

# EMICO

**UNI-BODY CLASS 150 & 300 FIRE-SAFE BALL VALVES**



**E**

EMICO BRAND

**A**VALVE SYMBOL  
A: BALL VALVE**503 507**SERIES NUMBER  
503: CLASS 150  
507: CLASS 300**F****C**BODY MATERIAL  
F: CFBM / 316 SS  
C: WCB / A105 CS

## A BRIEF HISTORY

- 1984** EMICO (Eayuan Metal Industrial Co. Ltd.) was incorporated at Lugang, Changhua (Taiwan) and began establishing itself as a professional ball valve manufacturer for the oil, petrochemical, natural gas, on-shore plants and water & processing markets.
- 2000** EMICO opened a second facility in Lugang to meet demands of the company's growth and increase its manufacturing capacity.
- 2002** EMICO set up its third manufacturing facility in Shanghai for the production of gate, globe & check valves in collaboration with Hitachi, Japan.
- 2007** EMICO combined both its manufacturing facilities in Changbin industrial Park in Lugang and invested in state-of-the-art machining centres to further expand its production capacity in order to meet growing demands of its international clientele.
- 2008** EMICO added a new production facility in Shanghai to service the needs of its China market.

一原金屬工業股份有限公司  
EAYUAN METAL INDUSTRIAL CO., LTD.EMICO  
一原金屬工業股份有限公司  
EAYUAN METAL INDUSTRIAL CO., LTD.

## PRODUCTION RANGE

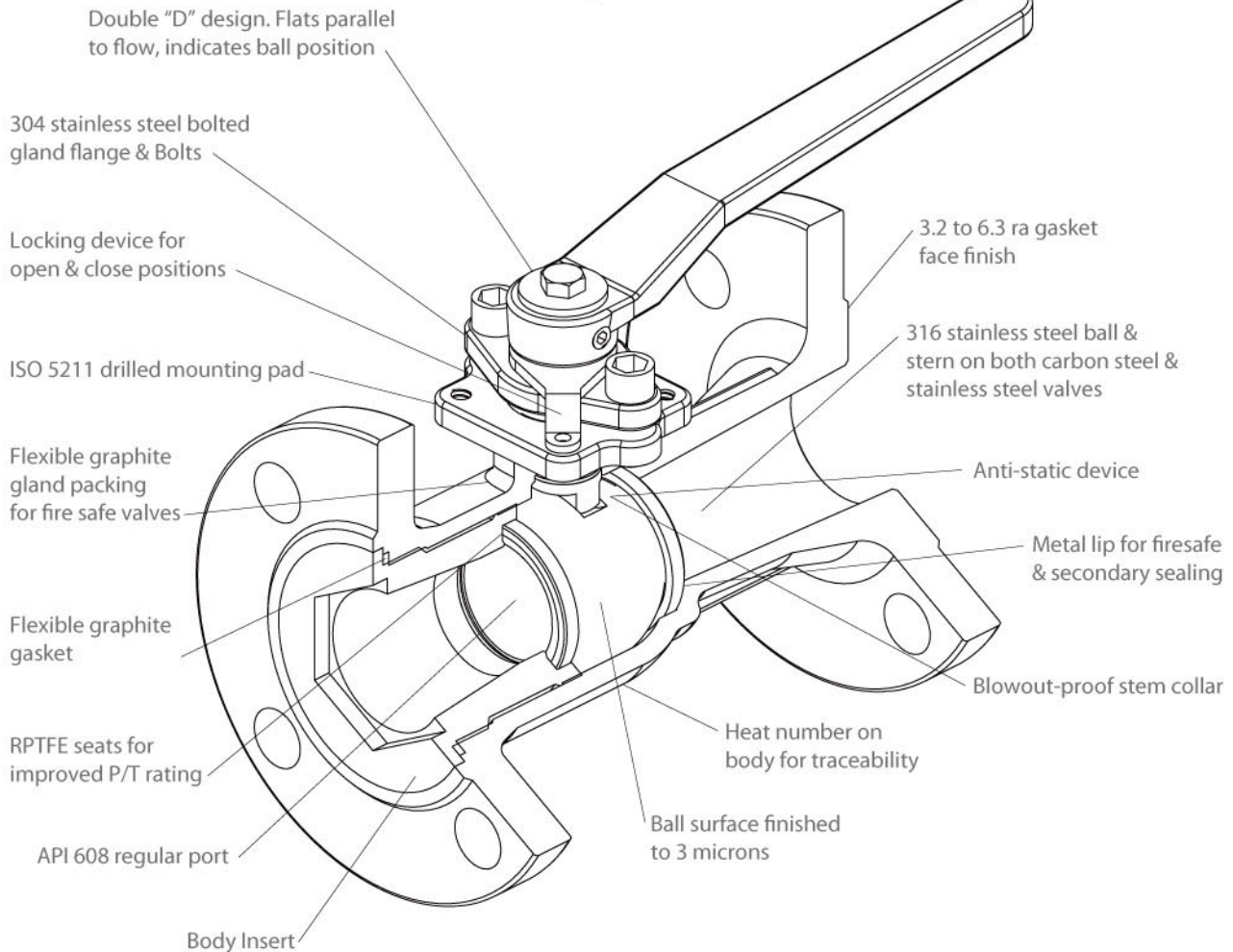
- EMICO ball valves are made by investment casting (lost wax process) from size 1/4" up to 4" and sand shell casting or stack shell casting from 4" to 12". High pressure classes are supplied in forged construction.
- Ball valves are supplied in various configurations: 1-piece, 2-piece & 3-piece with threaded, socket weld, butt weld and flanged ends.
- Standard materials offered are 316 stainless steel and carbon steel in WCB or A105 to applicable ASTM standards. Other materials introduced to the supply range are Alloy 20/CN7M, Hastelloy C, Duplex and Super Duplex.
- EMICO also supplies full port PFA lined ball valves for corrosive applications.
- EMICO's product range includes Oil Field valves and Sanitary valves.
- Class ratings: Class 150, Class 300, Class 800, Class 1500 and Class 2500.



