100) - 800 PSI (PN40 bar).
- End Connection : Threaded end / Socket weld end / Butt weld end.

EB-310

3-pc Design Full Bore Ball Valve.
- Blow-out-proof stem.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/4" ~ 2" (DN8 ~ DN50) - 1000 PSI (PN63 bar).
  2-1/2" ~ 4" (DN65 ~ DN100) - 800 PSI (PN40 bar).
- End Connection : Threaded end / Socket weld end / Butt weld end.

EB-310M

3-pc Design Full Bore Ball Valve.
- Blow-out-proof stem.
- ISO 5211 mounted pad.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/4" ~ 2" (DN8 ~ DN50) - 1000 PSI (PN63 bar).
  2-1/2" ~ 4" (DN65 ~ DN100) - 800 PSI (PN40 bar).
- End Connection : Threaded end / Socket weld end / Butt weld end.

EB-310MLM

3-pc Design Full Bore Ball Valve.
- Blow-out-proof stem.
- ISO 5211 mounted pad.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/4" ~ 2" (DN8 ~ DN50) - 1000 PSI (PN63 bar).
  2-1/2" ~ 4" (DN65 ~ DN100) - 800 PSI (PN40 bar).
- End Connection : Threaded end / Socket weld end / Butt weld end.
- Face-to-Face in compliance with DIN3202 M3.

EB-310D

3-pc Design Full Bore Ball Valve.
- Blow-out-proof stem and anti-static design.
- ISO 5211 direct-mounted pad.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/4" ~ 2" (DN8 ~ DN50) - 1000 PSI (PN63 bar).
  2-1/2" ~ 4" (DN65 ~ DN100) - 800 PSI (PN40 bar).
- End Connection : Threaded end / Socket weld end / Butt weld end.

EB-313DLM

3-pc Design Full Bore Ball Valve.
- Blow-out-proof stem and anti-static design.
- ISO 5211 direct-mounted pad.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/4" ~ 2" (DN8 ~ DN50) - 1000 PSI (PN63 bar).
- End Connection : Threaded end.
- Face-to-Face in compliance with DIN3202 M3.

EB-320M

3-pc Design Full Bore Ball Valve.

- Blow-out-proof stem.
- ISO 5211 mounting on body.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/4" ~ 1" (DN8 ~ DN25) - 2000 PSI (PN140 bar).
  1-1/4" ~ 2" (DN32 ~ DN50) - 1500 PSI (PN100 bar).
  2-1/2" ~ 4" (DN65 ~ DN100) - 1000 PSI (PN63 bar).
- End Connection : Threaded end / Socket weld end / Butt weld end.
- Reduce bore is available : EB-320MR.

EB-310K

3-pc Design Reduce Bore Ball Valve.

- Blow-out-proof stem.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/4" ~ 1" (DN8 ~ DN25) - 1000 PSI (PN63 bar).
- End Connection : Compression end.

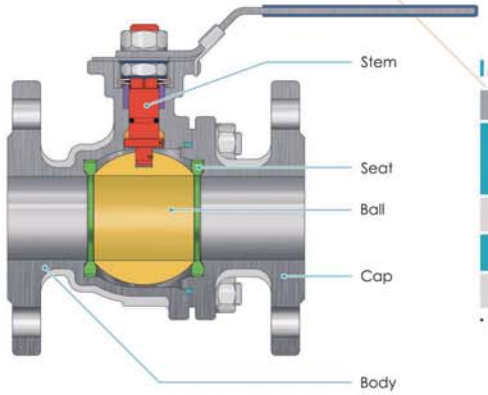
EB-320D

3-pc Design Full Bore Ball Valve.

- Blow-out-proof stem and anti-static design.
- ISO 5211 direct-mounted pad.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/4" ~ 1" (DN8 ~ DN25) - 2000 PSI (PN140 bar).
  1-1/4" ~ 2" (DN32 ~ DN50) - 1500 PSI (PN100 bar).
  2-1/2" ~ 4" (DN65 ~ DN100) - 1000 PSI (PN63 bar).
- End Connection : Threaded end / Socket weld end / Butt weld end.
- Reduce bore is available : EB-320DR.

Two Way Flange Ball Valve

Terofox Flange ball valves are ideal for industrial applications, and variety of connection design such as ANSI, DIN, JIS standards. Investment casting supply more precise casting, thereby Terofox can provide the most rugged ball valve. All body castings are marked with a foundry heat number for full traceability.Terofox provide a variety of two way flange ball valve models for option.



Material table

Part	Material	
Body / Cap	ASTM A216 WCB	ASTM A351 CF8M
	DIN 1.0619	DIN 1.4408
Ball	CF8M	
Stem	SS 316	
Seat	PTFE / RTFE	

• For other materials, please consult Terofox for your specific application.

TF-10

1-pc Design Full Bore Compact Body (Wafer Type) Ball Valve.

- Blow-out-proof stem and anti-static design.
- ISO 5211 mounting on body.
- Valve design in compliance with ASME B16.34.
- Size : 1/2" ~ 4" (DN15 ~ DN100) - Full port.
  5" ~ 6" (DN125 ~ DN150) - Reduce port.
- Pressure Rating : ANSI Class 150, DIN PN16.
- End Connection : RF Flange end.
- Face-to-Face : Manufacturer standard.

TF-10M

1-pc Design Full Bore Compact Body (Wafer Type) Ball Valve.

- Blow-out-proof stem and anti-static design.
- ISO 5211 mounted pad.
- Valve design in compliance with ASME B16.34.
  Size : 1/2" ~ 6".
- Pressure Rating : ANSI Class 150.
- End Connection : RF Flange end.
- Face-to-Face : Manufacturer standard.

TF-10D

1-pc Design Full Bore Compact Body (Wafer Type) Ball Valve.

- Blow-out-proof stem and anti-static design.
- ISO 5211 direct-mounted pad.
- Valve design in compliance with ASME B16.34.
- Size : 1/2" ~ 4" (DN15 ~ DN100) - Full port.
  5" ~ 6" (DN125 ~ DN150) - Reduce port.
- Pressure Rating : ANSI Class 150, DIN PN16.
- End Connection : RF Flange end.
- Face-to-Face : Manufacturer standard.

TF-11

1-pc Design Reduce Bore Flange Ball Valve.

- Blow-out-proof stem and anti-static design.
- ISO 5211 mounted pad.
- Valve design in compliance with ASME B16.34.
- Size : 1/2" ~ 12".
- Pressure Rating : ANSI Class 150 / 300.
- End Connection : RF Flange end.
- Face-to-Face in compliance with ASME B16.10.

TF-20

2-pc Design Full Bore Flange Ball Valve.
- Blow-out-proof stem and anti-static design.
- ISO 5211 mounted pad.
- Valve design in compliance with ASME B16.34.
- Size : 1/2" ~ 8" (DN15 ~ DN200).
- Pressure Rating : ANSI Class 150 / 300 / 600, DIN PN16 / 40, JIS 10K.
- End Connection : RF Flange end.
- Face-to-Face in compliance with ASME B16.10 / EN558 / JIS B2002.

TF-20D

2-pc Design Full Bore Flange Ball Valve.
- Blow-out-proof stem and anti-static design.
- ISO 5211 direct-mounted pad.
- Valve design in compliance with ASME B16.34.
- Size : 1/2" ~ 6" (DN15 ~ DN150).
- Pressure Rating : ANSI Class 150 / 300, DIN PN16 / 40, JIS 10K.
- End Connection : RF Flange end.
- Face-to-Face in compliance with ASME B16.10 / EN558 / JIS B2002.

TF-24

2-pc Design Full Bore Heavy-duty Type Flange Ball Valve.
- Blow-out-proof stem and anti-static design.
- ISO 5211 mounted pad.
- Valve design in compliance with ASME B16.34.
- Size : 1/2" ~ 12" (DN15 ~ DN300)
- Pressure Rating : ANSI Class 150 / 300, DIN PN16 / 40.
- End Connection : RF Flange end
- Face-to-Face in compliance with ASME B16.10 / EN558.

TF-28D

2-pc Design Full Bore Flange Ball Valve.
- On-site adjustment design.
- Blow-out-proof stem and anti-static design.
- ISO 5211 direct-mounted pad.
- Valve design in compliance with ASME B16.34 / API608.
- Size : 1/2" ~ 8" (DN15 ~ DN200).
- Pressure Rating : ANSI Class 150, DIN PN16 / 40, JIS 10K.
- End Connection : RF Flange end.
- Face-to-Face in compliance with ASME B16.10 / EN558 / JIS B2002.

EB-310F

3-pc Design Full Bore Flange Ball Valve.
- Blow-out-proof stem.
- Size : DN15 ~ DN100.
- Pressure Rating : DIN PN16 / 40.
- End Connection : RF Flange end.
- Face-to-Face in compliance with EN558.

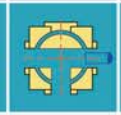
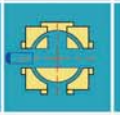
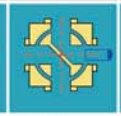
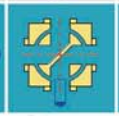
EB-310DF

3-pc Design Full Bore Flange Ball Valve.
- Blow-out-proof stem and anti-static design.
- ISO 5211 direct-mounted pad.
- Size : DN15 ~ DN100.
- Pressure Rating : DIN PN16 / 40.
- End Connection : RF Flange end.
- Face-to-Face in compliance with EN558.

Multi-way Ball Valve

Multi-way ball valves feature in simplify pipe systems, superfluous two way ball valves and automation devices can be replaced by one multi-way ball valve in pipe system. Multi-way ball valves are available in two different body styles, one end cap design with standard bore and four end cap design with full port. Standard port type is more cost-effective, but only available with threaded end connections. Full port type is available with variety end connection upon reuqest.

Flow Direction

Ball Type		0 °	90°	180°	270°
T Port					
L Port					
X Port (LL Port)					

MW-301M

3 Way Standard Bore Ball Valve.
- T / L port.
- Blow-out-proof stem.
- ISO 5211 mounted pad.
- One-end-cap Design.
- Valve design in compliance with ASME B16.34.
- Pressure Rating : 1/4" ~ 2" (DN8 ~ DN50) - 1000 PSI (PN63 bar).
- End Connection : Threaded end.

MW-302

3 Way Standard Bore Ball Valve.
- T / L port.
- Blow-out-proof stem.
- Valve design in compliance with ASME B16.34.
- Pressure Rating : 1/4" ~ 2" (DN8 ~ DN50) - 1000 PSI (PN63 bar).
- End Connection : Threaded end.

MW-303M

3 Way Reduce Bore Ball Valve.
- T / L port.
- Blow-out-proof stem.
- ISO 5211 mounted pad.
- Valve design in compliance with ASME B16.34.
- Pressure Rating : 1/4" ~ 3" (DN8 ~ DN80) - 1000 PSI (PN63 bar).
- End Connection : Threaded end.

MW-304M

3 Way Reduce Bore Ball Valve.
- Bottom port design.
- T / L port.
- Blow-out-proof stem.
- ISO 5211 mounted pad.
- One-end-cap design.
- Valve design in compliance with ASME B16.34.
- Pressure Rating : 1/4" ~ 3" (DN8 ~ DN80) - 1000 PSI (PN63 bar).
- End Connection : Threaded end.

MW-305D

3 Way Standard Bore Ball Valve.

- T / L port.
- Blow-out-proof stem and anti-static design.
- ISO 5211 direct-mounted pad.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/4" ~ 2" (DN8 ~ DN50) - 1000 PSI (PN63 bar).
- End Connection : Threaded End.

MW-309M

3-pc Design Full Bore Ball Valve.

- Diverter cap design.
- Blow-out-proof stem and anti-static design.
- ISO 5211 mounted pad.
- Valve design in compliance with ASME B16.34.
- Pressure Rating : 1/2" ~ 2" - 2250 PSI.
- End Connection : Threaded End / Socket Weld End / Butt Weld End.

MW-310D

3 Way Full Bore Ball Valve.

- T / L port.
- Blow-out-proof stem and anti-static design.
- ISO 5211 direct-mounted pad.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/2" ~ 4" (DN15 ~ DN100) - 1000 PSI (PN63 bar).
- End Connection : Threaded end / Socket weld end / Butt weld end.

MW-314M

3 Way Full Bore Ball Valve.

- T / L port.
- Blow-out-proof stem.
- ISO 5211 mounted pad.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/4" ~ 2" (DN8 ~ DN50) - 1000 PSI (PN63 bar).
- End Connection : Threaded end.

MW-316D

3 Way Full Bore Ball Valve.

- T / L port.
- Blow-out-proof stem and anti-static design.
- ISO 5211 direct-mounted pad.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/4" ~ 1-1/2" (DN8 ~ DN40) - 1000 PSI (PN63 bar).
- End Connection : Threaded end.

MW-410D

4 Way Full Bore Ball Valve.

- T / L / LL port.
- Blow-out-proof stem and anti-static design.
- ISO 5211 direct-mounted pad.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/2" ~ 4" (DN15 ~ DN100) - 1000 PSI (PN63 bar).
- End Connection : Threaded end / Socket weld end / Butt weld end.

MWF-310D

3 Way Full Bore Flange Ball Valve.

- T / L port.
- Blow-out-proof stem and anti-static design.
- ISO 5211 direct-mounted pad.
- Valve design in compliance with ASME B16.34.
- Size : 1/2" ~ 6" (DN15 ~ DN150)
- Pressure Rating : ANSI Class 150, DIN PN16 / 40.
- End Connection : RF Flange end.
- Face-to-Face : Manufacture standard.

MWF-314

3 Way Full Bore Heavy-duty Type Flange Ball Valve.

- T / L port.
- Blow-out-proof stem.
- Valve design in compliance with ASME B16.34.
- Size : 1-1/2" ~ 12" (DN40 ~ DN300)
- Pressure Rating : ANSI Class 150 / 300, DIN PN16 / 40.
- End Connection : RF Flange end.
- Face-to-Face : Manufacture standard.

