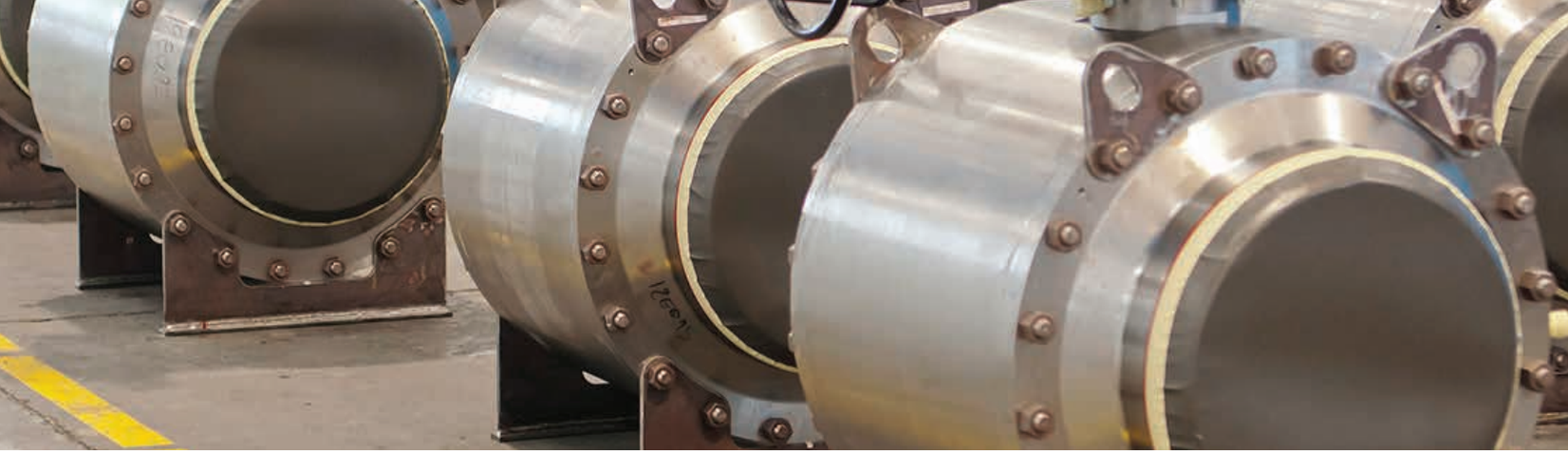
Virgo Trunnion and Floating Ball Valves

Delivering value with a comprehensive range
of products that meets your operational demands.

EMERSON™
Process Management



What is important when you purchase valves for your process?

- **Reliability**
- **Long Life**
- **Low emissions**
- **Local support**
- **Low cost of ownership**
- **All of the above**

With pressure to improve your bottom line, ever increasing quality and safety measures to implement, and more stringent regulatory requirements to comply with, you need confidence in your valve performance so that you have the ability to spend your time elsewhere. For high-quality, reliable ball valves from a trusted supplier, look to Emerson Process Management's Virgo Valves to meet your needs.

Emerson Process Management Commitment to Excellence With Virgo Products

Emerson is committed to delivering quality Virgo products that meet or exceed your expectations. We continue to improve our performance levels through the use of innovative technologies and processes, perfect execution principles, and promoting safety and quality among our employees.

Our pursuit of excellence drives Emerson to provide Virgo products and services the industry demands. Utilization of the latest design tools to help ensure product functionality, state-of-the-art facilities that control our manufacturing processes from start to finish, and rigorous testing practices to confirm product quality.

The Best Support You May Never Need

The true value of a supplier is about the attention you get before the sale and the support you receive after.

Backed by the global strength of Emerson and our local providers, we deliver superior pre- and post-sales support—including around-the-clock access to inventory and a comprehensive range of services. Our strategic stocking locations ensure short lead times, and product is ready when you need it. Our capability to provide broader solutions allows you to focus attention on keeping your plant operating smoothly.

With the Virgo Valves product line, Emerson has the perfect ball valve to fit your process. Whether your application requires a 2” off-the-shelf floating ball valve, a custom 60” trunnion mounted valve or something in between, Emerson can deliver.

TRUNNION MOUNTED BALL VALVE
2/3 Piece Cast

TRUNNION MOUNTED BALL VALVE
3 Piece Forged

FLOATING BALL VALVE

PRODUCT RANGE

	Trunnion Mounted Ball Valve 2/3 Piece Cast	Trunnion Mounted Ball Valve 3 Piece Forged	Floating Ball Valve
Size	2” to 36”	2” to 60”	½” to 10”
Pressure	150# to 1500#	150# to 2500#	150# to 1500#
Materials	• Carbon steel • Low temp carbon steel	• Stainless steel • Duplex	• Alloy • Other

PRODUCT REFERENCE STANDARDS

Design and Manufacturing	API 6D, API 608, API 6A, ASME B 16.34, BS EN ISO 17292
Face to Face	ASME B 16.10, API 6D
Flange Dimensions	ASME B 16.5 (up to 24”), ASME B16.47 Series A (26” and above)
Butt Weld Valve Ends	ASME B16.25
Pressure Tests	API 6D, API 598, BS EN 12266 -1 and 2
Fire Safety Test	API 607, API 6FA, BS EN ISO 10497
Quality/Product Certifications	ISO 9001, API 6D, PED 2014/68/EU, EAC (Russia), ATEX and OSHAS 18001
Safety Reliability	SIL3
Fugitive Emissions	ISO 15848

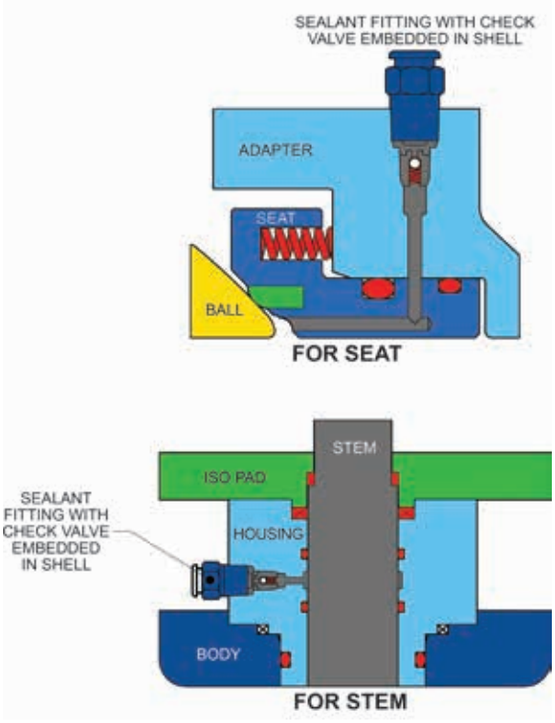
*Valve conforming to NACE MR 0175/MR 0103 can be supplied. Environmental restrictions may apply.

PRODUCT CONTROL

- Material traceability is maintained on all Virgo ball valves.
- All Virgo ball valves are tested and documented prior to shipment.
- Certificate of Compliance, material and mechanical test reports are provided with products.

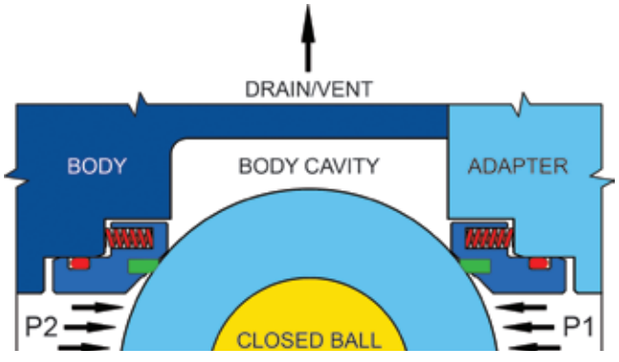
Trunnion Mounted 2/3 Piece Cast Ball Valve Design Features

The Virgo Trunnion Mounted Ball Valve is a robust API 6D monogrammed 2/3 piece cast body design with bi-directional sealing. It is available in sizes from 2 inches up to 36 inches and pressure classes from ANSI 150# to 1500#. The valve can be supplied in a variety of materials, body and trim configurations, and end connections to meet every need.



SEALANT INJECTION

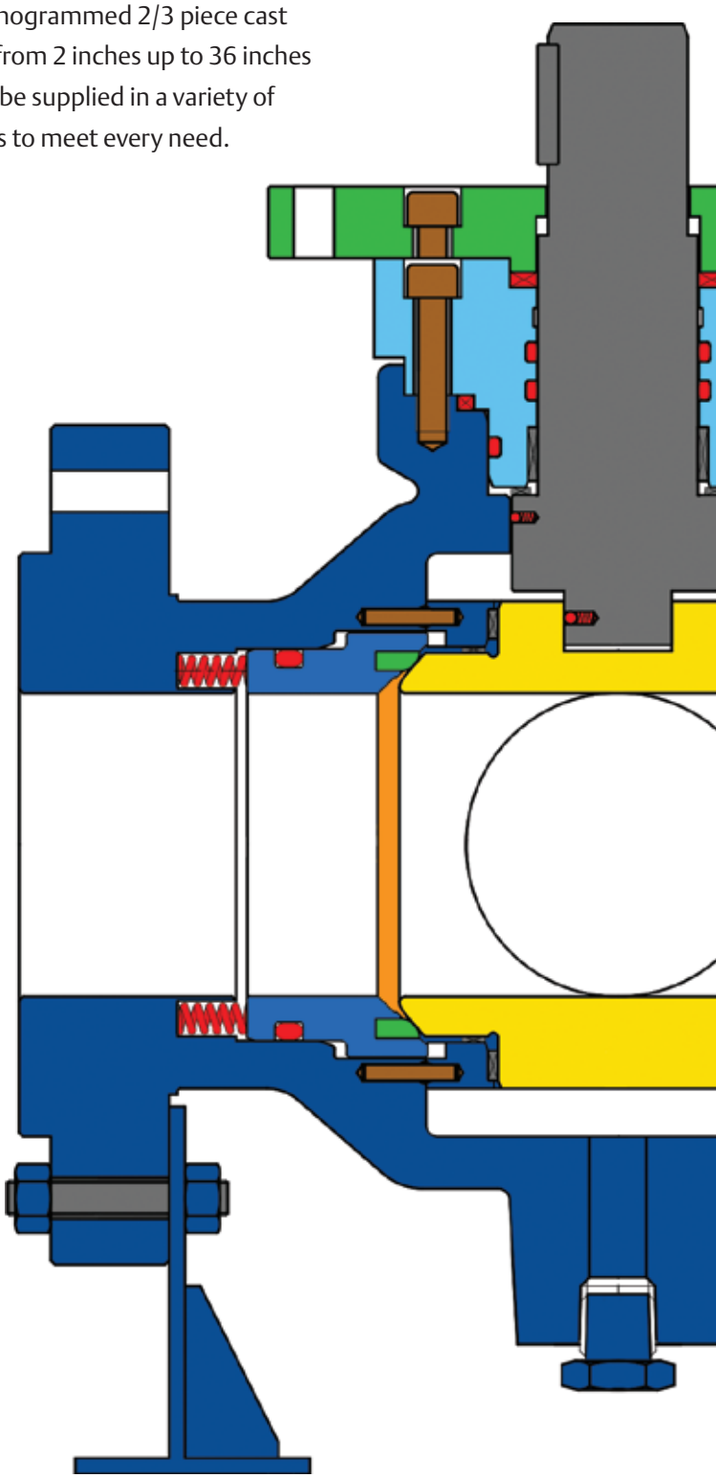
In the event of seat or seal damage due to contamination, an emergency seal can be formed using seat sealant injection.



