TRAINING ON
FLOATING BALL VALVE

econosto®

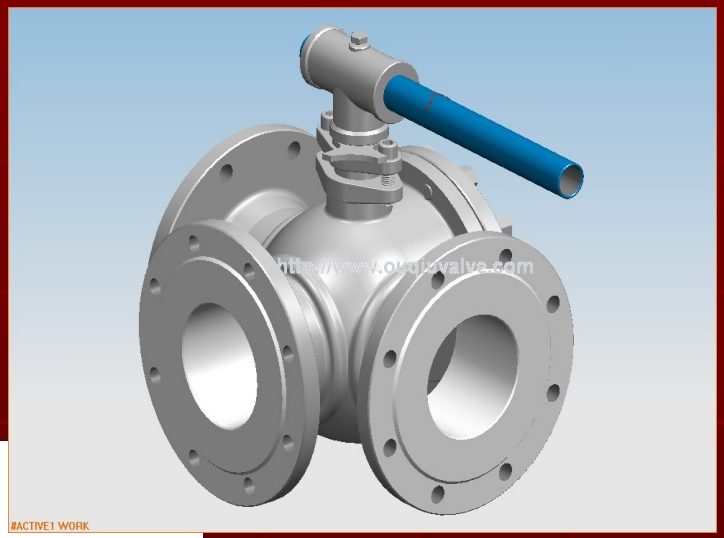
PRESENTED BY

MANJUNATH H SANGATI

QA/QC SOURCING ENGINEER

FLOATING BALL VALVE

MANJUNATH SANGATI
QA/QC ENGINEER



Index

- Introduction
- Features
- Applications
- Types of Ball Valves
- **Floating Ball Valve**

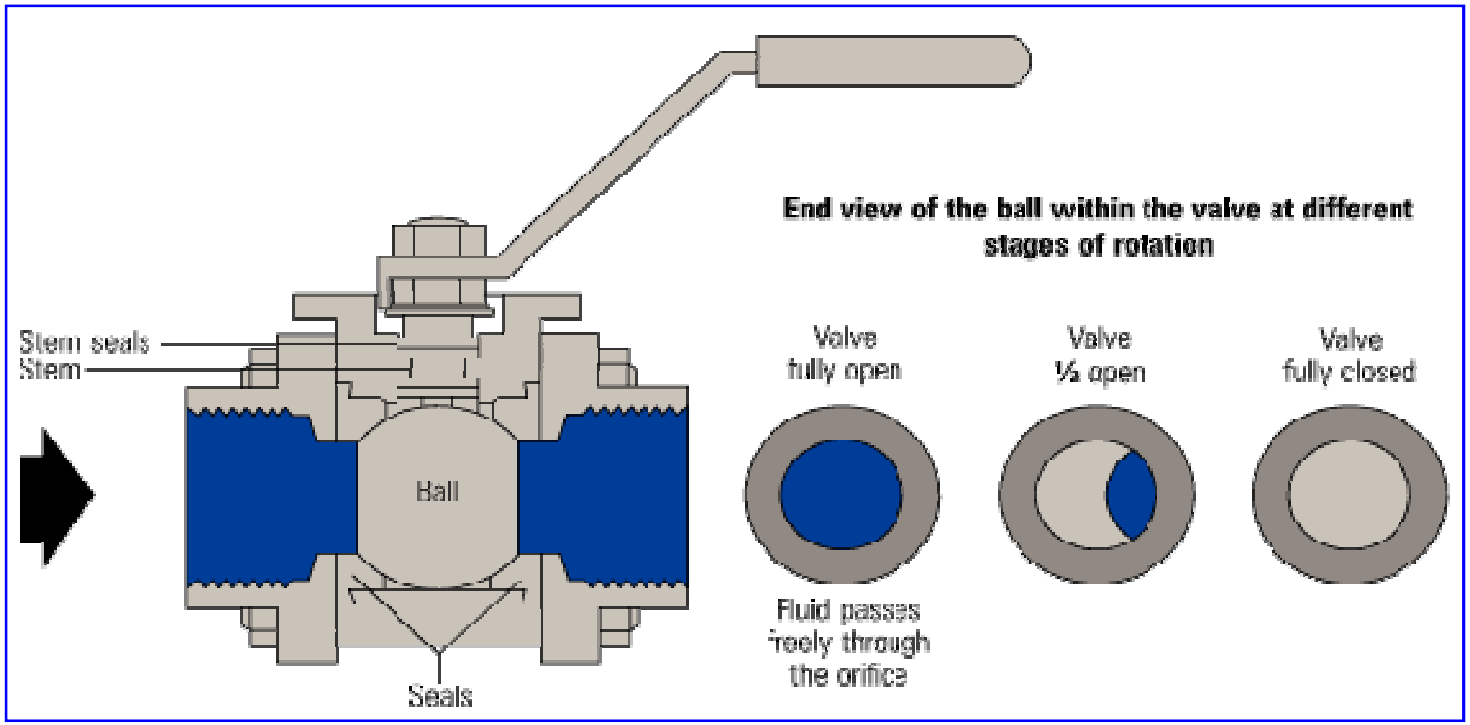
  Definition, Varieties of Floating Ball Valves,
  Design & Manufacturing Standards,
  Material Construction of Valve
  Surface Preparation on Trims & Internal Parts
  Features,
  Operations,
  Inspection & Hydro Testing,
  Installation & Maintenance

Introduction

Ball valves were developed during World War II and were initially intended for use in aircraft fuel systems, where weight and space are at a premium. They consist of a body which houses a rotating ball which has an orifice or bore machined directly through it. The ball is located in the body by two sealing rings.

Generally rotation of the ball through 90° opens and closes the valve and allows fluid to flow directly through the orifice. In the closed position, the blank sides of the ball block the inlet and the outlet preventing any flow. There are two basic designs of ball valves - the floating ball design, which relies on the valve seats to support the ball, and the trunnion mounted ball, which uses a trunnion to support the ball. Trunnion mounting is used on larger valves, as it can reduce the operating torque to about two-thirds of that provided by a floating ball.

Conventionally, the handle that is attached to the ball is in-line with the axis of the pipe when the valve is open; conversely, if it is at right angles to the pipe axis, this indicates that the valve is closed.



There are four general types of ball valves: full port, standard port, reduced port, and v port.

A ***full port* ball valve** has an over sized ball so that the hole in the ball is the same size as the pipeline resulting in lower friction loss. Flow is unrestricted, but the valve is larger.

A ***standard port* ball valve** is usually less expensive, but has a smaller ball and a correspondingly smaller port. Flow through this valve is one pipe size smaller than the valve's pipe size resulting in slightly restricted flow.

In ***reduced port* ball valves**, flow through the valve is one pipe size smaller than the valve's pipe size resulting in restricted flow.

A ***v port* ball valve has either a 'v' shaped ball or a 'v' shaped seat**. This allows the orifice to be opened and closed in a more controlled manner with a closer to linear flow characteristic. When the valve is in the closed position and opening is commenced the small end of the 'v' is opened first allowing stable flow control during this stage. This type of design requires a generally more robust construction due to higher velocities of the fluids, which would quickly damage a standard valve.

FEATURES OF BALL VALVE

- PTFE soft seating provides bubble tight shutoff and are field replaceable.
- Suitable for high pressure, Moderate Temperature and Service.
- Quick open, Quarter Turn operation, Low Torque, easy for operation.
- Fire safe and Antistatic features.
- Reduced Port for Economy and Full Port for Low Pressure drop.
- Special Design for Low Temperature applications.

APPLICATIONS OF BALL VALVE

- REFINERIES.
- OIL & GAS PROCESSING
- ONSHORE AND OFF SHORE PLATFORMS.
- FERTILIZER.
- PETROCHEMICAL INDUSTRIES.
- CHEMICAL PROCESS INDUSTRIES.
- PHARMACEUTICAL.
- POWER PLANT.
- LPG BOTTLING PLANTS.

TYPE OF BALL VALVE

- Based on No. of Body Pieces
  a) SINGLE PIECE
  b) TWO PIECE
  c) THREE PIECE

- Based on Flow of Ways
  a) Two Way
  b) Three Way
  c) Four Way

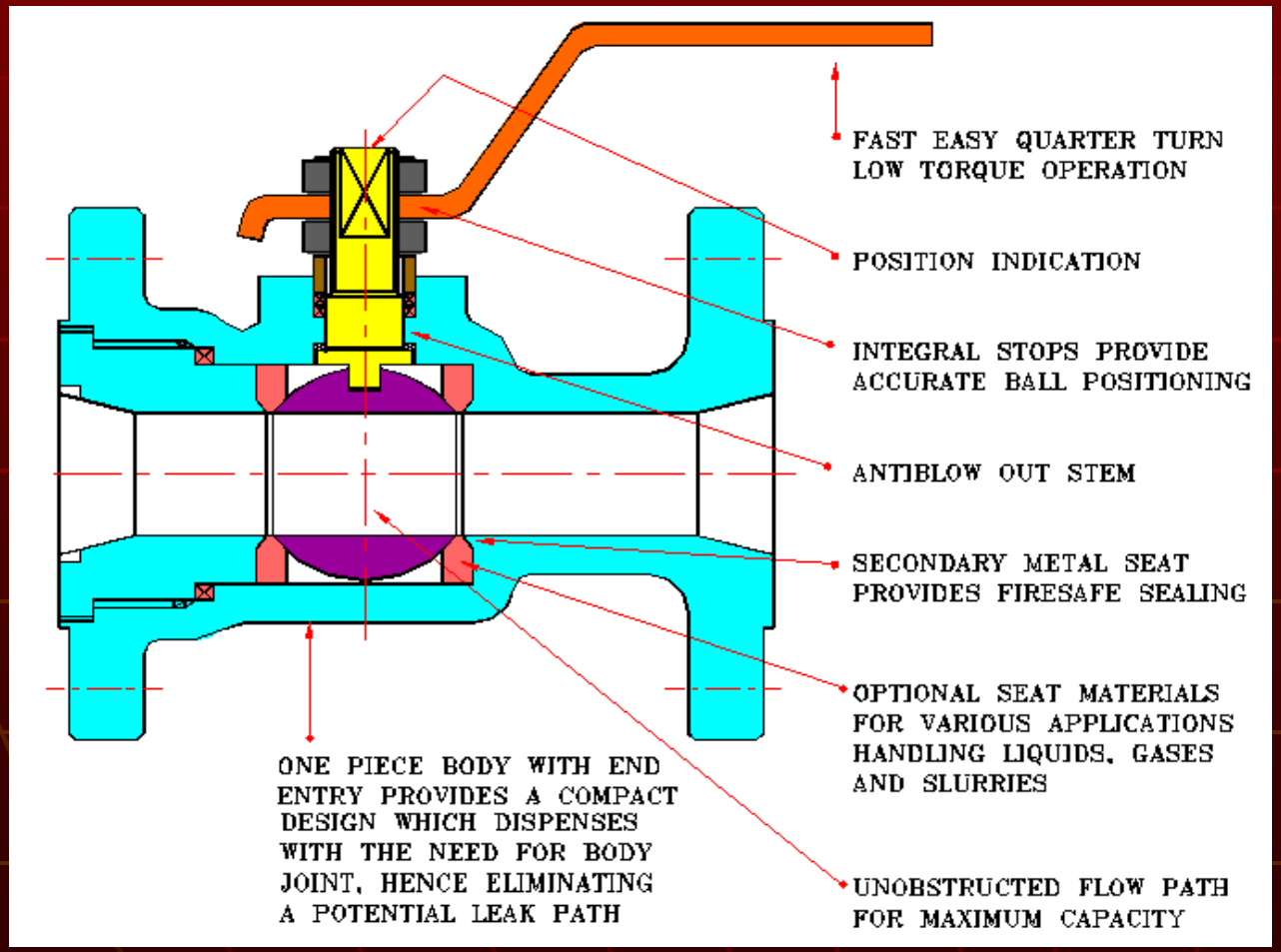
- Based on Ball Entry
  a) SIDE ENTRY
  b) TOP ENTRY

- Based on Ball Support
  a) Floating Type
  b) Trunnion Type

BASED ON NO. OF BODY PIECES

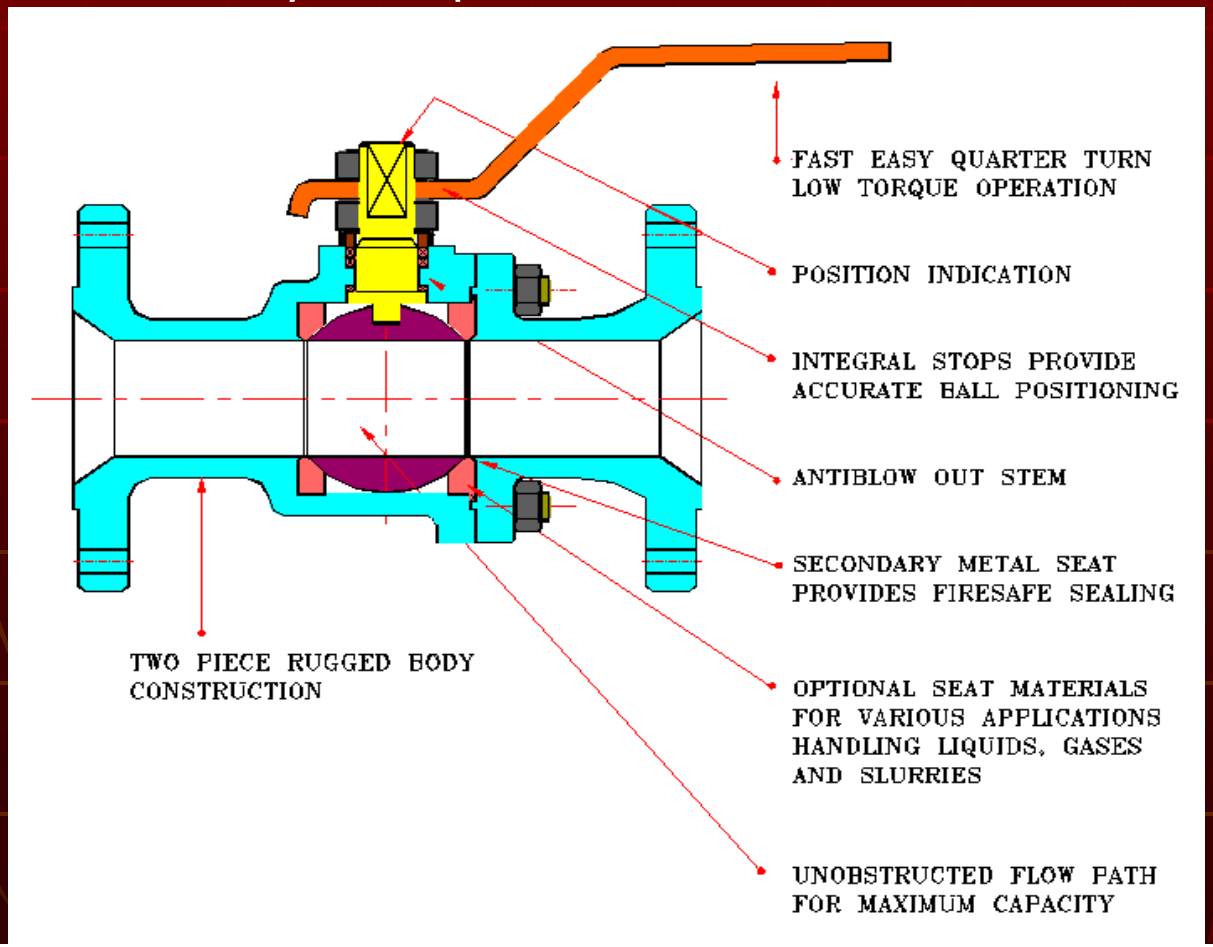
SINGLE PIECE BALL VALVE

Single piece valves - The ball is enclosed in the body by an insert fitted along the valve's axis. This eliminates the possibility of body joint leakage and any chance of disconnection whilst in service, but when maintenance is required, the whole valve has to be removed from the pipeline



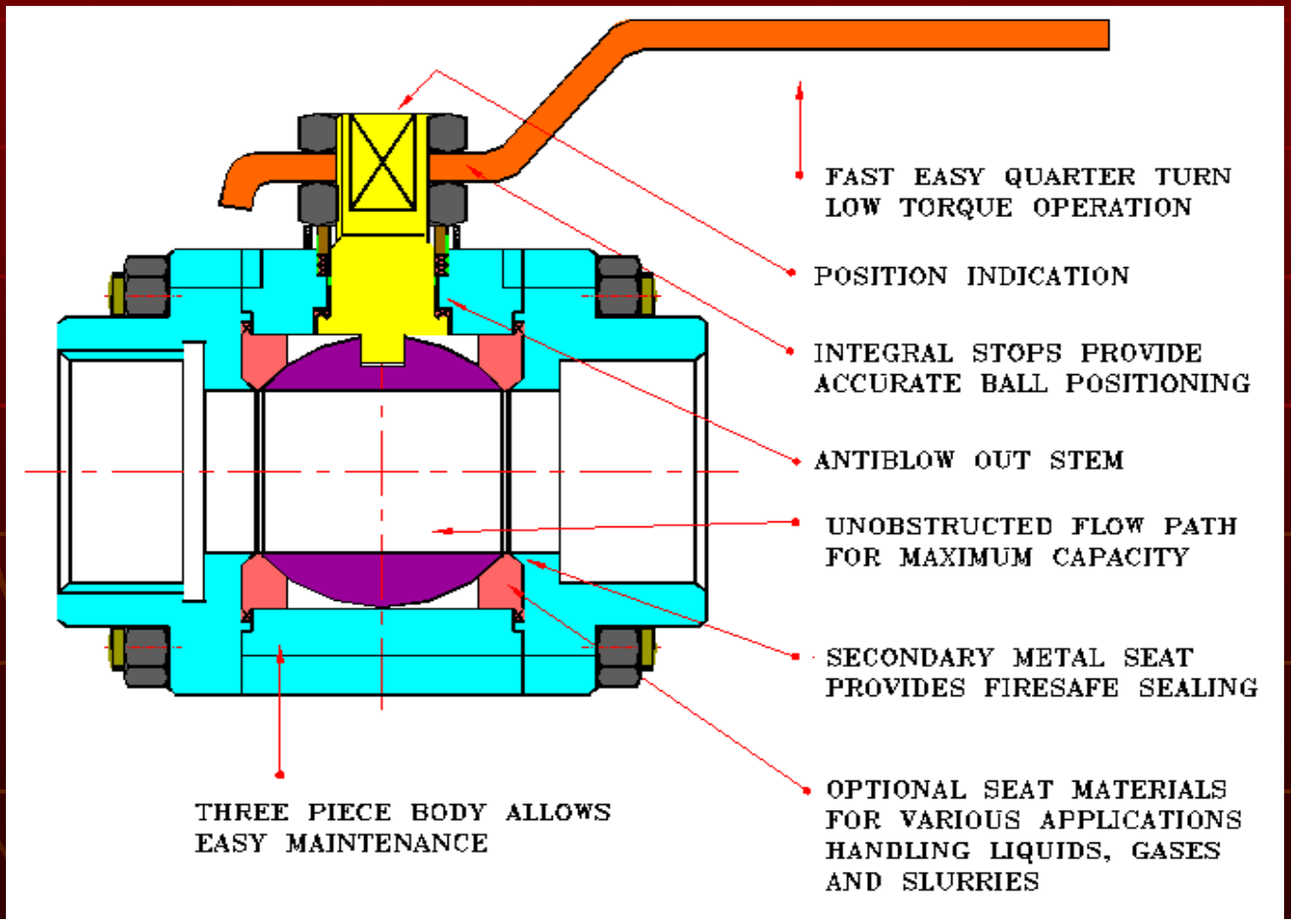
TWO PIECE BALL VALVE

Two piece valves - The body of the valve is split in one or two places in the same plane as the valve flange, and these pieces are bolted together. This has the advantage of simplified, in-line maintenance Two piece ball valves are generally slightly reduced (or standard) bore, they can be either throw-away or repairable

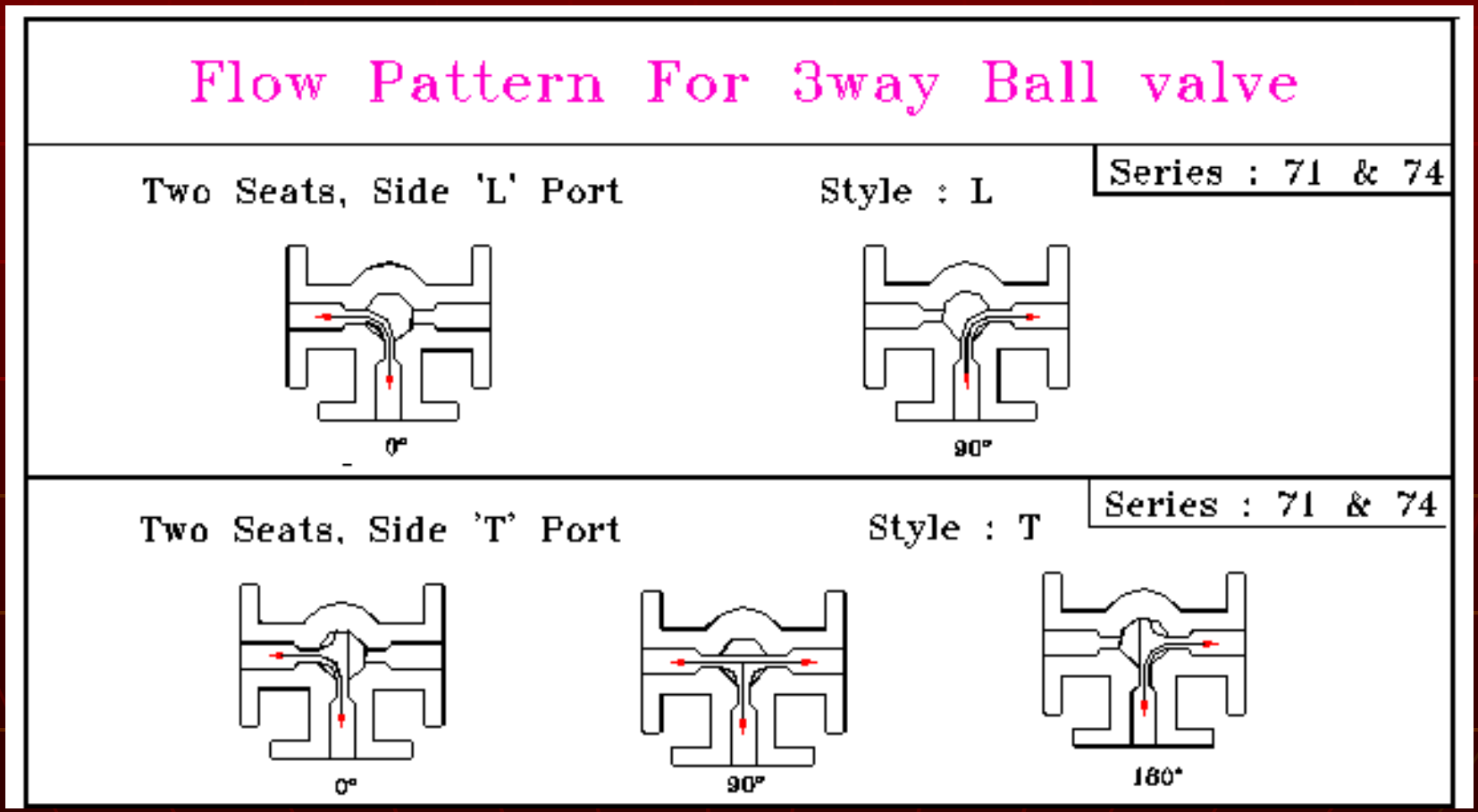


THREE PIECE BALL VALVE

The 3 piece design allows for the center part of the valve containing the ball, stem & seats to be easily removed from the pipeline. This facilitates efficient cleaning of deposited sediments, replacement of seats and gland packings, polishing out of small scratches on the ball, all this without removing the pipes from the valve body. The design concept of a three piece valve is for it to be repairable.



Based on Flow of Ways



2 , 3 & 4 WAY BALL VALVES

Straight through, two way, or three way ball valves

Schematic 3 way ball valve - L-shaped ball right, T-shaped left

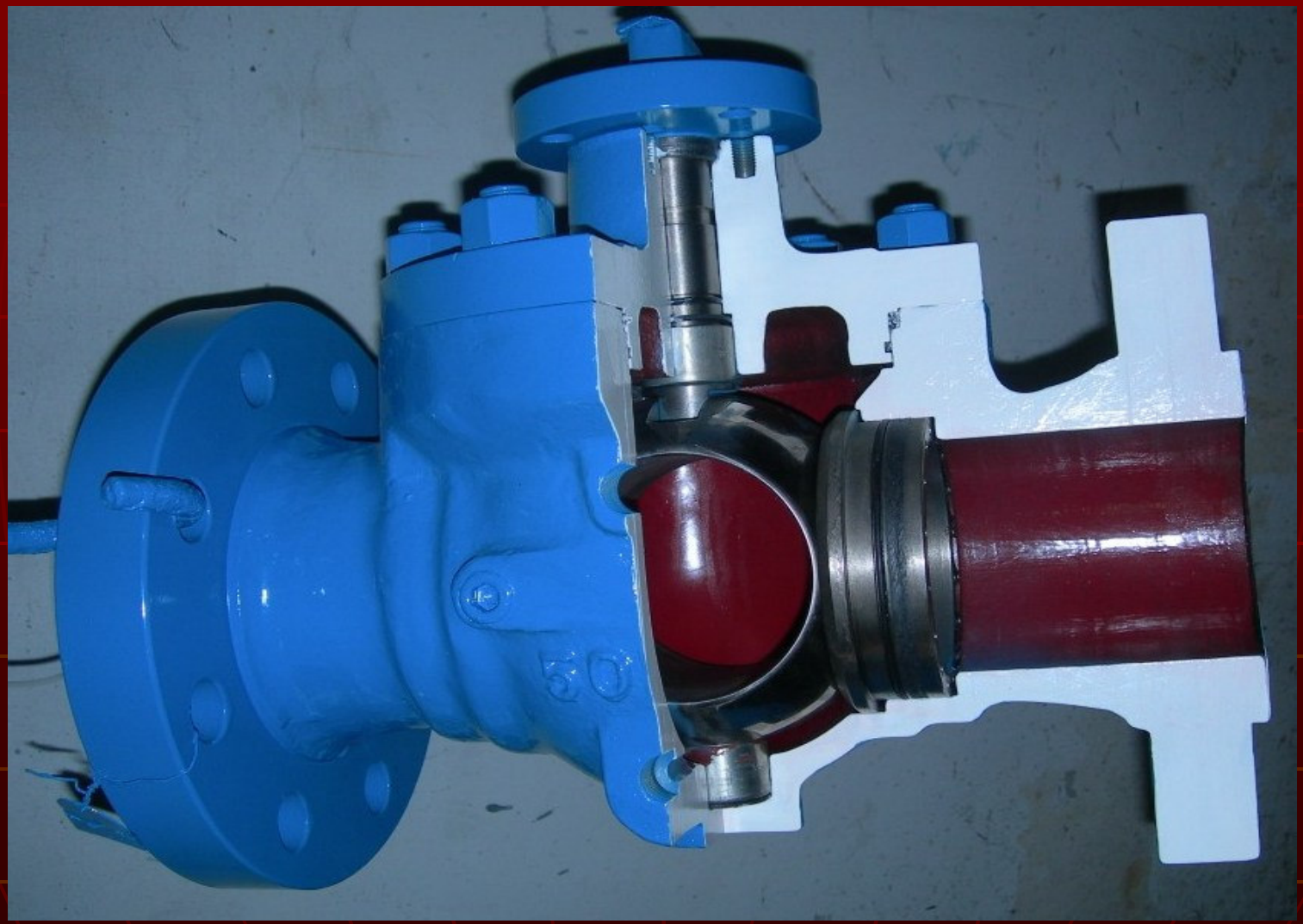
Three-way ball valves have an L- or T-shaped hole through the middle. The different combinations of flow are shown in the picture.