MWF-410D

4 Way Full Bore Flange Ball Valve.

- T / L / LL port.
- Blow-out-proof stem and anti-static design.
- ISO 5211 direct-mounted pad.
- Valve design in compliance with ASME B16.34.
- Size : 1/2" ~ 6" (DN15 ~ DN150)
- Pressure Rating : ANSI Class 150, DIN PN16 / 40.
- End Connection : RF Flange end.
- Face-to-Face : Manufacture standard.

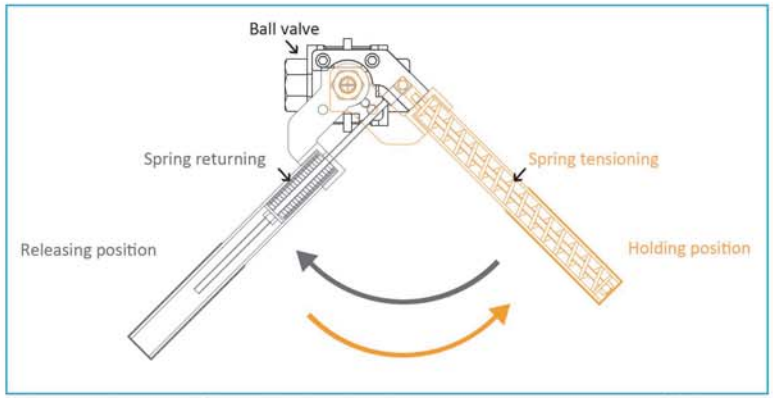
MWF-510D

5 Way Full Bore Flange Ball Valve.

- T / L port.
- Blow-out-proof stem and anti-static design.
- ISO 5211 direct-mounted pad.
- Valve design in compliance with ASME B16.34.
- Size : 1/2" ~ 6" (DN15 ~ DN150)
- Pressure Rating : ANSI Class 150, DIN PN16 / 40.
- End Connection : RF Flange end.
- Face-to-Face : Manufacture standard.

Spring Return Handle Ball Valve

Spring return handle, as known as Deadman handle, features in automatic closing or opening of manual valve. Valve will return to original position when spring return handle is released. It can be applied to sampling, by-pass, steam letdown, draining, pressure relief, etc.



EB-210DSRH

2-pc Design Full Bore Ball Valve.
- Spring Return Handle Design.
- Blow-out-proof stem and anti-static design.
- ISO 5211 direct-mounted pad.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/4" ~ 2" (DN8 ~ DN50) - 1000 PSI (PN63 bar).
- End Connection : Threaded end / Socket weld end.

EB-310DSRH

3-pc Design Full Bore Ball Valve.
- Spring Return Handle Design.
- Blow-out-proof stem and anti-static design.
- ISO 5211 direct-mounted pad.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/4" ~ 2" (DN8 ~ DN50) - 1000 PSI (PN63 bar).
- End Connection : Threaded end / Socket weld end / Butt weld end.

EB-320DSRH

3-pc Design Full Bore Ball Valve.
- Spring Return Handle Design.
- Blow-out-proof stem and anti-static design.
- ISO 5211 direct-mounted pad.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/4" ~ 1" (DN8 ~ DN25) - 2000 PSI (PN140 bar).
  1-1/4" ~ 2" (DN32 ~ DN50) - 1500 PSI (PN100 bar).
- End Connection : Threaded end / Socket weld end / Butt weld end.
- Reduce bore is available : EB-320DRSRH.

TF-20DSRH

2-pc Design Full Bore Flange Ball Valve.
- Spring Return Handle Design.
- Blow-out-proof stem and anti-static design.
- ISO 5211 driect-mounted pad.
- Valve design in compliance with ASME B16.34.
- Size : 1/2" ~ 2" (DN15 ~ DN50).
- Pressure Rating : ANSI Class 150 / 300, DIN PN16 / 40, JIS 10K.
- End Connection : RF Flange end.
- Face-to-Face in compliance with ASME B16.10 / EN558 / JIS B2002.

Fugitive Emissions Ball Valve

Alone with the advance of environmental consciousness, an increasing number of enterprises have realized the importance of low emissions testing. EN ISO 15848, as a principal standard of low emissions testing, consists of the following parts:
Part 1. Classification system and qualification procedures for type testing of valves;
Part 2. Production acceptance test of valves

The Oil and Gas industry is relatively new to measuring volatile organic compound (VOC) emissions from valves, the following phrases all of which tie back to fugitive emissions: Low Emissions, Low-E, EPA / LDAR, Quad-O, 40 CFR Part60/63, etc. Terofox Fugitive Emissions Ball Valve have been certified by ISO 15848-1:2015 Industrial valves Measurement, test and qualification procedures for fugitive emissions. For discrimination, the handle cover color of Terofox Fugitive Emissions Ball Valve is GREEN.

ISO15848-1

Test Fluid	He or CH4
Leakage Method	Global Measure
Class	A : 10-6 • mg • s^{-1} • m^{-1} B : 10-4 • mg • s^{-1} • m^{-1} C : 10-3 • mg • s^{-1} • m^{-1}
Valve Type Stroke	100% for on-off +10% for control
Number of Cycles	500 / 1000 / 2500

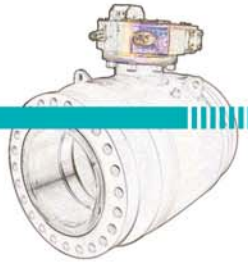
EB-310DLMFE

3-pc Design Full Bore Fugitive Emissions Ball Valve.
- ISO15848-1 : 2015 Fugitive emissions approved.
  Tightness Class : BH.
  Endurance Class : CO3 – 2500 cycles.
  Temperature Class : RT.
- Blow-out-proof stem and anti-static design.
- ISO 5211 driect-mounted pad.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/4" ~ 4" (DN8 ~ DN100) - 1000 PSI (PN63 bar).
- End Connection : Threaded end / Socket weld end / Butt weld end.
- Face-to-Face in compliance with DIN3202 M3.

TF-20DFE

2-pc Design Full Bore Fugitive Emissions Flange Ball Valve.
- ISO15848-1 : 2015 Fugitive emissions approved.
  Tightness Class : BH.
  Endurance Class : CO3 – 2500 cycles.
  Temperature Class : RT.
- Blow-out-proof stem and anti-static design.
- ISO 5211 driect-mounted pad.
- Valve design in compliance with ASME B16.34.
- Size : 1/2" ~ 6" (DN15 ~ DN150).
- Pressure Rating : ANSI Class 150 / 300, DIN PN16 / 40, JIS 10K.
- End Connection : RF Flange end.
- Face-to-Face in compliance with ASME B16.10 / EN558 / JIS B2002.

Trunnion Mounted Ball Valve



Terofox Trunnion Mounted Ball Valve is our own Taiwanese patterns design. Mainly with split body or 3-pc design in both casting and forged patterns. The torque required to turn a trunnion mounted ball is significantly less than that needed for a floating ball. Therefore, the trunnion mounted ball design is standard for larger sizes of the API6D applications. Terofox Trunnion Mounted Ball Valve complete with blow-out-proof stem and anti-static design, double block and bleed design, independent ball and stem, and API607 6th edition fire safe approved. Additionally, sour service application with NACE MR0175, emergency sealant injection, supporting legs and live-load seals are upon request.

Low emissions
Accurate machining of stem and bonnet sealing surfaces ensures compliance with the most severe pollution control regulations.

Independent ball and stem
The ball and stem are independent to minimize the affect of the side thrust generated by the pressure acting on the ball.

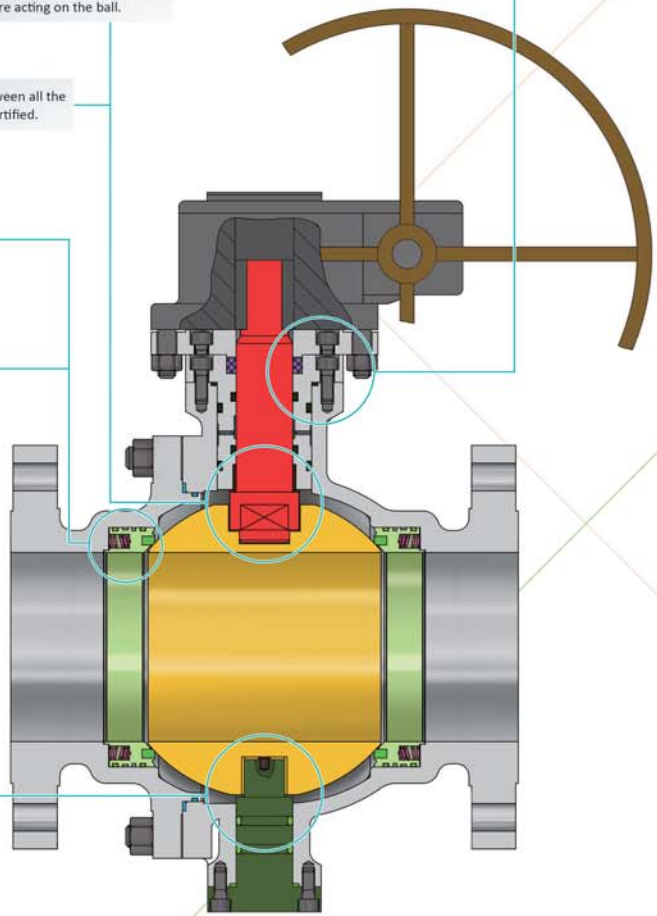
Anti-static design
The electrical conductance continuity between all the metallic components is guaranteed and certified.

Double block and bleed
The Double block and bleed feature, both with the ball in the fully closed or fully open position is a standard feature.

Floating self-relieving seat rings
Two independent floating seat rings assure the bi-directional tightness on the valve.

The seats are fully designed to minimize the torque required to operate the valves without losing sealing power. which is assured from zero differential pressure to the valve's maximum ated pressure. Self-relieving seat are supplied as a standard feature.

Double piston or combination seats (self-relieving / upstream, double piston / downstream) can be supplied on request.



Trunnion-mounted ball
The ball is fixed and the seat rings are floating, free to move along the valve axis. Side load generated by the pressure acting on the ball is absorbed by bearings.

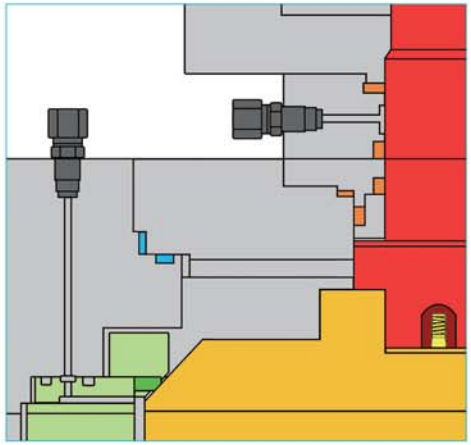
At low presssure the seat sealing action is achieved by the thrust of the springs acting on the seat rings.

As the pressure increases the fluid pressure pushing the seatrings against the ball.

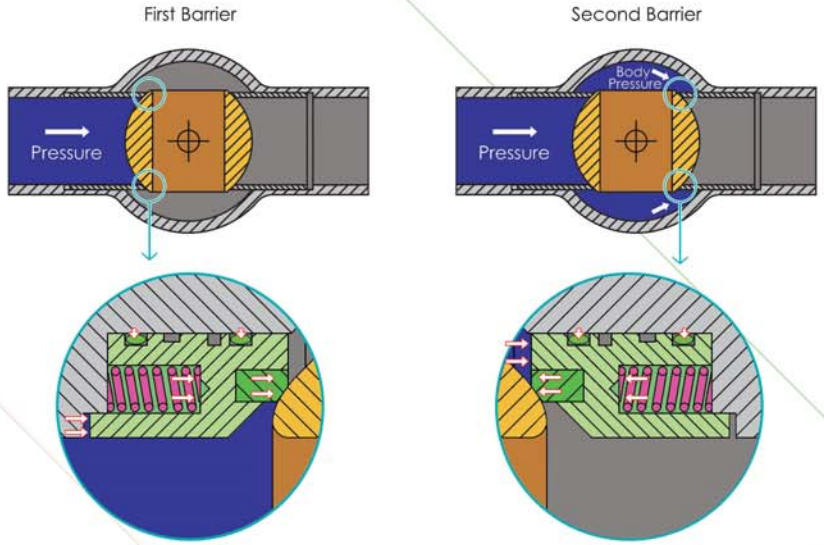
Stem Sealing
Two O-ring and graphite gasket ensure the stem seal. The graphite gasket can be replaced while the valve is under pressure and with the ball in any position, by removing the adaptor plate, after having released any pressure that may exist between the upper O-ring and the graphite gasket,through the grease injection fitting hole. The O-rings can be replaced with the valve in fully open or fully closed position by removing the stem cover after having released all the pressure in the body cavity.

Body Sealing
The double sealing action of O-rings and graphite gaskets in all the staticjoints of the body components, ensures zero leakage and the fire safen feature. Lip-seal rings and/or graphite gaskets can be used for special service.

Emergency Sealant Injection
Emergency sealants injection provide an effective temporary solution for minor leakage problems. Sealant can be injected directly to the stem sealing area and seat sealing area to effect a temporary emergency seal. in the event of the stem seal or seat seal is damaged.



Double block and bleed (DBB)
Single valve with two searing surfaces that, in the closed position, provides a seal against preesure from both ends of the valve with a means of bleeding the cavity between the seating surfaces. And single piston effect seats design, as known as self r elieving seats, permits the automatic release of any over preesure in the body cavity when the valve is in the fully open or fully closed position.



TF-40

API6D 2-pc Design Casting Type Full Bore Trunnion Mounted Ball Valve.