DOUBLE BLOCK AND BLEED

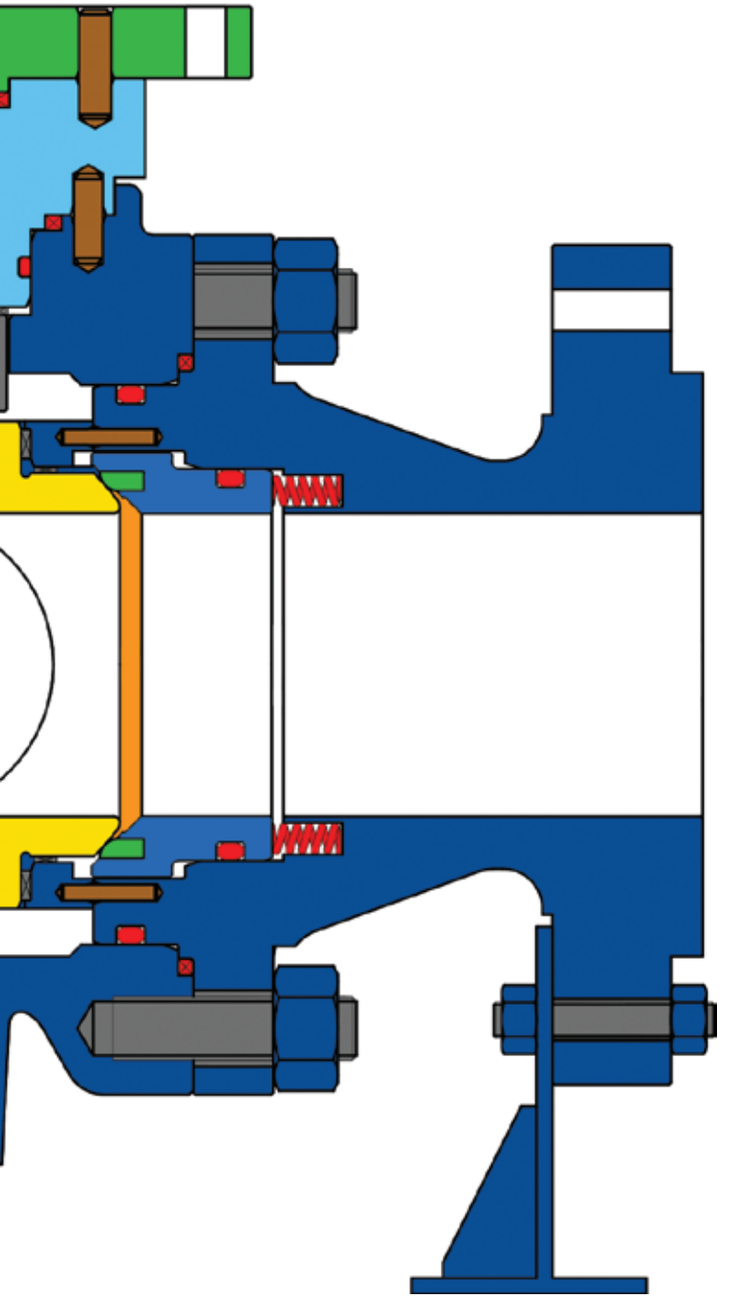
Spring loaded floating seats maintain contact with the ball and provide a tight shut off even at low pressure differential. Independent sealing of upstream and downstream sides facilitates draining/venting of the body cavity, thus the double block and bleed operation.

*Valve conforming to NACE MR 01-75/MR 0103 can be supplied. Environmental restrictions may apply.

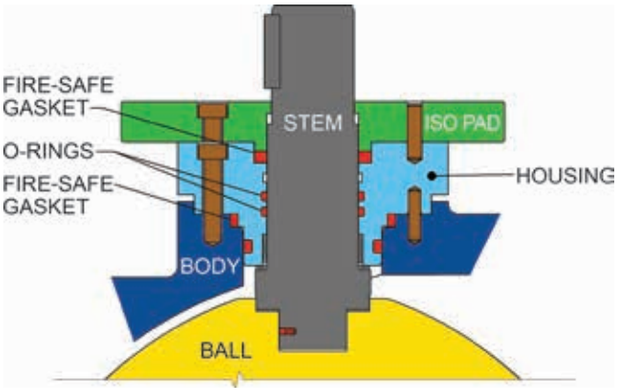


- **Extra wall thickness for increased corrosion allowance**
- **Low operating torques for easy automation**
- **Bi-directional zero leakage – maximum life with minimum maintenance**
- **SIL 3**
- **NACE MR 01–75/ISO 15156 compliant***

The Virgo Trunnion Mounted Ball Valve is manufactured with the highest level of engineering integrity, so you can have the greatest confidence in its ability to perform. Our engineering team focuses on continuous improvement to meet or exceed requirements in upstream and midstream oil and gas applications.

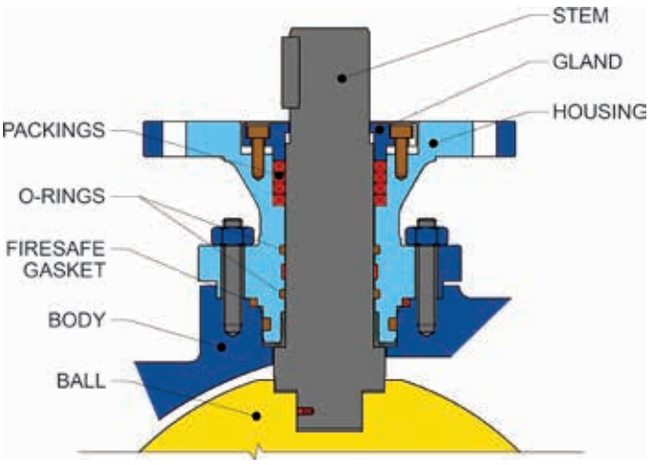


- **Anti-static device maximizes safety**
- **ISO 5211 mounting allows for easy automation**
- **API 607/6FA fire safe certification**
- **Compression springs provide uniform loading of seats, ensuring sealing at low pressures**
- **Blowout-proof stem**
- **Low fugitive emissions**



L SERIES MULTIPLE STEM SEALING

A multiple sealing stem includes triple sealing with two O-rings and a fire-safe gasket. This arrangement ensures consistent compliance with stringent fugitive emission testing requirements. The blowout-proof stem provides positive stem retention.

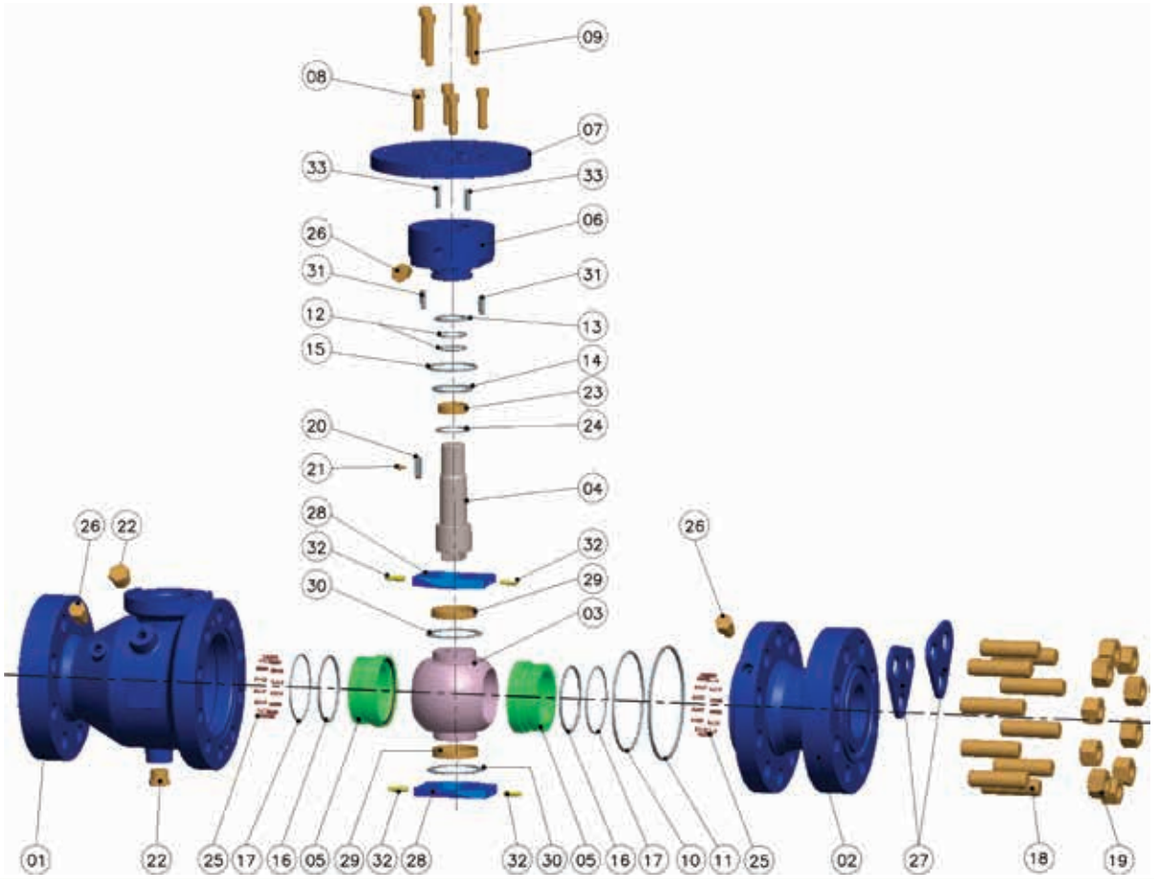


G SERIES MULTIPLE STEM SEALING

The G Series Trunnion Ball Valve offers a fully adjustable packing gland and multiple stem sealing for minimizing fugitive emissions. This multiple stem sealing consists of a layered graphite packing gland set and double shaft O-rings. This arrangement ensures consistent compliance to stringent fugitive emissions testing requirements. The blowout proof stem also enables positive stem retention.