Multi-port ball valves with 4 ways, or more, are also commercially available, the inlet way often being orthogonal to the plane of the outlets. For special applications, such as driving air-powered motors from forward to reverse, the operation is performed by rotating a single lever 4-way ball valve. The 4-way valve has two L-shaped ports in the ball that do not interconnect, sometimes referred to as an "×" port.

Based on Ball Entry

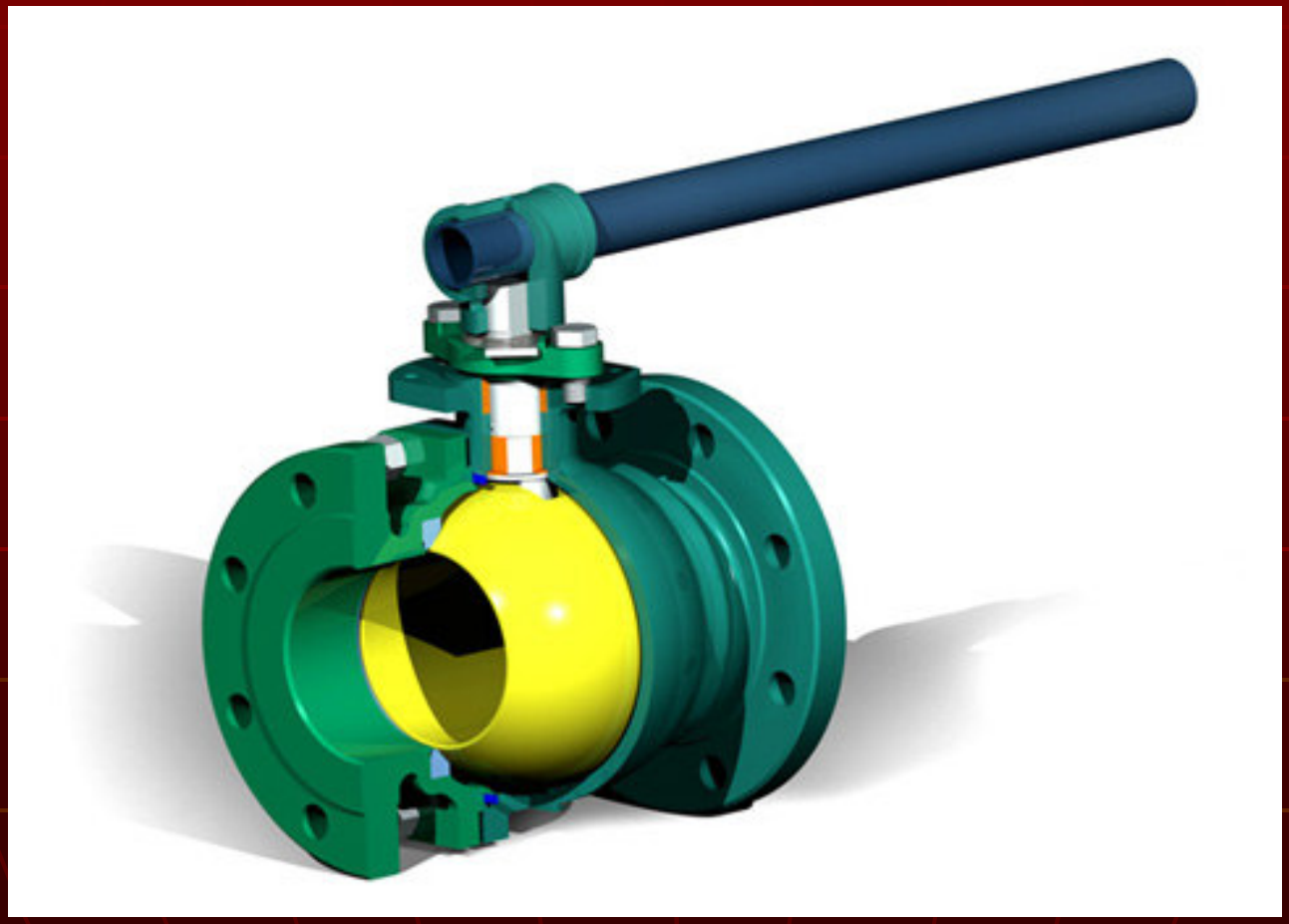
Side Entry Ball Valves

Top Entry Ball Valves

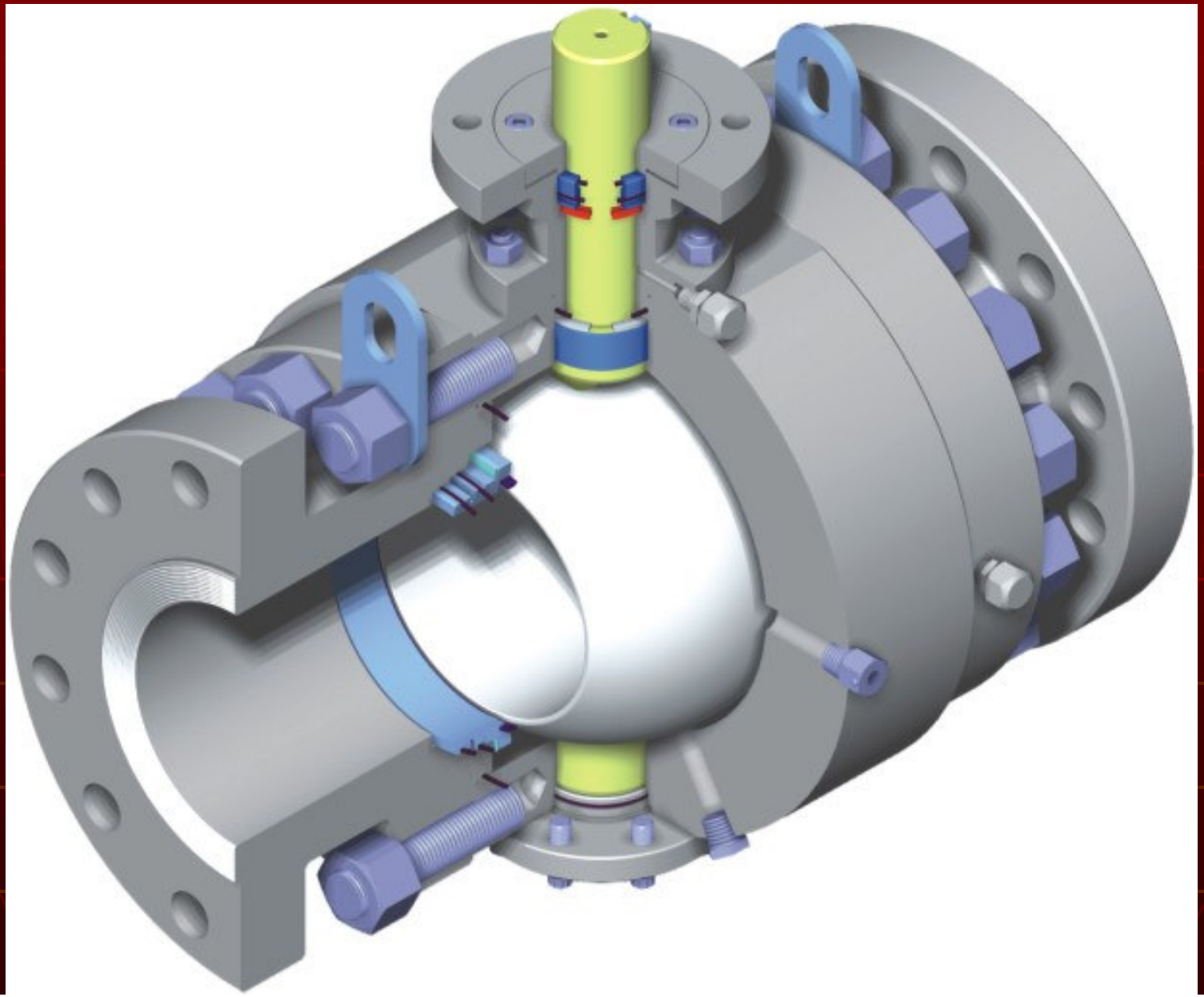


Based on Ball Support

FLOATING TYPE BALL



TRUNNION TYPE BALL

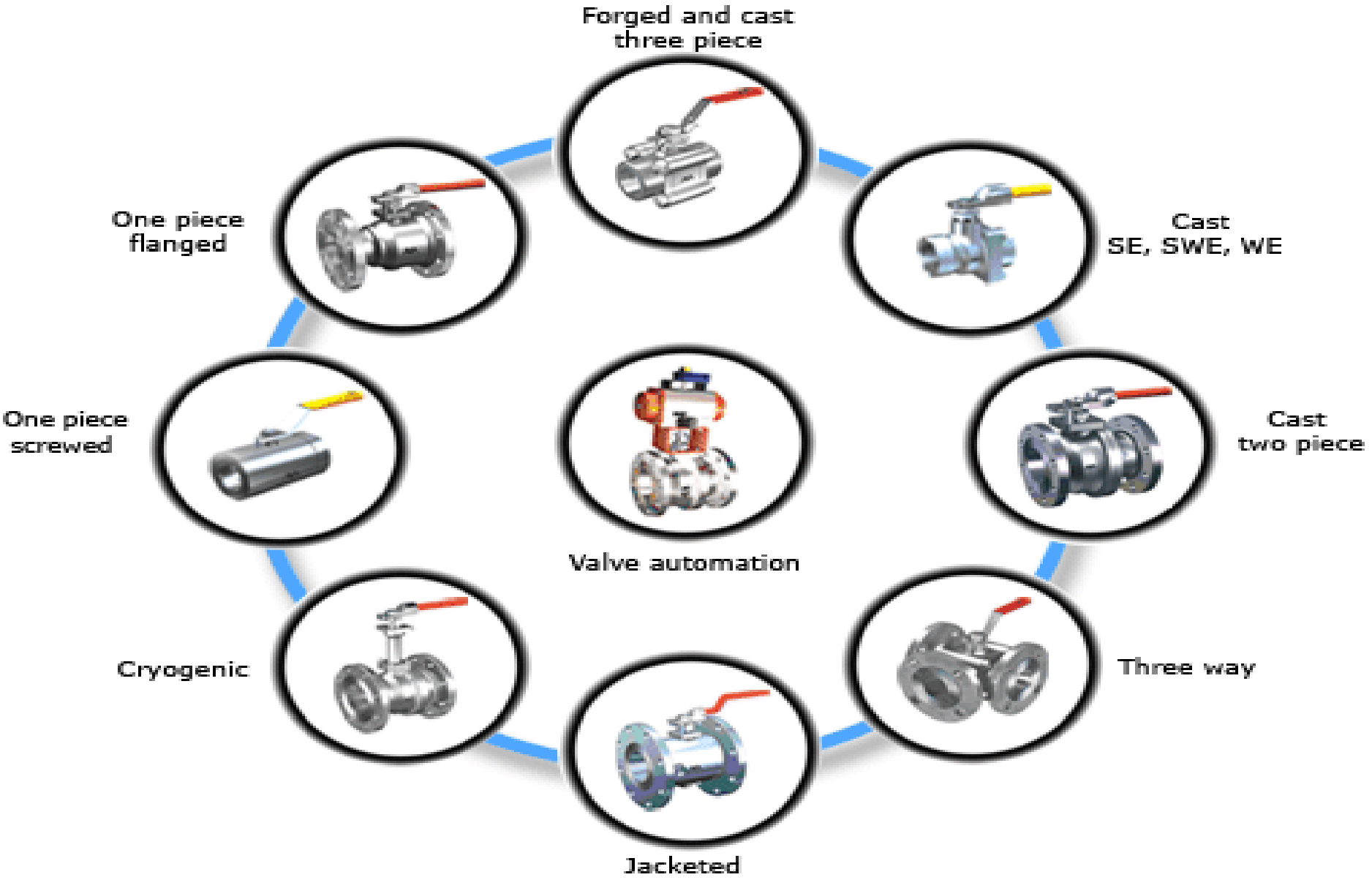


Floating Ball Valve

Definition:

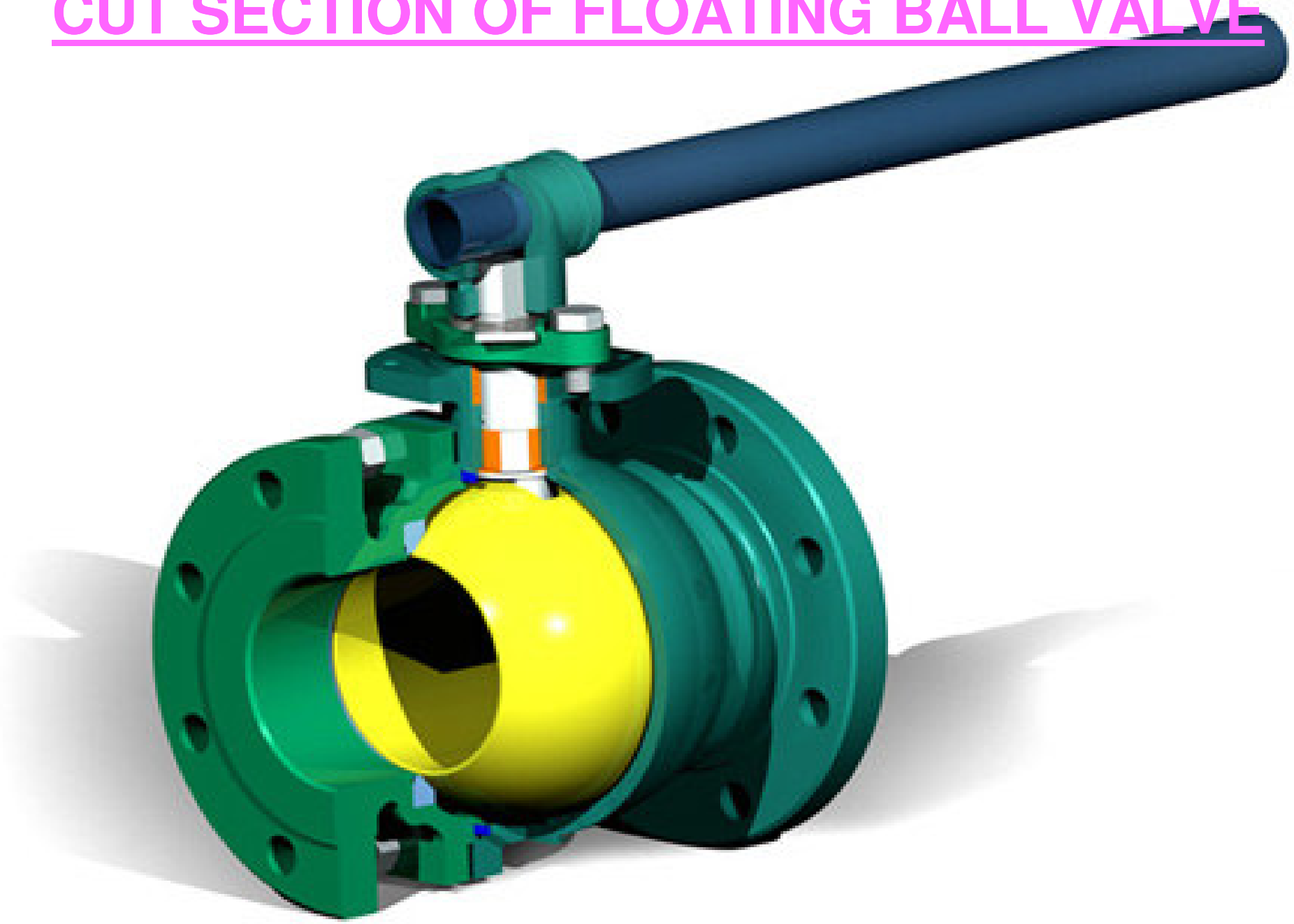
A **ball valve** (like the butterfly valve and plug valve are one of the family of valves called *quarter turn valves*) is a valve that opens by turning a handle attached to a ball inside the valve. The ball has a hole, or port, through the middle so that when the port is in line with both ends of the valve, flow will occur. When the valve is closed, the hole is perpendicular to the ends of the valve, and flow is blocked. The handle or lever will be inline with the port position letting you "see" the valve's position.

VARITIES OF FLOATING BALL VALVES



SE : Screwed ends SWE : Socket weld ends WE : Welding ends

CUT SECTION OF FLOATING BALL VALVE



Design & Manufacturing Standards

Standards of Compliance	
Design & Manufacturing Standard	API 6D/ BS 5351/ BS EN 17292 / ASME B 16.34/API 607/API 6FA/BS 6364
End To End (Face to Face)	ASME B 16.10/API 6D/BS 2080/ EN 558
Flanged End dimensions Butt Welded Screwed/Socket Weld end Valves.	ASME B16.5 & B 16.47 (26' & above) BS 4504 - 1 ASME 16.25 ASME 16.11
Drain / Vent / Bypass	API 6D / MSS-SP 45
Top Mounting (Actuator Mounting)	ISO 5211
Quality System	ISO 9001-2000 / API Q1/PED

API = American Petroleum Institute, BS = British Standard ASME = American Society of Mechanical Engineers

MSS = Manufacturers Standardization Society

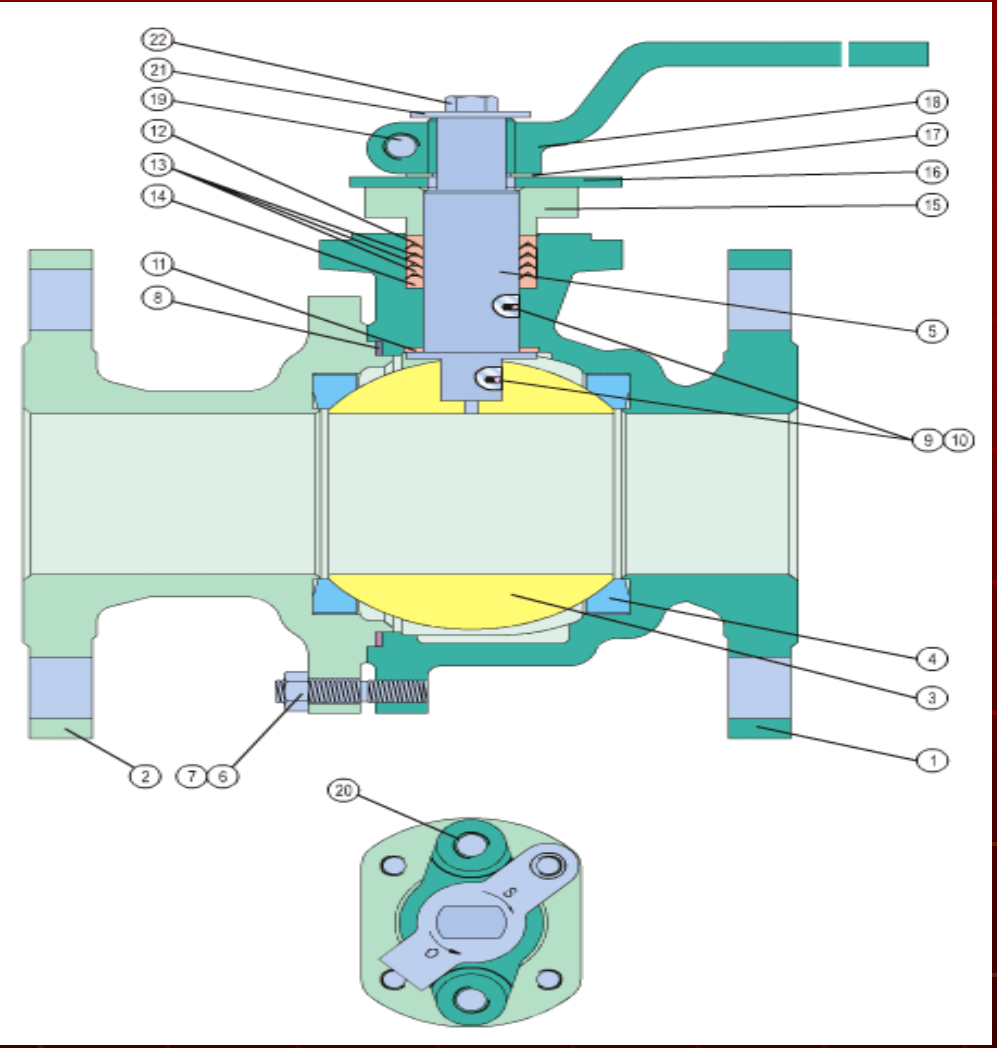
NACE = National Association of Corrosion Engineers

DETAILS OF STANDARDS

SL NO	NAME OF STANDRADS	SCOPE OF STANDARDS	SIZE & RATING	SUPPORTING STANDARDS
1	**ANSI/API 6D 23RD ED APR 08** **Specification for Pipeline Valves**	**Standard specifies requirements and provides recommendations for the design, manufacturing, testing and documentation of ball valves**	1/2″ to 60″ PN 20 TO 420 150# to 2500#	REF API 6D – NORMATIVE REF STD LIST
2	**BS 5351:1986** **Steel ball valves for the petroleum, petrochemical and allied industries**	**This British Standard specifies the valve seat and body pressure / temperature ratings, and the design, including materials, dimensions, operation, performance, testing and marking, of straightway steel ball valves having specified wall thickness, an antistatic feature and fire tested design.**	**1/4" to 16" PN 10, 16, 25, 40 150, 300, 600, 800#**	BS5351-2000 REFERRED STD LIST.
3	**BS EN ISO 17292: 2004** **Metal Ball Valves for Petroleum, Petrochemical & allied Industries**	**This Standard specifies the requirements for a services of metal ball valves suitable for petroleum, petrochemical, natural gas plants and related industrial applications.**	**1/4" to 20" PN 16, 25, 40 150, 300, 600 & 800#**	BS EN ISO 17292 2004 – PREFERRED LIST
4	**API 6FA – 3RD ED, APR 1999** **Specification for Fire Test for Valves**	**It is the purpose of this document to establish, the requirements for testing and evaluating the pressure-containing performance of API 6A and 6D valves when exposed to fire. The document establishes acceptable levels for leakage through the test valve and also external leakage after exposure to a fire for a 30 minutes time period.**	2″ TO 16″ PN 20 TO 420 CL 150# TO 2500#	1) Through Leakage (High Test Pressure) During Burn Period Burn – 30Min Leakage Rt: 400ml/in/min 2) External Leakage -cool down cool down 100ºC Leakage Rt: 100ml/in/min
5	**ANSI/API 607 5th ED 2005 (ISO 10497 - 5- 2004)** **Fire Test for Soft Seated Valves**	This International Standard specifies fire type-testing requirements and a fire type-test method for confirming the pressure-containing capability of a valve under pressure during and after the fire test.	2" to 8" PN 10 TO 420 CL 150 to 2500#	Permitted Max Leakage Rates Refer STD API 607 Table 1
7	**BS 6755 Part – 1, 1986 & API 598** 8th ED 2004 **Testing of Valves**	**This Part of BS 6755 specifies production pressure testing requirements and describes in Appendix D tests of Valve under pressure, and tests revivifying the degree of tightness and pressure - retaining capability of the valve seats and or closure mechanism**	**BS 6755 PART-1 1/4" to 20" & above PN 10, 16, 25, 40 150, 300, 600 & 800# Time:15 to 180 sec and above**	**API 598 2" to 14" & above 150 TO 2500# FL ENDS 150 TO 4500# BW ENDS Time:15 to 120 sec and above**
8	**BS 6364 : 1984** **Valves for CRYOGENIC SERVICES**	**Standard specifies requirements and provides recommendations for the design, manufacturing, testing of valves for cryogenic service**	**1/2" to 20" PN 16, 25, 40 150, 300, 600 & 800#**	**Permitted Leakages Check - 200mm³/S x DN Others - 100mm³/S x DN**

BS 5351	API 6D	BS ISO 17292	API 6FA
1) GENERAL	1) SCOPE	1) SCOPE	1) SCOPE
A) SCOPE	2) CONFORMANCE		
B) VALVE PATTERNS	3) NORMATIVE REFERENCES	2) NORMATIVE REFF	2) DESCRIPTION OF FIRE TEST
C) NOMINAL SIZES	4) TERMS & DEFINITIONS		
D) PRESSURE DESIGNATIONS	5) SYMBOLS & ABBREVIATED TERMS	3) TERMS & DEFINITIONS	3) TEST PROCEDURE
E) PRESSURE / TEMP RATINGS	6) VALVE TYPES & CONFIGURATIONS		
F) DIMENSIONS	7) DESIGN	4) PRESSURE / TEMP RATINGS	4) PERFORMANCE REQ
	8) MATERIAL		
2) DESIGN & MATERIALS	9) WELDING	5) DESIGN	5) CERTIFICATION
A) DESIGN OF VALVE	10) QUALITY CONTROL		
B) OPERATIONS	11) PRESSURE TESTING	6) MATERIAL	6) SAFETY CONSIDERATIONS
C) MATERIAL	12) COATING		
	13) MARKING	7) MARKING	7) QUIPMENT MARKING
3) PERFORMANCE	14) PREPARATION FOR SHIPMENT		
A) PRESSURE TESTING	15) DOCUMENTATION		FIGURES
B) FIRE TESTING	ANEX A – REQ OF NDT	8) TEST & INSPECTION	TABLES
C) ANTI-STATIC TESTING	ANEX B – SUPP TEST REQ		
	ANEX C – SUPP DOC REQ	9) PREPARATION FOR DISPATCH	
4) MARKING	ANEX D – PURCHASING		
	ANEX B – MARKING EXMP'S		
5) PREPARATION FOR STORAGE & TRANSPORTATION	ANEX F – API MONOGRAM		