- Double-block-bleed (DBB) design.
- API607 6th fire safe approved.
- Blow-out-proof stem and anti-static design.
- ISO 5211 mounted pad.
- Valve design in compliance with API6D.
- Size : 2" ~ 14".
- Pressure Rating : ANSI Class 150 / 300 / 600.
- End Connection : RF Flange end / RTJ Flange end.
- Face-to-Face in compliance with ASME B16.10.
- Reduce bore is available : TF-41.

TF-44WB

API6D 3-pc Design Forged Type Full Bore Trunnion Mounted Ball Valve.

- Full welding design.
- Double-block-bleed (DBB) design.
- API607 fire safe design.
- Blow-out-proof stem and anti-static design.
- ISO 5211 mounted pad.
- Valve design in compliance with API6D.
- Size : 2" ~ 40".
- Pressure Rating : ANSI Class 150 / 300 / 600 / 900 / 1500.
- End Connection : RF Flange end / RTJ Flange end.
- Face-to-Face in compliance with ASME B16.10.

TF-42

API6D 3-pc Design Casting Type Full Bore Trunnion Mounted Ball Valve.

- Double-block-bleed (DBB) design.
- API607 fire safe design.
- Blow-out-proof stem and anti-static design.
- ISO 5211 mounted pad.
- Valve design in compliance with API6D.
- Size : 16" ~ 40".
- Pressure Rating : ANSI Class 150 / 300 / 600.
- End Connection : RF Flange end / RTJ Flange end.
- Face-to-Face in compliance with ASME B16.10.
- Reduce bore is available : TF-43.

TF-44

API6D 3-pc Design Forged Type Full Bore Trunnion Mounted Ball Valve.

- Double-block-bleed (DBB) design.
- API607 6th fire safe approved.
- Blow-out-proof stem and anti-static design.
- ISO 5211 mounted pad.
- Valve design in compliance with API6D.
- Size : 2" ~ 40".
- Pressure Rating : ANSI Class 150 / 300 / 600 / 900 / 1500.
- End Connection : RF Flange end / RTJ Flange end.
- Face-to-Face in compliance with ASME B16.10.
- Reduce bore is available : TF-45.

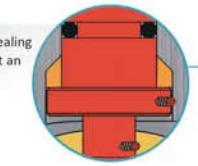
API607 Fire Safe Ball Valve

Use of valves is often found in oil pipelines and chemical plants. Components of soft seats like Teflon, at high temperature scenarios (approx. 500°C, will be damaged and malfunction). Compromised functionality of valve seats result in leakage of fluid. Leaking of toxic or flammable substance will cause disaster. In consideration of precaution, environmental friendliness and public security, the design of fire safe vales is produced.

A closed valve completely filled with water under pressure is completely enveloped in flames with an environmental temperature in the region of the valve of 750 °C to 1 000 °C for a period of 30 min. The objective is to completely envelop the valve in flames to assure that the seat and sealing areas are exposed to the high burn temperature. The intensity of the heat input shall be monitored using thermocouples and calorimeter cubes. During this period the internal and external leakage is recorded. After cool-down from the fire test, the valve is hydrostatically tested to assess the pressure containing capability of the valve shell, seats and seals.

Pyramidal 45° Thrust Washer

Under inner pressure, the force enhances the sealing between surfaces of thrust washers and body at an angle of 45°, preventing through-seat leakage.



High temp. Graphite based packings

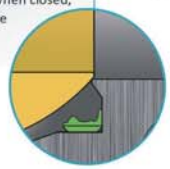
After the burn, graphite based packing to certain extent will prevent fluid leakage from stem.

Spiral Wound Gaskets for Body Seals

Spiral wound gaskets prevent external leakage from the connecting point of body and bonnet.

Fire Safe Metal Lip Design

During high temp. burn, seats are damaged. When closed, steel ball and the Fire Safe Metal Lip will assure the sealing of cavity.



Certificate

Terofox fire safe ball valves have been approved and affirmed to API 607 6th Edition Fire Safe and ISO 10497 : 2010 by different Notified Body as below, therefore Terofox would be the safest choice for you.

EB-321DFS

3-pc Design Full Bore Ball Valve.

- API607 6th edition fire safe approved.
- Blow-out-proof stem and anti-static design.
- ISO 5211 driect-mounted pad.
- Valve design in compliance with ASME B16.34.
- Pressure Rating : 1/4" ~ 4" (DN8 ~ DN100) - 2000 PSI (PN140 bar).
- End Connection : Threaded end / Socket weld end / Butt weld end.

TF-10MFS

1-pc Design Full Bore Compact Body (Wafer Type) Ball Valve.

- API607 6th fire safe approved.
- Blow-out-proof stem and anti-static design.
- ISO 5211 mounted pad.
- Valve design in compliance with ASME B16.34.
- Size : 1/2" ~ 4".
- Pressure Rating : ANSI Class 150.
- End Connection : RF Flange end.
- Face-to-Face : Manufacturer Standard.

TF-20FS

2-pc Design Full Bore Flange Ball Valve.

- API607 6th edition fire safe approved.
- Blow-out-proof stem and anti-static design.
- ISO 5211 mounted pad.
- Valve design in compliance with ASME B16.34.
- Size : 1/2" ~ 8" (DN15 ~ DN200).
- Pressure Rating : ANSI Class 150 / 300, DIN PN16 / 40.
- End Connection : RF Flange end.
- Face-to-Face in compliance with ASME B16.10 / EN558.

TF-20DFS

2-pc Design Full Bore Flange Ball Valve.

- API607 6th edition fire safe approved.
- Blow-out-proof stem and anti-static design.
- ISO 5211 driect-mounted pad.
- Valve design in compliance with ASME B16.34.
- Size : 1/2" ~ 6" (DN15 ~ DN150).
- Pressure Rating : ANSI Class 150 / 300, DIN PN16 / 40.
- End Connection : RF Flange end.
- Face-to-Face in compliance with ASME B16.10 / EN558.

TF-40

API6D 2-pc Design Casting Type Full Bore Trunnion Mounted Ball Valve.

- Double-block-bleed (DBB) design.
- API607 6th fire safe approved.
- Blow-out-proof stem and anti-static design.
- ISO 5211 mounted pad.
- Valve design in compliance with API 6D.
- Size : 2" ~ 14".
- Pressure Rating : ANSI Class 150 / 300.
- End Connection : RF Flange end / RTJ Flange end.
- Face-to-Face in compliance with ASME B16.10.

TF-44

API6D 3-pc Design Forged Type Full Bore Trunnion Mounted Ball Valve.

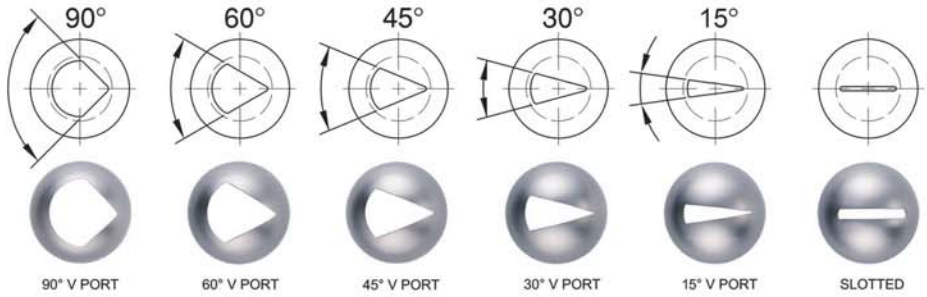
- Double-block-bleed (DBB) design.
- API607 6th fire safe approved.
- Blow-out-proof stem and anti-static design.
- ISO 5211 mounted pad.
- Valve design in compliance with API6D.
- Size : 2" ~ 40".
- Pressure Rating : ANSI Class 150 / 300 / 600 / 900.
- End Connection : RF Flange end / RTJ Flange end.
- Face-to-Face in compliance with ASME B16.10.

V-Flow Control Ball Valve

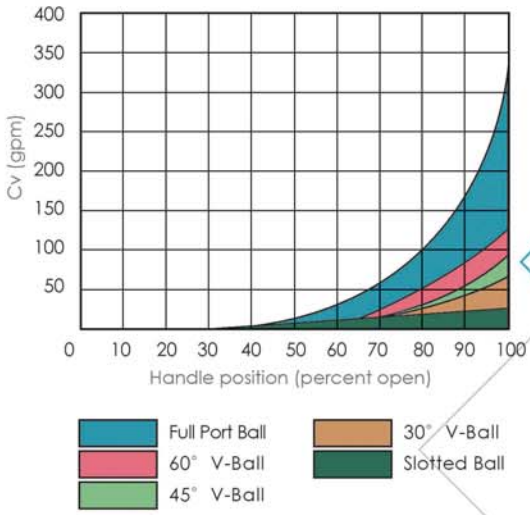
Terofox V-port ball valve are available with slotted to 90° V-port valves offer better and more consistent control than traditional round ported ball valves. Terofox offer the valve with the control port cast and machined into the ball, not in the seat. This allows much better flow characteristics and eliminates the need to replace seats. V-port control ball valve allows the orifice to be opened and closed in a more controlled manner with a closer to linear flow characteristic.

By means of angles between slotted to 90°, that controls throughout the valve rotation and the larger angles offer a larger Cv in addition to control flow, and this type of design requires a generally more robust construction due to higher velocities of the fluids, which might damage a standard valve. These can be referred to as a type of control valve but are not as accurate as a pressure regulator.

V-port Angle



Flow Travel Chart



EB-V310

3-pc Design V-port Ball Valve.

- Blow-out-proof stem.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/4" ~ 2" (DN8 ~ DN50) - 1000 PSI (PN63 bar).
  2-1/2" ~ 4" (DN65 ~ DN100) - 800 PSI (PN40 bar).
- End Connection : Threaded end / Socket weld end / Butt weld end.

EB-V310M

3-pc Design V-port Ball Valve.

- Blow-out-proof stem.
- ISO 5211 mounted pad.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/4" ~ 2" (DN8 ~ DN50) - 1000 PSI (PN63 bar).
  2-1/2" ~ 4" (DN65 ~ DN100) - 800 PSI (PN40 bar).
- End Connection : Threaded end / Socket weld end / Butt weld end.

EB-V310D

3-pc Design V-port Ball Valve.

- Blow-out-proof stem and anti-static design.
- ISO 5211 direct-mounted pad.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/4" ~ 2" (DN8 ~ DN50) - 1000 PSI (PN63 bar).
  2-1/2" ~ 4" (DN65 ~ DN100) - 800 PSI (PN40 bar).
- End Connection : Threaded end / Socket weld end / Butt weld end.

EB-V320M

3-pc Design V-port Ball Valve.

- Blow-out-proof stem.
- ISO 5211 mounting on body.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/4" ~ 1" (DN8 ~ DN25) - 2000 PSI (PN140 bar).
  1-1/4" ~ 2" (DN32 ~ DN50) - 1500 PSI (PN100 bar).
  2-1/2" ~ 4" (DN65 ~ DN100) - 1000 PSI (PN63 bar).
- End Connection : Threaded end / Socket weld end / Butt weld end.

EB-V320D

3-pc Design V-port Ball Valve.

- Blow-out-proof stem and anti-static design.
- ISO 5211 direct-mounted pad.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/4" ~ 1" (DN8 ~ DN25) - 2000 PSI (PN140 bar).
  1-1/4" ~ 2" (DN32 ~ DN50) - 1500 PSI (PN100 bar).
  2-1/2" ~ 4" (DN65 ~ DN100) - 1000 PSI (PN63 bar).
- End Connection : Threaded end / Socket weld end / Butt weld end.

EB-V310F

3-pc Design V-port Flange Ball Valve.

- Blow-out-proof stem.
- Size : DN15 ~ DN100.
- Pressure Rating : DIN PN16 / 40.
- End Connection : RF Flange end.
- Face-to-Face in compliance with EN558.

EB-V310DF

3-pc Design V-port Flange Ball Valve.

- Blow-out-proof stem and anti-static design.
- ISO 5211 direct-mounted pad.
- Size : DN15 ~ DN100.
- Pressure Rating : DIN PN16 / 40.
- End Connection : RF Flange end.
- Face-to-Face in compliance with EN558.

TF-V20

2-pc Design V-port Flange Ball Valve.

- Blow-out-proof stem and anti-static design.
- ISO 5211 mounted pad.
- Valve design in compliance with ASME B16.34.
- Size : 1/2" ~ 8" (DN15 ~ DN200).
- Pressure Rating : ANSI Class 150 / 300 / 600, DIN PN16 / 40, JIS 10K.
- End Connection : RF Flange end.
- Face-to-Face in compliance with ASME B16.10 / EN558 / JIS B2002.

TF-V20D

2-pc Design V-port Flange Ball Valve.

- Blow-out-proof stem and anti-static design.
- ISO 5211 direct-mounted pad.
- Valve design in compliance with ASME B16.34.
- Size : 1/2" ~ 6" (DN15 ~ DN150).
- Pressure Rating : ANSI Class 150 / 300, DIN PN16 / 40, JIS 10K.
- End Connection : RF Flange end.
- Face-to-Face in compliance with ASME B16.10 / EN558 / JIS B2002.

TF-V40

2-pc Design Casting Type V-port Trunnion Mounted Ball Valve.

- Double-block-bleed (DBB) design.
- API607 fire safe design.
- Blow-out-proof stem and anti-static design.
- ISO 5211 mounted pad.
- Valve design in compliance with API 6D.
- Size : 2" ~ 14".
- Pressure Rating : ANSI Class 150 / 300.
- End Connection : RF Flange end / RTJ Flange end.
- Face-to-Face in compliance with ASME B16.10.

TF-V44

3-pc Design Forged Type V-port Trunnion Mounted Ball Valve.