NOTE: L Series Ball Valve representative drawing only. Consult Emerson Sales for actual product drawings.

Materials of Construction



Item No.	Part Name	Carbon/Carbon	Carbon/Stainless
1	BODY	ASTM A216 GR. WCB	ASTM A216 GR. WCB
2	ADAPTER	ASTM A216 GR. WCB	ASTM A216 GR. WCB
3	BALL	ASTM A105 WITH 1 MIL ENP	ASTM A182GR.F316/ASTM A351 GR. CF8M
4	STEM	ASTM A322 GR. 4140 WITH 1 MIL ENP	ASTM A479 TYPE 316
5	SEAT	ASTM A105 WITH 1 MIL ENP+DEVLON™	ASTM A182 GR.F316+DEVLON™
6	HOUSING	ASTM A216 GR. WCB/ASTM A105	ASTM A216 GR. WCB/ASTM A105
7	ISO PAD	ASTM A216 GR. WCB/ASTM A105	ASTM A216 GR. WCB/ASTM A105
8	FASTENER (ISO PAD-HOUSING)	ASTM A193 GR. B7M	ASTM A193 GR. B7M
9	FASTENER (HOUSING-BODY)	ASTM A193 GR. B7M	ASTM A193 GR. B7M
10	O-RING (BODY SEAL)	HNBR	HNBR
11	GASKET (BODY SEAL)	GRAPHITE	GRAPHITE
12	O-RING (STEM SEAL)	HNBR	HNBR
13	GASKET (STEM SEAL)	GRAPHITE	GRAPHITE
14	O-RING (HOUSING SEAL)	HNBR	HNBR
15	GASKET (HOUSING SEAL)	GRAPHITE	GRAPHITE
16	O-RING (SEAT SEAL)	HNBR	HNBR
17	O-RING (SEAT SEALANT)	HNBR	HNBR
18	STUD (BODY-ADAPTER)	ASTM A193 GR. B7M	ASTM A193 GR. B7M
19	NUT (BODY-ADAPTER)	ASTM A194 GR. 2HM	ASTM A194 GR. 2HM
20	KEY	ASTM A321 GR.1040	ASTM A321 GR.1040
21	CAP SCREW (KEY-STEM)	ASTM A193 GR. B8M	ASTM A193 GR. B8M
22	DRAIN & VENT PLUG	ASTM A105	ASTM A105
23	BEARING (STEM)	SS316+PTFE	SS316+PTFE
24	THRUST WASHER (STEM)	SS316+PTFE	SS316+PTFE
25	SEAT SPRING	ASTM B637 UNS N07750	ASTM B637 UNS N07750
26	SEALANT FITTING FOR NPS 4 CLASS 600 AND ABOVE	ASTM A479 TYPE 316	ASTM A479 TYPE 316
27	LIFTING HOOK FOR NPS 4 CLASS 600 AND ABOVE	CARBON STEEL	CARBON STEEL
28	TRUNNION PLATE	ASTM A216 GR. WCB/ASTM A105	ASTM A216 GR. WCB/ASTM A105
29	BEARING (TRUNNION PLATE)	SS316+PTFE	SS316+PTFE
30	THRUST WASHER (TRUNNION)	SS316+PTFE	SS316+PTFE
31	DOWEL (BODY-HOUSING)	ASTM A321 GR.1040	ASTM A321 GR.1040
32	DOWEL (TRUNNION PLATE-BODY/ADAPTER)	ASTM A276 TYPE 316	ASTM A276 TYPE 316
33	DOWEL (ISO PAD-HOUSING)	ASTM A321 GR.1040	ASTM A321 GR.1040

NOTE: Information shown for L-Series Trunnion Mounted Ball Valve Sizes NPS 2,3,4, 6 FB Class 600, 900, 1500; NPS 8-18, Class 150-1500; NPS 20, FB Class 150-900; NPS 24, FB Class 150-600. For other sizes and materials, contact your local Emerson sales office or Emerson Process Management representative.

Product Selection Code – Trunnion Mounted 2/3 Piece Cast

Design	Construction	–	End Connection	Ratings	–	Bore	–	Body / Adaptors	Ball / Seat Ring / Stem	Coating (If Applicable)	–	Seat Insert (Ball Seal)	–	Seals (O ring, Lip)	–	Operator (If Applicable)	–	Special (If Applicable)
L G N M W E U	2 3		RF RS FF FS RT BW	1 2 3 5 6 9		F R		C 7 L 2 4 6 3 5 A U W I M	1 8 L 6 2 9 N X 4 5 A U W I M	E 3 Y H S C T N Z		L P E F		1 2 3 4 5 6 7 8 9 B K E G L		B G L A Z		SI PP SE BE DP SP JK LT CR XX

Design

- **L** Side Entry Soft Seated Trunnion - O-Ring
- **G** Side Entry Soft Seated Trunnion O-Ring and packing material
- **N** Side Entry Soft Seated Trunnion
- **M** Side Entry Metal Seated Trunnion
- **W** Side Entry Welded Body Trunnion
- **E** Top Entry Soft Seated Trunnion
- **U** Top Entry Metal Seated Trunnion

Construction

- **2** Two Piece
- **3** Three Piece

End Connection

- **RF** Flanged Raised Face Serrated
- **RS** Flanged Raised Face Smooth
- **FF** Flanged Flat Face Serrated
- **FS** Flanged Flat Face Smooth
- **RT** Flanged RTJ
- **BW** Butt Weld

Ratings

- **1** 150#
- **2** 1500#
- **3** 300#
- **5** 2500#
- **6** 600#
- **9** 900#

Bore

- **F** Full
- **R** Reduced – Single (Regular)

Body and Adapters

- **C** WCB
- **7** WCC
- **L** LCB
- **2** LCC
- **4** CF8
- **6** CF8M
- **3** CF3
- **5** CF3M
- **A** CA15
- **U** Duplex (4A or F51)
- **W** Duplex (S21760, 6A or F55)
- **I** Inconel®
- **M** Monel®

Ball / Seat Ring* / Stem

- **1** A105 / A105 / 4140
- **8** LF2 / LF2 / 17-4 ph
- **L** LF2 / LF2 / LF2
- **6** F316 or CF8M* / F316 / 316
- **2** F316 or CF8M* / F316 /17-4 ph
- **9** F316 or CF8M* / F316 / Duplex
- **N** F316 or CF8M* / F316 /Inconel® 718
- **X** F304L or CF3* / F304L / 304
- **4** F304 or CF8* / F304 / 304
- **5** F316L or CF3M* / F316L / 316L
- **A** F6A / F6A / 410
- **U** Duplex 4A or F51
- **W** Super Duplex 6A or F55
- **I** Inconel®
- **M** Monel®
- * cast or forged balls may be used

Coating – Apply As Appropriate

- **E** ENP 1 mil / 25 Micron
- **3** ENP 3 mil / 75 Micron
- **Y** Overlay
- **H** Hard Chrome
- **S** Stellite™
- **C** Chrome Carbide
- **T** Tungsten Carbide
- **N** Chromium Nitride
- **Z** Other than above

Seat Insert (Ball Seal)

- **L** Devlon™
- **P** PEEK™
- **E** PCTFE (Kel F)®
- **F** Reinforced PTFE

Seals (O-ring, Lip, Gasket)

- **1** HNBR
- **2** HNBR 90 Durometer
- **3** HNBR AED
- **4** HNBR Low Temp
- **5** FKM Type 2 (Viton® B or similar)
- **6** FKM AED (Viton® AED or Similar)
- **7** FKM Low Temp (Viton® GLT or Similar)
- **8** Aflas®
- **J** JW EOL 985
- **W** JW EOL 101
- **F** JW FR58/90
- **B** Buna N Low Temp
- **K** FFKM (Kalrez® or Similar)
- **E** EPDM
- **G** Graphite Gasket (no o rings)
- **L** Lip Seals (Material As Specified)

Operator

- **B** Bare Stem
- **G** Gear
- **L** Hand Lever
- **A** Actuator
- **Z** Other than above

Special

- **SI** Sealant Injection
- **PP** Pup Piece
- **SE** Stem Extension
- **BE** Bonnet Extension
- **DP** Double Piston Effect (Non Relieving)
- **SP** Short Pattern
- **JK** Jacketed
- **LT** Low Temp (Lip Seals)
- **CR** Cryogenic
- **XX** Special Design - Refer to BOM

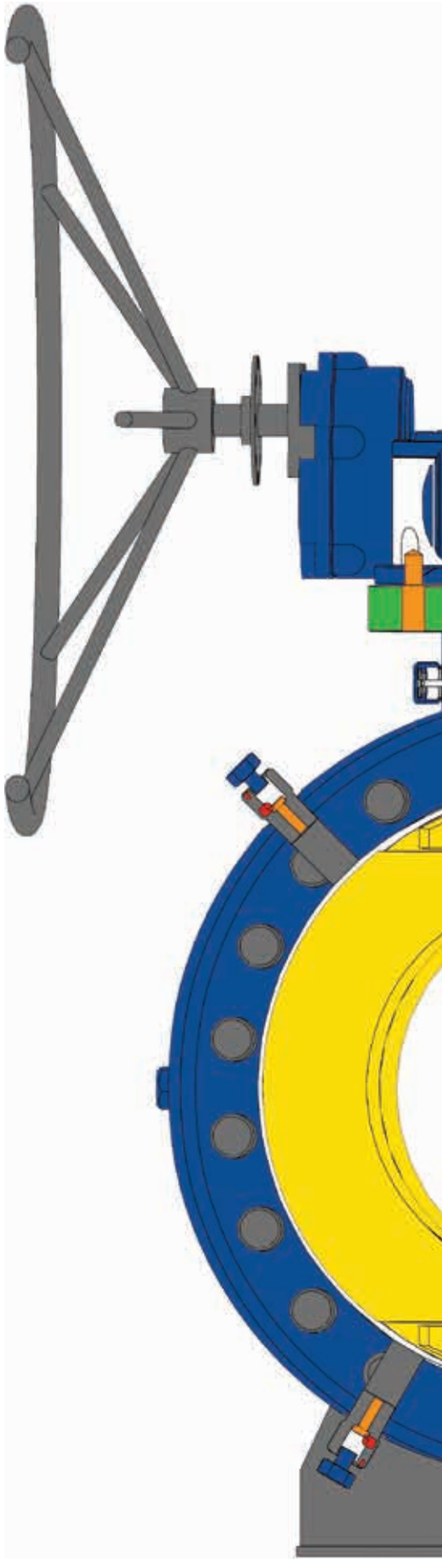
EXAMPLE:

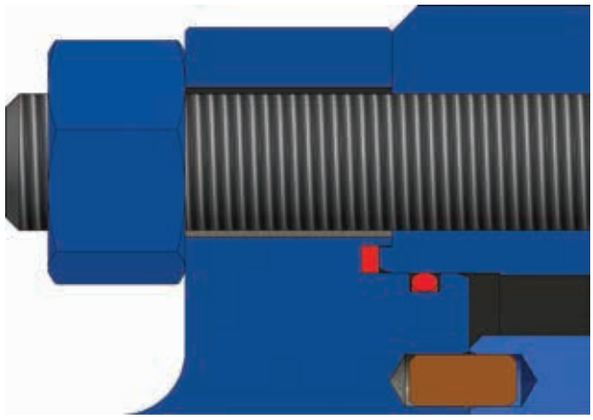
L	2	–	RT	9	–	F	–	2	8	E	–	L	–	3	–	G	–	SI

L Series Side entry, soft seated trunnion ball valve, 2 piece body, RTJ flanged ends, 900# class, Full port, LCC body, LF2 ball and seat rings w/ENP, 17–4 PH stem, Devlon® seat inserts, HNBR AED orings, gear operated, sealant injection fittings

Trunnion-Mounted 3 Piece Forged Design Features

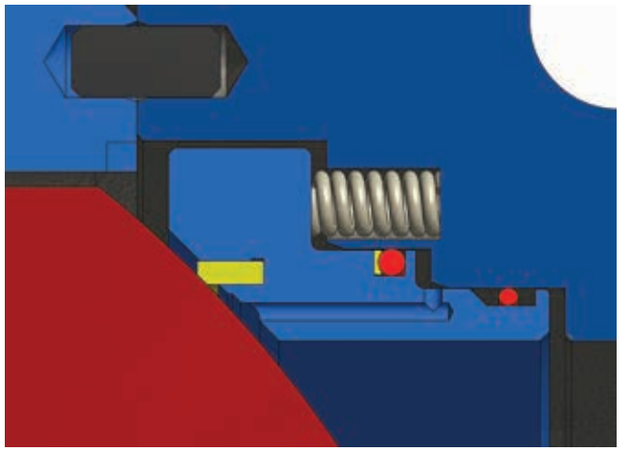
The Virgo Trunnion Mounted 3 piece forged ball valve features an API 6D compliant design that is engineered to deliver high reliability and maximum customer value. They are available in sizes from 2 inches to 60 inches and pressure classes from ANSI 150# to 2500#. ASME B16.34 and API 6A compliant designs are available.





DOUBLE BODY SEALING

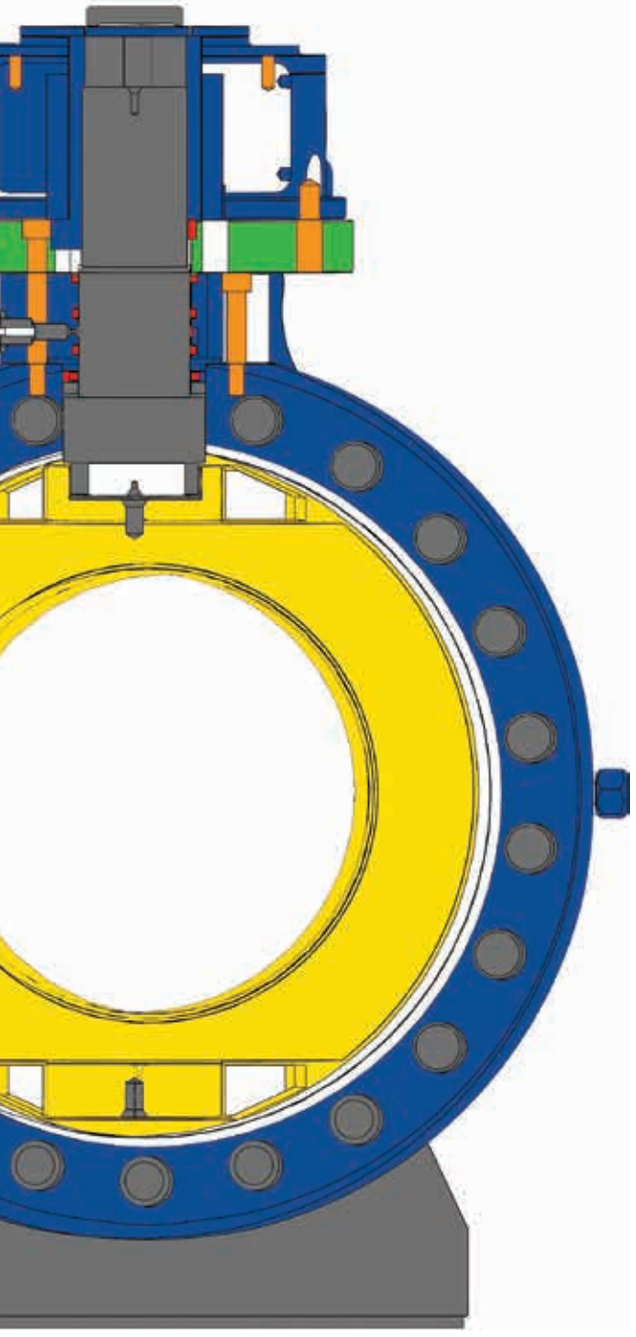
Pipelines often put stress on valve body seals.
To overcome these stresses and to ensure a leak free joint, a double body seal is utilized. Body to tailpiece interface available in either ASME B16.34 or ASME Section 8.



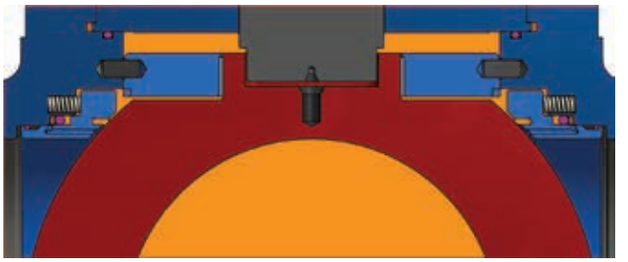
FIRE SAFE DESIGN

To increase safety, the valve is certified API 607/6FA fire safe. If a fire should develop, the valve is designed to provide a metal-to-metal seal.

- **Bi-directional Zero leakage**
- **Low Torque for cost effective automation**
- **Forged Construction**
- **NACE MR-01-75 Compliant**
- **Sealant Injection**



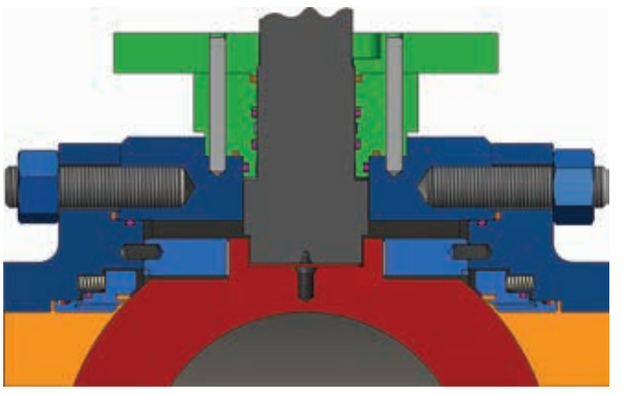
- **Standard LF2 Body / Adapter (F3 Series)**
- **Built-in internal stops (F3 Series)**
- **Anti-static device maximizes safety**
- **ISO 5211 mounting and direct mount operators**
- **Double Block and Bleed**



DOUBLE PISTON EFFECT SEATS

Seats will not relieve and will maintain sealing capability, even in the case of failure of the upstream seat. Double piston effect seats or a combination of single piston/double piston can be provided on Virgo Trunnion-mounted Ball Valves upon request.

NOTE: In case both seats are DPE, separate pressure relief valve has to be provided on the body vent to prevent over pressuring of the body cavity.

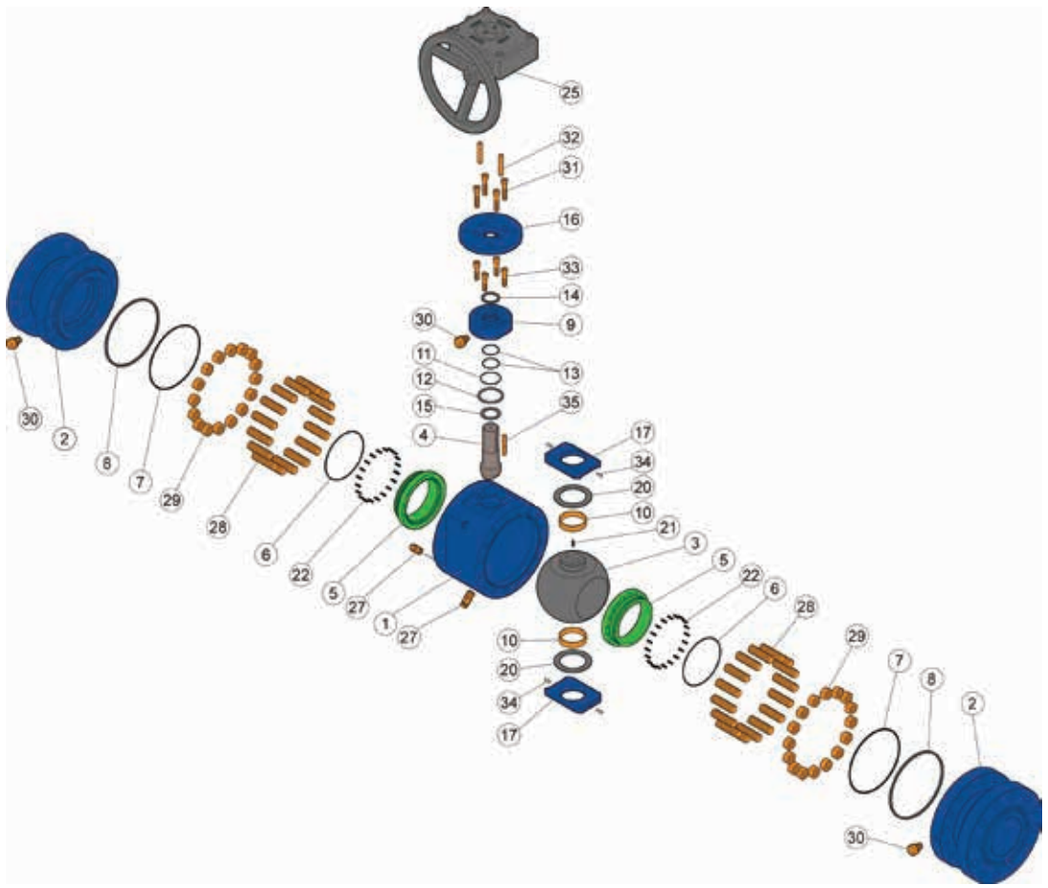


DOUBLE BLOCK AND BLEED

This standard feature allows both seats to hold their respective pressures independent of body cavity pressure.