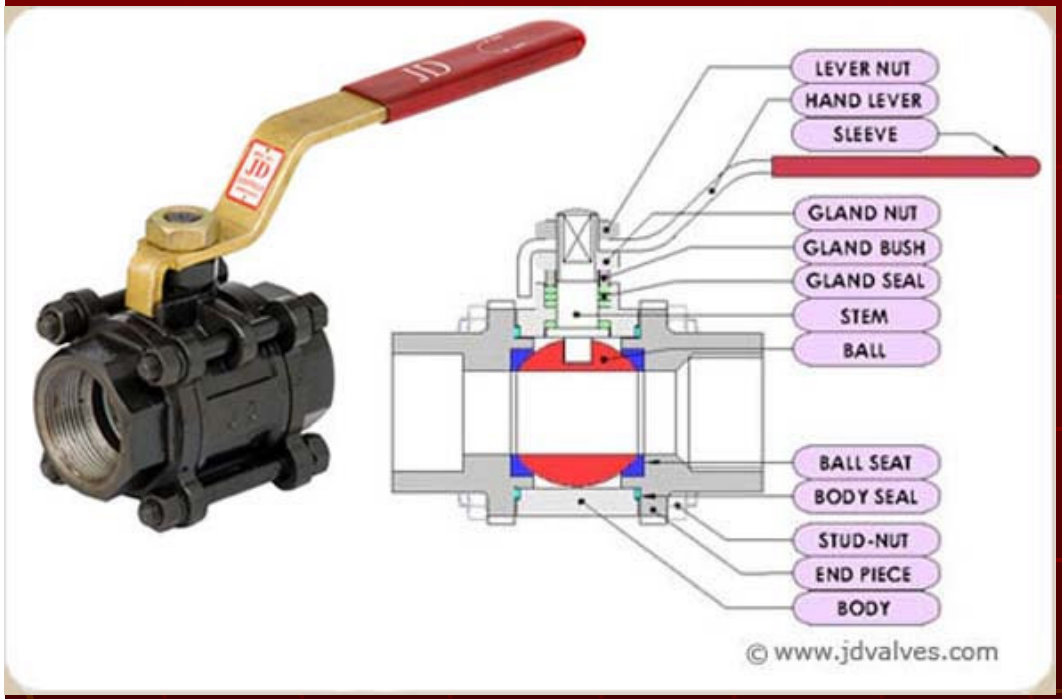
CONSTRUCTION OF CAST STEEL FLOATING BALL VALVE

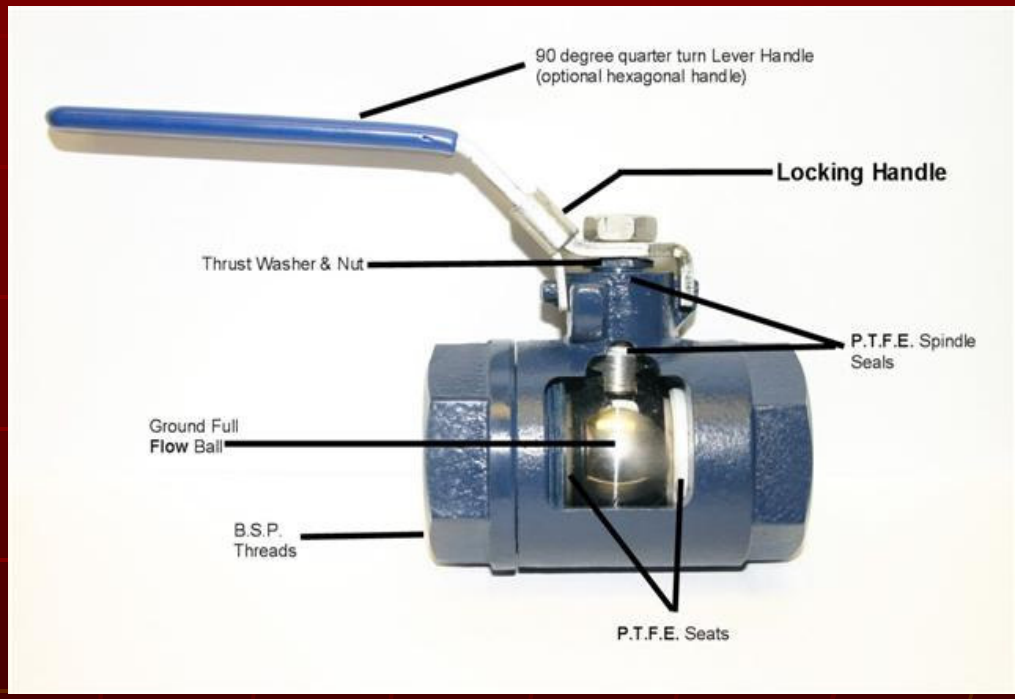


1	Body	WCB/ENP	CF8M/316
2	Adapter	ASTM A216-WCB	ASTM A351-CF8M
3	Ball	ASTM A216-WCB	ASTM A351-CF8M
4	Seat	ASTM A105/ENP	ASTM A182-F316
5	Stem	PTFE	PTFE
6	Body Stud	ASTM A182-F6a	ASTM A182-F316
7	Body Nut	ASTM A193-B7	ASTM A193-B8
8	Body Gasket *	ASTM A194-2H	ASTM A194-8
9	Antistatic Spring	304SS + Graphite	316SS + Graphite
10	Steel Ball	Stainless Steel	Stainless Steel
11	Thrust Washer	Stainless Steel	Stainless Steel
12	Top Packing *	PTFE	PTFE
13	Middle Packing *	PTFE / Graphite	PTFE / Graphite
14	Bottom Packing *	PTFE / Graphite	PTFE / Graphite
15	Gland Flange	PTFE / Graphite	PTFE / Graphite
16	Stop Plate	ASTM A216-WCB	ASTM A351-CF8M
17	Retainer	Carbon Steel	Stainless Steel
18	Lever	Carbon Steel	Stainless Steel
19	Screw	Carbon Steel	Carbon Steel
20	Screw	ASTM A193-B7	Stainless Steel
21	Washer	Carbon Steel	ASTM A193-B8
22	Bolt	Carbon Steel	Stainless Steel

MATERIAL: CAST CARBON, ALLOY, STAINLESS, DUPLEX STEELS & BRASS & BRONZE

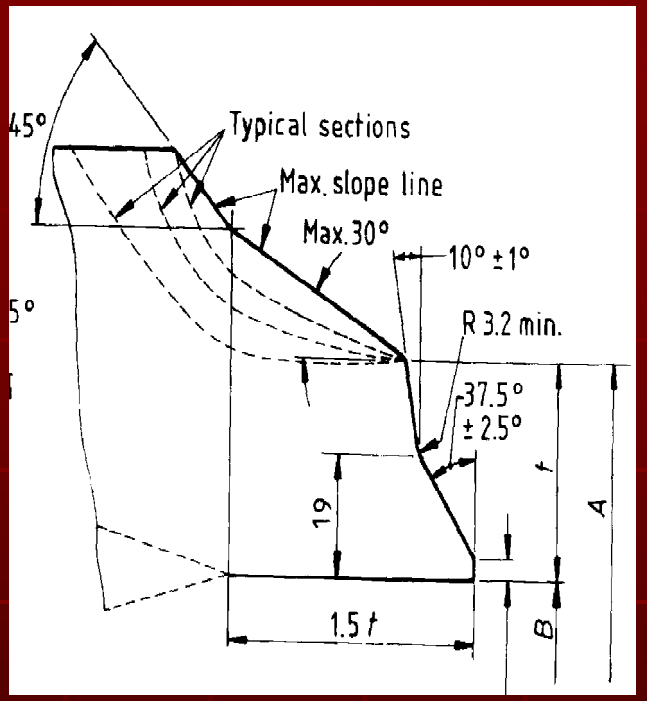
CONSTRUCTION OF FORGED STEEL FLOATING BALL VALVES





MATERIAL: FORGED CARBON, ALLOY, STAINLESS, DUPLEX STEELS & BRASS & BRONZE

END CONNECTIONS OF FLOATING BALL VALVE



End connections details:

1) Flange End Dim's: BS 4504-1 & ASME B 16.5
2) SW & Screwed Dimensions: ASME B1.20.1/ B.16.11
3) Butt Welded Dim's : ASME B 16.25 / BS 5351 Appendix B

VARIOUS SURFACE TREATMENTS ON TRIMS & INTERNAL PARTS

- STELLITING
- ENP COATING
- CLADDING
- OVERLAY
- TUNGSTEN CARBIDE COATING
- EPOXY COATING
- LININGS

VARIOUS SURFACE TREATMENTS ON TRIMS & INTERNAL PARTS

1 - STELLITING

- It is a process of welding deposition of Cobalt-chromium-tungsten-molybdenum alloys metal over meeting surfaces.
- Stellite alloy is a range of cobalt-chromium alloys designed for wear resistance a completely non magnetic and non-corrosive
- It is a Standard feature for high pr. Class #900 & above.
- STL 1,3,6 & 12 : Hard facing rod is available in three grades as 1,3,6 & 12 & will have different hardness.
- Applied on Stainless steel & nickel based alloys

PURPOSE

- Increase surface hardness & wear resistance properties
- Low co-efficient of friction
- Ability to take high polish
- Resistance to chemical action

2 - ENP

- ELECTROLESS NICKEL PLATING
- It is chemical process of deposition of nickel layer on metal surface without using any electric current.
- Object to be dipped in tank of Nickel based & phosphoric acid based chemicals for specified time.

PURPOSE

- Better surface finish which reduce torque & seat life.
- Chemical resistance.

3 - CLADDING

- Cladding can be described as the welding of two materials with different qualities.
- High-quality material can be clad on a cheaper base material in order to increase the erosion and corrosion resistance of a product.
- Cladding material can be Monel, Inconel, SS316 etc.,

PURPOSE

This is a good alternative for expensive duplex materials. Cladding (surfacing) is also applied to increase the mechanical qualities.

4 - OVERLAY

- Overlay is welding deposition of one metal over other.
- High-quality material can be deposited on a cheaper base material in order to increase the erosion and corrosion resistance of a product
- Overlay can be 13% Chrome, Monel, Inconel, SS316 etc.,

PURPOSE

This is a good alternative for expensive materials. Cladding (surfacing) is also applied to increase the mechanical qualities.

5 - TCC

- Tungsten Carbide Coating
- Coating of Tungsten Carbide alloys over base material by with welding/fusion process. (Process HVOF, welding)
- TCC is done on seating surfaces of valves where application is metal seat-high pressure-high pressure.

PURPOSE

Tungston Carbide is very high wear-temperature resistant material & it gives very high wear & tear resistance to surface even at higher temperature.

6 - EPOXY COATING

- It is powder coating of epoxy resins over surface to protect it from chemical reaction/corrosion.
- Epoxy spray coatings : Applied with spraying gun to required thickness.
- Fusion bonded epoxy coating: Applying epoxy powder over surface & fused/bonded my heating process.

PURPOSE

- Protecting of valve surfaces from chemical reaction/corrosion.
- Saving expensive base material using alternative economical material with lining.

7 - LININGS

- It is proces of lining the surface with rubber or plastic.
- Rubber lining
  a) Replaceable type, b) Vulcanising , c) Bonding
- PFA lining

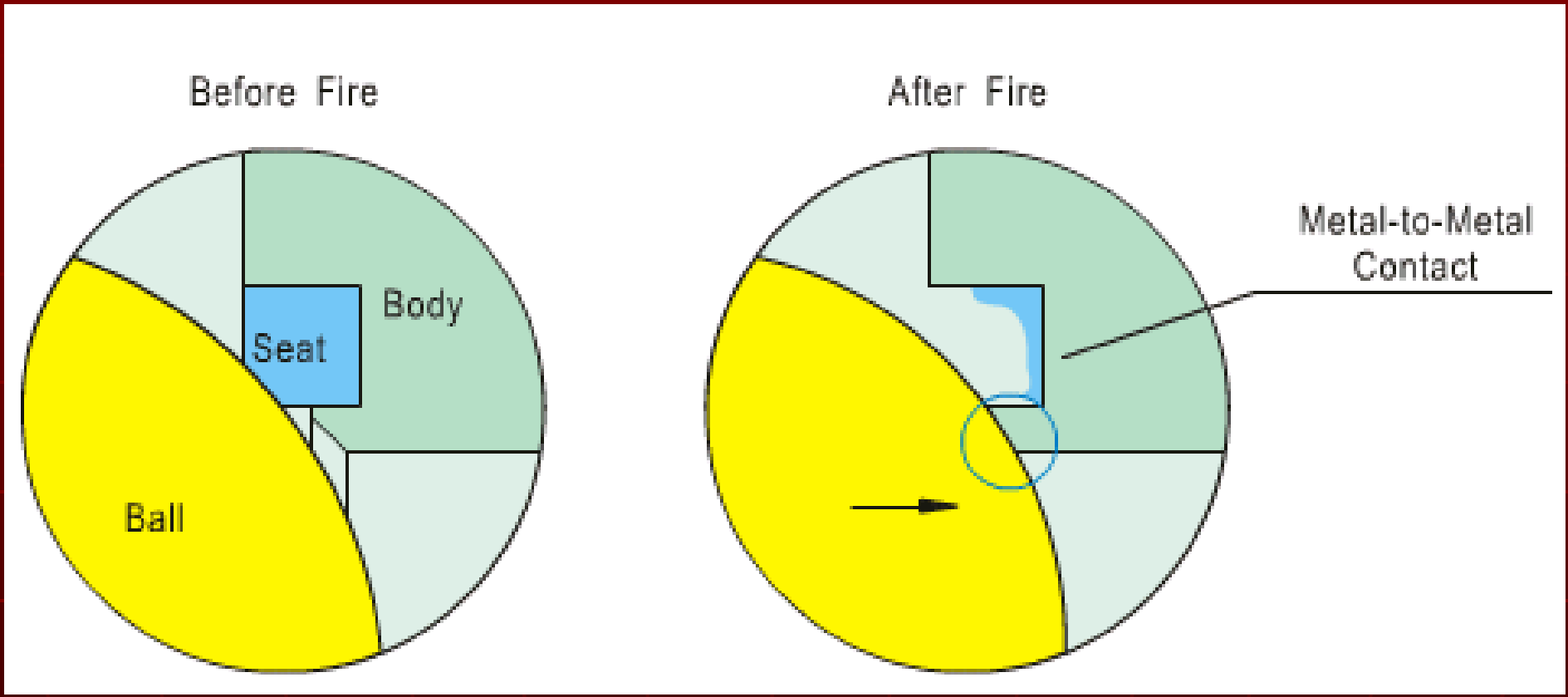
PURPOSE

- Protecting of valve surfaces from chemical reaction/corrosion
- Saving expensive base material using alternative economical material with lining.

FEATURES OF FLOATING BALL VALVE

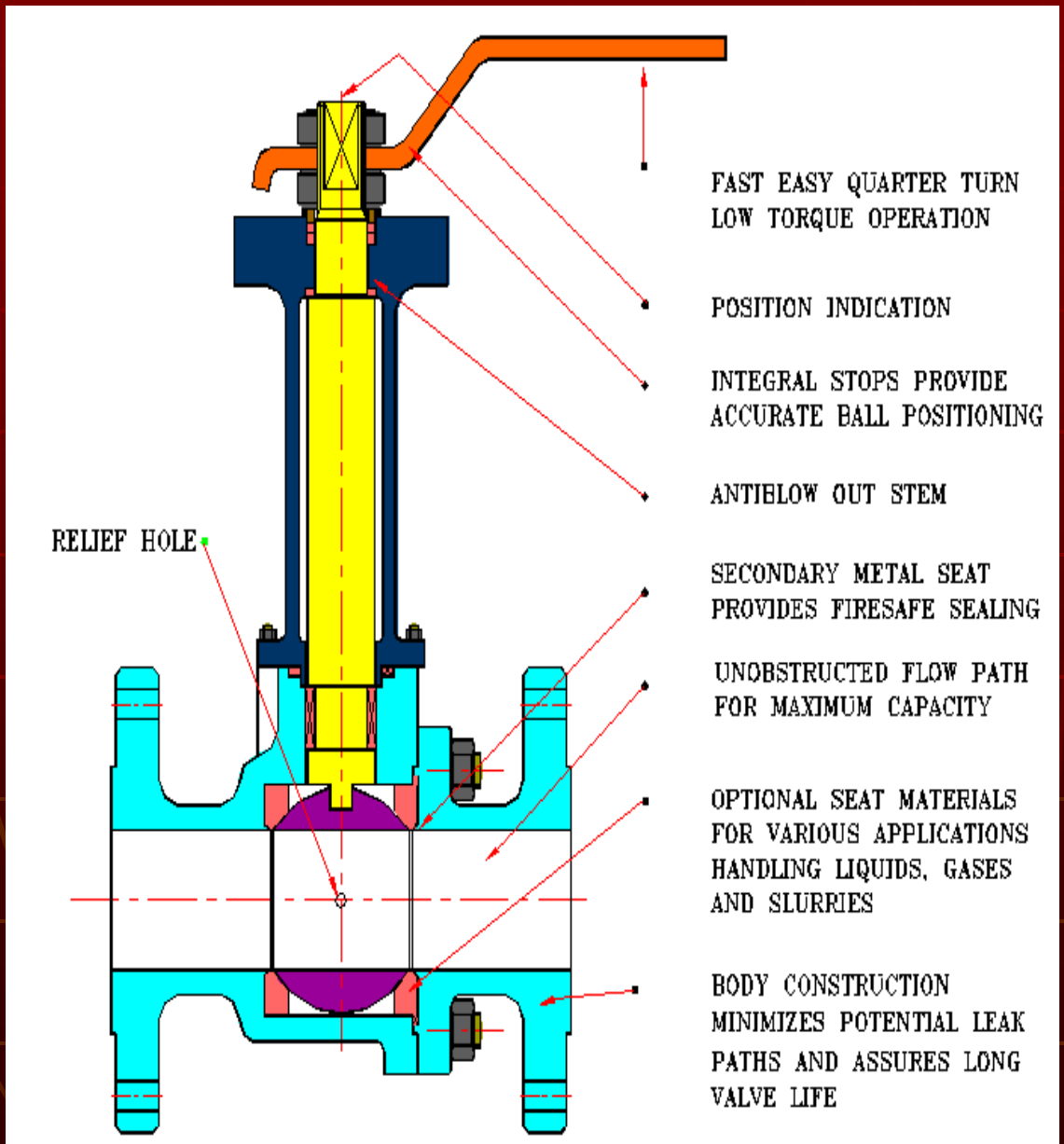
- FIRE SAFE SEAT SEALING
- CRYOGENIC SERVICE
- BLOW-OUT PRROF STEM
- ANTI-STATIC DEVICE
- LOW EMMISION PACKING
- LIVE LOADED GLAND FLANGE

Fire Safe Seat Sealing



Floating ball valves' fire safe is designed in accordance with API 607 & API SPEC 6FA. When non-metal resilient seats are destroyed in a fire, the upstream medium pressure push the ball into the downstream metal seat lip to cut off the line fluid and prevent the internal leakage due to a secondary metal-to-metal seals

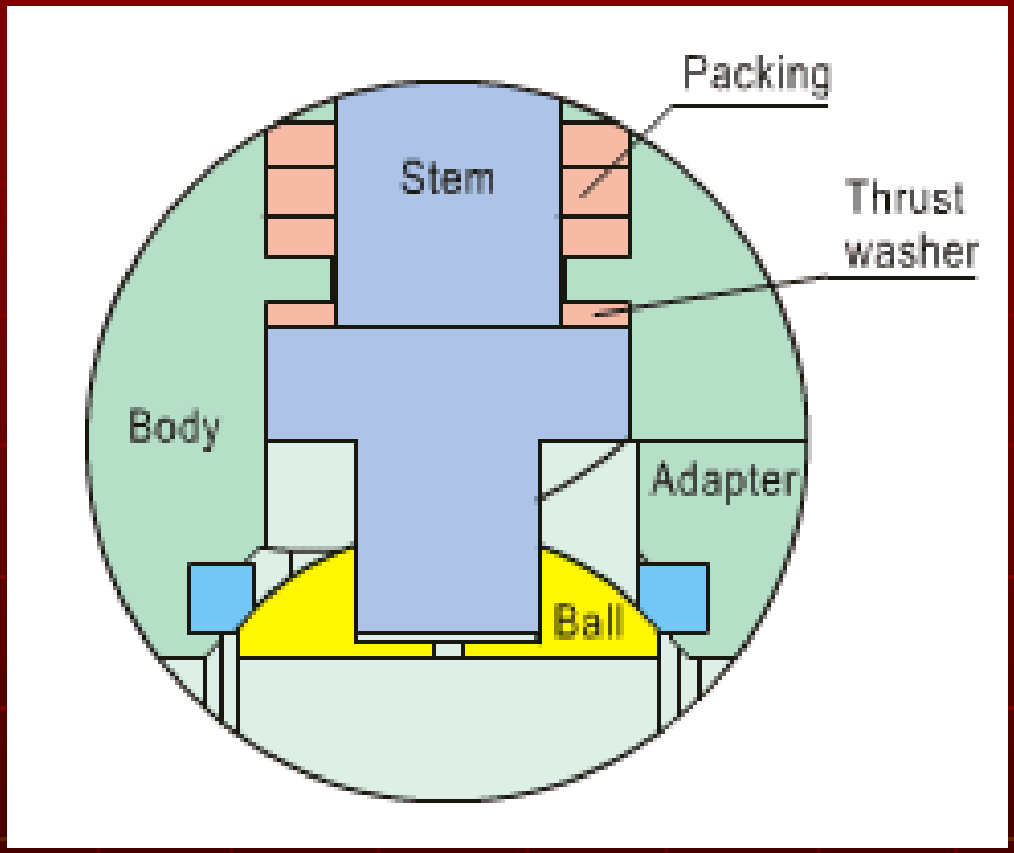
CRYOGENIC FLOATING BALL VALVE



Cryogenic valves normally refer to valves with working temperature blow -100ºC, It is widely used in LNG, LPG and other low temperature industry.

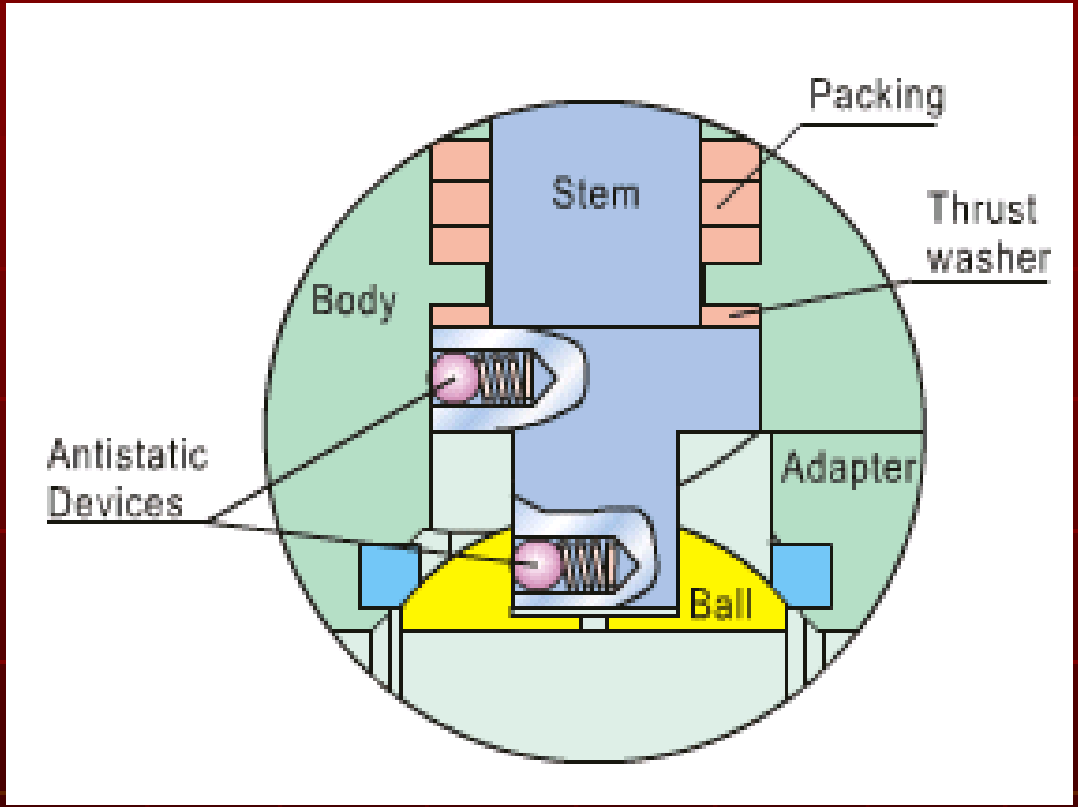
This test is conducted at **(-) 196˚C** in the case of Austenitic Stainless Steel Valves. Reference is made to Appendix – BS 6364:1998 "**Valves for Cryogenic Service"**

Blow-out Proof Stem



The stem is designed with integral T-type shoulder to provide blow-out proof effectively. It is internally inserted as the backseat function to assure stem sealing safety at all pressures.