- Double-block-bleed (DBB) design.
- API607 fire safe design.
- Blow-out-proof stem and anti-static design.
- ISO 5211 mounted pad.
- Valve design in compliance with API 6D.
- Size : 2" ~ 40".
- Pressure Rating : ANSI Class 150 / 300 / 600 / 900.
- End Connection : RF Flange end / RTJ Flange end.
- Face-to-Face in compliance with ASME B16.10.

V-port Ball Flow Coefficient - Cv vs. Travel

Size	Ball Type	Percent of rated travel in degree of rotation										
		0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
1/2"	1/32" Slotted	0.000	0.000	0.000	0.070	0.120	0.160	0.200	0.240	0.280	0.320	0.360
	1/16" Slotted	0.000	0.000	0.075	0.145	0.250	0.330	0.410	0.570	0.650	0.740	0.890
	1/8" Slotted	0.000	0.000	0.145	0.261	0.550	0.660	0.850	1.120	1.350	1.500	1.780
	30° V-port	0.000	0.000	0.100	0.172	0.324	0.429	0.649	0.873	1.350	1.749	2.435
	60° V-port	0.000	0.000	0.120	0.236	0.539	0.643	1.081	1.587	2.615	3.664	5.525
	90° V-port	0.000	0.100	0.200	0.400	0.600	0.900	1.500	2.200	3.800	5.400	6.900
3/4"	1/16" Slotted	0.000	0.000	0.070	0.160	0.330	0.410	0.620	0.750	0.950	1.112	1.250
	1/8" Slotted	0.000	0.000	0.163	0.260	0.536	0.658	1.021	1.166	1.615	1.760	2.115
	30° V-port	0.000	0.000	0.128	0.159	0.338	0.489	0.850	1.166	1.805	2.408	2.884
	60° V-port	0.000	0.000	0.151	0.238	0.453	0.729	1.275	1.915	3.419	4.630	6.440
	90° V-port	0.000	0.200	0.400	0.800	1.200	2.000	3.100	4.600	8.000	11.300	14.000
1"	1/16" Slotted	0.000	0.030	0.149	0.312	0.442	0.580	0.770	0.940	1.080	1.240	1.370
	3/16" Slotted	0.000	0.030	0.327	0.639	0.923	1.172	1.604	1.942	2.223	2.610	2.805
	30° V-port	0.000	0.030	0.312	0.436	0.659	0.986	1.539	2.129	2.921	4.045	4.761
	60° V-port	0.000	0.030	0.445	0.607	0.790	1.417	2.308	3.318	5.270	7.568	10.108
	90° V-port	0.000	0.200	0.600	1.800	3.400	5.100	8.100	11.400	16.000	21.000	29.000
1-1/4"	3/16" Slotted	0.000	0.050	0.350	1.200	2.215	3.150	4.230	5.220	6.150	6.775	7.350
	30° V-port	0.000	0.050	0.359	0.857	1.661	2.686	4.230	6.186	8.530	11.193	13.230
	60° V-port	0.000	0.060	0.441	1.114	1.845	3.426	5.575	8.215	13.290	18.360	24.499
	90° V-port	0.000	0.300	0.800	2.000	5.000	8.000	14.000	19.000	28.000	39.000	55.000
1-1/2"	3/16" Slotted	0.000	0.050	0.470	1.650	2.850	4.120	4.200	6.650	7.650	8.500	9.300
	30° V-port	0.000	0.050	0.410	1.099	1.995	3.430	4.044	7.432	10.230	13.540	16.126
	60° V-port	0.000	0.060	0.570	1.556	2.849	5.488	7.077	12.908	19.665	28.068	37.099
	90° V-port	0.000	0.400	0.900	3.500	7.000	13.000	20.000	31.000	42.000	63.000	78.000
2"	1/4" Slotted	0.000	0.050	0.745	2.765	4.685	6.650	8.650	10.650	12.150	13.550	14.850
	30° V-port	0.000	0.050	0.549	1.620	3.320	5.574	8.252	11.931	16.397	21.797	26.234
	60° V-port	0.000	0.060	0.698	2.477	4.784	9.094	15.410	21.889	31.707	46.343	60.981
	90° V-port	0.000	0.500	2.000	6.000	12.000	22.000	35.000	45.000	70.000	105.000	135.000
2-1/2"	3/8" Slotted	0.000	0.060	0.955	3.700	6.400	8.800	11.450	14.300	16.200	18.300	20.000
	30° V-port	0.000	0.060	0.955	3.115	6.400	10.364	15.210	22.440	30.620	41.270	49.400
	60° V-port	0.000	0.090	0.955	3.699	7.100	13.199	22.222	31.972	46.028	68.120	89.400
	90° V-port	0.000	0.500	1.700	7.000	14.000	28.000	48.000	70.000	106.000	160.000	218.000
3"	7/16" Slotted	0.000	0.100	1.200	4.450	7.680	10.950	14.000	17.650	19.855	22.150	24.260
	30° V-port	0.000	0.100	0.750	2.610	5.907	10.153	16.661	24.500	33.650	44.300	53.880
	60° V-port	0.000	0.120	1.000	4.156	9.943	18.514	28.984	48.566	66.704	93.350	123.860
	90° V-port	0.000	0.700	3.500	8.000	18.000	35.000	60.000	90.000	135.000	205.000	310.000
4"	1/2" Slotted	0.000	0.100	2.500	9.100	15.500	21.950	27.850	35.000	40.100	44.850	48.880
	30° V-port	0.000	0.100	0.900	3.522	8.390	15.990	26.280	39.850	56.460	72.098	89.580
	60° V-port	0.000	0.120	1.200	5.576	15.200	28.600	47.980	72.760	106.730	149.800	199.500
	90° V-port	0.000	1.000	3.500	16.000	40.000	75.000	125.000	190.000	295.000	442.000	670.000

• For reference only, please consult Terofox for any further question.

High Pressure Ball Valve

As the name implies, Terofox High Pressure ball valve are available for high pressure or high temperature application. Delrin and Peek seats are mostly applied to high pressure or high temperature condition. Delrin (Polyoxymethylene POM) provides operating temperature range from -20°C to 80°C and maximum working pressure at 425 bar. It combines high tensile strength and creep resistance. PEEK (Polyether ether ketone) is a colourless organic thermoplastic polymer, provides a wide operating temperature range from -20°C to 260°C and maximum working pressure at 400 bar. It combines excellent abrasion and corrosion resistance. API 607 Fire safe design is upon request.

HPV-230

2-pc Full Bore High Pressure Ball Valve.
- Blow-out-proof stem and anti-static design.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/4" ~ 2" (DN8 ~ DN50) - 3000PSI (PN210 bar).
  2-1/2" ~ 4" (DN65 ~ DN100) - 2000 PSI (PN140 bar).
- End Connection : Threaded end / Socket weld end.

HPV-230D

2-pc Full Bore High Pressure Ball Valve.
- Blow-out-proof stem.
- ISO 5211 direct-mounted pad.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/4" ~ 2" (DN8 ~ DN50) - 3000 PSI (PN210 bar).
- End Connection : Threaded end / Socket weld end.
- 2" Reduce bore.

HPV-231D

2-pc Full Bore High Pressure Ball Valve.
- Blow-out-proof stem .
- ISO 5211 direct-mounted pad.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/4" ~ 2" (DN8 ~ DN50) - 3000PSI (PN210 bar).
- End Connection : MALE x FEMALE Threaded end.
- 2" Reduce bore.

HPV-260

2-pc Full Bore High Pressure Ball Valve.
- Blow-out-proof stem and anti-static design.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/2" ~ 2" (DN15 ~ DN50) - 6000 PSI (PN420 bar).
- End Connection : Threaded end / Socket weld end.

HPV-260M

2-pc Full Bore High Pressure Ball Valve.
- Blow-out-proof stem .
- ISO 5211 mounted pad.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/4" ~ 2" (DN8 ~ DN50) - 6000 PSI (PN420 bar).
- End Connection : Threaded end / Socket weld end.
- 2" Reduce bore.

HPV-260MWB

2-pc Full Bore High Pressure Ball Valve.
- Full welding design.
- Blow-out-proof stem .
- ISO 5211 mounted pad.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/4" ~ 2" (DN8 ~ DN50) - 6000 PSI (PN420 bar).
- End Connection : Threaded end / Socket weld end.
- 2" Reduce bore.

HPV-210

2-pc Full Bore High Pressure Ball Valve.

- Blow-out-proof stem.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/2" ~ 1" (DN15 ~ DN25) - 10000PSI (PN630 bar).
- End Connection : Threaded end / Socket weld end.

HPV-330MSF

3-pc Full Bore High Pressure Ball Valve.

- ISO 5211 mounted on body.
- Blow-out-proof stem and anti-static design.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  2" (DN50) - 3000PSI (PN210 bar).
- End Connection : SAE Flanged end (according to SAE J518).

HPV-331M

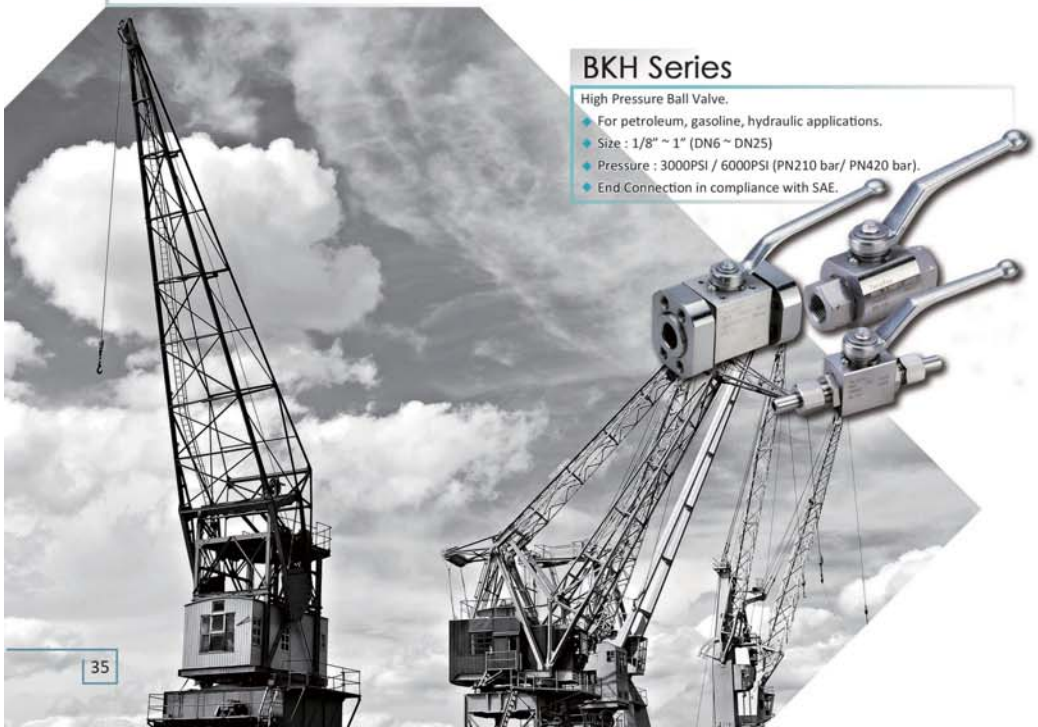
3-pc Full Bore High Pressure Ball Valve.

- Blow-out-proof stem and anti-static design.
- ISO 5211 mounted pad.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/2" ~ 4" (DN15 ~ DN100) - 2250PSI (PN155 bar).
- End Connection :
  Threaded end/ Radiator socket weld end/ Radiator butt weld end.

HPV-360M

3-pc Full Bore High Pressure Ball Valve.

- ISO 5211 mounted on body.
- Blow-out-proof stem and anti-static design.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/4" ~ 2" (DN8 ~ DN50) - 6000PSI (PN420 bar).
- End Connection : Threaded end/ Socket weld end/ Butt weld end.



BKH Series

High Pressure Ball Valve.

- For petroleum, gasoline, hydraulic applications.
- Size : 1/8" ~ 1" (DN6 ~ DN25)
- Pressure : 3000PSI / 6000PSI (PN210 bar/ PN420 bar).
- End Connection in compliance with SAE.

Cryogenic Ball Valve

Terofox Cryogenic Ball Valves are used for extreme low temperature service such as LNG (Liquefied Natural Nas), LPG (Liquefied Petroleum Gas) and any other cryogenic applications. Pressure rating could be 2000 PSI, Class 150, Class 300, PN16 or PN40 according as different models. As for the working temperature, PCTFE seat is able to endure extreme low temperature down to -320°F (-196°C). Terofox offer tight shutoff, high flow capacity, low torque and long service life under cryogenic condition.

Application

- LN2, N2,O2, Co2, He, H2, LNG.
- Liquefied gases.
- LNG storage and distribution.
- Food processing.
- Automated filling systems.
- Lyophilization Systems.
- CO2 and nitrogen injection.

CRV-320D

3-pc Full Bore Cryogenic Ball Valve.

- BS 6364 cryogenic certified
- Bonnet extended design.
- Uni-directional flow path.
- Blow-out-proof stem and anti-static design.
- ISO 5211 direct-mounted pad.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/4" ~ 1-1/2" (DN8 ~ DN40) - 2000PSI (PN140 bar).
  2" (DN50) - 1500PSI (PN100 bar).
- End Connection :
  Threaded end/ Socket weld end/ Butt weld end.

CRV-20D

2-pc Full Bore Cryogenic Flange Ball Valve.

- BS 6364 cryogenic certified
- Bonnet extended design.
- Uni-directional flow path.
- Blow-out-proof stem and anti-static design.
- ISO 5211 direct-mounted pad.
- Valve design in compliance with ASME B16.34.
- Size : 1/4" ~ 4" (DN8 ~ DN100).
- Pressure Rating : ANSI Class 150/300, DIN PN16 /40.
- End Connection : RF Flange end.
- Face-to-Face in compliance with ASME B16.10 / EN558.