NOTE: F3 Series Ball Valve representative drawing only. Consult Emerson Sales for actual product drawings.

Materials of Construction



Item No.	Part Name	Low Temp Carbon/ Low Temp Carbon	Low Temp Carbon/ Stainless
1	BODY	ASTM A350 Gr LF2	ASTM A350 Gr LF2
2	ADAPTER	ASTM A350 Gr LF2	ASTM A350 Gr LF2
3	BALL	ASTM A350 Gr LF2 WITH 1 MIL ENP	ASTM A182 Gr F316
4	STEM	ASTM A350 Gr LF2 WITH 1 MIL ENP	ASTM A182 Gr F316
5	SEAT/INSERT	ASTM A350 Gr LF2 WITH 1 MIL ENP/DEVLON®	ASTM A182 Gr F316 / DEVLON®
6	O-RING, SEAT	HNBR	HNBR
7	O-RING, BODY ADAPTOR	HNBR	HNBR
8	GASKET, BODY	GRAPHITE	GRAPHITE
9	STEM HOUSING	ASTM A350 Gr LF2	ASTM A182 Gr F316
10	BUSH BEARING	CS-BRONZE-PTFE	CS-BRONZE-PTFE
11	O-RING, STEM HOUSING	HNBR	HNBR
12	GASKET, STEM HOUSING	GRAPHITE	GRAPHITE
13	O-RING, STEM	HNBR	HNBR
14	GASKET, STEM	GRAPHITE	GRAPHITE
15	THRUST WASHER, STEM	RPTFE	RPTFE
16	ISO MOUNTING PLATE	ASTM A350 Gr LF2	ASTM A350 Gr LF2
17	TRUNNION PLATE	ASTM A350 Gr LF2	ASTM A350 Gr LF2
20	THRUST WASHER, TRUNNION	RPTFE	RPTFE
21	ANTI-STATIC SPRING	A313 SS 302 / B637 (INC X-750)	A313 SS 302 / B637 (INC X-750)
22	SPRING, SEAT	B637 (INC X-750)	B637 (INC X-750)
23	DRAIN PLUG	STEEL	STEEL
24	HANDLE (NOT SHOWN)	STEEL	STEEL
25	GEAR BOX	WCB/DI	WCB/DI
27	BLEED VALVE	STEEL	SS 316
28	STUD	A320 GR L7M	A320 GR L7M
29	NUT, BODY ADAPTER	A 194 GR 7M	A 194 GR 7M
30	INJECTION FITTING	STEEL	STEEL
31	BOLT, ISO MOUNTING FLANGE	A320 GR L7M	A320 GR L7M
32	DOWEL PIN	STEEL	STEEL
33	BOLT, STEM HOUSING	A320 GR L7M	A320 GR L7M
34	ALIGNMENT PIN	STEEL	STEEL
35	STEM KEY	STEEL	STEEL

NOTE: Information shown for F3 Series Trunnion Ball Valve. For other sizes and materials, contact your local Emerson sales office or Emerson Process Management representative.

Product Selection Code – Trunnion Mounted 3 Piece Forged

Design	Construction	–	End Connection	Ratings	–	Bore	–	Body / Adaptors	Ball / Seat Ring* / Stem	Coating (If Applicable)	–	Seat Insert (Ball Seal)	–	Seals (O ring, Lip)	–	Operator (If Applicable)	–	Special (If Applicable)
F N	3		RF RS FF FS RT BW	1 2 3 5 6 9		F R D		1 8 4 6 3 5 A U W I M	1 8 6 2 9 N X 4 5 A U W I M	E 3 Y H S C T N Z		L P E F		1 2 3 4 5 6 7 8 9 B K E G L		B C G L A Z		SI PP SE BE DP JK LT XX

Design

F Side Entry Soft Seated Forged Trunnion
N Side Entry Soft Seated Forged Trunnion with Section 8 Body Bolting

Construction

3 Three Piece

End Connection

RF Flanged Raised Face Serrated
RS Flanged Raised Face Smooth
FF Flanged Flat Face Serrated
FS Flanged Flat Face Smooth
RT Flanged RTJ
BW Butt Weld

Ratings

1 150#
2 1500#
3 300#
5 2500#
6 600#
9 900#

Bore

F Full
R Reduced / Regular
D Reduced - Double

Body and Adapters

1 A105
8 LF2
4 F304
6 F316
3 F304L
5 F316L
A F6A
U Duplex (F51)
W Duplex (S21760 or F55)
I Inconel®
M Monel®

Ball / Seat Ring* / Stem

1 A105 / A105 / 4140
8 LF2 / LF2 / 17-4 ph
L LF2 / LF2 / LF2
6 F316 or CF8M* / F316 / 316
2 F316 or CF8M* / F316 /17-4 ph
9 F316 or CF8M* / F316 / Duplex
N F316 or CF8M* / F316 /Inconel 718
X F304L or CF3* / F304L / 304
4 F304 or CF8* / F304 / 304
5 F316L or CF8M* / F316L / 316L
A F6A / F6A / 410
U Duplex F51
W Super Duplex F55
I Inconel®
M Monel®
* cast or forged balls may be used

Coating – Apply As Appropriate

E ENP 1 mil / 25 micron
3 ENP 3 mil / 25 micron
Y Overlay
H Hard Chrome
S Stellite™
C Chrome Carbide
T Tungsten Carbide
N Chromium Nitride
Z Other than above

Seat Insert (Ball Seal)

L Devlon™
P PEEK™
E PCTFE (Kel F)®
F Reinforced PTFE

Seals (O-ring, Lip, Gasket)

1 HNBR
2 HNBR 90 Durometer
3 HNBR AED
4 HNBR Low Temp
5 FKM Type 2 (Viton® B or similar)
6 FKM AED (Viton® AED or Similar)
7 FKM Low Temp (Viton® GLT or Similar)
8 Aflas®
J JW EOL EL985
W JW EOL 101
F JW FR58/90
B Buna N Low Temp
K FFKM (Kalrez® or Similar)
E EPDM
G Graphite Gasket (no o rings)
L Lip Seals (Material As Specified)

Operator

B Bare Stem
C Chain Wheel
G Gear
L Hand Lever
A Actuator
Z Other than above

Special

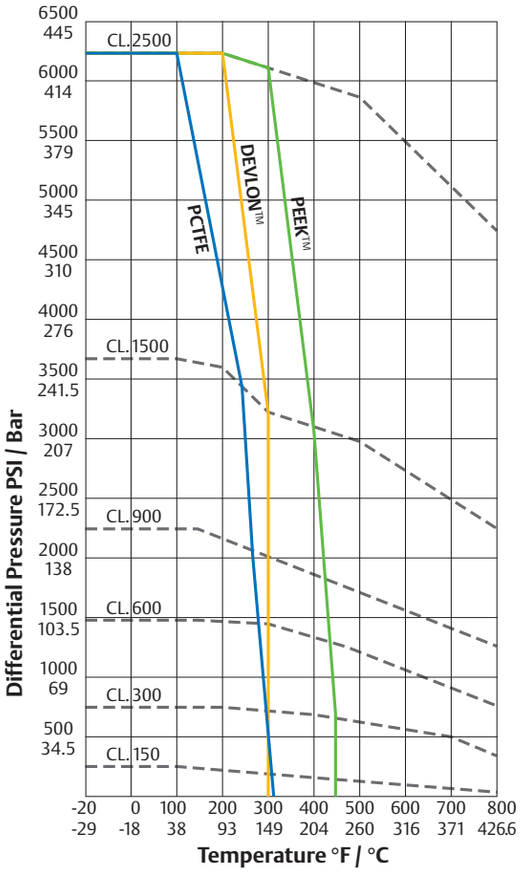
SI Sealant Injection
PP Pup Piece
SE Stem Extension
BE Bonnet Extension
DP Double Piston Effect (Non Relieving)
JK Jacketed
LT Low Temp (Lip Seals)
XX Special Design - Refer to BOM

EXAMPLE:

D	3	–	RT	9	–	F	–	8	8	3	–	L	–	3	–	G	–	SI

F Series Side entry, soft seated trunnion ball valve, 3 piece body, RTJ flanged ends, 900# class, Full port, LF2 body, LF2 ball, LF2 seat rings and 17–4 PH stem with 3 mil ENP, Devlon® seat inserts, HNBR O-rings, gear operated, sealant injection fittings

Pressure Temperature Ratings



Temperature Limits

Typical values for commonly used materials.

		Lower limit Deg.F (Deg.C)	Upper limit* Deg.F (Deg.C)
Body Material	WCB	-20 (-29)	797 (425)
	A105	-20 (-29)	797 (425)
	LCC	-50 (-46)	653 (345)
	LF2	-50 (-46)	797 (425)
	CF8M	-425 (-254)	1000 (538)
	F316	-325 (-198)	1000 (538)
Seat Material	DEVLON™	-40 (-40)	As per graph
	PEEK™	-50 (-46)	As per graph
	PCTFE	-400 (-240)	As per graph
O-Ring Material	HNBR	-20 (-29)	300 (149)
	Low Temp HNBR	-40 (-40)	300 (149)
	FKM	-4 (-20)	400 (204)
	Low Temp FKM	-40 (-40)	350 (177)
	FFKM	-4 (-20)	620 (327)
	TEF/P	32 (0)	450 (232)

These ratings are a general guide. It is important that you analyze all aspects of your application. Due to the variety of operating conditions and applications for these products, the user, through his/her own analysis and testing, is solely responsible for making the final selection of the products and assuring that all performance, safety and warning requirements of the application are met.