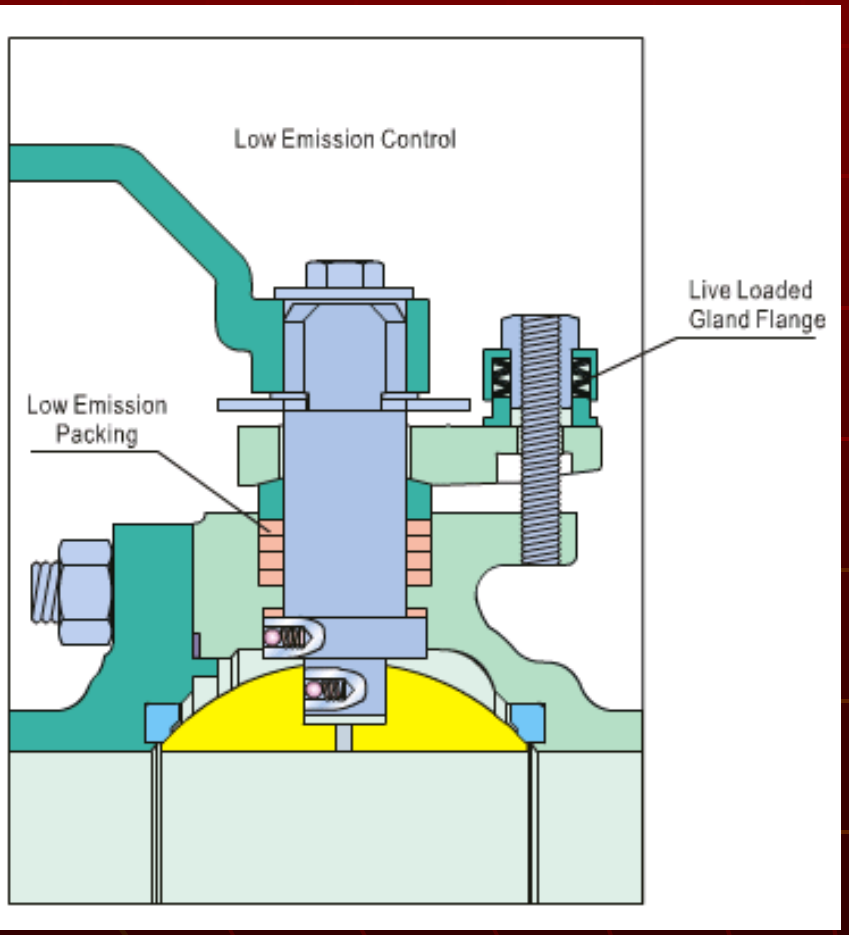
Anti-Static Device



Antistatic devices between ball & stem and stem & body are assembled by a spring & a stainless steel ball, which ensure all metal valve parts are grounding.

Low Emission Packing

With more and more concern for environment protection in the whole world, low emission valve will be widely used. Low emission valve can prevent poisonous, flammable, explosive medium from leaking to pollute the air; and also important that low emissions valve can minimum fugitive emission of VOC to help solve the problem of "Global Warming"



Because of frequent opening and closing of the valve, normal graphite granule can be drawn by the stem, which will cause leakage. Generally designed low emissions valve use special low emissions packing to ensure the seal of stem. The cone packing is made of expanding graphite in die-formed rings and has features of heat resistance, less stress relaxation and low creep. With this special structure, it allows for a low-friction on rotary & rising stem valve, therefore providing the stabilized sealing performance for long cycle life. For low temperature service, the standard V shape PTFE packing rings are used for low emissions control.

Live Loaded Gland Flange

It’s also a key point to control the stem and stuffing box finish when machining. The stem is made by cold rolling and stem surface finish is controlled by Ra0.4, which can reduce friction for stem moving and ensure the graphite to fill and migrate into the stems micro scratches, and function as a lubricant to reduce stem leakage. The stuffing box surface is controlled within Ra1.6 and Ra3.2 for better holding of the packing ring and results in a better sealing performance.

Controlled Stem and Stuffing Box Finish

It’s also a key point to control the stem and stuffing box finish when machining. The stem is made by cold rolling and stem surface finish is controlled by Ra0.4, which can reduce friction for stem moving and ensure the graphite to fill and migrate into the stems micro scratches, and function as a lubricant to reduce stem leakage. The stuffing box surface is controlled within Ra1.6 and Ra3.2 for better holding of the packing ring and results in a better sealing performance.

TYPES OF OPERATIONS

- LEVER / HANDWHEEL
- WARM GEAR
- PNEUMATIC ACTUATOR
- ELECTRIC ACTUATOR
- HYDRAULIC ACTUATOR

TYPE OF OPERATION OF FLOATING BALL VALVES

Testing Standards

Standards of Compliance	
Hydro Testing & Antistatic Test	**BS 5351/6755-Part 1/ BS EN 12266 API 6D / API 598 / ISO 5208**
Fire Tested Design	**API 6FA /API 607/BS EN ISO 10497**
Cryogenic Test	**Bs 6364: 1984**
Casting Acceptance	**MSS-SP 55**
Fugitive emission qualification	**MESC 77/312, ISO 1576 & TA-Luft**
Spark Test	**IS 4682 Part I**
Documentation	**BS EN 10204**
DETAIL HYDRO TESTING METHOD DECRIBED IN HYDRO TESTING PROCEDURE	

INSTALLATION & MAINTENANCE OF FLOATING BALL VALVE

INSTALLATION & MAINTENANCE METHODS DESCRIBED IN MAINTENANCE MANUAL

TROUBLESHOOTING

Sl. No.	Nature of Defect	Cause	Remedy
1	Seat Leakage	1. Damage of Seat due to presence of foreign particles. 2. Damage of '0' Ring at the seat/retainer. 3. Damage of seat in weld end valves due to improper precautions. 4. Damage of seat at high temperature. 5. Improper closing of actuator operated valves. 6. Damage of seat due to rust at body of seat retainer.	•Dismantle, clean & replace by new seats •Dismantle, clean & replace by new '0' Rings •Suggest following right steps as per IOM manual. •Check for suitability of seat material and design. •Ensure correct closing of actuator. •Dismantle, clean & reassemble/replace.
2	Gland Leakage	1. Loosening of check nut or locking bolt. 2.Damage of stem seal/stem washer 3. Misalignment of actuator, bracket & stem.	•Tighten the check nut & locking bolts •Replace the stem seal/stem washer. •Ensure correct alignment.
3	Body Seal Leakage	1. Improper tightening of Body bolting. 2. Improper precautions in case of weld end valves. 3. Misalignment of pipe line mating flanges.	•Ensure proper tightening of Body bolting. •Suggest following right steps as per our IOM manual. •Ensure correct alignment of flanges.
4	High Torque operation	1. High temperature of fluid handled. 2. Highly viscous fluid handled. 3. Insufficient air supply pressure in case of pneumatic operated valves 4. Reducing of lever length by user due to less space. 5. Pipeline flange pressure in case of single piece valves.	•Check for suitability of material and design. •Check for suitability of material and design. •Ensure sufficient air pressure. •Suggest using levers of correct length. •Face the seat or seat seal to relieve extra pressure.
5	Jerky operation	1. Presence of foreign particles at seat contact area. 2. Peeling of plating of Ball in case of metal seated valves. 3. Insufficient air supply pressure in case of pneumatic operated valves	•Dismantle, Clean & Reassemble. •Check for service condition/replace. •Ensure sufficient air pressure.
6	Gear Operator Damage	1. Very high torque operation. 2. Poor material of construction & design. 3.Transit damage	Check for causes as covered in Sl.No.4 Check for suitability. Replace the damaged spares & report accordingly.

The End

TRAINING ON
TRUNNION MOUNTED BALL VALVE

econosto®

PRESENTED BY

MANJUNATH H SANGATI

QA/QC SOURCING ENGINEER

TRUNNION MOUNTED BALL VALVE

Index

- Introduction
- Features
- Applications
- Types of Ball Valves
- **TRUNNION MOUNTED BALL VALVE**

  Design & Manufacturing Standards,
  Material Construction of Valve
  Bolted & Welded Body Joints
  End Connection Valves
  Surface Preparation on Trims & Internal Parts
  Features,
  Operations,
  Inspection & Testing,
  Requirements of Body Marking & Nameplates
  Installation & Maintenance

INTRODUCTION

World's first valve system used by humans was the plug valve made out of wood for irrigation control. This quarter turn for opening valve has been popular system since then. When the technology for generation of sphere by machining was perfected the ball valve emerged.

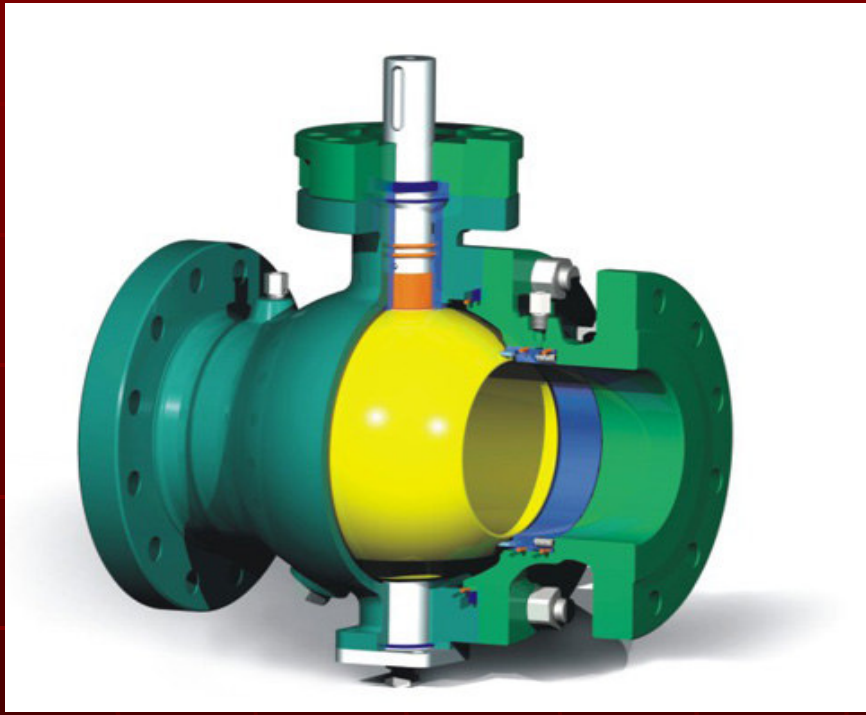
The advantages of ball valves are many. It is also quarter turn for opening or closing, low torque requirement for operation, can ensure bubble tight sealing because of use of non-metallic sealing adopted, light weight, high flow capacity, low pressure drop, ability to provide fire-safe protection, can handle severe service chemicals, provides tight shutoff and low stem leakage. Further multiple port configuration too is possible. Since PTFE is normal material for main seals, it has low coefficient of friction and excellent sealing properties. Designed use is in full open or closed condition and not for throttling.

These valves are also available in venturi, reduced port and full port patterns..

Body could be castings, forging. or formed to shape. Ball itself could be turned out of bar, casting or forging and machined to profile. When the ball is not made out of corrosion resistant material, the carbon steel balls are given electro-less nickel plating to give a surface hard enough to break in, in the initial operation.

TRUNNION MOUNTED BALL VALVE

The trunnion mounted ball, which uses a trunnion to support the ball. Trunnion mounting is used on 2” and above sizes valves, as it can reduce the operating torque to about two-thirds of that provided by a floating ball



Trunnion ball valve is designed in accordance with API6D & BS 5351 standards, suitable for various pipelines between Class 150 to Class 2500 & PN 10 to 420
The opening and closing part of the ball valve is a ball with a hole, vertical to spindle, rotating, to cut off media. The ball valves are mainly used for various cut-off pipes and equipments

Specifications	
Design	API 6D /ASME B16.34/ BS 5351
Face to Face	ASME B16.10/API 6D/BS 2080
End Flange	ASME B16.5
BW End	ASME B16.25
Test	API 598 / API 6D / BS 6755 PR 1
Fire Safe Test	API 607/API 6FA/ BS 5146 - A

Advantages

- Little flow resistance.
- Simple structure, compact and light.
- Reliable seal performance, plastics is needed for seal, widely used for vacuum systems.
- Easy to operate and quick in opening and closing, full open to full closed, only rotated by 90°, easy for remote control.
- Easy to maintain, simple structure, seal ring is movable, easy to exchange and discharge.
- Seal surface on ball and seat are separated from media when it is fully open or closed, without corrosion.
- Widely used for various diameters and pressures.

FEATURES OF TRUNNION MOUNTED BALL VALVE

- Anti-Static Device
- Blow-out Proof Stem
- Fire Safe Design
- Emergency Sealant Injector (6" & Larger)
- Double block & bleed
- Cavity pressure self relief
- Cryogenic Service
- Dual/ Double Piston Effect
- Fugitive / Low Emission

APPLICATIONS OF BALL VALVE

- REFINERIES.
- OIL & GAS PROCESSING
- ONSHORE AND OFF SHORE PLATFORMS.
- FERTILIZER.
- PETROCHEMICAL INDUSTRIES.
- CHEMICAL PROCESS INDUSTRIES.
- PHARMACEUTICAL.
- POWER PLANT.
- LPG BOTTLING PLANTS.

TYPE OF BALL VALVE

- Based on No. of Body Pieces
  a) SINGLE PIECE (TOP ENTRY ONLY)
  b) TWO PIECE (TRUNNION)
  c) THREE PIECE (TRUNNION)

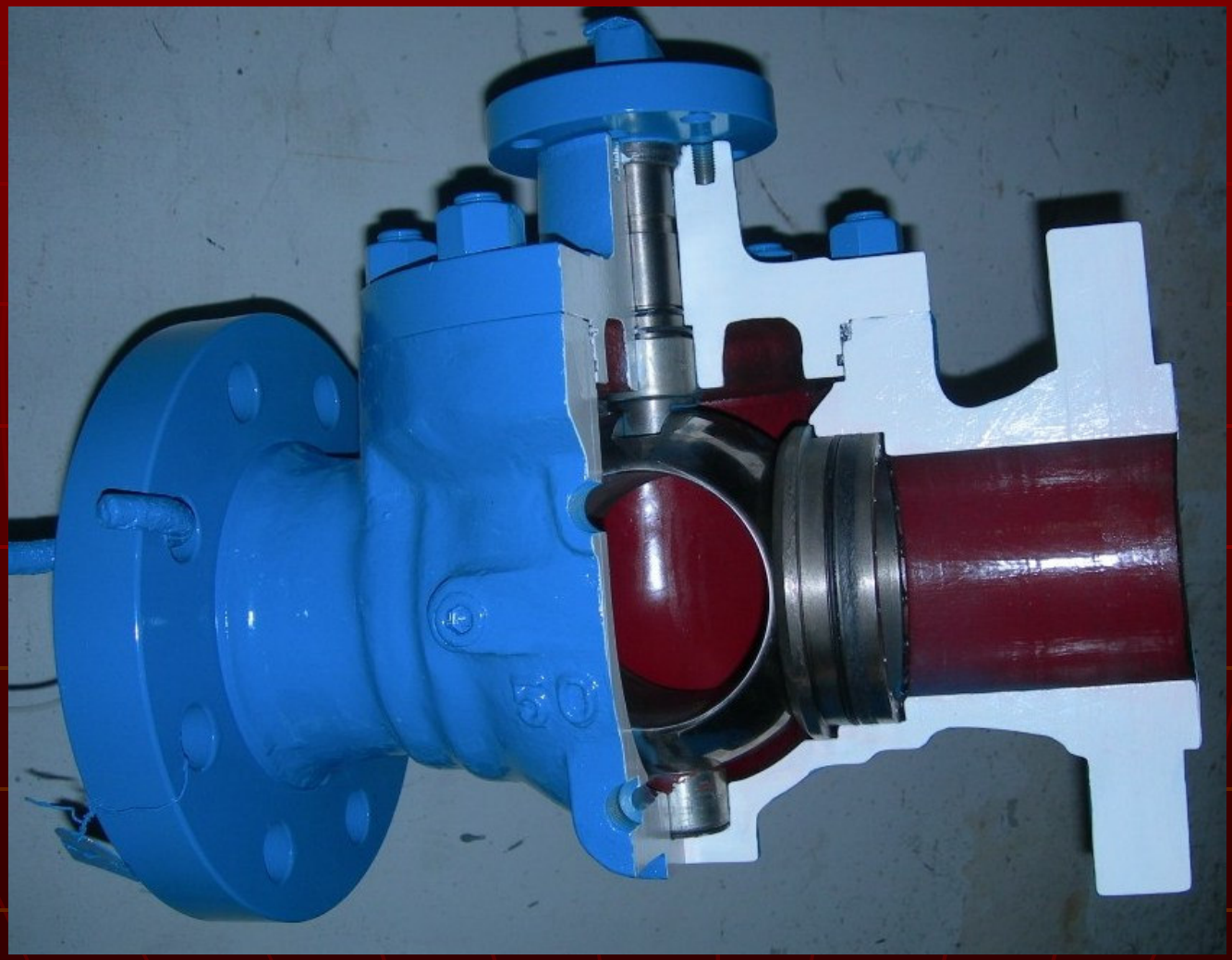
- Based on Flow of Ways
  a) Two Way
  b) Three Way

- Based on Ball Entry
  a) SIDE ENTRY
  b) TOP ENTRY

- Based on Ball Support
  a) Floating Type
  b) Trunnion Type

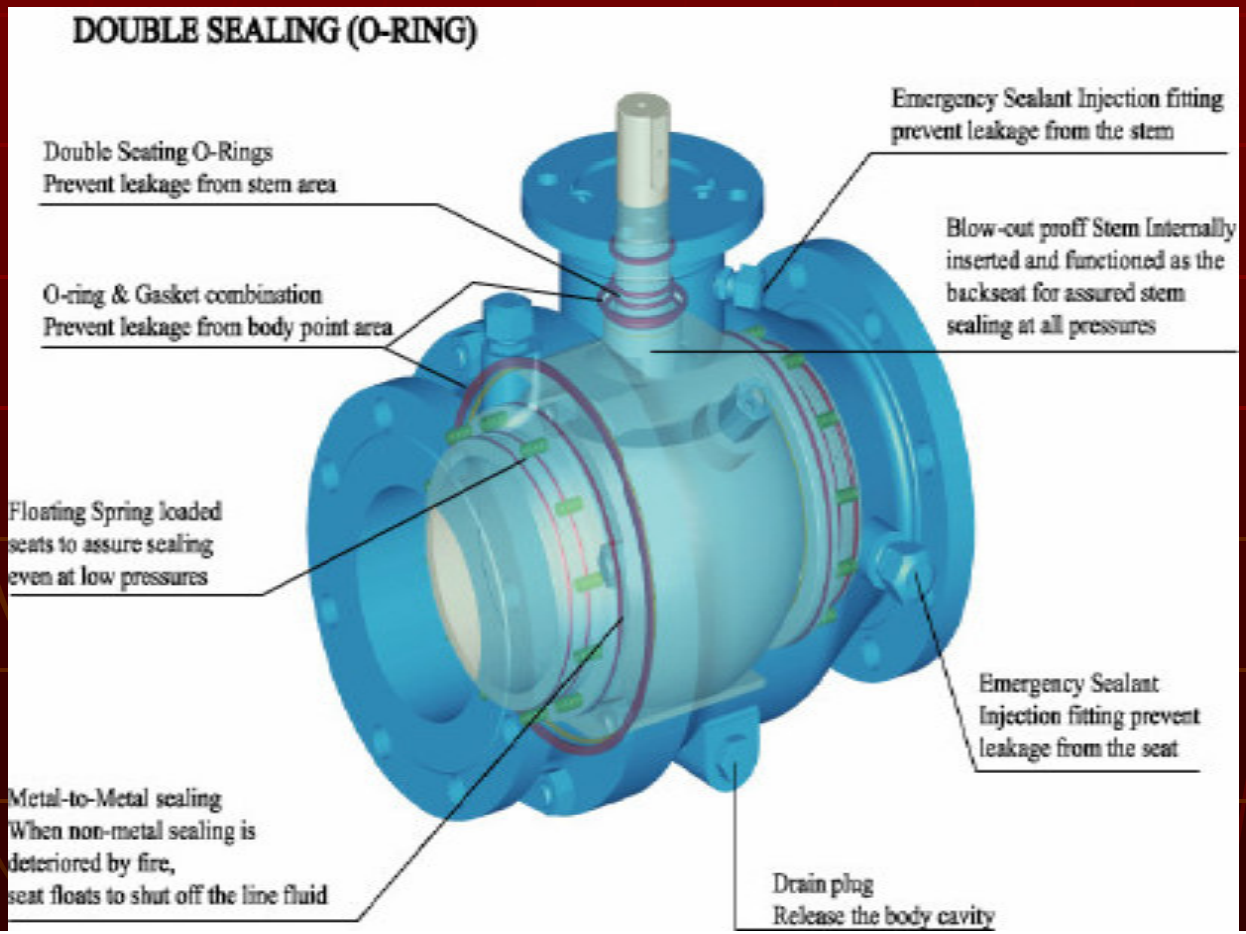
BASED ON NO. OF BODY PIECES

SINGLE PIECE TRUNNION MOUNTED BALL VALVE



TWO PIECE BALL VALVE

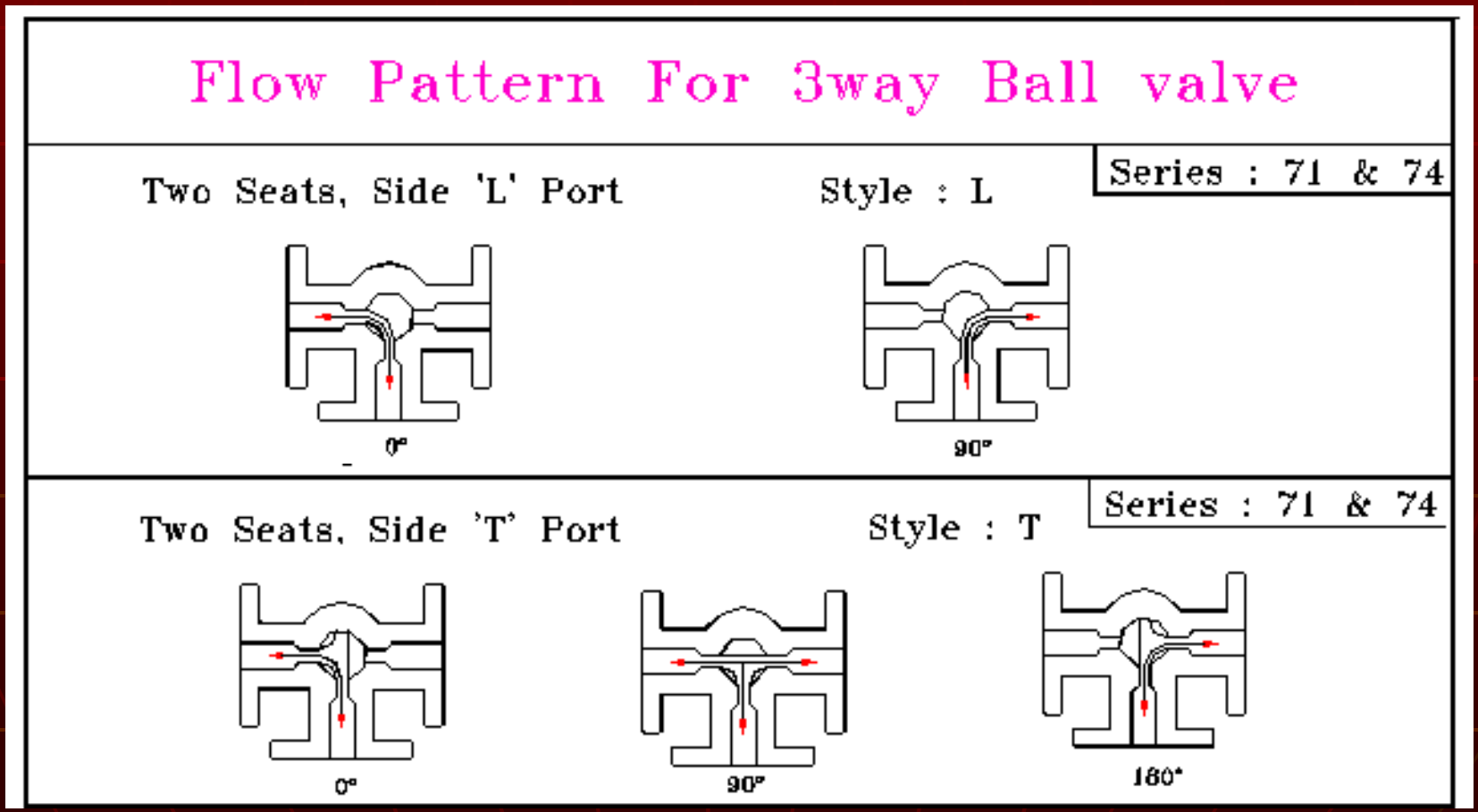
Two piece valves - The body of the valve is split in one or two places in the same plane as the valve flange, and these pieces are bolted together. This has the advantage of simplified, in-line maintenance Two piece ball valves are generally slightly reduced (or standard) bore, they can be either throw-away or repairable



THREE PIECE BALL VALVE

The 3 piece design allows for the center part of the valve containing the ball, stem & seats to be easily removed from the pipeline. This facilitates efficient cleaning of deposited sediments, replacement of seats and gland packings, polishing out of small scratches on the ball, all this without removing the pipes from the valve body. The design concept of a three piece valve is for it to be repairable.

Based on Flow of Ways



2 & 3 WAY BALL VALVES

Straight through, two way, or three way ball valves

Schematic 3 way ball valve - L-shaped ball right, T-shaped left

Three-way ball valves have an L- or T-shaped hole through the middle. The different combinations of flow are shown in the picture.

Multi-port ball valves with 4 ways, or more, are also commercially available, the inlet way often being orthogonal to the plane of the outlets. For special applications, such as driving air-powered motors from forward to reverse, the operation is performed by rotating a single lever 4-way ball valve. The 4-way valve has two L-shaped ports in the ball that do not interconnect, sometimes referred to as an "×" port.

Based on Ball Entry

Side Entry Ball Valves

The trunnion mounted ball valves with spring loaded seat adopts polymer materials as seat sealing. It has excellent seal functions under wide temperature variety and pressure change which ensures no air bulb leakage and lowest torque under closing differential pressure.

Trunnion mounted ball valves have profuse materials and complete specification in different pressure class, including full bore and reduced ball design, which is an ideal product for transforming pipelines in petroleum, natural gas and chemical materials.