CRV-320DF

3-pc Full Bore Cryogenic Flange Ball Valve.

- BS 6364 cryogenic certified
- Bonnet extended design.
- Uni-directional flow path.
- Blow-out-proof stem and anti-static design.
- ISO 5211 direct-mounted pad.
- Valve design in compliance with ASME B16.34.
- Size : 1/4" ~ 2" (DN8 ~ DN50).
- Pressure Rating : ANSI Class 300.
- End Connection : RF Flange end.
- Face-to-Face in compliance with ASME B16.10.

Metal Seat Ball Valve

Terofox Mateal Seat Ball Valve are designed for use in severe services such as high temperature, high pressure, and abrasive fluids found in Oil & Gas, Petroleum, Petrochemical, Chemical, Power Generation, Pulp & Paper, and Mining industries. Terofox concerns all our valuable clients and provides different coatings process to overcome a wide variety of critical services. Selecting the appropriate hard surface is a key to choose metal seat ball valve. It will very useful for us to select the right coatings on the right circumstances if we are advised of working temperature, working pressure and media.

Chromium carbide with nickel chrome binder applied by a High Velocity Oxygen Fuel (HVOF) gun creates a 0.5mm hard outer layer. This multipurpose wear resistance coating is used extensively in the power generation, refining and hot catalyst handling services. Its limitations are in wet sulfur or chloride environments where sulfuric acid can form and attack the coating.

Tungsten Carbide with a cobalt binder coating is applied by HVOF techniques. This coating resists cryogenic temperature down to -196°C (320°F) and high temperature up to 538°C (1000°F). Tungsten Carbide is a wear resistance and dense coating with chemical resistance to sulfur environmnet on Nickel-base alloy.

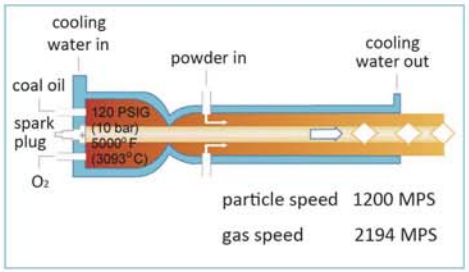
Stellite is the most common coatings for metal seat ball valves, acobalt-base stellite coating provides excellent mechanical wear resistance with good corrosion resistance at temperature up to 538°C (1000°F). The stellite is applied by a Plasma Thermal Arc (PTA) method. Most stellite alloys are cobalt based with elements of Chromium (Cr), Carbon (C), Tungsten (W) and Nickel (Ni). Stellite is broadly used in the pulp and paper industry, as well as in refining applications, such as catalyst handling and hydrocracker processes.

Coating

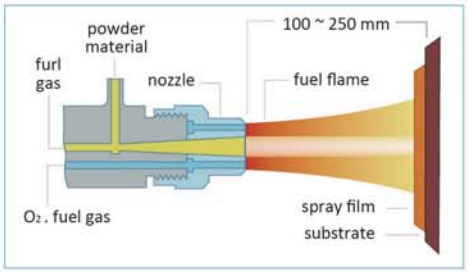
Coatings / Surface Treatments	Process Method	Process Material	Coating Thickness	Temperature	Corrosion Resistance
Hardended coating	Harden chrome plating	Chrome	0.03mm	350°C (662°F)	Good
Chrome Carbide (Cr3C2)	HVOP spray (High velocity oxygen fuel spray coating)	Chromium, Carbon Nickel	0.5mm	800°C (1472°F)	Good
Nickel-base alloy	Powder flame spray fused coating	Nickel-base alloy	0.5mm	500°C (932°F)	Good
Tungsten Carbide (WC-Co)	HVOP spray (High velocity oxygen fuel spray coating)	Tungsten, Carbon Cobalt	0.5mm	500°C (932°F)	Excellent
Stellite	PTA (Plasma transfer arc welding)	Cobalt-Ni	3mm	500°C (932°F)	Good

• The valve maximum temperature is 650°C(1202 °F).

HVOF spray (High Velocity Oxygen Fuel)



Powder spray



Feature

- Full bore design for high flow capacity and minimum turbulences.
- Ecxenllent lapping process on ball and metal seat in-house.
- Various coatings for corrosion and abrasion resistance.
- Flange end, screw end, socket weld end, butt weld end, extended tube weld end connection.
- Up to 425˚C (797˚F) temperature, Class 150 / 300 / 600 / 900 / 1500 rating.
- Stem extension for metal seat ball valve is upon severe applications and working surroundings.

MS-320M

3-pc Full Bore Metal Seat Ball Valve.

- Uni-directional flow path.
- Blow-out-proof stem.
- ISO 5211 mounted pad.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/2" ~ 4" (DN15 ~ DN100) - 2250PSI (PN155 bar).
- End Connection : Threaded end/ Socket weld end/ Butt weld end.
- Leakage Rating : FCI 70-2 Class V.

MS-24

2-pc Full Bore Metal Seat Ball Valve.

- Uni-directional flow path.
- Blow-out-proof stem.
- ISO 5211 mounted pad.
- Valve design in compliance with ASME B16.34.
- Size : 1/2" ~ 4" (DN15 ~ DN100).
- Pressure Rating : ANSI Class 150/300.
- End Connection : RF Flange end.
- Face-to-Face in compliance with ASME B16.10.
- Leakage Rating : FCI 70-2 Class V.

MS-40

API6D 2-pc Design Casting Type Full Bore Trunnion Mounted Ball Valve.

- Double-block-bleed (DBB) design.
- API607 6th fire safe approved.
- Blow-out-proof stem and anti-static design.
- ISO 5211 mounted pad.
- Valve design in compliance with API 6D.
- Size : 2" ~ 14".
- Pressure Rating : ANSI Class 150 / 300.
- End Connection : RF Flange end / RTJ Flange end.
- Face-to-Face in compliance with ASME B16.10.
- Reduce bore is available : MS-41.

Sanitary / High Purity / Ultra-High Purity Ball Valve

Sanitary Ball Valve

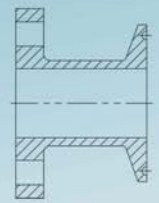
Terofox provides cost-efficient sanitary ball valve for food & beverage application with full selection of tube ends. And also provides Food and Beverage Industry offer a full line of Sanitary 2,3,4 and 5-way ball valves along with flush bottom tank outlet ball valve for optimum performance in controlling and automated process lines. Investment casting valve body and end cap perform excellent surface and durable shape of valve design. Pneumatic actuator, electronic actuator, limit switch box, solenoid valve, V port, TFM1600 seat, FDA certification, etc. are available.

Specification

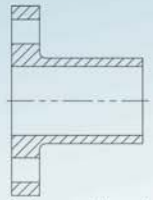
Application	Food & beverage
Material	ASTM A351 CF8 / CF8M / CF3M ASTM A276 SS304 / SS316 /SS316L
End connection	T-clamp end / Tube weld end (3A / DIN 11850 / ISO 1127)
Seat	PTFE Cavity-filled PTFE
Cleanness & Packaging	Supersonic cleaning procedure with Polyethylene bag packaging and labeling.

End Connection

All ends are one-piece castings and are machined on all wetted parts to high garde finish. The standard ends are T-clamp, Tube weld end or Extended tube weld end.



T-clamp end



Tube weld end

ST-310

3-pc Design Tube Bore Sanitary Ball Valve.
- Internal surface finish Ra ≦ 0.6 μm.
- Blow-out-proof stem.
- Valve design in compliance with ASME B16.34.
- Pressure Rating : 1/2" ~ 4" (DN15 ~ DN100) - 1000PSI (PN63 bar).
- End Connection : T-clamp end/ Tube weld end.

ST-310M

3-pc Design Tube Bore Sanitary Ball Valve.
- Internal surface finish Ra ≦ 0.6 μm.
- Blow-out-proof stem.
- ISO 5211 mounted pad.
- Valve design in compliance with ASME B16.34.
- Pressure Rating : 1/2" ~ 4" (DN15 ~ DN100) - 1000PSI (PN63 bar).
- End Connection : T-clamp end/ Tube weld end.

ST-310D

3-pc Design Tube Bore Sanitary Ball Valve.
- Internal surface finish Ra ≦ 0.6 μm.
- Blow-out-proof stem.
- ISO 5211 direct-mounted pad.
- Valve design in compliance with ASME B16.34.
- Pressure Rating : 1/2" ~ 4" (DN15 ~ DN100) - 1000PSI (PN63 bar).
- End Connection : T-clamp end/ Tube weld end.

ST-211M

2-pc Design Tube Bore Sanitary Ball Valve.
- Internal surface finish Ra ≦ 0.6 μm.
- High grade surface finish precisely machined body.
- Blow-out-proof stem.
- ISO 5211 mounted pad.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1" ~ 2" (DN25 ~ DN50) - 1000PSI (PN63 bar).
- End Connection : T-clamp end/ Tube weld end.

STM-310D

3 Way Tube Bore Sanitary Ball Valve.
- Internal surface finish Ra ≦ 0.6 μm.
- T / L port.
- Blow-out-proof stem.
- ISO 5211 direct-mounted pad.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/2" ~ 4" (DN15 ~ DN100) - 1000PSI (PN63 bar).
- End Connection : T-clamp end/ Tube weld end.

ST-311M

3-pc Design Tube Bore Sanitary Ball Valve.
- Internal surface finish Ra ≦ 0.6 μm.
- High grade surface finish precisely machined body.
- Blow-out-proof stem.
- ISO 5211 mounted on body.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/2" ~ 2" (DN15 ~ DN50) - 1000PSI (PN63 bar).
- End Connection : T-clamp end/ Tube weld end.

STM-311D

3 Way Tube Bore Sanitary Ball Valve.
- Internal surface finish Ra ≦ 0.6 μm.
- T / L port.
- Blow-out-proof stem.
- ISO 5211 direct-mounted pad.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/2" ~ 4" (DN15 ~ DN100) - 1000PSI (PN63 bar).
- End Connection : T-clamp end/ Tube weld end.

STM-410D

4 Way Tube Bore Sanitary Ball Valve.
- Internal surface finish Ra ≦ 0.6 μm.
- T / L / LL port.
- Blow-out-proof stem.
- ISO 5211 direct-mounted pad.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/2" ~ 4" (DN15 ~ DN100) - 1000PSI (PN63 bar).
- End Connection : T-clamp end/ Tube weld end.

High Purity Ball Valve

Terofox for the Pharmaceutical and Biotechnology Industry are specifically designed and tested to perform in many types of sanitary and clean steam applications. We can also provided full line of valves include low ferrite cast or forged 2 and 3-way ball valves, available in 316/316L (ASTM A351 CF8M/CF3M) stainless steel level. All of our High Purity Ball Valves are compliance with sanitary regulations (BPE-2014) . Also in the end connection such as ASTM A351 CF8M / CF3M T-clamp or ASTM A351 CF3M chemical composition ETO (Extended Tube OD) and Sulfur content between 0.005% and 0.017% are both available.

Specification

Application	Pharmaceutical, Cosmetic, Vacuum service, WFI – Water For Injection, CDA – Clean Dry Air.
Material	ASTM A351 CF8M / CF3M ASTM A276 SS316 / SS316L Low Ferrite condition < 3% Sulfur content condition between 0.0005~0.017%
End connection	T-clamp end / Tube weld end (SIP/CIP port option) (ASME BPE T-Clamp / ASTM A270 Extended Tube OD / DIN 11850 / ISO 1127)
Seat	TFM1600, Cavity-Filled TFM1600 in FDA certification (FDA USP 23 Class VI).
Cleanness & Packaging	Oil-free cleanness is Terofox standard. Oxygen clean is available. Polyethylene bag packaging with sealing.

Clamp or Tube Welded ends to ASME BPE with sulphur controlled between 0.005 and 0.017%. Mechanical and Electropolished Interna surface available as per customer requirement.

Blow-out proof stem & Live-loaded design.Antistatic Device available for volatile or flammable appication. Precision fit bottom entry 316 / 316L stem for maximum operating safety.

Stainless Steel handle with plastic sleeve.

Precision cast stainless steel construction, solution annealed / normalised ensuring highest quality and added strength. Each body is etched with a heat number for material traceability. Purge ports available on the integral bosses for CIP or SIP applications.

Precison Engineered solid 316 / 316L stainless steel ball with ID dimensions equal to tube ID, ensuring maximun flow capacity with minimum pressure drop across the valve.

Mechanical and Electropolished surface finishes as per ASME BPE Table SF-3 to suit specfic customer requirements.

PTFE-TFM seats - hygienic non slotted design which eliminates entrapment areas. Provides tight shutoff and low pressures, reduces wear and valve torque. Cavity filled seats available for reducing dead volume between the ball and the body.

Full encapsulated PTFE/TFM seal which prevent leakage to atmosphere or in vacuum service to internal media.

Acceptance Criteria for Stainless Steel and Higher Alloy Mechanically Polished Product Contact Surface Finishes.

Anomaly or Indication	Acceptance Criteria
Pits	If diameter <0.020 in. and bottom is shiny. Pits <0.003 in. diameter are irrelevant and acceptable.
Cluster of pits	No more than 4 pits per each 1/2 in. x 1/2 in. inspection window. The cumulative total of all relevant pits shall not exceed 0.040 in.
Dents	None accepted.
Finishing marks	If Ra max. is met.
Welds	As welded shall meet requirements of MJ-6. If welds are finished, then shall be smooth and blended.
Nicks	None accepted.
Scratches	For tubing, if cumulative length is <12.0 in. per 20 ft tube length or prorated and if depth is <0.003 in. For fittings, valves, and other process components, if length is <0.25 in. cumulatively, depth<0.003 in. and Ramax. is met. For vessels, if length < 0.50 in. at 0.003 depth and if <3 per inspection window.
Surface cracks	None accepted.
Surface inclusions	If Ra max. is met.
Surface residuals	None accepted, visual inspection.
Surface roughness (Ra)	See below table.
Weld slag	For tubing, up to 3 per 20 ft length or prorated, if <75% of the width of the weld bead. For fittings, valves, vessels, and other process components, none accepted (as welded shall meet the requirements of MJ-6 and Table MJ-3).
Porosity	None open to the surface.