Common Applications

TRUNNION VALVE APPLICATIONS

GATHERING

- Onshore
- Offshore
- Headers and Manifolds
- Isolation
- ESDV and SDV and BDV
- Safety Systems
- Metering

DISTRIBUTION AND TRANSMISSION

- Compressor Stations
- Metering and Regulating Stations
- Bypass Lines
- Isolation
- ESDV and SDV and BDV
- Safety Systems
- AOV and ROV
- Trunk and Lateral Lines
- Tanks and Terminals

PROCESSING

- Separators and Treaters
- Metering
- Isolation
- ESDV and SDV and BDV
- Safety Systems
- Bypass lines

REFINING

- Distillation Units
- Hydrotreater Units
- Hydrocracker Units
- Catalytic Reformer Units
- Liquefied Gas Storage Vessels
- Solvent Refining Units
- Storage Tanks
- LPG

Additional Configurations and Options

The Virgo Trunnion Mounted Ball Valve is offered in other configurations and with options including:

METAL SEATED VALVES

Metal Seated Trunnion Ball Valves are designed to be used in higher-temperature applications. For improved performance both the ball and seat are hard faced with tungsten carbide or chrome carbide using a High Velocity Oxygen Fuel (HVOF) process. Available from 2” to 60” and in pressure classes from ASME 150# to 2500#.

TOP ENTRY VALVES

Top Entry Ball Valves are designed for inline field repairability and the single piece body is more resistant to pipeline stresses. Available from 2” to 60” and in pressure classes from ASME 150# to 2500#.

WELDED BODY VALVES

Welded body designs eliminate body flanges, reducing potential leak paths and increasing resistance to pipeline pressure and stresses. Often used in buried service. Available from 2” to 60” and in pressure classes from ASME 150# to 2500#.

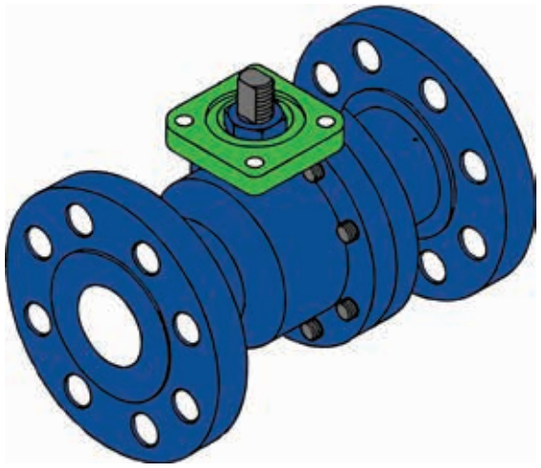
EXTENDED STEM OPTIONS

Virgo Valves are offered with stem line extensions for use in buried installations.

Floating Ball Valve Design Features

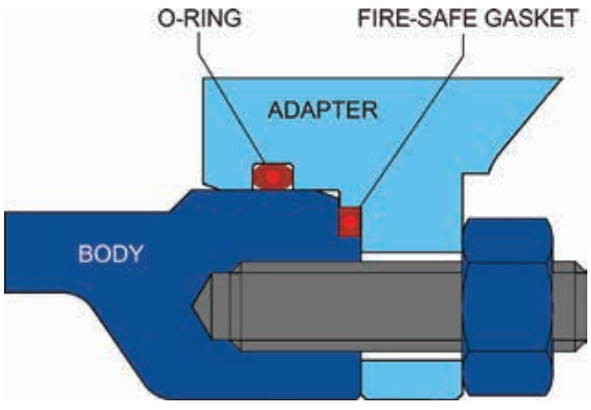
Virgo Floating Ball Valves

The Virgo S Series Floating Ball Valve is available in two piece body in sizes ranging from ½" to 10" and pressure classes of ANSI 150# to 1500#, including carbon steel, stainless steel, duplex and nickel alloys. Designed for ease of use, Emerson delivers the solution you are looking for in a valve.



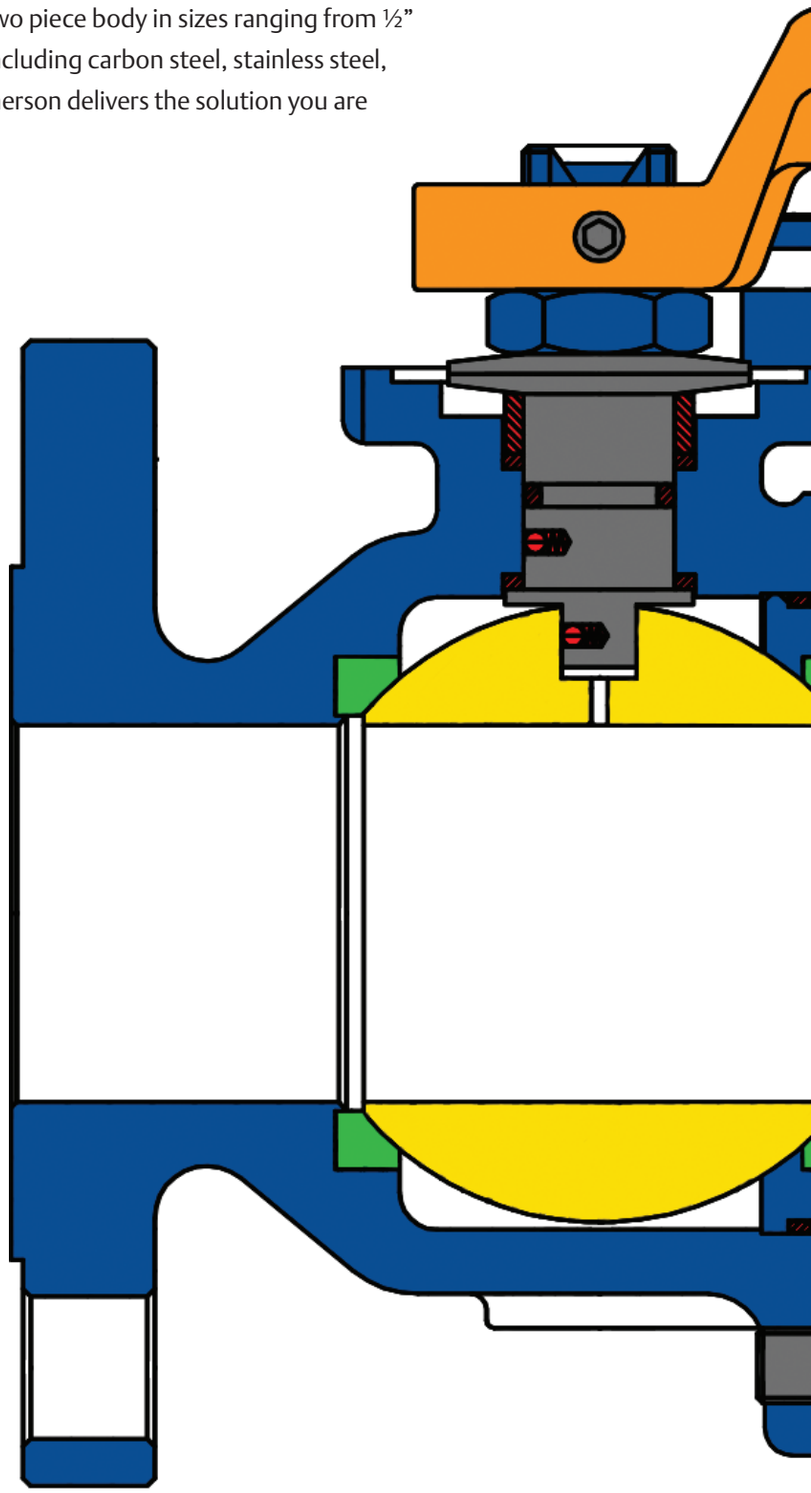
ISO MOUNTING PAD

Virgo valves incorporate ISO 5211 top pad which simplifies actuator or gear operator mounting



DOUBLE BODY SEALING

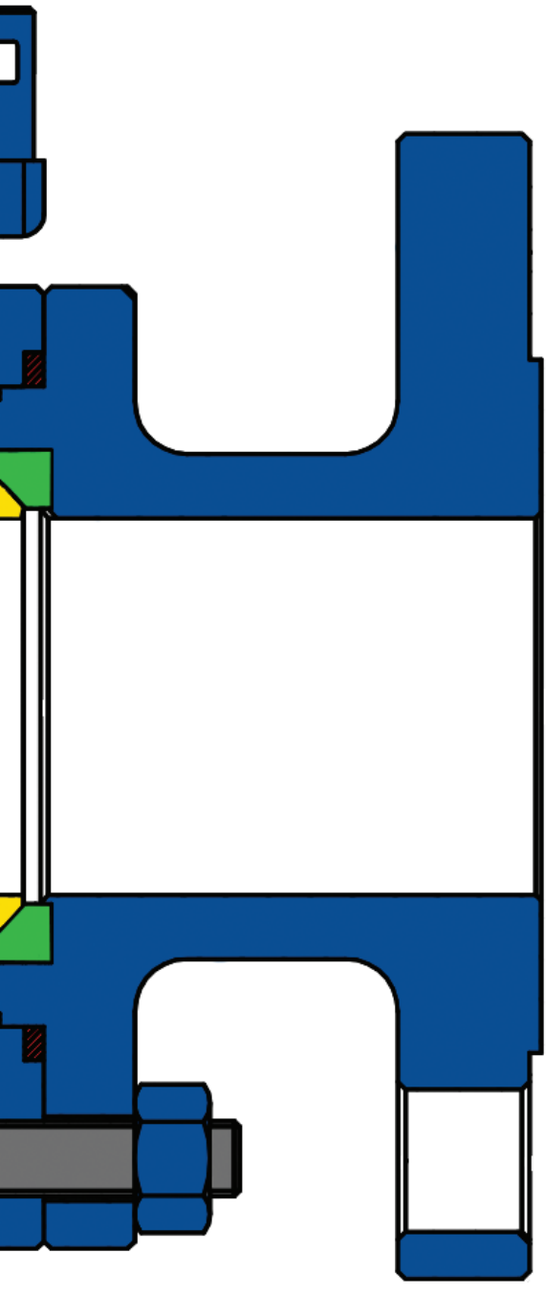
Double body sealing ensures positive body joint sealing against pipeline stresses