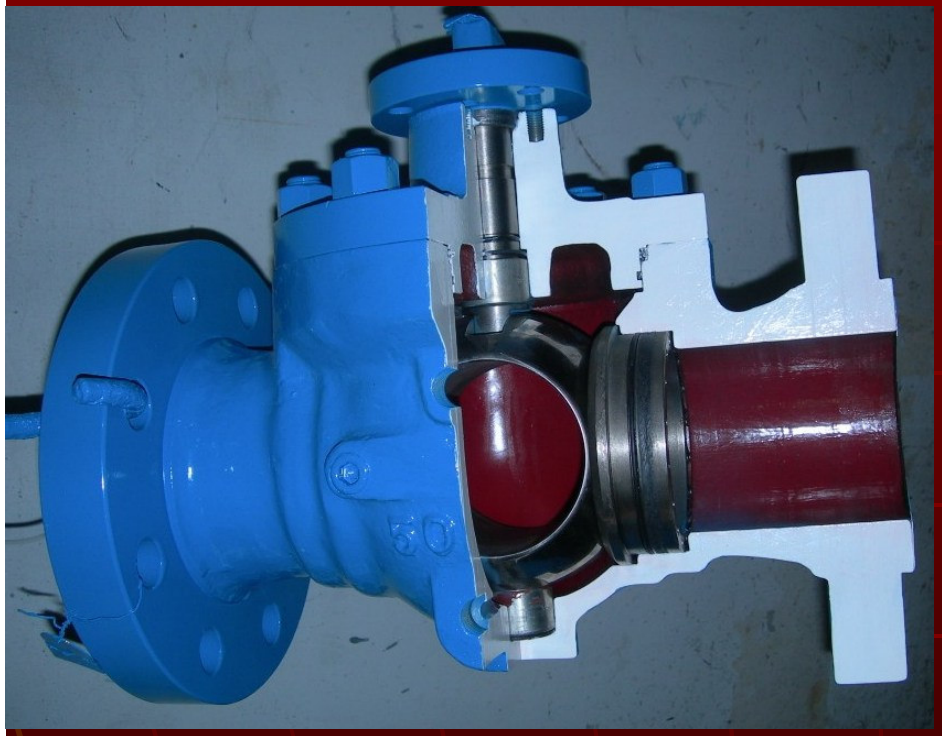
Specifications

Design	**API 6D /ASME B16.34/ BS 5351**
Face to Face	**ASME B16.10/API 6D/BS 2080**
End Flange	**ASME B16.5**
BW End	**ASME B16.25**
Test	**API 598 / API 6D / BS 6755 PR 1**
Fire Safe Test	**API 607/API 6FA/ BS 5146 - A**

Features:

a) Low operating torque reliable sealing
b) Auxiliary valve seat sealing c) No side loads on the stem
c) Ball and stem centerlines are exact
d) Self-relief in the body cavity d) Fire Safe, Anti-static Design
e) DBB function f) Self-lubricating PTFE metal axle
g) With spring loaded to 100% close to seat
h) Inject sealant through auxiliary system to reduce leakage
i) Fluorubber O-ring prevent pressure reduction explosion
j) Most stem are installed with auxiliary sealing device
k) Spring loaded upper/lower seat ring is set

Top Entry Ball Valves



Top entry ball valves are of rigid body design and allow easy access to the internal area. Suitable for all topside and sub-sea applications. A top entry ball valve comprises a plug element having two curved sides and two inclined flat sides which contain the ball and two seats. The valve body includes a cylindrical bore which is perpendicular to the axis of the inlet and outlet ports of the valve. The plug element is biased into the cylindrical bore, whereby the inclined sides of the plug element act against the inclined sides of the cheek elements to produce an axial force on the seats and the ball to form a leak-proof valve assembly. The ball is inserted through a bonnet in the top of the valve. This facilitates in-line maintenance

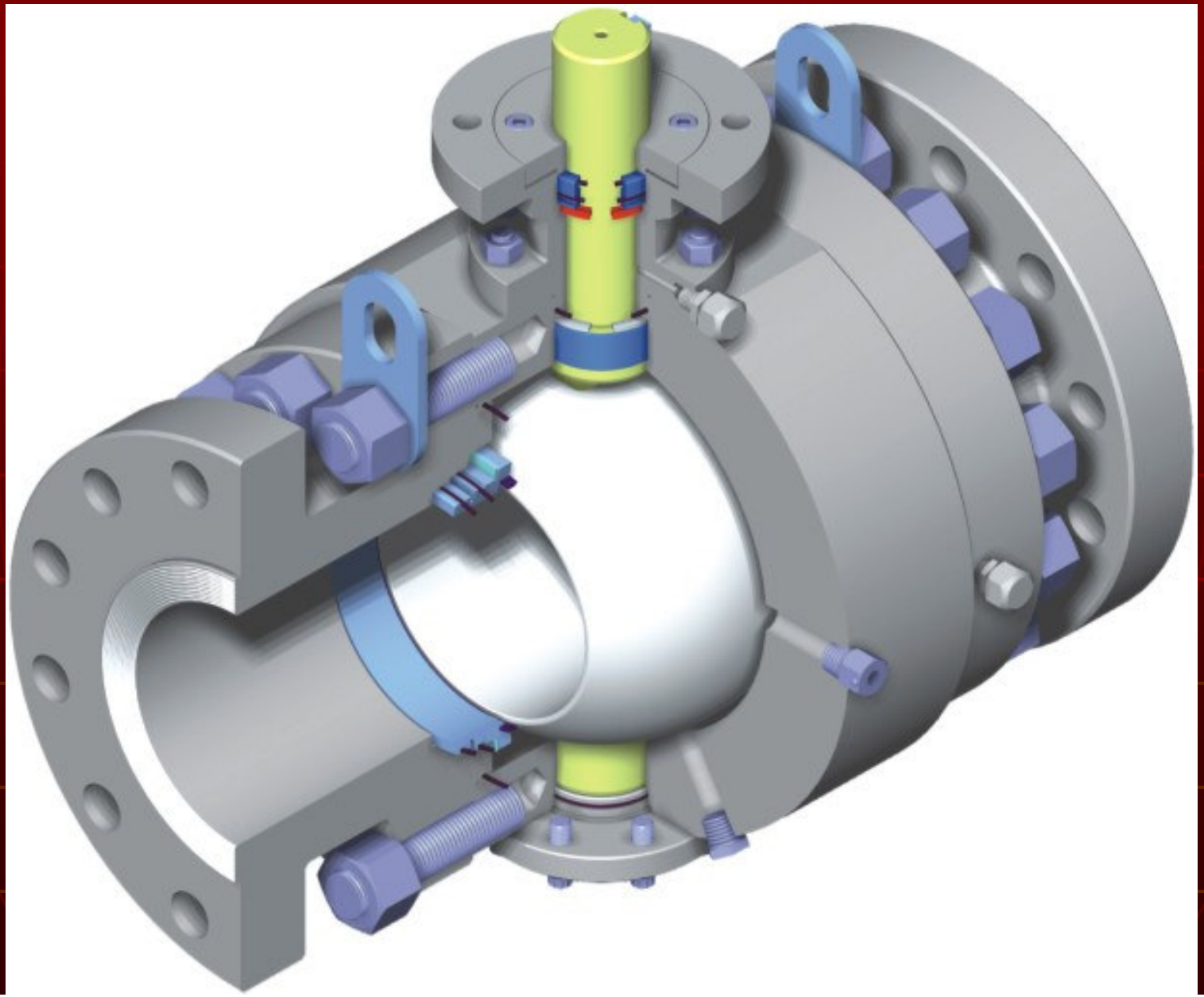
Features:

- Double-block and Bleed Function
- Easy in-line access to all parts for maintenance
- Self-relief in the Body Cavity
- Anti-static Feature
- Choice of soft seated or metal-to-metal seated designs
- Full or reduced port configurations
- Fire safe certified design
- Easy replacement of valve inner component.

Specifications	
Design	API 6D /ASME B16.34/ BS 5351
Face to Face	ASME B16.10/API 6D/BS 2080
End Flange	ASME B16.5
BW End	ASME B16.25
Test	API 598 / API 6D / BS 6755 PR 1
Fire Safe Test	API 607/API 6FA/ BS 5146 - A

Based on Ball Support

TRUNNION TYPE BALL



Design & Manufacturing Standards

Standards of Compliance	
Design & Manufacturing Standard	API 6D / ASME B 16.34/ BS 5351,
End To End (Face to Face)	ASME B 16.10 / API 6D/ EN 558
Flanged End dimensions Butt Welded Screwed/Socket Weld end Valves.	ASME B16.5 & B 16.47 (26' & above) ASME 16.25 ASME 16.11
Drain / Vent / Bypass	API 6D / MSS-SP 45
Top Mounting Actuator Mounting)	ISO 5211
Quality System	ISO 9001-2000 / API Q1/PED

API = American Petroleum Institute, BS = British Standard

ASME = American Society of Mechanical Engineers

MSS = Manufacturers Standardization Society

NACE = National Association of Corrosion Engineers

American Petroleum Institute – API

API 6D
API 6A
API 6FA
API 607
API 598
API 605

American Society of Mechanical Engineers – ASME

ASME B 16.5
ASME B 16.10
ASME B 16.25
ASME B 16.34
ASME B 31.3
ASME B31.8
ASME B 46.1

International Organization for Standardisation – ISO

ISO 9001:2000
ISO 14313

British Standards

BS EN 10222
BS EN 9000
BS 1560
BS EN 10213
BS 4504
BS EN 12266
BS 5351

Manufacturers Standardization Society – MSS

MSS SP 6
MSS SP 25
MSS SP 44
MSS SP 45
MSS SP 55
MSS SP 61
MSS SP 72

Compliant to CSA Z245

DETAILS OF STANDARDS

SL NO	NAME OF STANDRADS	SCOPE OF STANDARDS	SIZE & RATING	SUPPORTING STANDARDS
1	**ANSI/API 6D 23RD ED APR 08** **Specification for Pipeline Valves**	**Standard specifies requirements and provides recommendations for the design, manufacturing, testing and documentation of ball valves**	1/2″ to 60″ PN 20 TO 420 150# to 2500#	REF API 6D – NORMATIVE REF STD LIST
2	**BS 5351:1986** **Steel ball valves for the petroleum, petrochemical and allied industries**	**This British Standard specifies the valve seat and body pressure / temperature ratings, and the design, including materials, dimensions, operation, performance, testing and marking, of straightway steel ball valves having specified wall thickness, an antistatic feature and fire tested design.**	**1/4" to 16" PN 10, 16, 25, 40 150, 300, 600, 800#**	BS5351-2000 REFERRED STD LIST.
3	**API 6FA – 3RD ED, APR 1999** **Specification for Fire Test for Valves**	**It is the purpose of this document to establish, the requirements for testing and evaluating the pressure-containing performance of API 6A and 6D valves when exposed to fire. The document establishes acceptable levels for leakage through the test valve and also external leakage after exposure to a fire for a 30 minutes time period.**	2″ TO 16″ PN 20 TO 420 CL 150# TO 2500#	1) Through Leakage (High Test Pressure) During Burn Period Burn – 30Min Leakage Rt: 400ml/in/min 2) External Leakage -cool down cool down 100ºC Leakage Rt: 100ml/in/min
4	**ANSI/API 607 5th ED 2005 (ISO 10497 - 5- 2004)** **Fire Test for Soft Seated Valves**	This International Standard specifies fire type-testing requirements and a fire type-test method for confirming the pressure-containing capability of a valve under pressure during and after the fire test.	2" to 8" PN 10 TO 420 CL 150 to 2500#	Permitted Max Leakage Rates Refer STD API 607 Table 1
5	**BS 6755 Part – 1, 1986 & API 598** 8th ED 2004 **Testing of Valves**	**This Part of BS 6755 specifies production pressure testing requirements and describes in Appendix D tests of Valve under pressure, and tests revivifying the degree of tightness and pressure - retaining capability of the valve seats and or closure mechanism**	**BS 6755 PART-1 1/4" to 20" & above PN 10, 16, 25, 40 150, 300, 600 & 800# Time:15 to 180 sec and above**	**API 598 2" to 14" & above 150 TO 2500# FL ENDS 150 TO 4500# BW ENDS Time:15 to 120 sec and above**
6	**BS 6364 : 1984** **Valves for CRYOGENIC SERVICES**	**Standard specifies requirements and provides recommendations for the design, manufacturing, testing of valves for cryogenic service**	**1/2" to 20" PN 16, 25, 40 150, 300, 600 & 800#**	**Permitted Leakages Check - 200mm³/S x DN Others - 100mm³/S x DN**

BS 5351	API 6D	API 6FA	API 607
1) GENERAL	1) SCOPE	1) SCOPE	1) SCOPE
A) SCOPE	2) CONFORMANCE		
B) VALVE PATTERNS	3) NORMATIVE REFERENCES	2) DESCRIPTION OF FIRE TEST	2) NORMATIVE REFERENCES
C) NOMINAL SIZES	4) TERMS & DEFINITIONS		
D) PRESSURE DESIGNATIONS	5) SYMBOLS & ABBREVIATED TERMS	3) TEST PROCEDURE	3) TERMS & DEFINITIONS
E) PRESSURE / TEMP RATINGS	6) VALVE TYPES & CONFIGURATIONS		
F) DIMENSIONS	7) DESIGN	4) PERFORMANCE REQ	4) Test Conditions
	8) MATERIAL		
2) DESIGN & MATERIALS	9) WELDING	5) CERTIFICATION	5) Fire Test Methods
A) DESIGN OF VALVE	10) QUALITY CONTROL		
B) OPERATIONS	11) PRESSURE TESTING	6) SAFETY CONSIDERATIONS	6) Performance
C) MATERIAL	12) COATING		
	13) MARKING	7) QUIPMENT MARKING	7) Qualification of other valves by representative size, pressure rating and materials of construction.
3) PERFORMANCE	14) PREPARATION FOR SHIPMENT		
A) PRESSURE TESTING	15) DOCUMENTATION	FIGURES	
B) FIRE TESTING	ANEX A – REQ OF NDT	TABLES	
C) ANTI-STATIC TESTING	ANEX B – SUPP TEST REQ		
	ANEX C – SUPP DOC REQ		
4) MARKING	ANEX D – PURCHASING		
	ANEX B – MARKING EXMP'S		
5) PREPARATION FOR STORAGE & TRANSPORTATION	ANEX F – API MONOGRAM		

REQUIREMENTS OF API 6D (ISO 14313:2007)

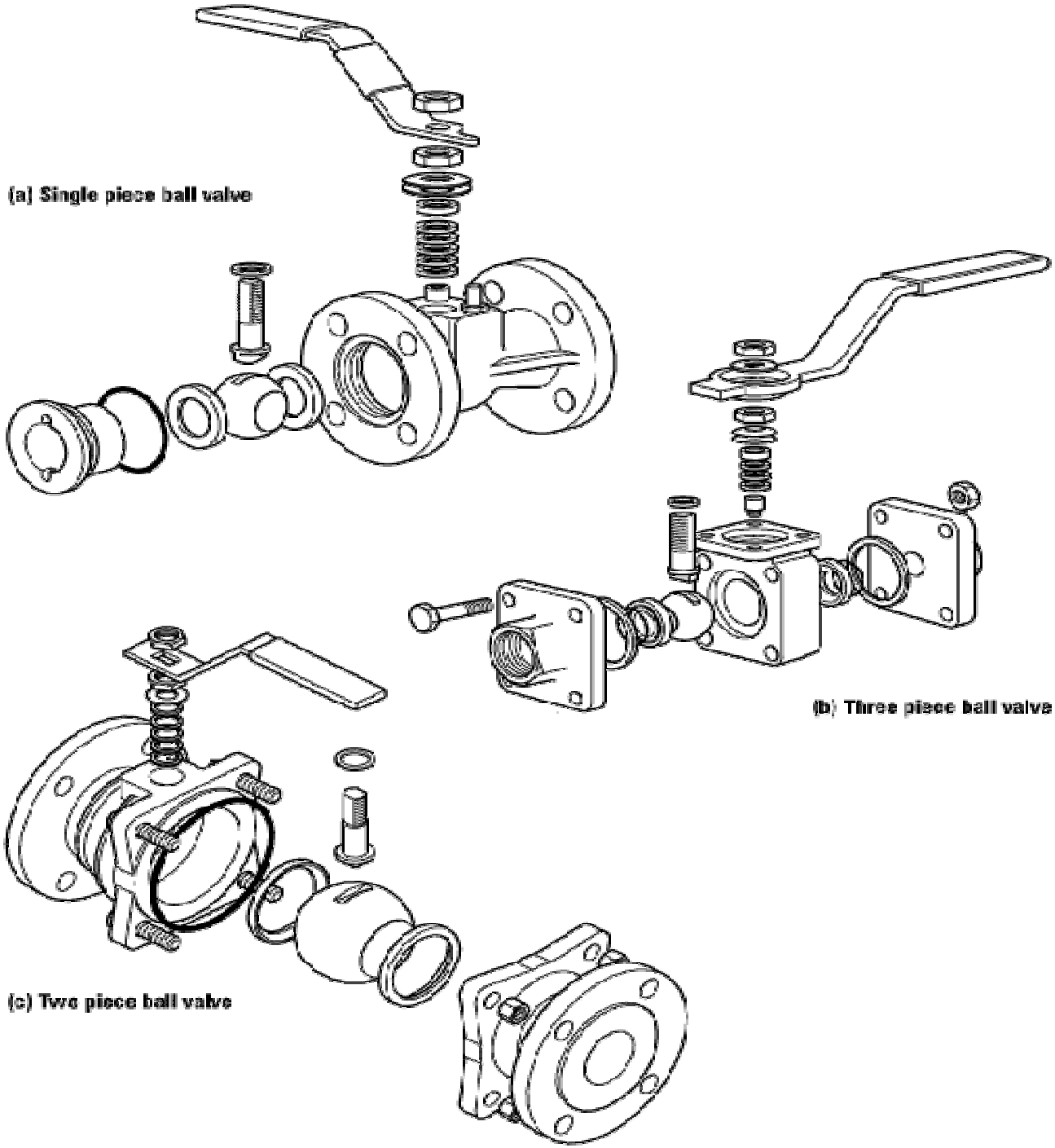
SL No	Mandatory Requirements	Supplementary Requirements (Purchaser Requirements)
06	Types of Valve and Configuration	7.5 Valve Operation (Cv/Kv, Breakaway Trq & Trust Trq)
07	Design Standards and Calculations	7.6Piping (Piggability)
7.2	Pressure and Temperature Rating,	Welding Ends (Outside Dia)
7.3	Nominal Sizes	7.7.3 Alternate Valve end connections
7.4	Face to Face and End to End Dimensions, (RF B, RTJ) 2”-36” -150-900# , 26” – 1500# , 12” – 2500#	7.8 Pressure Relief (If cavity relief valves are req, to specify to provision in service testing)
7.7	Fanged Ends (MSS Sp 44 for 22”)	
7.7.1.2	Offset Aligned Flange Centrelines (up 4”-2mm & 4” above 3mm)	7.9 Bypass, Drains & Vent connection complying with ASME B 1.20.1 & Threads ISO 228-1
7.7.1.3	Parallelism of aligned flanges faces(2.5mm/m)	7.10 Injection Points (Sealant, Lubrication & Flushing for Seat & Stem)
7.7.1.4	Total Allowable misalignment of Bolt Holes (up 4”-2mm & 4” above 3mm)	7.11 Drain, Vent and Sealant Lines (Extension stem for rigid Pipe works)
7.7.2	Welding Ends (ASME B 31.4, B 16.25 Tp 30º / 45º)	7.12 Drain, Vent and Sealant Valves
7.8	Pressure Relief (Body Cavity in the Open/Close) 1.33 times of Pr Rating, Relief Valve ½” & above	7.13 Hand Wheel / Gear Box inputs of shall be provided Torque Limiting
7.13	Hand Wheels and Levers (Max Trq 360N (80lbf) HW Dia max = F to F of Valve (1000mm max)	7.18 Actuator, Operators and Stem Extensions (Misalignment , Sealing, Over Pr Protection, Protection of Extended Stems for underground Servce
7.14	Locking Device, Position Indicators & Travel Stops (Open & Close)	
7.19	Lifting (8” & above)	

Continued

SL No	Mandatory Requirements	Supplementary Requirements (Purchaser Requirements)
7.20.1	Design Trust or Torque (Drive Train Calculation min 2times of Breakaway Trust / Torque	7.22Fire Type Testing
7.21	Stem Retention (Stem does not eject any Int Pr)	7.23 Anti-Static Device (Soft Seated Valves)
7.24	Design Documents (Retrievable & Reproducible)	NDT Requirements and other special testing
7.25	Design Document Review (Not Competent Person)	
8	**MATERIALS** (Chemical, Carbon Equivalent, Heat Treatment, Mechanical Properties, Testing, Certification)	8.2 Service Compatibility (Metallic & Non Metallic Process Parts) (Metallic materials to avoid Corrosion & galling
8.3	Forged Parts (Hot Worked, Heat Treated & uniform grain Mechanical Properties)	8.6 Bolting (Carbon and Low alloy Steel HRC 34, not to be used valve app Hydrogen embitterment can occur
8.4	Composition Limits (C = 0.23%, S & P=0.035%, CE = 0.43%,	8.8 Sour Service (Pressure Containing Materials to be meet the requirements of ISO 15156)
8.5	Toughness Test (Carbon, Alloy, Non SS - 29ºc below impact Test using by Charpy V-notch, ASTM A 370)	* Tensile Strength < 586 = 20J Av3 , 16J 1 Spcmn, 586 to 689 = 27 J Av 3, 21J Single Specimen > 689 = 34J Av 3, 26J Single Specimen.
9	**WELDING** (Qualifications for Welding, Repair Welding-Procedure Qualified ASME Sec IX, 9.2&9.3	
9.2	Impact Testing (Welding, Repair Welding - 29ºc below)	
9.3	Hardness Testing (Welding, Repair Welding – ISO 15156)	
9.4	Weld Repair (Minor Defects, any weld repair not more 50mm, Fabrication-30% & Presentation 20%	

Continued

SL No	Mandatory Requirements	Supplementary Requirements (Purchaser Requirements)
10	Quality Control	10.1 NDE Requirements
10.2	Measuring & Test Equipment (Identified, Controlled & Calibration)	
	Pressure Measuring Devices (Pressure gauge ±2%)	
	Pressure Gauge Range (25% to 75% full Pr Range)	
	Calibration of Pr Gauge (Dead Wt 25%, 50%, 75%)	
	Temperature Measuring Device (Fluctuation 5ºC)	
10.3	Qualification of Inspection and Test Personnel	
	NDE Personnel (ANST SNT-TC-1A / ISO 9712) Eye Exam – 12months) Weld Inspector – AWS QC1	Weld and NDE
	Visual Inspection of Castings – MSS SP 55	
11	**PRESSURE TESTING** (Water Chloride – max 30 ppm) Acceptance for Metal Seat valve 2time of ISO 5208 Rate D	Additional Seat Testing (DBB)
	Stem Backseat (2min – 4” & 5Min 6” & above)	
	Hydro Shell Test –100% (4”-2Min, 6-10”-5min, 12-18” 15min, 20” above 30min)	
	Hydro Static Seat Test (2min – 4” & 5Min 6” above)	
	Seat test procedure for Block Valve (Uni-direction & Bi-Directional)	
12	COATING (Metallic Surface – up to 50º C)	
14	MARKING (Mfg Name, Material, Size, Rating) Details in API 6D Annexure A	Name plate for smaller than 2” valves