Marking Information

Labeling on the Polyethylene bag is compliance with following iformation:

1. Manufacturer's name, logo, or trademark.
2. Material in ASTM, EN DIN designation.
3. Internal surface symbol for appropriate BPE table.
4. Cleanness level.
5. Year and Month of manufacturer.

MTR's

Mill Test Reports are recorded for each size and heat number. Those documents included information as following:

1. Manufacturer's name, logo, or trademark.
2. Material in ASTM, EN DIN designation.
3. Chemical analysis.
4. Mechanical properties.
5. Heat number.
6. Year and Month of manufacturer .

Options

- Accessories:
  Pneumatic actuator / Electronic actuator / Limit Switch Box / Solenoid Valve.
- CIP ports :
  Compresstion port, Clamp fitting port.
- Extended stem
- Polish:

Mechanical	Electronic
MP1-20 Ra SF1	EP1-15 Ra SF4
MP2-25 Ra SF2	EP2-20 Ra SF5
MP2-30 Ra SF3	EP3-25 Ra SF6

Ra Readings For Product Contact Surface

Mechanical polishing [1]

Surface designation	Ra µ-in	Ra µm
SF1	20	0.51
SF2	25	0.64
SF3	30	0.76

Mechanical polishing and Electro-polishing [1]

Surface designation	Ra µ-in	Ra µm
SF4	15	0.38
SF5	20	0.51
SF6	25	0.64

[1] Or any other finishing method that meets the Ra max.

NOTE:

(a) All Ra readings are taken across the lay, wherever possible.

(b) No single Ra reading shall exceed the Ra max. valuein this table.

(c) Other Ra readings are available if agreed upon between owner/user and manufacturer, not to exceed values in this table.

Conversion Chart

Standard Grit	Ra µ-in	Ra µm	Ra µ-in	Ra µm
150g	27-32	0.68-0.80	30-35	0.76-0.89
180g	18-23	0.46-0.58	20-25	0.51-0.64
240g	14-18	0.34-0.46	15-20	0.38-0.51
320g	8-10	0.21-0.25	9-11	0.23-0.28

Grit :
Measures the number of scratches per linear inch of abrasive pad, Higher numbers indicate a smoother finish.

RMS :
Defined as Root Mean Square roughness, this method measures a sample for peaks and valleys. Lower numbers indicate a smoother finish.

Ra :
Known as the Arithmetic Mean, this measurement represents the average value of all peaks and valleys. Lower numbers indicate a smooth finish.

Ultra-High Purity Ball Valve

It's a term that intends to emphasize the need for extremely high levels of purity. It's a term widely used in the semiconductor marketplace where absolute minimal amounts of particles in the flow stream are demanded. The semiconductor industry valve design requests extremely strict adherence to standards to eliminate or minimize contamination from particles, outgassing and moisture.

Specification

Application	Semi-conductor.
Material	ASTM A351 CF8M / CF3M ASTM A276 SS316 / SS316L
End connection	T-clamp end / Tube weld end (SIP/CIP port option) (ASME BPE T-Clamp / ASTM A270 Extended Tube OD / DIN 11850 / ISO 1127)
Seat	PTFE / TFM1600, Cavity-Filled PTFE / TFM1600 in FDA certification.
Cleanness & Packaging	Oil-free cleanness is Terofox standard. Oxygen clean is available. Polyethylene bag packaging with sealing.

Marking Information

Labeling on the Polyethylene bag is compliance with following information:

1. Manufacturer's name, logo, or trademark.
2. Material in ASTM, EN DIN designation.
3. Internal surface symbol for appropriate BPE table.
4. Cleanness level.
5. Year and Month of manufacturer.

MTR's

Mill Test Reports are recorded for each size and heat number. Those documents included information as following:

1. Manufacturer's name, logo, or trademark.
2. Material in ASTM, EN DIN designation.
3. Chemical analysis.
4. Mechanical properties.
5. Heat number.
6. Year and Month of manufacturer .

Options

- Accessories:
  Pneumatic actuator / Electronic actuator / Limit Switch Box / Solenoid Valve.
- Purge Ports :
  Compressor end connection, VCR end connection.
- Extended stem

ST-310

3-pc Design Tube Bore Sanitary Ball Valve.

- C/W Purge port.
- Internal surface finish Ra ≦ 0.6 µm.
- Blow-out-proof stem.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/2" ~ 4" (DN15 ~ DN100) - 1000PSI (PN63 bar).
- End Connection : T-clamp end/ Tube weld end.

ST-320D

3-pc Design Tube Bore Sanitary Ball Valve.

- C/W Purge ports (Downstream / Upstream).
- Internal surface finish Ra ≦ 0.6 µm.
- Blow-out-proof stem.
- ISO 5211 direct-mounted pad.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/2" ~ 2" (DN15 ~ DN50) - 2000PSI (PN140 bar).
- End Connection : T-clamp end/ Tube weld end.

Tube Dimensions (ASTM A270)

Size	OD	T
1/4"	0.25 (6.35mm)	0.035 (0.89mm)
3/8"	0.375 (9.53mm)	0.035 (0.89mm)
1/2"	0.50 (12.70mm)	0.049" (1.24mm)
3/4"	0.75 (19.05mm)	0.065 (1.650mm)
1"	1.00 (25.4mm)	0.065 (1.650mm)
11/2"	1.50 (38.10mm)	0.065 (1.650mm)
2"	2.00 (50.80mm)	0.065 (1.650mm)
21/2"	2.50 (63.50mm)	0.065 (1.650mm)
3"	3.00 (76.20mm)	0.065 (1.650mm)
4"	4.00 (101.6mm)	0.083 (2.11mm)
6"	6.00 (152.4mm)	0.109 (2.77mm)
8"	8.00 (203.2mm)	0.120 (3.05mm)

ISO 5211 Direct-mounted / Automation Ball Valve

Manual ball valves are cost-effective, typical and easy to operate. However, some large valves are impossible to operate manually, some valves may be located in remote, some valves may be located in hostile environments, etc., manual bal valves are useless in such condition. Terofox provide certain ball valves complete with mounted pad which is in conformity to ISO 5211 for actuator assembling, such as Pneumatic Actuator or Electric Actuator which are able to remote control. Terofox can offer not only bare shaft ISO 5211 direct-mounted pad ball valves, but also well-assembled automation ball valves, and furthermore accessories such as solenoid valve, limit switch box, positioner and override gear box are upon request. For designated models which do not complete with ISO 5211 direct-mounted pad but ISO 5211 mounted pad, Terofox still can provide bracket assembling service.

Pneumatic Actuator
Air pressure acting driver which can move the valve in the opening or closing direction.

Limit Switch Box
A vavle position monitor.

Electric Actuator
Electric motor which can move the valve in the opening or closing direction.

Override Gear Box
Can manual operate temporarily when the actuator failed.

Solenoid Valve
An electromagnetic controller for air pass in and out

ISO 5211 Direct-mounted Pad
a connection which is able to assemble a actuator directly.

Bare Shaft Ball Valve

Pneumatic Actuator Ball Valve

Electric Actuator Ball Valve

Positioner
a valve position controller, can contorl the actuator accordingly by signal and monitor valve position remotely.

Bracket
Additional connected support between valve and actuator. It would be only demanded when a valve can not fit the actuator directly.

EB-210D

EB-210DDA c/w Double acting pneumatic actuator
EB-210DSR c/w Spring return pneumatic actuator
EB-210DEL c/w Electric actuator
2-pc Design Full Bore Ball Valve.
- Blow-out-proof stem and anti-static design.
- ISO 5211 direct-mounted pad.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/4" ~ 2" (DN8 ~ DN50) - 1000 PSI (PN63 bar).
  2-1/2" ~ 3" (DN65 ~ DN80) - 800 PSI (PN40 bar).
- End Connection : Threaded end / Socket weld end.

EB-210DLM

EB-210DLMDA c/w Double acting pneumatic actuator
EB-210DLMSR c/w Spring return pneumatic actuator
EB-210DLMEL c/w Electric actuator
2-pc Design Full Bore Ball Valve.
- Blow-out-proof stem.
- ISO 5211 direct-mounted pad.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/4" ~ 2" (DN8 ~ DN50) - 1000 PSI (PN63 bar).
- End Connection : Threaded end / Socket weld end.
- Face-to-Face in compliance with DIN3202 M3.

EB-213DLM

EB-213DLMDA c/w Double acting pneumatic actuator
EB-213DLMSR c/w Spring return pneumatic actuator
EB-213DLMEL c/w Electric actuator
2-pc Design Full Bore Ball Valve.
- Blow-out-proof stem.
- ISO 5211 direct-mounted pad.
- Valve design in compliance with ASME B16.34.
- Pressure Rating : 1/4" ~ 2" (DN8 ~ DN50) - 1000 PSI (PN63 bar).
- End Connection : Threaded end.
- Face-to-Face in compliance with DIN3202 M3.

EB-310D

EB-310DDA c/w Double acting pneumatic actuator
EB-310DSR c/w Spring return pneumatic actuator
EB-310DEL c/w Electric actuator
3-pc Design Full Bore Ball Valve.
- Blow-out-proof stem and anti-static design.
- ISO 5211 direct-mounted pad.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/4" ~ 2" (DN8 ~ DN50) - 1000 PSI (PN63 bar).
  2-1/2" ~ 4" (DN65 ~ DN100) - 800 PSI (PN40 bar).
- End Connection : Threaded end / Socket weld end / Butt weld end.
- V-port is available : EB-V310D.

EB-310DLMFE

EB-310DLMFEDA c/w Double acting pneumatic actuator
EB-310DLMFESR c/w Spring return pneumatic actuator
EB-310DLMFEEL c/w Electric actuator
3-pc Design Full Bore Fugitive Emissions Ball Valve.
- ISO15848-1 : 2015 Fugitive emissions approved.
  Tightness Class : BH.
  Endurance Class : CO3 – 2500 cycles.
  Temperature Class : RT.
- Blow-out-proof stem and anti-static design.
- ISO 5211 driect-mounted pad.
- Valve design in compliance with ASME B16.34.
- Pressure Rating : 1/4" ~ 4" (DN8 ~ DN100) - 1000 PSI (PN63 bar).
- End Connection : Threaded end / Socket weld end / Butt weld end.
- Face-to-Face in compliance with DIN3202 M3.

EB-313DLM

EB-313DLMDA c/w Double acting pneumatic actuator
EB-313DLMSR c/w Spring return pneumatic actuator
EB-313DLMEL c/w Electric actuator
3-pc Design Full Bore Ball Valve.
- Blow-out-proof stem and anti-static design.
- ISO 5211 direct-mounted pad.
- Valve design in compliance with ASME B16.34.
- Pressure Rating : 1/4" ~ 2" (DN8 ~ DN50) - 1000 PSI (PN63 bar).
- End Connection : Threaded end.
- Face-to-Face in compliance with DIN3202 M3.

EB-320D

EB-320DDA c/w Double acting pneumatic actuator
EB-320DSR c/w Spring return pneumatic actuator
EB-320DEL c/w Electric actuator
3-pc Design Full Bore Ball Valve.

- Blow-out-proof stem and anti-static design.
- ISO 5211 direct-mounted pad.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/4" ~ 1" (DN8 ~ DN25) - 2000 PSI (PN140 bar).
  1-1/4" ~ 2" (DN32 ~ DN50) - 1500 PSI (PN100 bar).
  2-1/2" ~ 4" (DN65 ~ DN100) - 1000 PSI (PN63 bar).
- End Connection : Threaded end / Socket weld end / Butt weld end.
- Reduce bore is available : EB-320DR.

EB-310DF

EB-310DFDA c/w Double acting pneumatic actuator
EB-310DFSR c/w Spring return pneumatic actuator
EB-310DFEL c/w Electric actuator
3-pc Design Full Bore Flange Ball Valve.

- Blow-out-proof stem and anti-static design.
- ISO 5211 direct-mounted pad.
- Size : DN15 ~ DN100.
- Pressure Rating : DIN PN16 / 40.
- End Connection : RF Flange end.
- Face-to-Face in compliance with EN558.
- V-port is available : EB-V310DF.

TF-28D

TF-28DDA c/w Double acting pneumatic actuator
TF-28DSR c/w Spring return pneumatic actuator
TF-28DEL c/w Electric actuator
2-pc Design Full Bore Flange Ball Valve.

- On-site adjustment design.
- Blow-out-proof stem and anti-static design.
- ISO 5211 direct-mounted pad.
- Valve design in compliance with ASME B16.34 / API608.
- Size : 1/2" ~ 8" (DN15 ~ DN200).
- Pressure Rating : ANSI Class 150, DIN PN16 / 40, JIS 10K.
- End Connection : RF Flange end.
- Face-to-Face in compliance with ASME B16.10 / EN558 / JIS B2002.

MW-305D

MW-305DDA c/w Double acting pneumatic actuator
MW-305DSR c/w Spring return pneumatic actuator
MW-305DEL c/w Electric actuator
3 Way Standard Bore Ball Valve.

- T / L port.
- Blow-out-proof stem and anti-static design.
- ISO 5211 direct-mounted pad.
- One-end-cap Design.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/4" ~ 2" (DN8 ~ DN50) - 1000 PSI (PN63 bar).
- End Connection : Threaded End.