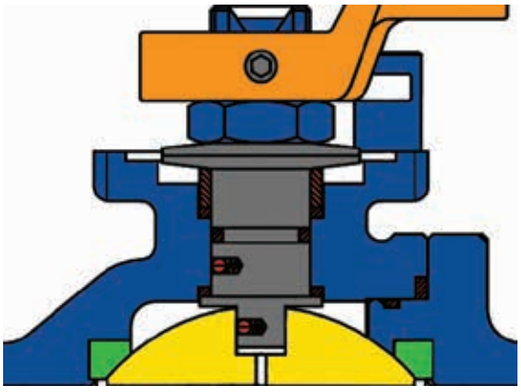


S2 FLOATING BALL VALVE

- **Low operating torques**
- **Bi-directional zero leakage**
- **Fire-safe API 607/API 6FA/ ISO 10497 certification**
- **Blowout-proof stem construction**
- **NACE MR 01-75/ISO 15156 Compliance**

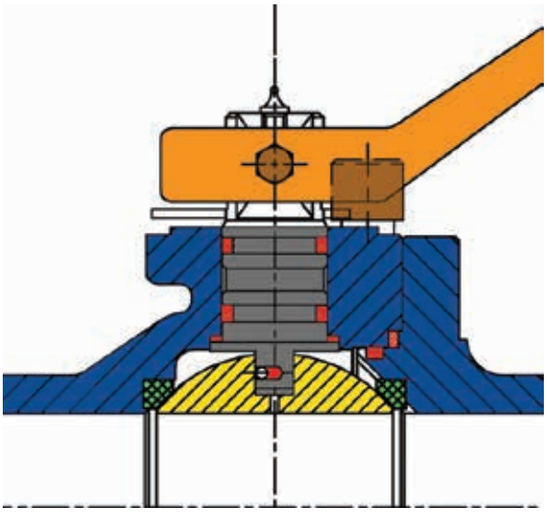
The Virgo S2 Floating Ball Valve utilizes a disc (Belleville) spring to live-load the graphite stem gasket. This live loading reduces maintenance and provides the ideal seal.





S2 MULTI-SEAL STEM

The triple seal utilizes a combination of O-rings and packing materials to provide a leak-proof seal and to minimize fugitive emissions. Live loaded system design ensures additional protection against leakage through the stem housing even at very low pressures.



- **Low fugitive emissions**
- **Integral ISO 5211 mounting pads**
- **Anti-static device maximizes safety**
- **Body cavity pressure relief***

*when valve is in open position; optional for closed position also

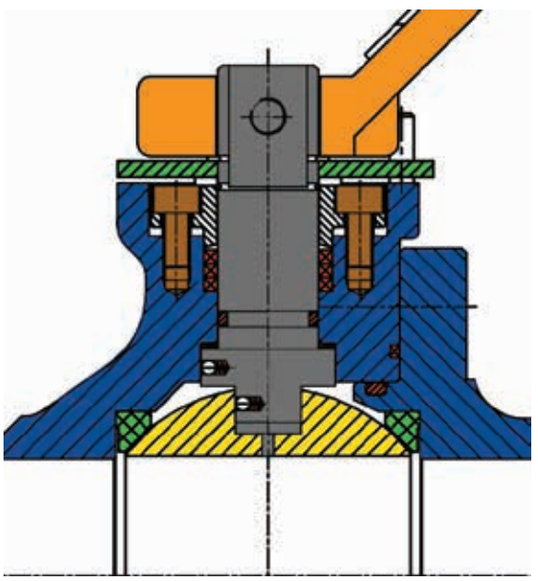
S2 ALTERNATE STEM AND SEAL CONFIGURATION

The Virgo S2 with alternative seal Floating Ball Valve includes features designed to accommodate the rigorous oil patch environment.

Floating Ball Valve Models

Virgo Floating Ball Valve Models				
Class	S2		SA2	
	FB	RB	FB	RB
150	1/2"	3/4" x 1/2"	2"	10" x 8"
	3/4"	1" x 3/4"	3"	
	1"	1-1/2" x 1"	4"	
	1-1/2"	2" x 1-1/2"	6"	
	2"	3" x 2"	8"	
	2-1/2"	4" x 3"	10"	
	3"	6" x 4"		
	4"	8" x 6"		
	6"			
300	1/2"	3/4" x 1/2"	2"	8" x 6"
	3/4"	1" x 3/4"	3"	10" x 8"
	1"	1-1/2" x 1"	4"	
	1-1/2"	2" x 1-1/2"	6"	
	2"	3" x 2-1/2"	8"	
	2-1/2"	4" x 3"		
	3"	6" x 4"		
	4"			
600	1/2"	3/4" x 1/2"	2"	
	3/4"	1" x 3/4"	3"	
	1"*	2" x 1-1/2"*	4"	
	1-1/2"*	3" x 2"*		
	2"	4" x 3"*		
	3"	6" x 4"*		
	4"			
900/1500	1/2"	3/4" x 1/2"		
	3/4"	1" x 3/4"		
	1"	1-1/2" x 1"		
	1-1/2"			
	2"			

* These sizes utilize the S2 alternate stem seal design



SA 2 STEM AND SEAL CONFIGURATION

The Virgo SA 2 Floating Ball Valve is designed to provide optimum sealing through the combination of O-ring seal and adjustable packing provides the ideal seal and low fugitive emissions. Oversized stem is ideal for automation.

Additional Configurations and Options

The Virgo Floating Ball Valve is available in other configurations and with options including:

METAL SEATED VALVES

Metal-seated valves are used in high temperature applications. Both the ball and seat are hard faced with tungsten carbide or chrome carbide using a High Velocity Oxygen Fuel (HVOF) surface spray, one of the industry's most advanced coating processes. Available in 1/2" to 2" and in pressure classes from 150# to 1500#.

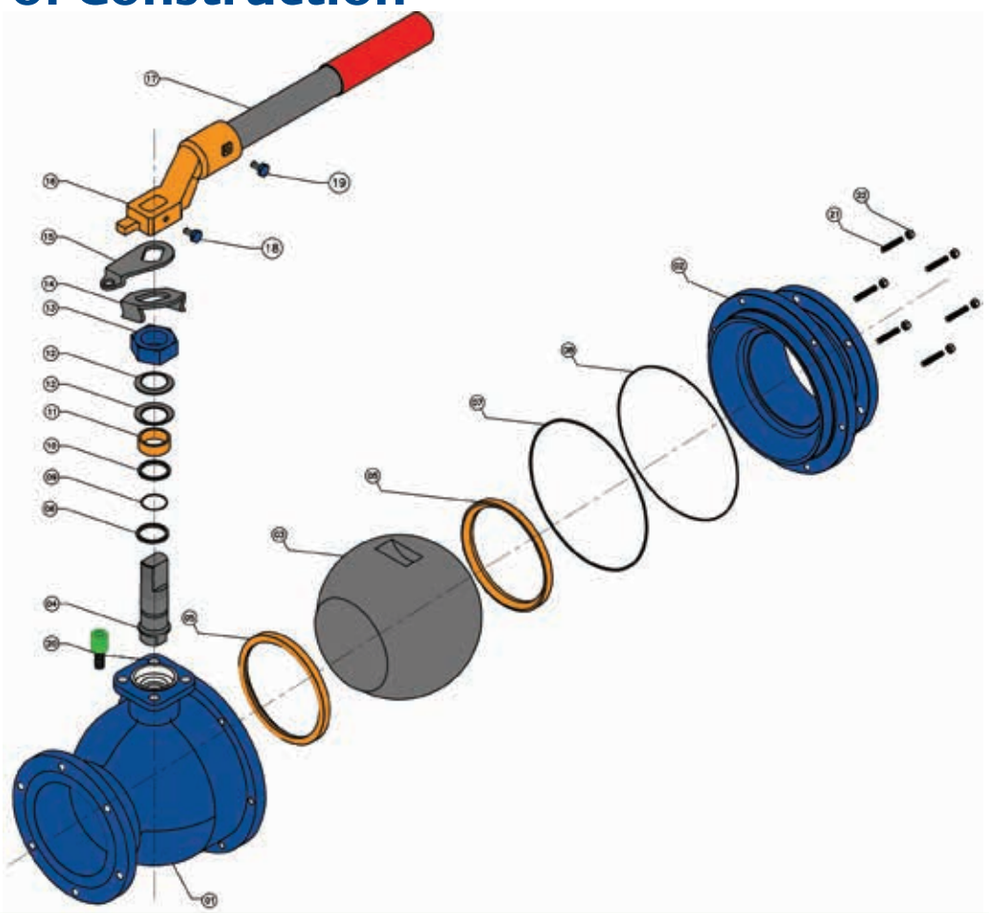
CRYOGENIC VALVES

Low torques and a long cycle life combine with specially designed seats and seals to compensate automatically for wear and fluctuations of pressure and temperature in harsh, cold environments. BS6364 design is for applications up to -196°C.

EXTENDED STEM OPTIONS

Virgo Floating Ball Valves are offered with stem extensions for use with buried service applications.

Materials of Construction



Item No.	Part Name	Carbon/Stainless	Stainless/Stainless
1	BODY	ASTM A216 GR. WCB	ASTM A351 GR. CF8M
2	ADAPTER	ASTM A216 GR. WCB	ASTM A351 GR. CF8M
3	BALL	ASTM A182 GR.F316	ASTM A182 GR.F316
4	STEM	ASTM A479 TYPE 316	ASTM A479 TYPE 316
5	SEAT	MODIFIED PTFE / RTFE	MODIFIED PTFE / RTFE
6	THRUST WASHER	RPTFE	RPTFE
7	O-RING (BODY SEAL)	VITON®-B / HNBR*	VITON®-B / HNBR*
8	GASKET (BODY SEAL)	GRAPHITE	GRAPHITE
9	O-RING (STEM SEAL)	VITON®-B / HNBR*	VITON®-B / HNBR*
10	GASKET (STEM SEAL)	GRAPHITE	GRAPHITE
11	GLAND SPACER	ASTM A479 TYPE 316	ASTM A479 TYPE 316
12	CUP SPRING	DIN 10089 GR.51CrV4	ASTM A479 TYPE 304 / SS316
13	STEM NUT	ASTM A194 GR. 8M	ASTM A194 GR. 8M
14	STEM NUT LOCK PLATE	ASTM A666 AISI 301	ASTM A666 AISI 301
15	LOCK PLATE	CARBON STEEL	CARBON STEEL
16	HANDLE COUPLER	ASTM A216 GR. WCB	ASTM A216 GR. WCB
17	PIPE	CARBON STEEL	CARBON STEEL
18	GRUB SCREW	IS 1367 HTS GR. 12.9	IS 1367 HTS GR. 12.9 / ISO 3506-1 A2-70
19	HEX BOLT	IS 1367 GR. 8.8	IS 1367 GR. 8.8 / ISO 3506-1 A2-70
20	STOP PIN	AISI 1040	ASTM A479 TYPE 316
21	STUD	ASTM A193 GR. B7M	ASTM A193 GR. B8M
22	NUT	ASTM A194 GR. 2HM	ASTM A194 GR. 8M

* On 600# and higher valves, seat material is Devlon™ and O-rings are HNBR

NOTE: Information shown for S2 Floating Ball Valve. For other sizes and materials, contact your local Emerson sales office or Emerson Process Management representative.