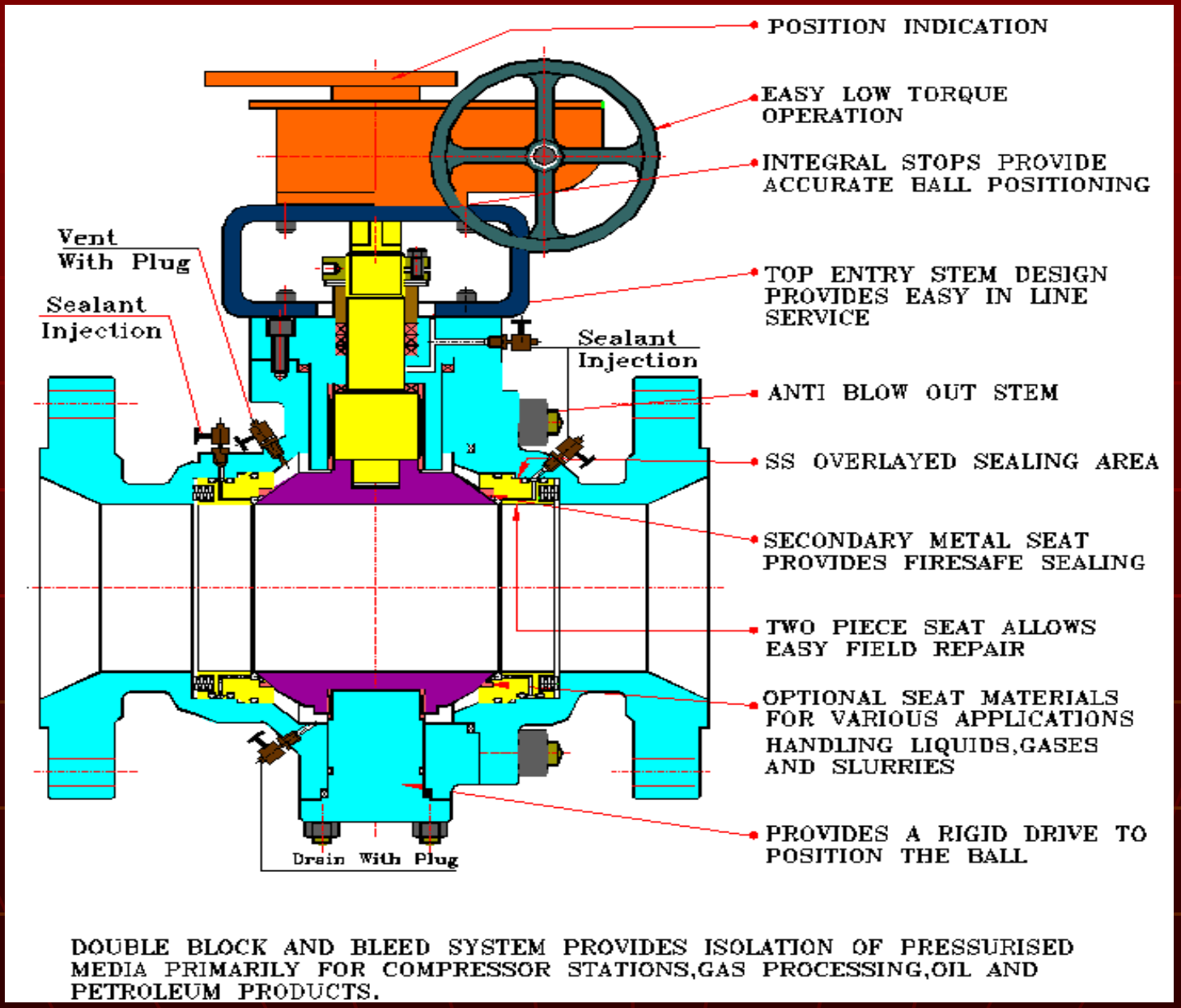


(a) Single piece ball valve

(b) Three piece ball valve

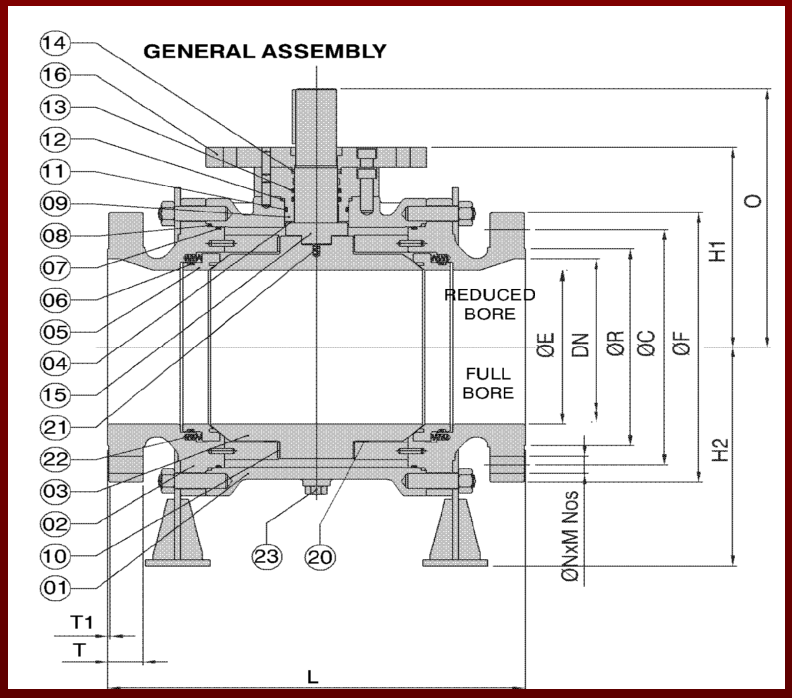
(c) Two piece ball valve

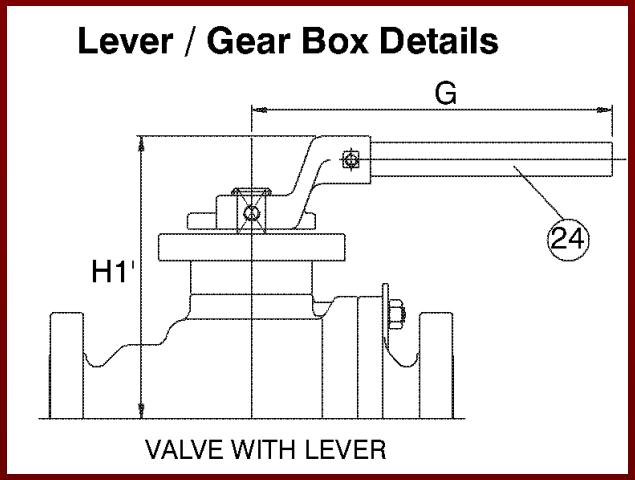
Construction of TMBV

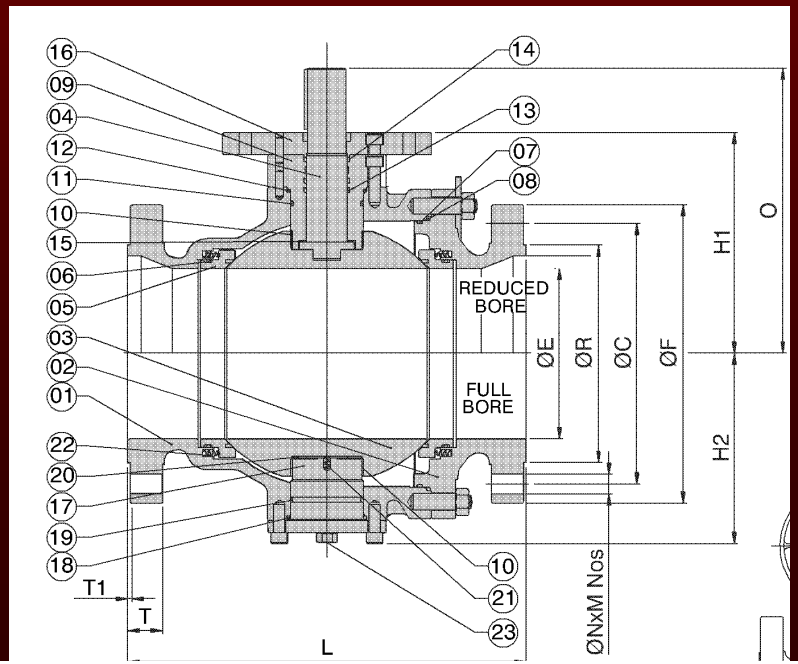


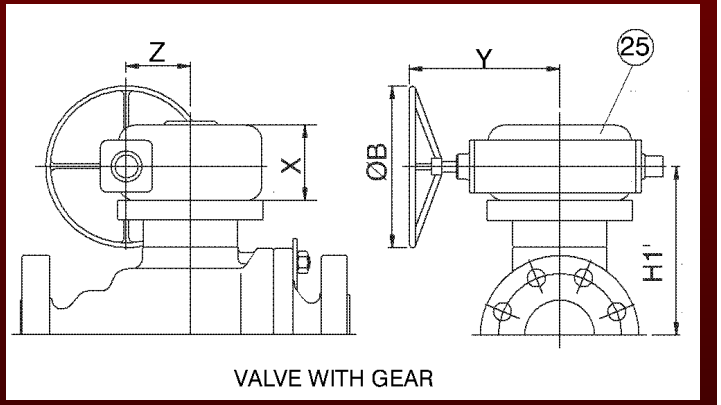
DOUBLE BLOCK AND BLEED SYSTEM PROVIDES ISOLATION OF PRESSURISED MEDIA PRIMARILY FOR COMPRESSOR STATIONS,GAS PROCESSING,OIL AND PETROLEUM PRODUCTS.

Trunnion Mounted Ball Valve









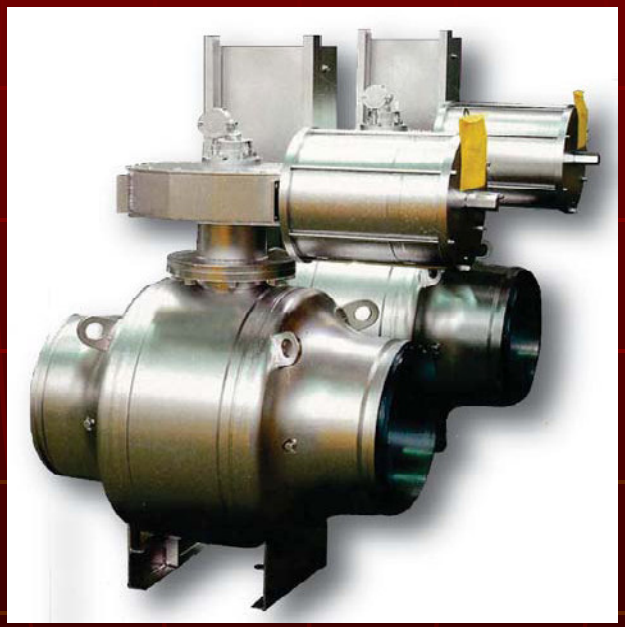
ITEM NO.	PART NAME
01	BODY
02	BODY ADAPTER
03	BALL
04	STEM
05	SEAT + INSERT
06	O RING (SEAT)
07	O RING (BODY ADAPTER)
08	GASKET (BODY)
09	STEM HOUSING
10	BUSH BEARING
11	O RING (STEM HOUSING)
12	GASKET (STEM HOUSING)
13	O RING (STEM)
14	GASKET (STEM)
15	STEM THRUST WASHER
16	ISO MOUNTING FLANGE
17	TRUNNION
18	GASKET (TRUNNION)
19	O RING (TRUNNION)
20	TRUNNION THRUST WASHER
21	ANTISTATIC SPRINGS
22	SEAT SPRINGS
23	DRAIN PLUG/BLEED VALVE
24	HAND LEVER
25	GEAR BOX

MATERIAL OF CONSTRUCTION

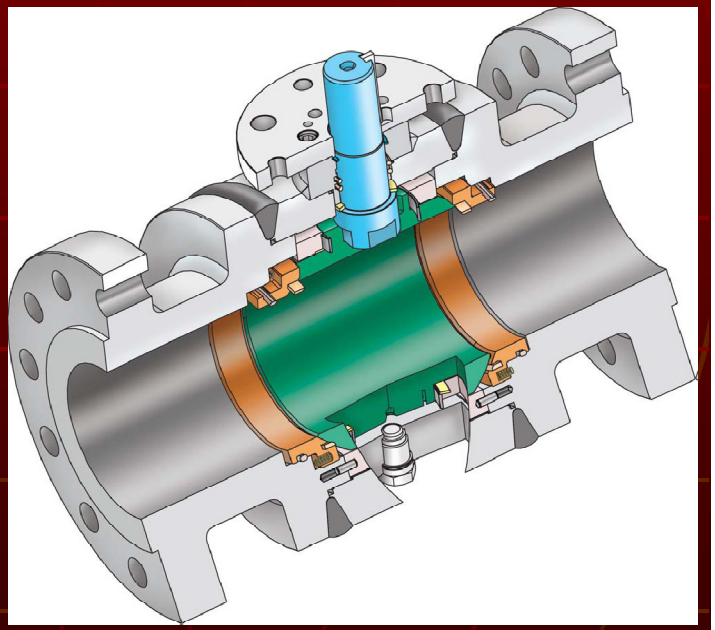
PART	MATERIAL OPTIONS
BODY	ASTM - A 216 WCB / WCC / LF2 / A 105 / A 351 CF8M / A 351 CF3M / A 352 LCB / LCC / A 217 CA15 / DUPLEX SS / INCONEL / 254 SMO.
BODY ADAPTER	ASTM - A 216 WCB / WCC / LF2 / A 105 / A 351 CF8M / A 351 CF3M / A 352 LCB / LCC / A 217 CA15 / DUPLEX SS / INCONEL / 254 SMO.
BALL	ASTM - A 216 WCB/WCC + ENP / A 351 CF8M / A 351 CF3M / A 217 CA 15 / DUPLEX SS / INCONEL / MONEL
STEM HOUSING	ASTM - A 216 WCB / A351 CF8M / A 351 CF3M / A 352 LCB / A 217 CA 15
STEM	A 479 SS 316 / A 479 SS 316L / A 182 F 6A / A 564 TYPE 630 / A 479 SS 410 / AISI 4140 + ENP / ASTM A 182 F51, F53, F44 / INCONEL (625, 825, 718)
SEAT	ASTM - A 105 + ENP / A 182 F316 / ASTM A 182 F6A / DUPLEX SS / INCONEL / F44 / LF2
SEAT INSERT	RPTFE / NYLON / PEEK / DEVLON / PCTFE
STEM GASKET	GRAPHITE / LIP SEAL
BODY GASKET	GRAPHITE / REINFORCED SPIRAL-WOUND SS 316 GRAPHITE / LIP SEAL
STEM H. GASKET	GRAPHITE / LIP SEAL
TRUNNION GASKET	GRAPHITE / LIP SEAL
O RING	VITON (SPECIAL O-RING ON REQUEST)
TRUNNION	A 479 SS 316 / A 479 SS 316L / A 182 F 304 / A 182 F 316 / A 182 F 410 / A 564n TYPE 630 / A 105 / LF2 / DUPLEX SS / INCONEL
ISO MTG FLANGE	STEEL
SPRINGS	ASTM - A 313 SS 302 / ASTM B 637 (INCONEL 750) / INCONEL 718
THRUST WASHER	PHOSPHOR BRONZE / A 479 SS 316 + BRONZE + PTFE COATED / A 479 SS 316 + PTFE COATED
STUDS / BOLTS / CAP SCREW `	ASTM - A 320 L7, L7M / A 193 B8M / A 193 B7 / A 193 GR. B7M
NUT	ASTM - A 194 GR 7M / A 194 GR 8M / A 194 2H / A 194 GR 2HM
BEARING	A 479 SS 316 + PTFE COATED
COUPLING	STEEL + PLATING
SUPPORT STAND	STEEL
LIFTING HOOK	STEEL
BRACKET	STEEL
DRAIN PLUG/ NEEDLE VALVE	STANDARD

BOLTED & WELDED BODY JOINTS

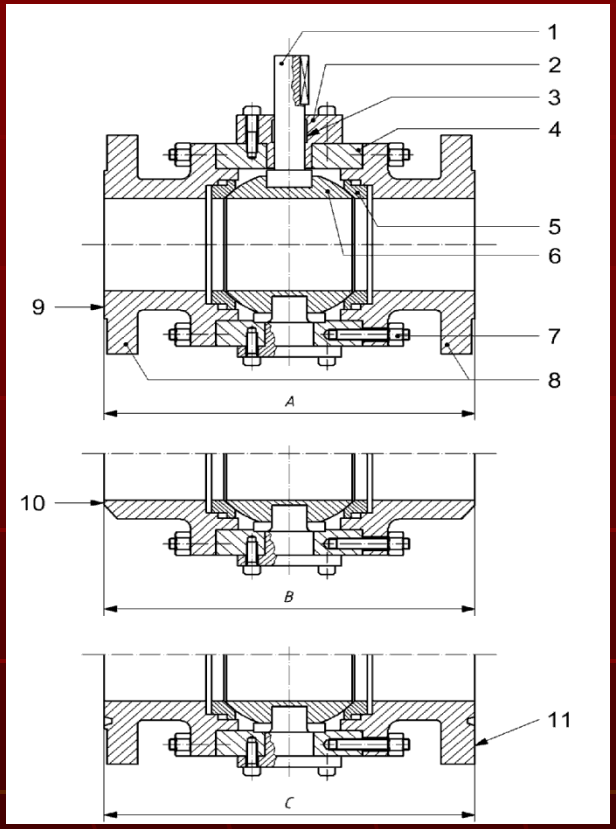
BOLTED BODY JOINTS



WELDED BODY JOINTS



END CONNECTIONS



1	stem
2	body cover
3	stem seal
4	body
5	seat ring
6	ball
7	body bolting
8	closure
9	raised face
10	welding end
11	ring joint
A	raised-face face-to-face dimension
B	welding-end end-to-end dimension
C	ring-joint end-to-end dimension

VARIOUS SURFACE TREATMENTS ON TRIMS & INTERNAL PARTS

1 - STELLITING

- It is a process of welding deposition of Cobalt-chromium-tungsten-molybdenum alloys metal over meeting surfaces.
- Stellite alloy is a range of cobalt-chromium alloys designed for wear resistance a completely non magnetic and non-corrosive
- It is a Standard feature for high pr. Class #900 & above.
- STL 1,3,6 & 12 : Hard facing rod is available in three grades as 1,3,6 & 12 & will have different hardness.
- Applied on Stainless steel & nickel based alloys

PURPOSE

- Increase surface hardness & wear resistance properties
- Low co-efficient of friction
- Ability to take high polish
- Resistance to chemical action

2 - ENP

- ELECTROLESS NICKEL PLATING
- It is chemical process of deposition of nickel layer on metal surface without using any electric current.
- Object to be dipped in tank of Nickel based & phosphoric acid based chemicals for specified time.

PURPOSE

- Better surface finish which reduce torque & seat life.
- Chemical resistance.

3 - CLADDING

- Cladding can be described as the welding of two materials with different qualities.
- High-quality material can be clad on a cheaper base material in order to increase the erosion and corrosion resistance of a product.
- Cladding material can be Monel, Inconel, SS316 etc.,

PURPOSE

This is a good alternative for expensive duplex materials. Cladding (surfacing) is also applied to increase the mechanical qualities.

4 - OVERLAY

- Overlay is welding deposition of one metal over other.
- High-quality material can be deposited on a cheaper base material in order to increase the erosion and corrosion resistance of a product
- Overlay can be 13% Chrome, Monel, Inconel, SS316 etc.,

PURPOSE

This is a good alternative for expensive materials. Cladding (surfacing) is also applied to increase the mechanical qualities.

5 - TCC

- Tungsten Carbide Coating
- Coating of Tungsten Carbide alloys over base material by with welding/fusion process. (Process HVOF, welding)
- TCC is done on seating surfaces of valves where application is metal seat-high pressure-high pressure.

PURPOSE

Tungston Carbide is very high wear-temperature resistant material & it gives very high wear & tear resistance to surface even at higher temperature.

6 - EPOXY COATING

- It is powder coating of epoxy resins over surface to protect it from chemical reaction/corrosion.
- Epoxy spray coatings : Applied with spraying gun to required thickness.
- Fusion bonded epoxy coating: Applying epoxy powder over surface & fused/bonded my heating process.

PURPOSE

- Protecting of valve surfaces from chemical reaction/corrosion.
- Saving expensive base material using alternative economical material with lining.

7 - LININGS

- It is proces of lining the surface with rubber or plastic.
- Rubber lining
  a) Replaceable type, b) Vulcanising , c) Bonding
- PFA lining

PURPOSE

- Protecting of valve surfaces from chemical reaction/corrosion
- Saving expensive base material using alternative economical material with lining.

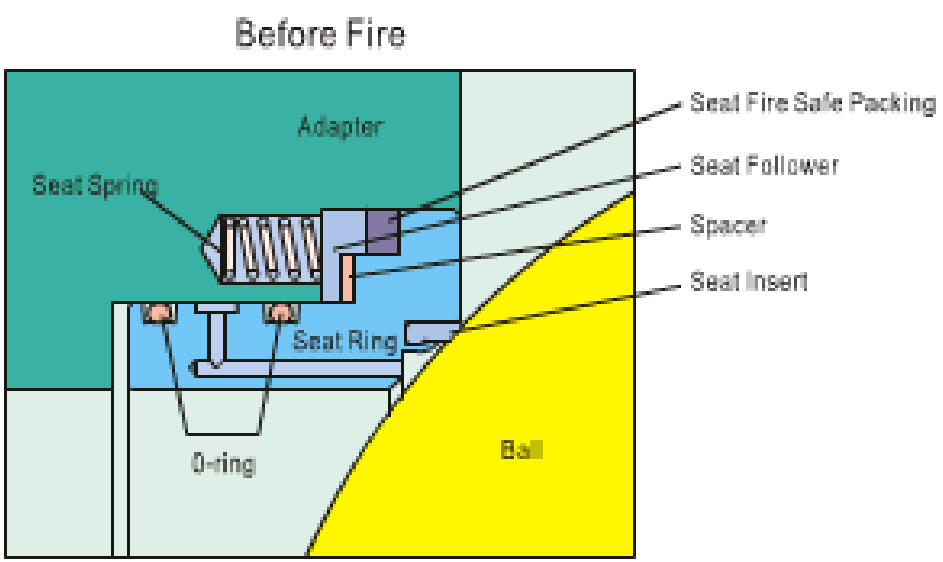
FEATURES OF TMBV BALL VALVE

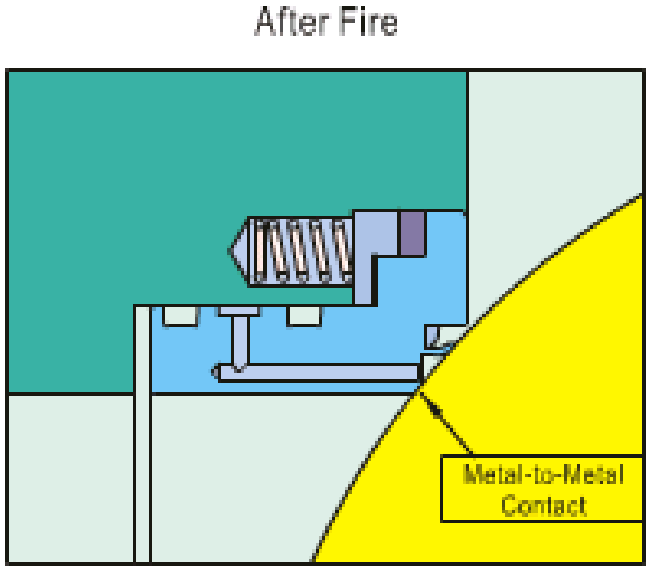
- FIRE SAFE SEAT SEALING
- CRYOGENIC SERVICE
- ANTI BLOW-OUT STEM
- ANTI-STATIC DEVICE
- EMERGENCY SEALANT INJECTION SYSTEM
- DOUBLE BLOCK AND BLEED
- SEAT SEALING FEATURE & SELF RELIVING SEAT
- DUAL PISTON FEEFCT SEALING
- LOW / FUGITIVE EMISSION

FIRE SAFE BALL VALVE

Fire safe - As ball valves are commonly used in gas and oil pipelines, it is essential that the valves used in such applications are fire safe. A valve is considered fire safe if, when exposed to fire conditions, it will continue to provide minimal leakage through the seat and stem, and provide effective shut-off during or following a fire or exposure to excessive temperatures. Standards relating to fire-safety are set out in BS 5146, API 607, API 6FA BS 6755 - Part II. BS EN ISO 10497.

The main concern is that burning temperatures will destroy soft seats and seals; a number of methods have been developed to overcome this. One approach is to include secondary metal sealing surfaces behind the polymeric seats as an integral part of the body. When exposed to burning temperatures, the seat begins to deform and the pressure of the process media displaces the ball so that it extrudes the polymeric seat (Ref below Figure). When the seat has been completely destroyed, the ball will seat against the body metal sealing surface, providing a tight shut-off (Ref below Figure)



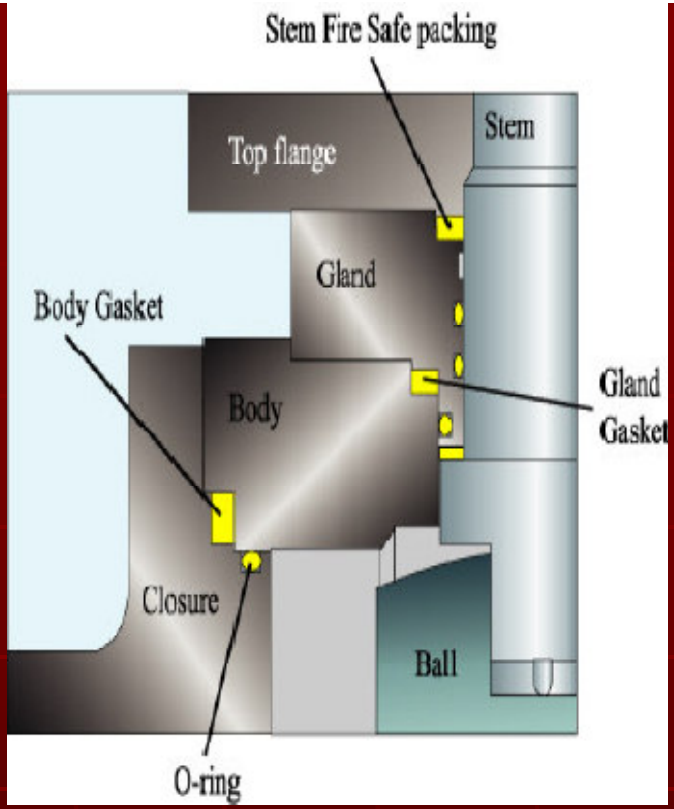


Internal leakage prevention

When seat insert, O-ring and spacer are damaged in a fire, the line pressure and the seat preloaded spring push the seat metal lip into the ball surface to cut off the line fluid and prevent the internal leakage to reach fire-safe purpose. Besides, the seat graphite packing can prevent fluid leakage from between the valve body and the seat.

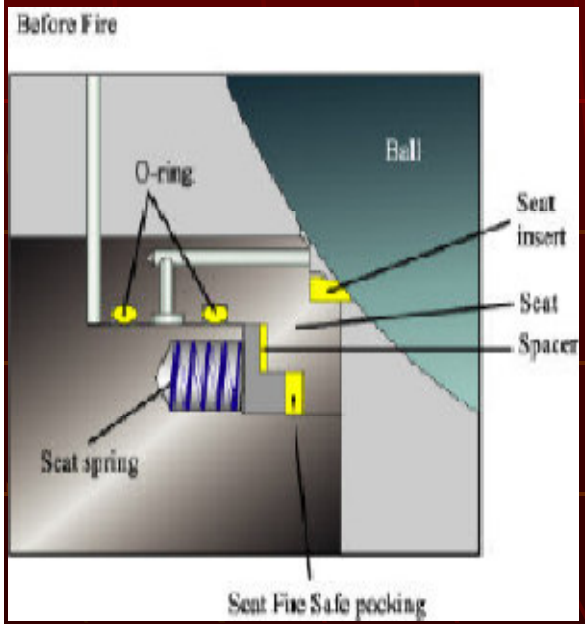
External leakage prevention

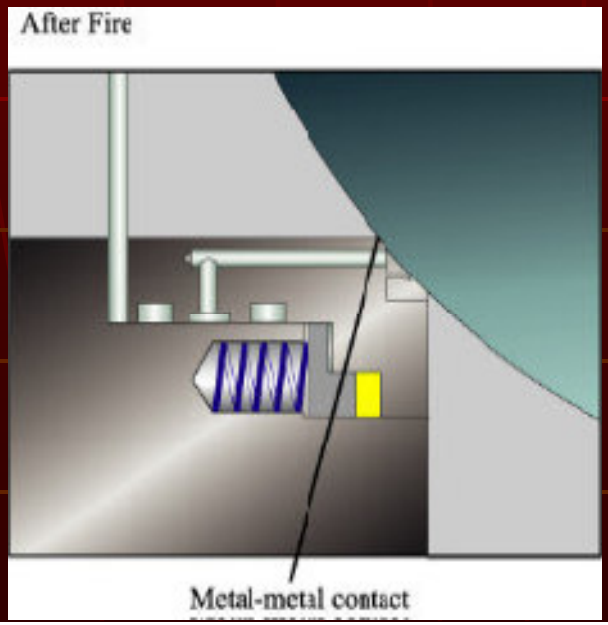
A combination of O-ring and graphite gasket on body/adapter connection, body/gland connection, and stem/gland joint, can prevent the external leakage. When O-rings are damaged after a fire, body gasket, gland gasket, and stem packing, can reach sealing function and prevents external fluid leakage



EXTERNAL LEAKAGE PREVENTION:

Leakage from the valve stem area is prevented by double sealing with 2 O-Rings and Gland Gasket. Leakage through the valve body joint is also blocked by double sealing with O-Ring and Body Gasket. After a fire has deteriorated O-Rings, Gland Gasket, Body Gasket and Stem Fire safe packing are the measure that prevents external fluid leakage.