TF-10D

TF-10DDA c/w Double acting pneumatic actuator
TF-10DSR c/w Spring return pneumatic actuator
TF-10DEL c/w Electric actuator
1-pc Design Full Bore Compact Body (Wafer Type) Ball Valve.

- Blow-out-proof stem and anti-static design.
- ISO 5211 direct-mounted pad.
- Valve design in compliance with ASME B16.34.
- Size : 1/2" ~ 4" (DN15 ~ DN100) - Full port.
  5" ~ 6" (DN125 ~ DN150) - Reduce port.
- Pressure Rating : ANSI Class 150, DIN PN16.
- End Connection : RF Flange end.
- Face-to-Face : Manufacturer standard.

TF-20D

TF-20DDA c/w Double acting pneumatic actuator
TF-20DSR c/w Spring return pneumatic actuator
TF-20DEL c/w Electric actuator
2-pc Design Full Bore Flange Ball Valve.

- Blow-out-proof stem and anti-static design.
- ISO 5211 direct-mounted pad.
- Valve design in compliance with ASME B16.34.
- Size : 1/2" ~ 6" (DN15 ~ DN150).
- Pressure Rating : ANSI Class 150 / 300, DIN PN16 / 40, JIS 10K.
- End Connection : RF Flange end.
- Face-to-Face in compliance with ASME B16.10 / EN558 / JIS B2002.
- V-port is available : TF-V20D.

MW-310D

MW-310DDA c/w Double acting pneumatic actuator
MW-310DSR c/w Spring return pneumatic actuator
MW-310DEL c/w Electric actuator
3 Way Full Bore Ball Valve.

- T / L port.
- Blow-out-proof stem and anti-static design.
- ISO 5211 direct-mounted pad.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/2" ~ 4" (DN15 ~ DN100) - 1000 PSI (PN63 bar).
- End Connection : Threaded end / Socket weld end / Butt weld end.

MW-316D

MW-316DDA c/w Double acting pneumatic actuator
MW-316DSR c/w Spring return pneumatic actuator
MW-316DEL c/w Electric actuator
3 Way Full Bore Ball Valve.

- T / L port.
- Blow-out-proof stem and anti-static design.
- ISO 5211 direct-mounted pad.
- Valve design in compliance with ASME B16.34.
- Pressure Rating :
  1/4" ~ 1-1/2" (DN8 ~ DN40) - 1000 PSI (PN63 bar).
- End Connection : Threaded end.

TF-20DFE

TF-20DFEDA c/w Double acting pneumatic actuator
TF-20DFESR c/w Spring return pneumatic actuator
TF-20DFEEL c/w Electric actuator
2-pc Design Full Bore Fugitive Emissions Flange Ball Valve.

- ISO15848-1 : 2015 Fugitive emissions approved.
  Tightness Class : BH.
  Endurance Class : CO3 – 2500 cycles.
  Temperature Class : RT.
- Blow-out-proof stem and anti-static design.
- ISO 5211 driect-mounted pad.
- Valve design in compliance with ASME B16.34.
- Size : 1/2" ~ 6" (DN15 ~ DN150).
- Pressure Rating : ANSI Class 150 / 300, DIN PN16 / 40, JIS 10K.
- End Connection : RF Flange end.
- Face-to-Face in compliance with ASME B16.10 / EN558 / JIS B2002.

MW-410D

MW-410DDA c/w Double acting pneumatic actuator
MW-410DSR c/w Spring return pneumatic actuator
MW-410DEL c/w Electric actuator
4 Way Full Bore Ball Valve.

- T / L / LL port.
- Blow-out-proof stem and anti-static design.
- ISO 5211 direct-mounted pad.
- Valve design in compliance with ASME B16.34.
- Pressure Rating : 1/2" ~ 4" (DN15 ~ DN100) - 1000 PSI (PN63 bar).
- End Connection : Threaded end / Socket weld end / Butt weld end.

ST-310D

ST-310DDA c/w Double acting pneumatic actuator
ST-310DSR c/w Spring return pneumatic actuator
ST-310DEL c/w Electric actuator
3-pc Design Tube Bore Sanitary Ball Valve.

- Internal surface finish Ra ≤ 0.6 μm.
- Blow-out-proof stem.
- ISO 5211 direct-mounted pad.
- Valve design in compliance with ASME B16.34.
- Pressure Rating : 1/2" ~ 4" (DN15 ~ DN100) - 1000PSI (PN63 bar).
- End Connection : T-clamp end/ Tube weld end.

MWF-310D

MWF-310DDA c/w Double acting pneumatic actuator
MWF-310DSR c/w Spring return pneumatic actuator
MWF-310DEL c/w Electric actuator
3 Way Full Bore Flange Ball Valve.

- T / L port.
- Blow-out-proof stem and anti-static design.
- ISO 5211 direct-mounted pad.
- Valve design in compliance with ASME B16.34.
- Size : 1/2" ~ 6" (DN15 ~ DN150)
- Pressure Rating : ANSI Class 150, DIN PN16 / 40.
- End Connection : RF Flange end.
- Face-to-Face : Manufacture standard.

STM-310D

STM-310DDA c/w Double acting pneumatic actuator
STM-310DSR c/w Spring return pneumatic actuator
STM-310DEL c/w Electric actuator
3 Way Tube Bore Sanitary Ball Valve.

- Internal surface finish Ra ≤ 0.6 μm.
- T / L port.
- Blow-out-proof stem.
- ISO 5211 direct-mounted pad.
- Valve design in compliance with ASME B16.34.
- Pressure Rating : 1/2" ~ 4" (DN15 ~ DN100) - 1000PSI (PN63 bar).
- End Connection : T-clamp end/ Tube weld end.

MWF-410D

MWF-410DDA c/w Double acting pneumatic actuator
MWF-410DSR c/w Spring return pneumatic actuator
MWF-410DEL c/w Electric actuator
4 Way Full Bore Flange Ball Valve.

- T / L / LL port.
- Blow-out-proof stem and anti-static design.
- ISO 5211 direct-mounted pad.
- Valve design in compliance with ASME B16.34.
- Size : 1/2" ~ 6" (DN15 ~ DN150)
- Pressure Rating : ANSI Class 150, DIN PN16 / 40.
- End Connection : RF Flange end.
- Face-to-Face : Manufacture standard.

STM-410D

STM-410DDA c/w Double acting pneumatic actuator
STM-410DSR c/w Spring return pneumatic actuator
STM-410DEL c/w Electric actuator
4 Way Tube Bore Sanitary Ball Valve.

- Internal surface finish Ra ≤ 0.6 μm.
- T / L / LL port.
- Blow-out-proof stem.
- ISO 5211 direct-mounted pad.
- Valve design in compliance with ASME B16.34.
- Pressure Rating : 1/2" ~ 4" (DN15 ~ DN100) - 1000PSI (PN63 bar).
- End Connection : T-clamp end/ Tube weld end.

MWF-510D

MWF-510DDA c/w Double acting pneumatic actuator
MWF-510DSR c/w Spring return pneumatic actuator
MWF-510DEL c/w Electric actuator
5 Way Full Bore Flange Ball Valve.

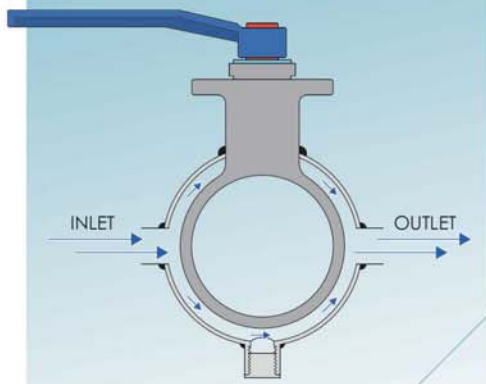
- T / L port.
- Blow-out-proof stem and anti-static design.
- ISO 5211 direct-mounted pad.
- Valve design in compliance with ASME B16.34.
- Size : 1/2" ~ 6" (DN15 ~ DN150)
- Pressure Rating : ANSI Class 150, DIN PN16 / 40.
- End Connection : RF Flange end.
- Face-to-Face : Manufacture standard.

Steam Jacket Ball Valve

Terofox Steam Jacket Ball Valve is complete with full jacketed design to maintain the temperature of the media. It is effective in some certain circumstances where keeps temperature or control temperature. The Jacket guarantees consistent in heating or cooling of the process media to avoid crystallization or seizing of flow media. Steam can be used as carrier for heating media.

NOTE

Make sure that no foreign objects obstruct the inlet, or outlet before installing the jacketed ball valve.



1/2" NPT Drain Port

TF-11J

1-pc Design Reduce Bore Jacket Flange Ball Valve.

- Valve design in compliance with ASME B16.34.
- Size : 1/2" X 1-1/2" ~ 8" X 10".
- Pressure Rating : ANSI Class 150, JIS 10K.
- End Connection : RF Flange end.
- Face-to-Face in compliance with ASME B16.10 / JIS B2002.

Special Material Ball Valve

For certain applications, the regular material (WCB, SS316, SS304,etc.) may not adequate, Terofox can offer various materials for option. Material selecting should consider a variety of factors, such as operating temperature, operating pressure, media, environment, etc. Terofox engineer team is capable of estimating the sufficient material at our client's request.

Madel : ST-310
Body Material : Hastelloy C276

Madel : EB-320M
Body Material : Titanium

Material Table

Material Code		Nominal Designation	Casting			Bar or Forged		
			ASTM	DIN	UNS	ASTM	DIN	UNS
Austenitic Stainless Steel	SS304	18Cr-8Ni	A351 CF8	1.4308	J92600	A276 304	1.4301	S30400
	SS304L	18Cr-8Ni-LC	A351 CF3	1.4309	J92500	A276 304L	1.4306	S30403
	SS316	18Cr-9Ni-2Mo	A351 CF8M	1.4408	J92900	A276 316	1.4401	S31600
	SS316L	18Cr-9Ni-2Mo-C<0.03%	A351 CF3M	1.4409	J92800	A276 316L	1.4404	S31603
	SS317	18Cr-12Ni-3.5Mo	A351 CG8M	1.4412	J93000	A276 317	1.4449	S31700
	SS317L	18Cr-12Ni-3.5Mo-C<0.03%	A351 CG3M	1.4438	J92999	A276 317L	1.4438	S31703
	SS347	18Cr-10Mi-Nb	A351 CF8C	1.4552	J92710	A276 347	1.4550	S34700
	904L	19Cr-23Ni-4.0Mo		1.4539		AISI 904L	1.4539	N08904
	Alloy 20	29Ni-20.5Cr-3.5Cu-2.5Mo	A351 CN7M	1.4536	J95150	B473	2.4660	N08020
	254 Mo	20Cr-18Ni-6.5Mo-N-Cu	A351 CK3MCuN	1.4593	J93254	A276		S31254
Nickel-based Alloy	Monel 400	67Ni-30Cu	A494 M-35-1	2.4365	J24135	B164	2.4360	N04400
	Hastelloy B	67Ni-28Mo-5Fe	A494 N-12MV	2.4882	J30012	B335	2.4819	N10001
	Hastelloy B2	67Ni-30Mo-1Fe	A494 N-7M	2.4617		B335	2.4856	N10665
	Hastelloy C276	58Ni-16Cr-16Mo-6Fe-4W	A494 CW12MW	2.4686	J30002	B574	2.4819	N10002
	Hastelloy C	64Ni-18Cr-18Mo	A494 CW6M	2.4819	N30107	B574	1.7752	N10276
	Hastelloy C22	58Ni-21Cr-14Mo-4Fe-3W	A494 CX2MW	9.4602	N26022	B574	2.4602	N06022
	Inconel 600	78Ni-15Cr-5Fe	A494 CY-40	2.4816	J06040	B166	2.4817	N06600
	Inconel 625	65Ni-22Cr-9Mo-3.5Nb	A494 CW6MC	2.4856	J26625	B446	2.4856	N06625
	Nickel CZ100	97Ni	A494 CZ-100	2.4066	J02100			
Duplex Stainless Steel	1B	25Cr-5Ni-Mo-Cu-N	A955 CD4MCuN	1.4507	J93372	A790 31260		
	2A	24Cr-5Ni-Mo-N	A955 CE8MN		J93345			
	2205/4A	22Cr-5Ni-Mo-N	A955 CD3MN	1.4462	J92205	A790 31803	1.4462	S31803
Super Duplex Stainless Steel	2507/5A	25Cr-7Ni-4Mo-N	A955 CE3MN	1.4501	J93404	A479 32750	1.4410	S32750
	Z100/6A	25Cr-7Ni-3Mo-Cu-N-W	A955 CD3MWCuN	1.4468	J93380	A479 32760	1.4460	S32760
	Ferralium 255/1C	25Cr-6Ni-Mo-Cu-N	A890 CD3MCuN		J93373	A479 39277		S39277
	329	25Cr-7Ni-3Mo-N		1.4507		A479 32760	1.4460	S32900

Application

Material Code		Typical Application	Applicable Standard
Austenitic Stainless Steel	SS304	nitric acid, phosphoric acid, organic acid	
	SS304L	nitric acid, phosphoric acid, organic acid	
	SS316	nitric acid, phosphoric acid, organic acid	
	SS316L	alkali chloride, boiled acid	
	SS317	alkali chloride, boiled acid	
	SS317L	alkali chloride, boiled acid	
	SS347	sulfuric acid	
	904L	sulfuric acid	
	Alloy 20	sulfuric acid	Superior resistance to stress -corrosion, preventing cracking in boiling at 20% to 40% sulfuric acid
	254 Mo		High resistance to pitting, crevice and general corrosion, very high resistance to chloride stress corrosion cracking
Nickel-based Alloy	Monel 400	alkali chloride, boiled acid	Good resistance against corrosion by acids and oxygen makes Monel suitable for the chemical industry
	Hastelloy B	hydrochloric acid, sulfuric acid (up to 60%), phosphoric acid, copper chloride	
	Hastelloy B2	hydrochloric acid, sulfuric acid (up to 60%), phosphoric acid, copper chloride	
	Hastelloy C276		
	Hastelloy C	wet chlorine gas, chlorine dioxide, organic acid, acetic acid, seawater	Effective survival under high-temperature. Can outlast a moderately to severely corrosive environment
	Hastelloy C22		
	Inconel 600		
	Inconel 625	oxidizing and high temperature environment	
	Nickel CZ100		
Duplex Stainless Steel	1A	nitric acid, phosphoric acid , organic acid	
	1B	nitric acid, phosphoric acid , organic acid	
	2A	nitric acid, phosphoric acid , organic acid	
	2205/4A	nitric acid, phosphoric acid , organic acid	2205 is a duplex stainless steel designed to combine improved resistance to stress corrosion cracking, pitting, crevice corrosion and stronger when compared with other stainless alloys.
Super Duplex Stainless Steel	2507/5A	salt / seawater application, sulfuric acid, phosphoric acid, formic acid, acetic acid,	Duplex 2507 is a super duplex stainless steel designed for applications which demand exceptional strength and corrosion resistance.
	Z100/6A	salt / seawater application, sulfuric acid, phosphoric acid, formic acid, acetic acid,	
Titanium	Grade 2		Titanium Grade 2 is used commonly in applications that require welding because of its strong weldability properties. Titanium Grade 2 is light weight and highly corrosion resistant.