Product Selection Code – Floating Ball Valves

Design	Construction	–	End Connection	Ratings	–	Bore	–	Body / Adaptors	Ball / Stem	Coating (If Applicable)	–	Seat	–	Seals (O ring, Lip)	–	Operator (If Applicable)	–	Special (If Applicable)
S SA P	2 3		RF RS FF FS RT SW SN NP BW	1 2 3 4 6 8 9		R		C 1 7 L 8 2 4 6 3 5 A U W I M	6 2 9 N X 4 5 A U W I M	Y H S C T N Z		T G L D P E F		1 2 3 4 5 6 7 8 9 B K E H L		B G L A Z		PP SE BE SP JK LP LT CR XX

Design

- **S** Side Entry Soft Seated Floater – O Ring
- **SA** Side Entry Soft Seated Floater – Adjustable Gland
- **P** Side Entry Metal Seated Floater

Construction

- **2** Two Piece
- **3** Three Piece

End Connection

- **RF** Flanged Raised Face Serrated
- **RS** Flanged Raised Face Smooth
- **FF** Flanged Flat Face Serrated
- **FS** Flanged Flat Face Smooth
- **RT** Flanged RTJ
- **SW** Socket Weld
- **SN** Socket Weld with Nipple Extension
- **NP** Screwed NPT
- **BW** Butt Weld

Ratings

- **1** 150#
- **2** 1500#
- **3** 300#
- **4** 400#
- **6** 600#
- **8** 800#
- **9** 900#

Bore

- **F** Full
- **R** Reduced / Regular

Body and Adapters

- **C** WCB
- **1** A105
- **7** WCC
- **L** LCB
- **8** LF2
- **2** LCC
- **4** CF8 or F304
- **6** CF8M or F316
- **3** CF3 or F304L
- **5** CF3M or F316L
- **A** CA15 or F6A
- **U** Duplex (4A or F51)
- **W** Duplex (S21760, 6A or F55)
- **I** Inconel®
- **M** Monel®

Ball /Stem

- **6** F316 or CF8M*/ 316
- **2** F316 or CF8M*/ 17–4 ph
- **9** F316 or CF8M*/ Duplex
- **N** F316 or CF8M*/ Inconel® 718
- **X** F304L or CF3*/ 304
- **4** F304 or CF8*/ 304
- **5** F316L or CF3M*/ 316L
- **A** F6A / 410
- **U** Duplex SS S31803 or 4A or F51
- **W** Super Duplex SS S21760 or 6A or F55
- **I** Inconel®
- **M** Monel®
- * cast or forged balls may be used

Coating – Apply As Appropriate

- **Y** Overlay
- **H** Hard Chrome
- **S** Stellite™
- **C** Chrome Carbide
- **T** Tungsten Carbide
- **N** Chromium Nitride
- **Z** Other than above

Seat

- **T** PTFE (Virgin)
- **G** RTFE (TFM 1600)
- **L** Devlon®
- **D** Delrin™
- **P** PEEK™
- **E** PCTFE (Kel F®)
- **F** Reinforced PTFE

Seals (O ring, Lip, Gasket)

- **1** HNBR
- **2** HNBR 90 Durometer
- **3** HNBR AED
- **4** HNBR Low Temp
- **5** FKM Type 2 (Viton® B or similar)
- **6** FKM AED (Viton® AED or Similar)
- **7** FKM Low Temp (Viton® GLT or Similar)
- **8** Aflas®
- **J** JW EOL 985
- **W** JW EOL 101
- **F** JW FR58/90
- **B** Buna N Low Temp
- **K** FFKM (Kalrez® or Similar)
- **E** EPDM
- **G** Graphite Gasket (no O-rings)
- **L** Lip Seals (Material As Specified)

Operator

- **B** Bare Stem
- **G** Gear
- **L** Hand Lever
- **A** Actuator
- **Z** Other than above

Special

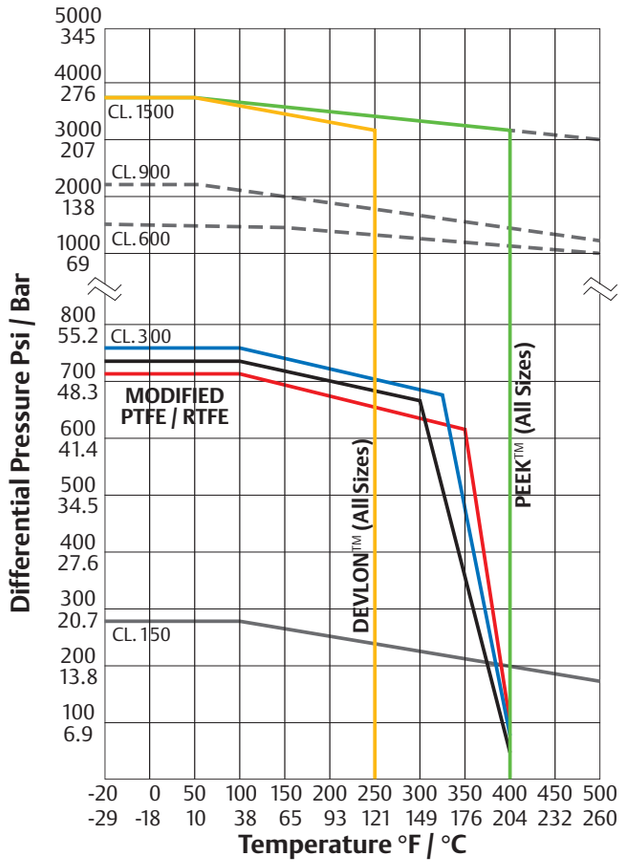
- **PP** Pup Piece
- **SE** Stem Extension
- **BE** Bonnet Extension
- **SP** Short Pattern
- **JK** Jacketed
- **LP** Long Pattern
- **LT** Low Temp (Lip Seals)
- **CR** Cryogenic
- **XX** Special Design - Refer to BOM

EXAMPLE:

S	2	–	RF	3	–	F	–	2	2	–	–	G	–	4	–	L	–	– –

S Series Side entry, soft seated floating ball valve, 2 piece body, RF flanged ends, 300# class, Full port, LCC body, F316 ball and seat, 17-4 stem, TFM 1600 seat inserts, HNBR low temp O-rings, lever operated

Pressure Temperature Ratings



MODIFIED PTFE / RTFE
Size:
1/2″ to 2″ ——— 3″ to 4″ ——— 6″ to 10″ ———

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Common Applications

FLOATING BALL VALVE APPLICATIONS

PETROCHEMICAL
- Isolation
- Safety Systems
- Severe Service
- Pressure Relief
- Unit Bypass
- Utilities

CHEMICAL
- Isolation
- Safety Systems
- Product Flow Lines
- Utilities

OIL AND GAS
- Gathering Lines
- Metering
- Storage Tanks
- Cryogenic
- Isolation
- Gas Treating

REFINING
- Isolation
- Hydrotreater Units
- Hydrocracker Units
- Solvent Refining Units
- Utilities
- Flare Gas

Automation Capabilities

Virgo Valves can be automated to meet your unique system requirements. With our low operating torque and universal ISO mounting design, we can provide solutions for isolation, emergency shutdown, remote operated SDVs and safety instrumented systems (SIS-SIL3 certified).

Lower stem torques can reduce actuator sizes to save space and lower cost. Available automation packages include:

- Pneumatic actuators
- Gas or gas over oil actuators
- Line break systems
- Fireproof actuator systems
- Motor-operated valves
- Hydraulic/electro hydraulic-operated systems
- Valves with digital partial stroking
- HIPPS
- SIS

Why Virgo Valves?

RELIABLE PRODUCTS AT A COMPETITIVE PRICE

Emerson's investment in superior manufacturing equipment, an ongoing commitment to keep employees well-trained, and the quest for upper quartile performance are just a few items that drive our mission for the highest in-class quality. At the same time, our global supply chain and manufacturing allow us to supply products at very competitive prices when compared to other high-quality valve manufacturers.

EXPERT PROJECT MANAGEMENT

Virgo valves have been supplied to over than 2,300 projects around the globe, both large and small. We help our customers maintain project certainty by pre-sale design collaboration, a structured project execution process and maintaining flexibility throughout the manufacturing process. The result is a responsive supplier that supports you throughout the process and meets the promised delivery dates.

SINGLE POINT ACCOUNTABILITY

Emerson owns the complete process from design, manufacturing, assembly, automation, proof testing, integration, and lifecycle coverage. Emerson goes to great lengths to maintain full process accountability that only a few industry-leading manufacturers can provide. This includes having our own in-house foundry, which enables Emerson to uphold the highest quality standards on all Virgo products.

LOCAL SUPPORT AND A GLOBAL PRESENCE

Our vast network of sales offices and Local Business Partners (LBPs) are available to support our customers around the globe. We provide our customers superior pre- and post-sales support, local inventory, as well as a comprehensive range of other services.

SAFE, PROVEN PRODUCTS

We are committed to delivering quality products that meet or exceed our customers' expectations. This commitment starts with thorough testing of our products to ensure they comply with the latest standards and maintain the highest safety ratings. These products are then certified by respected third party organizations. Our commitment is backed by years of experience in many of the most demanding applications around the globe. We have supplied over 1 million valves to more than 150 of the world's leading EPCs, OEMs, and end users and they keep coming back to Emerson over and over.

For more information about Virgo Ball Valves, contact your local Emerson sales office or Emerson Process Management representative.

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