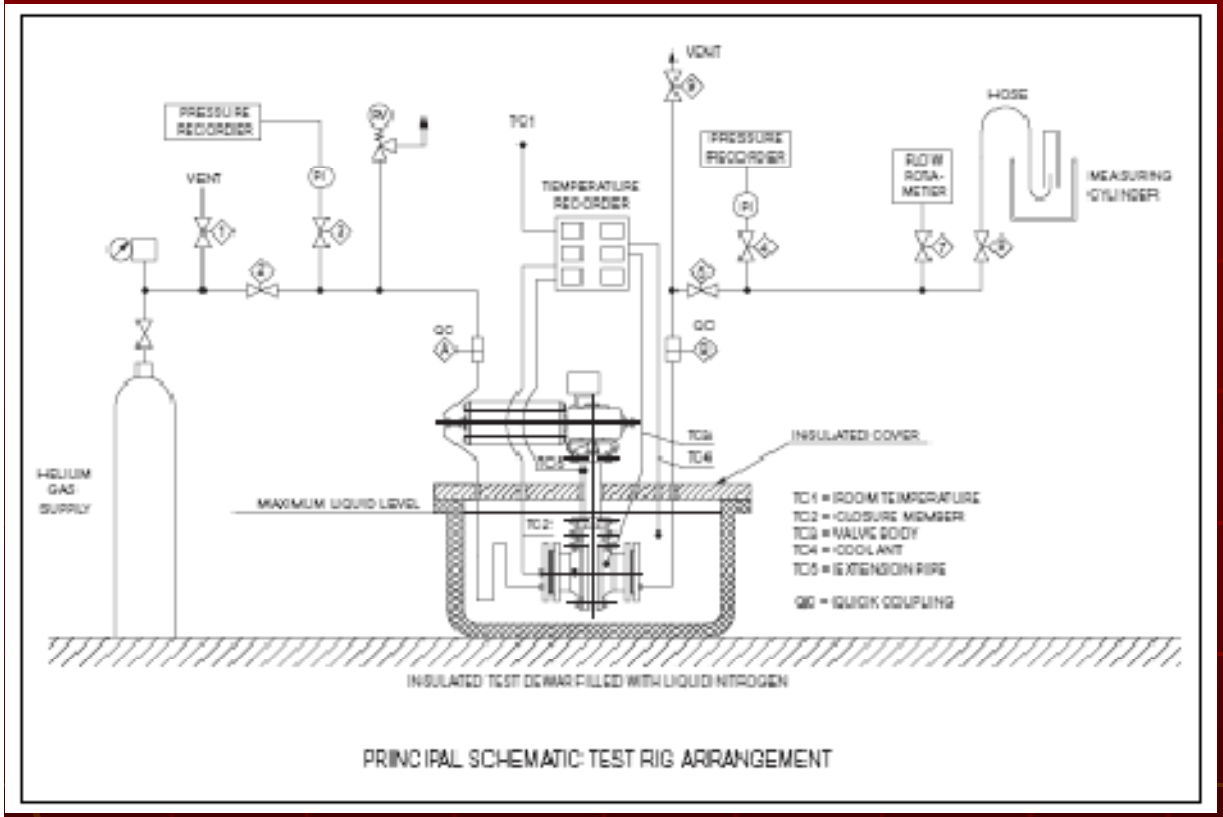




INTERNAL LEAKAGE PREVENTION:

When non-metal materials such as O-Ring, seat insert and spacer are decomposed or deteriorated by fire, the edge of the metal seat preloaded by the seat spring comes into contact with the Ball to shut off line fluid to minimize internal leakage through the valve bore. Also the fire safe flexible graphite seat packing will be compressed by the seat spring to prevent fluid leakage between the valve body and the seat.

CRYOGENIC -TRUNNION MOUNTED BALL VALVE



PRINCIPAL SCHEMATIC TEST RIG ARRANGEMENT

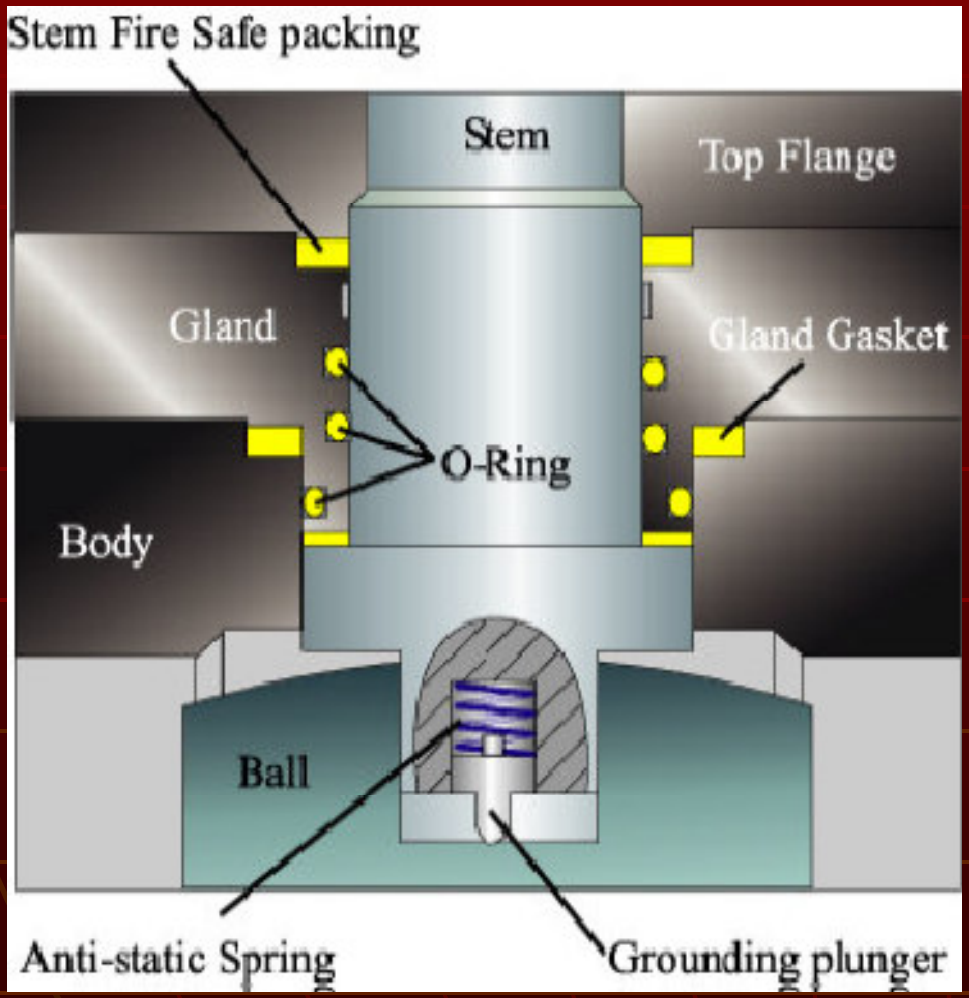
Cryogenic valves normally refer to valves with working temperature blow -50ºC to 196ºC, It is widely used in LNG, LPG and other low temperature industry.

The size range covered BS 6364 standard from DN 15mm to a maximum sizes. This test is conducted at **(-) 196˚C** in the case of suitable Steel Valves. Reference is made to Appendix – BS 6364:1984 "**Valves for Cryogenic Service"**

The CRYOGENIC VALVE shall have a name plate with following details,

1. Valve Type
2. Size
3. Pressure Rating
4. Body & Bonnet/Cover/Sidepiece material
5. Seat test pressure
6. Shell test pressure.
7. BS 6364, (-) 196˚C
8. Valve Serial No and Tag No,
9. Trim material
10. Tag No

ANTI BLOW-OUT STEM & ANTI-STATIC DEVICE



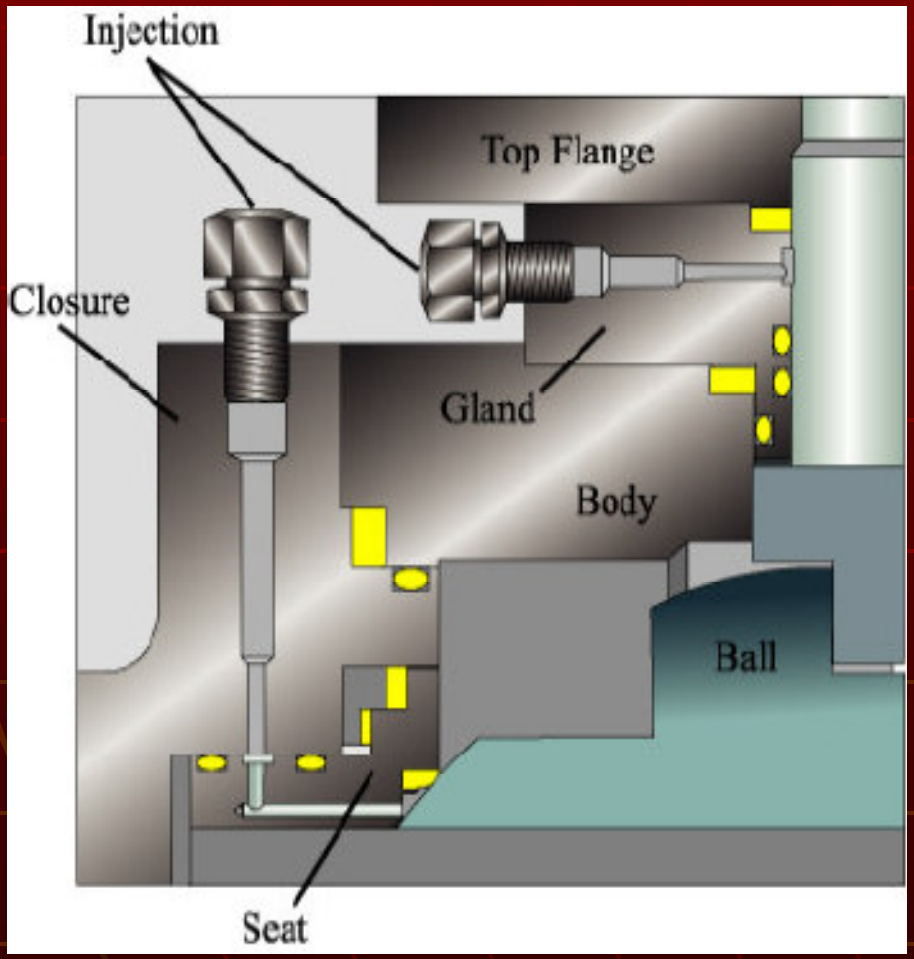
ANTI BLOW-OUT STEM:

The stem is made separately from the ball; The lover end of the stem is designed with an integral collar to be blowout-proof

ANTI-STATIC DEVICE

Antistatic device is a standard feature of RHINO ball valve. A spring-loaded pin assures the electrical continuity, between ball, stem and body, so as to avoid sparks during turning of the stem to open and close the valve, which could be dangerous in case of hazardous area installation.

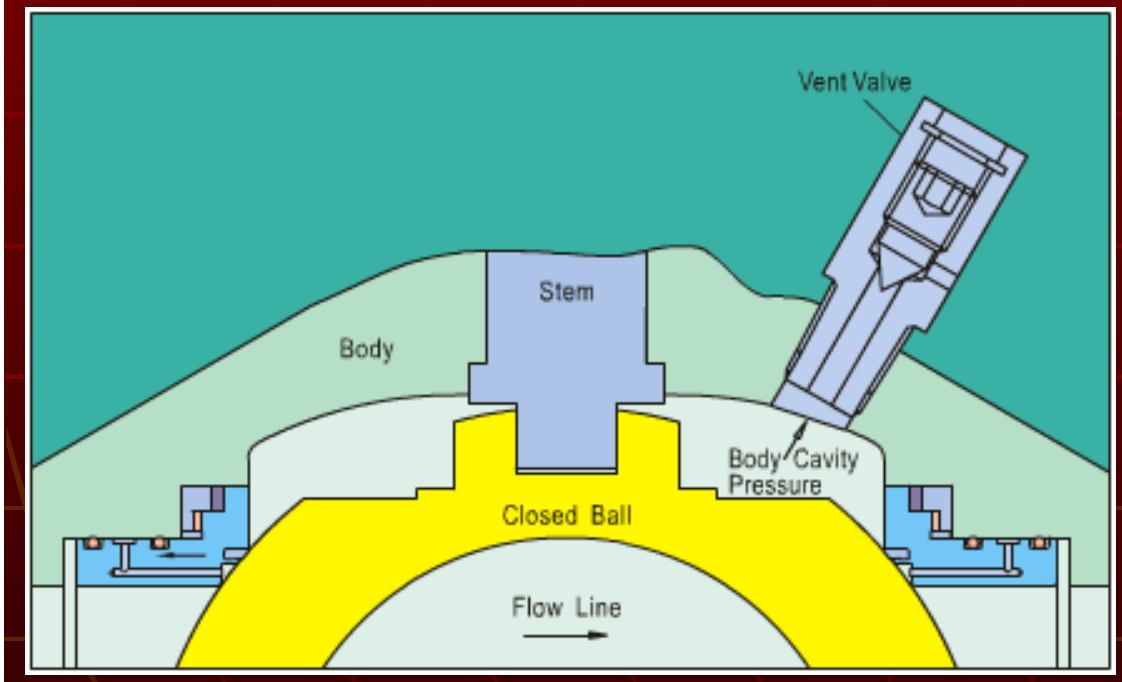
EMERGENCY SEALANT INJECTION SYSTEM



EMERGENCY SEALANT INJECTION SYSTEM:

Trunnion mounted ball valves will be installed with a sealant injection fittings on both stem and seats.
When the sealing materials (seat sealing or stem O-Ring) are damaged or decomposed by fire or other accidental causes, leakage from the seat and stem can be prevented by injection of sealant into these fittings. Fitting also internally installed a second check valve to provides backup sealing.

DOUBLE BLOCK AND BLEED



DOUBLE BLOCK AND BLEED:

Each ball seats shut off the line fluid independently and the upstream and downstream side, allowing double block operation.

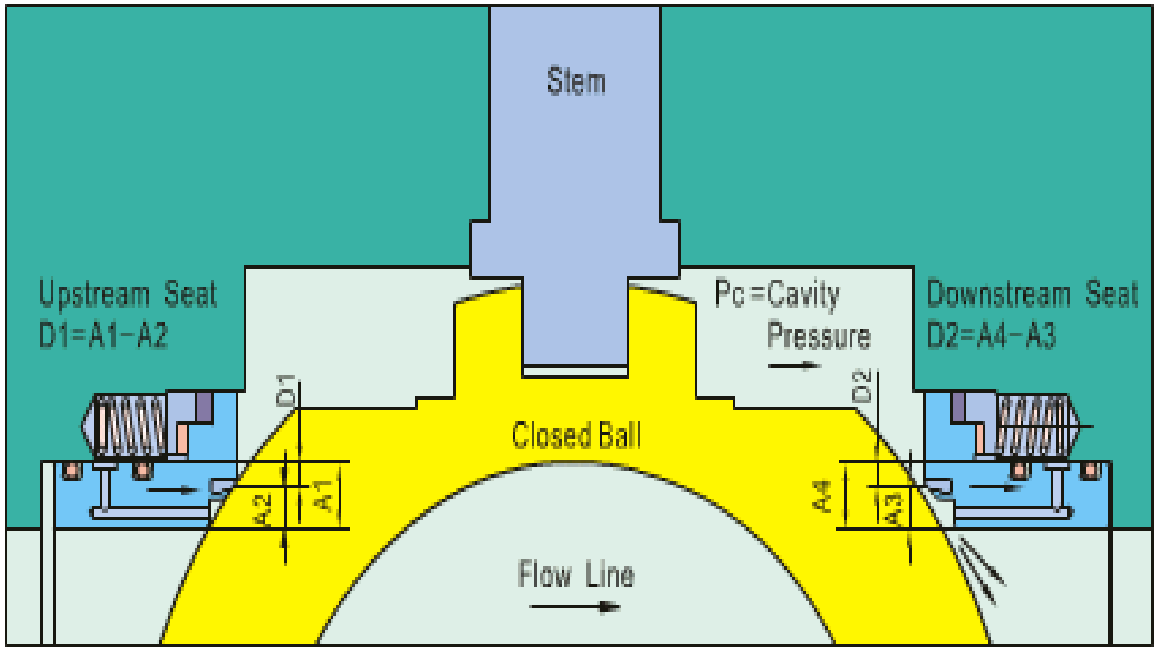
When the pressure is simultaneously applied to both sides of the ball in closed position, the valve bore and the body cavity will be isolated from each other, and the residue within the body cavity can be released through the drain plug.

SEAT SEALING FEATURE & SELF RELIVING SEAT

Seat Sealing Future:

a) Upstream seat: The seats can be moved slightly along the valve axis, Upstream line pressure acting on the seat area (A1) does not equalize against on the seat area (A2).The differential force in the area (D1) pushes the seat tightly against the ball surface resulting in a tight effective seal.

b) Downstream seat: When the body cavity pressure is lower than the downstream pressure, the net pressure difference acting over area (D2) pushes the downstream seat tightly against the ball surface creating a positive seal.



Self Reliving Seat:

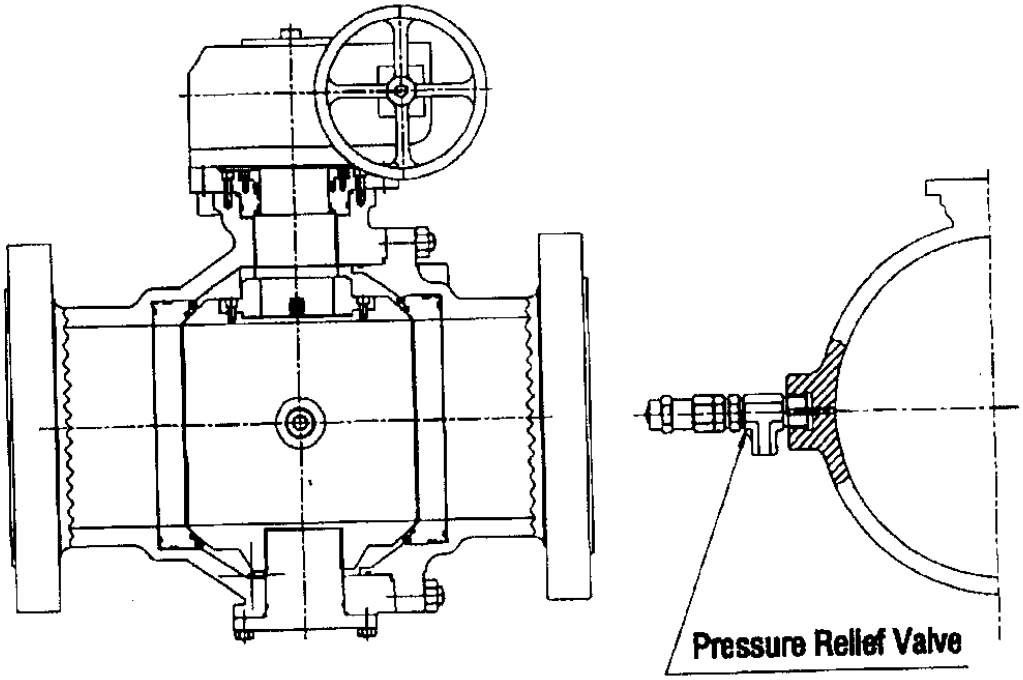
When the body cavity pressure exceeds the downstream seat spring preloaded force, the differential force in the area (D2) pushes the downstream seat away from the ball, the body cavity pressure will automatically relieve. And then the seat returns to the ball under spring action.

DUAL PISTON FEFFECT SEALING

FITTED WITH RELIEF VALVE

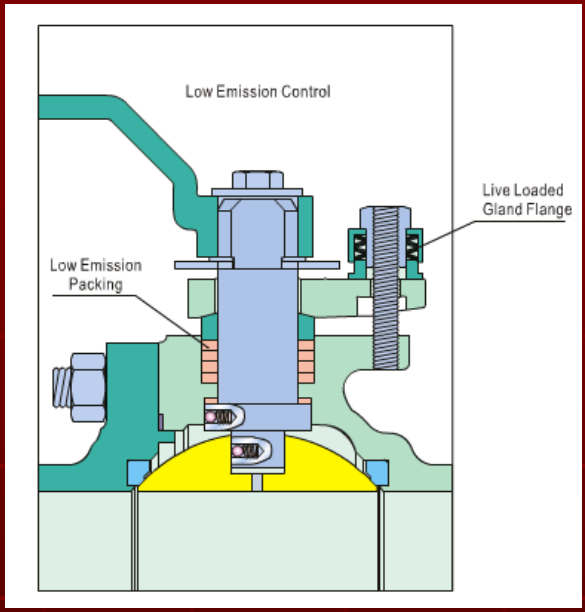
Standard Trunnion mounted Ball valves are by design has self cavity relief, and when Dual piston effect seats are used this can be achieved by using external pressure relief valve, details of which are shown in the drawing.

Whenever Ball valves are supplied with dual piston effect seats, self cavity relief is not possible. To achieve this feature, we are supplying the valve fitted with Pressure relief valve which can be set to maximum working pressure of valve of each rating or as per customer's requirement.



Body cavity Relief Valve is fitted for self body cavity relief, when Ball Valves are supplied with Double piston effect seats.

FUGITIVE EMISSION



Because of frequent opening and closing of the valve, normal graphite granule can be drawn by the stem, which will cause leakage. Valve designed low emissions valve use special low emissions packing to ensure the seal of stem. The cone packing is made of expanding graphite in die-formed rings and has features of heat resistance, less stress relaxation and low creep. With this special structure, it allows for a low-friction on rotary & rising stem valve, therefore providing the stabilized sealing performance for long cycle life. For low temperature service, the standard V shape PTFE packing rings are used for low emissions control.

Fugitive emission - for evaluation of external leakage of valve stems & body joints

This specification shall apply to the test & evaluation of fugitive emission suppressing performance level of on/off valves.
REFERENCE: MESC SPE 77/312 REV. 18 – 06 - 2004

TYPES OF OPERATIONS

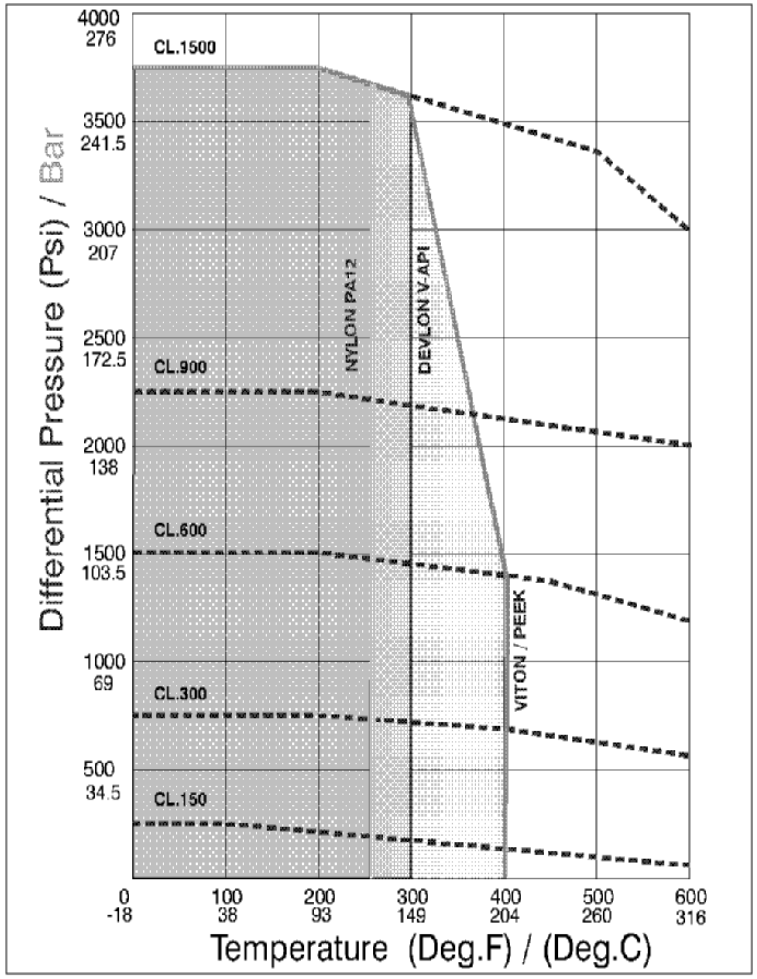
- LEVER / HANDWHEEL
- WARM GEAR
- PNEUMATIC ACTUATOR
- ELECTRIC ACTUATOR
- HYDRAULIC ACTUATOR

TYPES OF OPERATIONS

Testing Standards

Standards of Compliance	
Hydro Testing & Antistatic Test	**BS 5351/6755-Part 1/ BS EN 12266 API 6D / API 598 / ISO 5208**
Fire Tested Design	**API 6FA /API 607/BS EN ISO 10497 BS 5146 Appendix A/BS 6755 - Part II**
Cryogenic Test	**Bs 6364: 1984**
Helium & Vacuum Testing	**ASME SEC V Article 10**
Casting Acceptance	**MSS-SP 55**
Fugitive emission qualification	**MESC 77/312, ISO 1576 & TA-Luft**
Spark Test	**IS 4682 Part I**
Documentation	**BS EN 10204**
Above testing methods and acceptance level detail described in there respective testing procedures.	