* Data provided on page 51 & 52 is for general information only. Always consult current ASME or API official publications to verify information and cross reference data.

PFA Lined Ball Valve

Terofox PFA Lined Ball Valves are resistant against corrosion, temperature range from -20 to 180°C. Typical applications are in semiconductor, optoelectronics, pharmaceutical, food and beverage, petrochemical, refining, biochemical, cosmetics and high purity water industries.

Perfluoroalkoxy alkanes, as known as PFA, are fluoropolymers. PFA is commonly used as corrosion-resistant lining of valves or pipes in the chemical-processing industry. Highly corrosive non-acidifying acids, such as chloride, sulfuric acid, wet halogen gases, phosphoric acid, acetic acid, and fluoric acid, therefore PFA Lined Ball Valve play a significant role in the chemical industries.

TF-22DP

2-pc Design Full Bore PFA Lined Flange Ball Valve.

- Blow-out-proof stem.
- ISO 5211 direct-mounted pad.
- Valve design in compliance with ASME B16.34.
- Size : 1/2" ~ 4" (DN15 ~ DN100).
- Pressure Rating : ANSI Class 150, DIN PN16.
- End Connection : RF Flange end.
- Face-to-Face in compliance with ASME B16.10 / EN 558.

MWF-311DP

3 Way Reduce Bore PFA Lined Flange Ball Valve.

- One-piece stem-ball design.
- Blow-out-proof stem.
- ISO 5211 direct-mounted pad.
- Valve design in compliance with ASME B16.34.
- Size : 1" ~ 4" (DN25 ~ DN100).
- Pressure Rating : ANSI Class 150, DIN PN16.
- End Connection : RF Flange end.
- Face-to-Face in compliance with ASME B16.10 / EN 558.

One-piece stem-ball

One-piece stem-ball design assure no possibility of damaging PFA-lining on ball by the stem.

OEM

Terofox can not only offer regular valves, but also OEM products. Do not hesitate to consult with us for the products you need. Terofox sales team and engineer team will provide the most professional service and opinions.

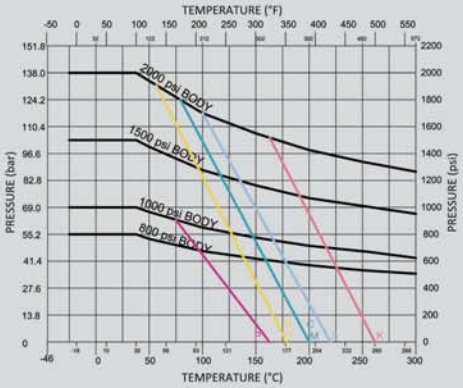
TECHNICAL REFERENCE

Seat Material Selection

Seat Material		Feature	Color	Temperature	
				Min.	Max.
PTFE	Polytetrafluoroethylene	PTFE is the most well-known seat material in the world. As its good elastic features, it's the common material to be used for valve seat.	White	-20°C	160°C
				-4°F	320°F
RTFE	15% GF + PTFE	With high temperature range than PTFE, offering good chemical resistance.	Chalky white	-20°C	180°C
				-4°F	356°F
MG1241	20% GF + 5% Graphite + PTFE	Tougher material for high cycle and reduced creep in moderate temperatures. Commonly used for low pressure steam service.	Black	-20°C	200°C
				-4°F	392°F
MG1431	15% GF + 5% MOS2	15% glass fiber and 5% MoS2 filled. High wear resistance, good electrical properties, low friction, and high creep resistance. Mainly application is for Mechanical and electrical service.	Grey	-20°C	180°C
				-4°F	356°F
TFM1600	PTFE+PFA	Features reduced cold flow, lower porosity and permeability, and lower void content. Offers the advantage of smoother surfaces, reduce deformation under load, and improved design flexibility.	White	-40°C	180°C
				-40°F	356°F
25% Carbon	25% Carbon + PTFE	This material exhibits a unique combination of heat resistance and low friction together with outstanding chemical and good electrical properties.	Grey	-20°C	200°C
				-4°F	392°F
50% SS	50% SS + PTFE	50%316 powder combined with 50% PTFE, Offering the abrasion resistance of metal with higher pressure and temperature ratings than RTFE.	Grey	-20°C	220°C
				-4°F	428°F
PEEK	Poly Ether Ketone	Excellent choice for high pressure and high temperature service. Which provides excellent abrasion and corrosion resistance, was one of the widely usage materials.	Tan	-20°C	260°C
				-4°F	500°F
Delrin	Polyoxymethylene (POM)	Delrin possesses high tensile strength, creep resistance and toughness. It also exhibits low moisture absorption. It is chemically resistant to hydrocarbons, solvents and neutral chemicals.	Translucent White	-20°C	80°C
				-4°F	176°F
Nylon		Nylon seats are offered for higher pressure but lower temperature service.	Translucent White	-20°C	100°C
				-4°F	212°F
PCTFE	Polychlorotrifluoroethylene	PCTFE offer the unique combination of physical and mechanical properties, non-flammability, chemical resistance, near zero moisture absorption, and excellent electrical properties. Extremely low out gassing making it well suited for use in aerospace and flight applications.	Translucent White	-200°C	150°C
				-328°F	302°F
Graphite		Good in high working pressure / temperature condition, most of them used for stem packing or sealing.	Black	-100°C	600°C
				-148°F	1112°F

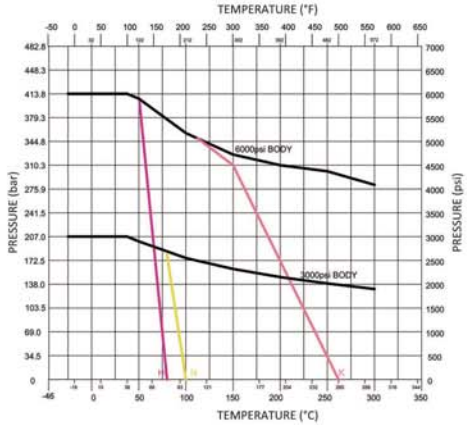
Pressure-Temperature Chart

• 800 / 1000 / 1500 / 2000 PSI
(PN40 / PN63 / PN100/140)



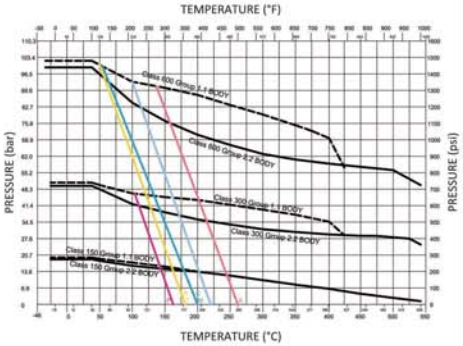
PTFE
RTFE / TFM 1600
MG1241 / TFM 4215
50% SS
PEEK

• 3000 / 6000 PSI
(PN210 / PN420)



DERLIN
NYLON
PEEK

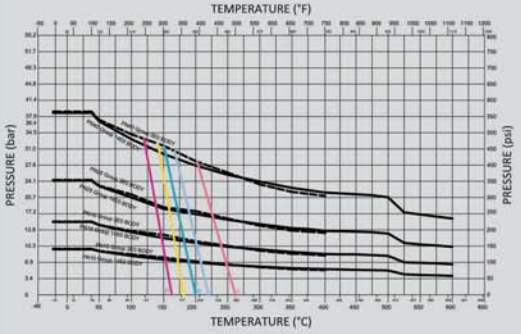
• ANSI CLASS 150 / 300 / 600



PTFE
RTFE / TFM 1600
MG1241 / TFM 4215
50% SS
PEEK

Group 1.1 (WCB)
Group 2.2 (CF8M)

• DIN PN16 /40



PTFE
RTFE / TFM 1600
MG1241 / TFM 4215
50% SS
PEEK

Group 3E0(1.0619)
Group 14E0 (1.4408)

Face to Face

Size		ANSI B16.10 Raised Face										EN 558 Raised Face				JIS B2002 10K
		Class 150 Short pattern		Class 150 Long pattern		Class 300 Short pattern		Class 300 Long pattern		Class 600 Long pattern		DIN 3202-1 Series F1	DIN 3202-1 Series F2	DIN 3202-1 Series F4	DIN 3202-1 Series F5	
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	mm	mm	mm	mm
15	1/2"	108	4.25	108	4.25	140	5.50	140	5.50	165	6.50	130	210	115	-	108
20	3/4"	117	4.62	117	4.62	152	6.00	152	6.00	190	7.50	150	230	120	-	117
25	1"	127	5.00	127	5.00	165	6.50	165	6.50	216	8.50	160	230	125	120	127
32	1-1/4"	140	5.50	140	5.50	178	7.00	178	7.00	229	9.00	180	260	130	140	140
40	1-1/2"	165	6.50	165	6.50	190	7.50	190	7.50	241	9.50	200	260	140	240	165
50	2"	178	7.00	178	7.00	216	8.50	216	8.50	292	11.50	230	300	150	250	178
65	2-1/2"	190	7.50	190	7.50	241	9.50	241	9.50	330	13.00	290	340	170	270	190
80	3"	203	8.00	203	8.00	282	11.12	282	11.12	356	14.00	310	380	180	280	203
100	4"	229	9.00	229	9.00	305	12.00	305	12.00	432	17.00	350	430	190	300	229
150	6"	267	10.50	394	15.50	403	15.88	403	15.88	559	22.00	480	550	210	350	267
200	8"	292	11.50	457	18.00	419	16.50	502	19.75	660	26.00	600	650	230	400	292
250	10"	330	13.00	533	21.00	457	18.00	568	22.38	787	31.00	730	775	250	450	330
300	12"	356	14.00	610	24.00	502	19.75	648	25.50	838	33.00	850	900	270	500	356
350	14"	381	15.00	686	27.00	572	22.50	762	30.00	889	35.00	980	1025	290	550	381
400	16"	406	16.00	762	30.00	610	24.00	838	33.00	991	39.00	1100	1150	310	600	406
450	18"	-	-	864	34.00	660	26.00	914	36.00	1092	43.00	1200	1275	330	650	432
500	20"	-	-	914	36.00	711	28.00	991	39.00	1194	47.00	1250	1400	350	700	457
550	22"	-	-	-	-	-	-	1092	43.00	1295	51.00	-	-	-	-	-
600	24"	-	-	1067	42.00	813	32.00	1143	45.00	1397	55.00	1450	1600	390	800	508

• Data in the table according to ASME B16.10:2017 / EN558:2017 / JIS B2002:1987.

Floating Ball Valve Inspection

Visual / Dimension / Torque / Material Checking

• Norm : Design standard & approval drawing.







Hydraulic Shell Test

• Norm : ASME B16.34:2017 / API598:2016 / EN 12266-1:2012.

• Test Pressure : CWP X 1.5. • Test Fluid : Water.

WCB CF8 CF8M	Rating	Class 150	Class 300	Class 400	Class 600	Class 900
	Testing Pressure	450 psi (32 bar)	1125 psi (78 bar)	1500 psi (104 bar)	2225 psi (154 bar)	3350 psi (232 bar)
1.0619 1.4308 1.4408	Rating	PN 16	PN 40	PN 63	PN 100	PN 140
	Testing Pressure	25 bar	60 bar	95 bar	150 bar	210 bar




Low-Pressure Closure-Seat Test Standard

• Norm : ASME B16.34:2017 / API598:2016 / EN 12266-1:2012.

• Test Pressure : 80 psi (6 bar). • Test Fluid : Compressor air.



High-Pressure Closure-Seat Test Standard (option)

• Norm : ASME B16.34:2017 / API598:2016 / EN 12266-1:2012.

• Test Pressure : CWP X 1.1. • Test Fluid : Water.

WCB CF8 CF8M	Rating	Class 150	Class 300	Class 400	Class 600	Class 900
	Testing Pressure	325 psi (23 bar)	825 psi (57 bar)	1100 psi (76 bar)	1650 psi (114 bar)	2450 psi (169 bar)
1.0619 1.4308 1.4408	Rating	PN 16	PN 40	PN 63	PN 100	PN 140
	Testing Pressure	18 bar	44 bar	70 bar	110 bar	154 bar

Test Duration

• Norm : ASME B16.34:2016 / API598:2016 / EN 12266-1:2012.

Valve size		Shell test duration	Seat test duration
inch	mm		
1/4" ~ 2"	8 ~ 50	15 second	15 second
2-1/2" ~ 6"	65 ~ 150	60 second	60 second
8"	200	120 second	120 second