PRESSURE TEMPERATURE RATINGS & TORQUE VALUES



P. T. Ratings

Pressure - temperature seat ratings of valves are as given in the graph for body material ASTM A 216 - Gr. WCB. With the exception of body seat rings and primary soft seals, all valve components are capable of withstanding the pressure - temperature ratings as specified in ASME B 16.34, BS 1560: Part II, BS 4504 : Part I or BS 5351/ BS EN ISO 17292 as applicable.

Temperature Limits:

		Lower limit Deg.F/Deg.C		Upper limit Deg.F/Deg.C	
Body Matl.	WCB	-20	-29	1000	538
	LCB	-50	-46	650	343
	CF8	-425	-254	1500	816
	CF8M	-425	-254	1500	816
Seat	NYLON	-50	-46	As per Graph	
	DEVLON	-50	-46	As per Graph	
	PEEK**	-50	-46	As per Graph	

** For applications above 400°F (205°C) consult Virgo

Note : These ratings are a guide for general service.
Please consult Virgo for specific recommendations.

Torque Values in Nm / in-lbs.

SIZE DN (NPS)	TORQUE TYPE	PRESSURE CLASS									
		150#		300#		600#		900#		1500#	
		Nm	In-lbs	Nm	In-lbs	Nm	In-lbs	Nm	In-lbs	Nm	In-lbs
1 1/2" (40)	BTO	54	478	81	717	99	876	111	982	162	1434
	ETC	43	381	65	575	79	699	89	788	130	1151
2" (50)	BTO	69	611	85	752	110	974	135	1195	285	2522
	ETC	55	487	68	602	88	779	108	956	228	2018
3" (80)	BTO	172	1522	239	2115	323	2859	436	3859	605	5354
	ETC	138	1221	191	1690	258	2283	349	3089	484	4283
4" (100)	BTO	275	2434	363	3213	465	4115	605	5354	931	8239
	ETC	220	1947	290	2567	372	3292	484	4283	744	6584
6" (150)	BTO	475	4204	756	6691	1211	10717	1664	14726	2580	22833
	ETC	380	3363	605	5354	968	8567	1331	11779	2064	18266
8" (200)	BTO	889	7869	1410	12479	2441	21606	3357	29706	5401	47802
	ETC	712	6298	1128	9983	1954	17292	2686	23769	4320	38232
10" (250)	BTO	1189	10524	1842	16302	3136	27750	4277	37851	6835	60490
	ETC	952	8422	1474	13041	2509	22205	3422	30281	5468	48387
12" (300)	BTO	1489	13179	2242	19838	3743	33123	5525	48896	12488	110515
	ETC	1192	10546	1793	15866	2994	26496	4420	39117	9990	88412
14" (350)	BTO	2668	23608	3931	34791	7064	62518	13247	117236	-	-
	ETC	2134	18882	3145	27835	5651	50012	10660	94341	-	-
16" (400)	BTO	3581	31690	5359	47429	8940	79120	19058	168663	-	-
	ETC	2864	25350	4288	37945	7153	63301	15275	135184	-	-
18" (450)	BTO	4980	44073	7835	69338	13737	121573	23215	205456	-	-
	ETC	3984	35258	6268	55468	10989	97252	18572	164360	-	-
20" (500)	BTO	6090	53897	10478	92734	20098	177867	-	-	-	-
	ETC	4872	43117	8383	74191	16078	142294	-	-	-	-
24" (600)	BTO	11688	103439	18437	163166	31941	282678	-	-	-	-
	ETC	9350	82751	14749	130530	25553	226142	-	-	-	-

B.T.O. = Break to open torque (Under Rated Pressure) E.T.C.= End to close torque (Reseating Torque)

NOTES :-
1) Torques Values are in Nm/In-lbs and are for Primary Soft Seated TMBVs with Seat Insert Material as Nylon PA - 12/ Devlon V (API).
2) Torque Values with PEEK seat insert are 100% higher than the corresponding above mentioned values.
3) Torque Values are at Ambient Temperature, media being clear water. (Without any safety factor)
4) For Reduced Bore Valves, take torque values corresponding to the lower size (Ball Bore size) e.g. : for 14" x 10" Reduced Bore Valve, take torque values corresponding to 10".
5) Torque details for balance sizes can be provided on request.
6) Above Torque Values are indicative and for reference only. Exact Torque Values for Actuator sizing will depend on service conditions.

Hydro Testing Chart

RATING AND TEST PRESSURES AT AMBIENT TEMPERATURE

ASME CLASS	RATING (1)			BODY TEST			H.P. SEAT TEST			AIR SEAT TEST		
	psi	bar	kg/cm²	psi	bar	kg/cm²	psi	bar	kg/cm²	psi	bar	kg/cm²
150	275	19	19.3	413	28.5	29	303	20.9	21	100	6	7
300	720	50	51	1080	75	77	792	55	56	100	6	7
600	1440	99	101	2160	148.5	152	1584	108.9	111	100	6	7
900	2160	149	152	3240	223.5	228	2376	163.9	167	100	6	7
1500	3600	248	253	5400	372	380	3960	272.8	278	100	6	7
2500	5988	413	421	8982	619.5	632	6587	454.3	463	100	6	7
API 3000	3000	207	210	4500	310.5	315	3300	227.7	231	100	6	7
API 5000	5000	345	352	7500	517.5	528	5500	379.5	387	100	6	7
API 10000	10000	690	703	15000	1035	1055	11000	759	773	100	6	7

(1) Typical only - rating pressure may change for different materials.

Conversion factors 1 bar = 14.50 psi and 1 bar = 0,981 kg/cm² and 1 bar = 100 kpa 1 kg/cm² = 14.22 psi
1°F = (1.8 x °C) +32 and 1°C = (°F -32) / 1.8

LEAKAGE RATES

Standard	Soft seated	Metal-seated	Cryogenic
API 6D	ISO 5208 Rate A	ISO 5208 Rate D	(1)
BS 12266-1	–	Rate D	(1)

STANDARD PERFORMANCE TESTS

- **Visual and dimensional check**
- **High-pressure hydrostatic shell test**
- **High-pressure hydrostatic seats test**
- **Low-pressure air seats test**
- **Stem torque check**

Cv FLOW COEFFICIENTS

API 6D

BORE (INCHES)	CLASSES					
	150	300	600	900	1500	2500
2	420	420	400	330	330	250
2 1/2	690	690	610	520	510	320
3 × 2	200	200	200	190	180	200
3	1200	1050	1000	910	820	500
4 × 3	600	600	600	590	550	560
4	2200	2100	1850	1800	1700	1100
6 × 4	800	800	790	790	780	745
6	5150	5100	4600	4380	3800	2500
8 × 6	2150	2150	2150	2150	2150	2150
8	9500	9400	9000	8500	7400	5300
10 × 8	4300	4300	4300	4450	4450	4100
10	15000	15000	14700	14500	11500	8300
12 × 10	7550	7550	7550	8000	9000	7550
14 × 10	6000	6000	6000	6100	6100	-
12	23000	23000	22500	21100	18000	13000
14 × 12	14000	14000	14000	12800	13000	-
16 × 12	9100	9100	9100	8900	8900	-
14	28000	28000	28000	25000	21000	-
16 × 14	15000	15000	15000	14200	14100	-
16	37200	37200	37200	34500	27500	-
18 × 16	21000	21000	21000	19200	19000	-
20 × 16	15300	15300	15300	13800	12000	-
18	49000	49000	49000	45000	37000	-
20 × 18	28400	28400	28400	25000	25000	-
20	59000	59000	59000	55200	47800	-
24 × 20	28200	28200	28000	25100	20600	-
22	68200	68200	68200	62000	54000	-
24	92000	92000	92000	83800	70000	-
30 × 24	36000	36000	36000	32900	-	-
26	110000	110000	110000	98500	-	-
28	121000	121000	121000	113000	-	-
30	145000	144000	144000	130000	-	-
36 × 30	64000	64000	64000	61500	-	-
32	170000	170000	170000	151000	-	-
36 × 32	87000	87000	87000	69500	-	-
36	210000	210000	210000	198200	-	-
40	267500	267500	267500	-	-	-
42 × 36	96700	96700	96000	-	-	-
42	280000	280000	280000	-	-	-
48	384000	384000	384000	-	-	-
56 × 42	89000	89000	89000	-	-	-
56	521000	521000	521000	-	-	-

API 6A

BORE (INCHES)	CLASSES		
	3000	5000	10000
1 13/16	270	270	230
2 1/16	350	350	300
3 1/8	1000	940	890
4 1/16	1750	1700	1600
5 1/8	2900	2700	2450
7 1/16	5930	5400	5220

DATA FOR CALCULATION OF FLOW

The coefficient of flow C_V expresses the rate of flow in gallons per minute at 60°F water with a pressure drop of 1 psig across the valve. The C_V coefficients for the various types and sizes, shown in the tables, have been determined from actual flow tests.

NOTE: K_V is the metric equivalent of C_V.

$$K_V = C_V \times 0.85$$

FOR LIQUIDS:

(1) $$Q_L = C_V \sqrt{\frac{\Delta P}{G_L}}$$

(2) $$\Delta P = G_L \left(\frac{Q_L}{C_V}\right)^2$$

WHERE: Q_L = Flow in U.S. gallons per minute.
ΔP = $(P_1 - P_2)$ Pressure drop in psi
G_L = Specific gravity of liquid (water = 1 at 60°F)

FOR GASES:

(3) $$Q_g = 1360\, C_V \sqrt{\frac{\Delta P}{G_g T}} \bullet \sqrt{\frac{P_1 + P_2}{2}}$$

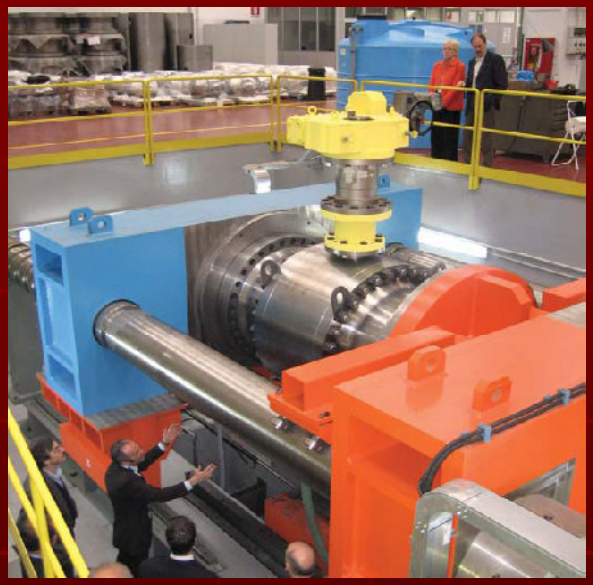
(4) $$\Delta P = P_1 - \sqrt{P_1^2 - 2G_g T \left(\frac{Q_g}{1360 C_v}\right)^2}$$

WHERE: Q_g = Volumetric flow of gas (SCFH)
G_g = Specific gravity of gas at standard conditions (air at atmosphere and 60°F = 1)
T = Absolute temperature of gas (°F +460)

NOTE: *For gas, max. $\Delta P = 1/2\, P_1$, and min. $P_2 = 1/2\, P_1$, and P_1, P_2 are absolute pressures (psia)*

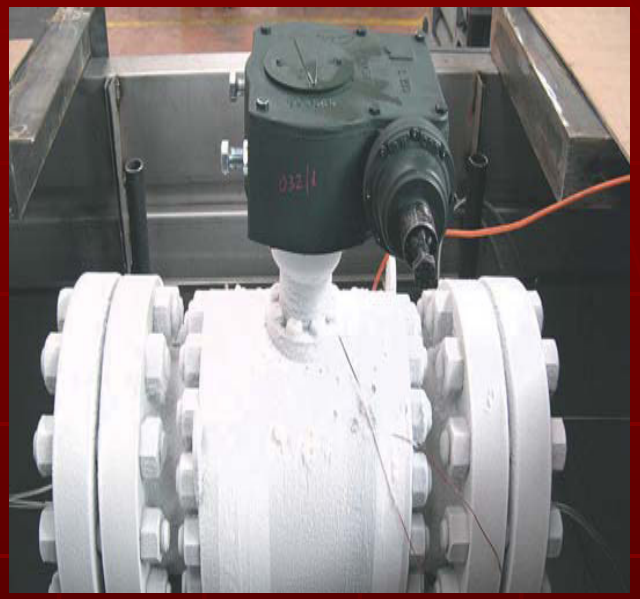
Testing of TMBV Valves

Hydro Testing



Hydro Testing

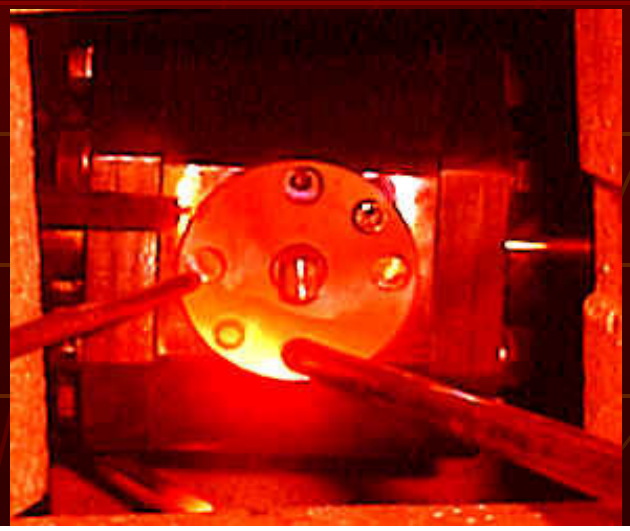
Cryogenic Testing



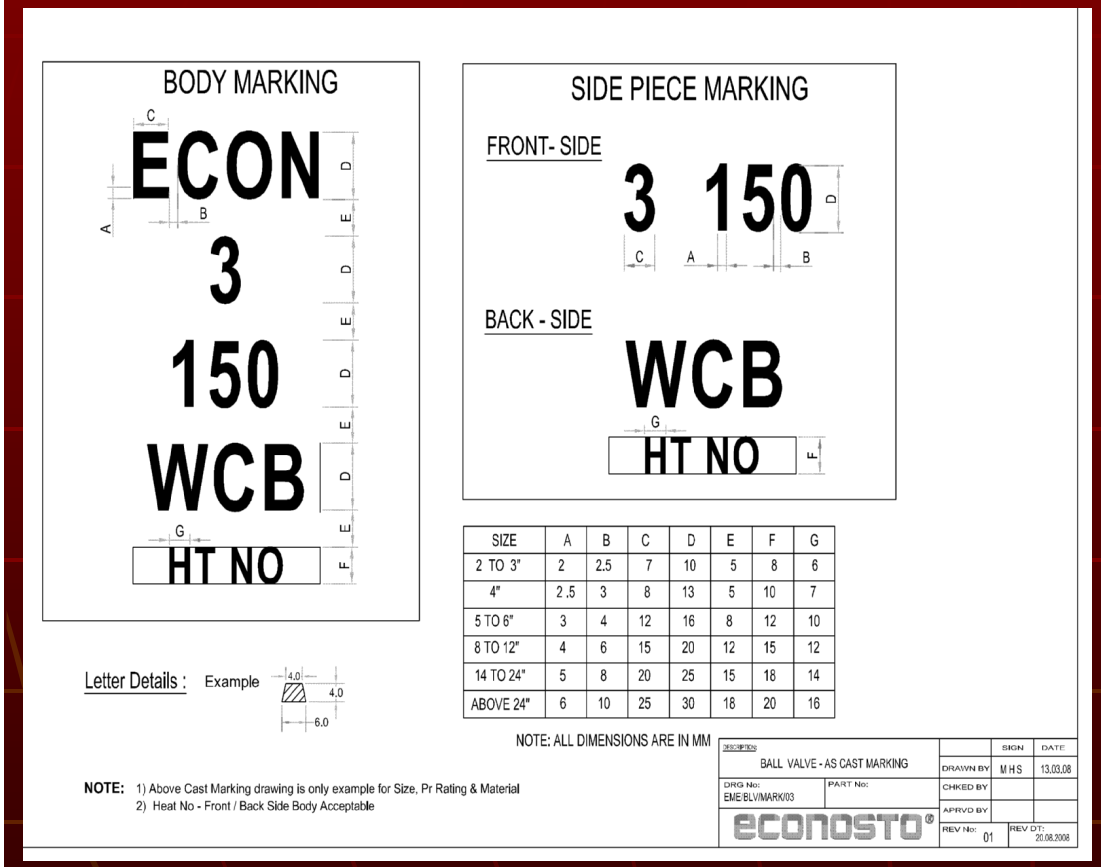
Hydro Testing

Fugitive Emission Testing

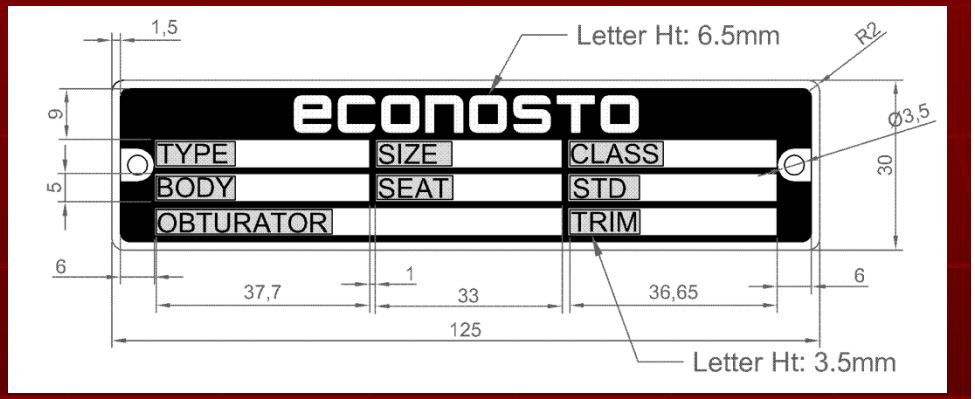
Fire Safe Testing

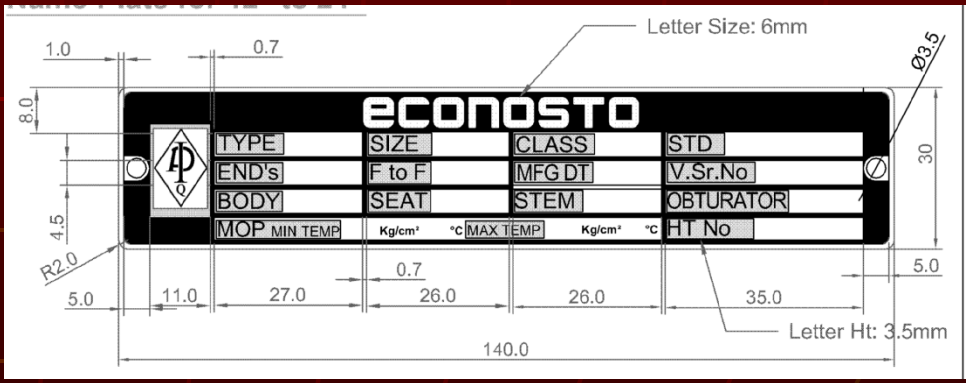


REQUIREMENTS OF BODY MARKING & NAMEPLATES



SIZE	A	B	C	D	E	F	G
2 TO 3"	2	2.5	7	10	5	8	6
4"	2.5	3	8	13	5	10	7
5 TO 6"	3	4	12	16	8	12	10
8 TO 12"	4	6	15	20	12	15	12
14 TO 24"	5	8	20	25	15	18	14
ABOVE 24"	6	10	25	30	18	20	16





Corrosion Protection and Painting

- All castings shall be shot blasted and are subjected to dewatering oil coats. Carbon Steel valves are Zinc phosphated and internally lacquered before final assembly.
- Valves should be thoroughly cleaned and primer coated with Epoxy Zinc Phosphate primer, followed by a final coat of Epoxy specified shade to be applied in semi gloss finish.
- Shall be shipped in vapor corrosion inhibitor impregnated paper bags with desiccant pouches to prevent corrosion due to saline environment.

Installation of TMBV

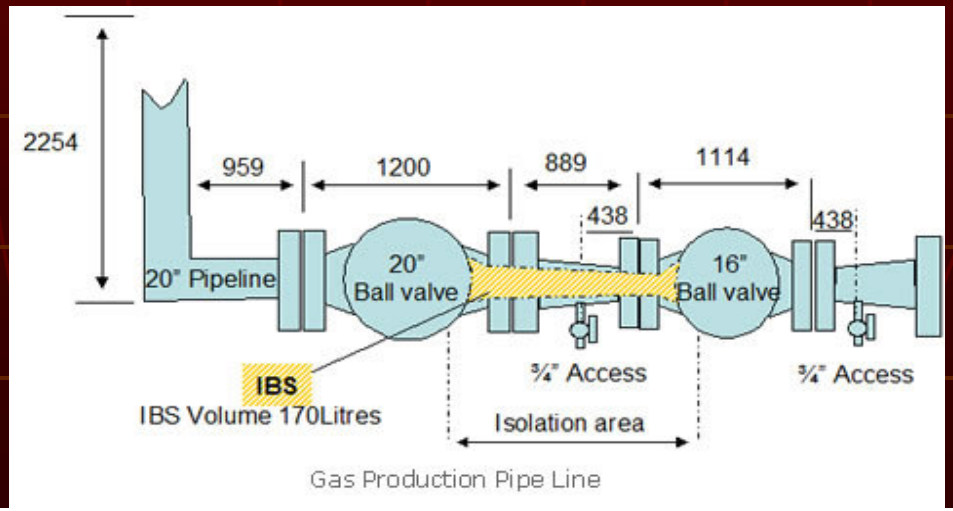
Under Ground

ON Shore Installation

OFF Shore Installation

ON Shore Installation

Pipeline Cleaning (Pigging)



Pressure Control System

Pressure control system in the gas transmission station is a gas pressure control device used in the gas transmission station of long distance gas pipeline, city distributing station, storage and distribution station, fuel gas for gas turbine plant and so on. It is called “Regulator Train”...

Metering and Regulating System of Self-used Gas within the Station

Metering and regulating system of self-used gas within the station is a skid-mounted gas supply equipment for small-scale generator, heating/hot water boiler and fuel gas for living within the station of long distance gas pipeline. The system integrates the functions of filtering, heating, regulation

Gas Metering and Regulating System for Gas Turbine

Gas metering and regulating system for gas turbine is a skid-mounted gas supply equipment for gas turbine in the compressor station of long distance gas pipeline, the system integrates the functions of filtering, heating, regulating, metering, venting, relief, leak alarm and automatic switching,

Turbine / Ultrasonic Metering System

Turbine / ultrasonic metering system is a skid-mounted metering system for custody transfer metering in the metering station of long distance gas pipeline. The system integrates the functions of filtering (or the filtering part is separated), metering, flow ratios, on-line calibration, system vent...

Oil Electric-hydraulic Control System

Oil electric-hydraulic control system is the key equipment to protect the pipeline system and control the oil throughput at oil transportation station. The control valve adopts V series ball valve manufactured by FISHER(in US). The actuator adopts DDYZ series electric-hydraulic actuator manufactur...

TROUBLESHOOTING

Sl. No.	Nature of Defect	Cause	Remedy
1	Seat Leakage	1. Damage of Seat due to presence of foreign particles. 2. Damage of '0' Ring at the seat/retainer. 3. Damage of seat in weld end valves due to improper precautions. 4. Damage of seat at high temperature. 5. Improper closing of actuator operated valves. 6. Damage of seat due to rust at body of seat retainer.	•Dismantle, clean & replace by new seats •Dismantle, clean & replace by new '0' Rings •Suggest following right steps as per IOM manual. •Check for suitability of seat material and design. •Ensure correct closing of actuator. •Dismantle, clean & reassemble/replace.
2	Gland Leakage	1. Loosening of check nut or locking bolt. 2.Damage of stem seal/stem washer 3. Misalignment of actuator, bracket & stem.	•Tighten the check nut & locking bolts •Replace the stem seal/stem washer. •Ensure correct alignment.
3	Body Seal Leakage	1. Improper tightening of Body bolting. 2. Improper precautions in case of weld end valves. 3. Misalignment of pipe line mating flanges.	•Ensure proper tightening of Body bolting. •Suggest following right steps as per our IOM manual. •Ensure correct alignment of flanges.
4	High Torque operation	1. High temperature of fluid handled. 2. Highly viscous fluid handled. 3. Insufficient air supply pressure in case of pneumatic operated valves 4. Reducing of lever length by user due to less space. 5. Pipeline flange pressure in case of single piece valves.	•Check for suitability of material and design. •Check for suitability of material and design. •Ensure sufficient air pressure. •Suggest using levers of correct length. •Face the seat or seat seal to relieve extra pressure.
5	Jerky operation	1. Presence of foreign particles at seat contact area. 2. Peeling of plating of Ball in case of metal seated valves. 3. Insufficient air supply pressure in case of pneumatic operated valves	•Dismantle, Clean & Reassemble. •Check for service condition/replace. •Ensure sufficient air pressure.
6	Gear Operator Damage	1. Very high torque operation. 2. Poor material of construction & design. 3.Transit damage	Check for causes as covered in Sl.No.4 Check for suitability. Replace the damaged spares & report accordingly.

HOW TO AVOID PROBLEMS

- Ball valves will be transported and stored with the ball in the fully open position.
- Flanged ends and welded ends will be protected.
- End protection will be removed only when the valve is installed in the line.
- Valves will be handled using the proper lifting lugs.
- Valves will be stored according to Valbart storage procedures. Long-term storage will be avoided.
- For welded-end valves, advise Valbart if there will be a post-weld heat treatment (transition pups may be necessary to avoid damages to seals).
- Always specify anti-explosive decompression material for valves to be used in high-pressure gas service.
- Make sure the selected actuator has been properly sized (an oversized actuator can be as dangerous as an undersized one).
- Flush and clean the line before operating the valve.
- Make sure no line-testing fluid is left in the line and/or the valve body.
- Avoid leaving the valve body filled with salt water to prevent internal corrosion.
- Advise Valbart of cycle frequency to ensure proper sizing of actuator.
- Do not use the actuator to lift the valve.
- During line-testing, valves will be left in the partially open position for the minimum possible amount of time.
- Standard ball valves will be used for on-off service only. Throttling service (use of the valve with the ball partially open) can damage the seats.
- Make sure to take into consideration the actual service conditions when selecting materials for O-rings and seat inserts.

The End