## QUALITY ASSURANCE & CERTIFICATION

- EMICO was the first ball valve manufacturer in Taiwan to implement the ISO 9002 Quality Assurance System. In 2000, it further obtained ISO 9001 Certification, Cross-approved with TUV DIN EN ISO 9001.
- EMICO is an authorised licensee to use API 6D and certified to PED, CE, ATEX, TA-Luft and is UL listed.
- EMICO is certified to Australian Gas Association (AGA) AG-214 for its range of EA-305 3-piece fire safe ball valves.
- Fire safe designs include: 1-pc EA-108, 2-pc EA-25A, 3-pc EA-305, EA-309, EA-310 & P135. These valves are fire safe to API 607 4th & 5th edition fire test requirements and tested and certified by Southwest Research Institute (SwRI) in Texas, USA and TÜV.
- EMICO has an established Engineering Department of engineers, technicians and an R&D centre with many years experience in the manufacture of quality ball valves.
- All valves are fully traceable and certified to EN 10204-2004 3.1 (chemical, mechanical, hydrostatic & pneumatic pressure tests) and can be supplied with NDE performed to ASME B16.34 international standards. Valves are tested and certified to API 598.

### Design Features



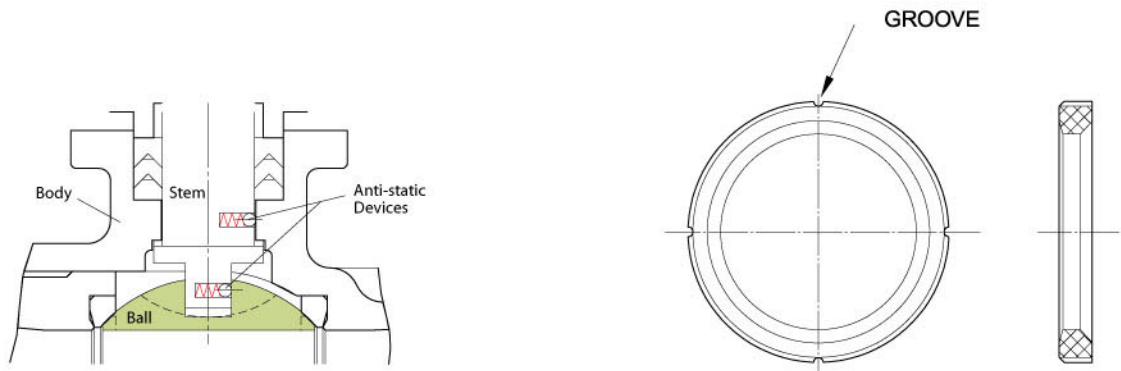
Cross-section of a typical EMICO regular port, uni-body ball valve displaying basic design

- **BODY: Investment castings** upto 100mm with high quality finish. Sand Cast above 100mm
- **PORT: Reduced Port**
- **DESIGN:** ANSI B16.5 & ANSI B16.34.
- **TESTING:** API 607 & API 598.
- **DIMENSIONS:** Face to face dimensions ANSI B16.10 long pattern, 6" & 8" short pattern.
- **SEALING: Bubble-tight bi-directional** sealing is achieved by the use of two rigid seats firmly secured in the valve body on either side of the ball. Seat rings encapsulated to minimise erosion & cold flow. In floating ball designs, pressure upstream causes downstream movement of the ball effecting a seal against the downstream seat ring.

## TECHNICAL FEATURES

### EMICO UNI-body ball valves in Carbon Steel and Stainless Steel- Classes 150 & 300, Flanged ends

Quality manufactured & tested under **Quality Assurance** systems ISO 9001



- **Anti-static plunger** - positive earthing of ball and stem to valve body, preventing static electricity build-up.
- **Blowout-proof stem** - Internally fitted back-seated stem prevents anti-blowout under pressure and also functions as the backseat for stem sealing.
- **Locking device** - locks valve in open and closed positions to prevent accidental valve operation.
- **Double "D" stem** design ensures lever can only be fitted in line with flow direction for positive open / closed indication.  
  
Stem bearing on 150mm & 200mm valves, reduces side thrust.
- **ISO 5211** Actuator Mount - Integral actuator mounting pad as standard for all modern pneumatic and electric actuators.
- **Bolted gland flange.** Actuators can be fitted to the valve without disturbing the gland.
- **316SS corrosion resistant** trim for longer valve life.
- **15% Glass Fiber Reinforced PTFE** for higher pressure / temperature rating. Other seat materials are optionally available including Pure PTFE & Carbon-Filled PTFE.

- **Pressure equalising grooves** - ensure efficient sealing at all pressures.

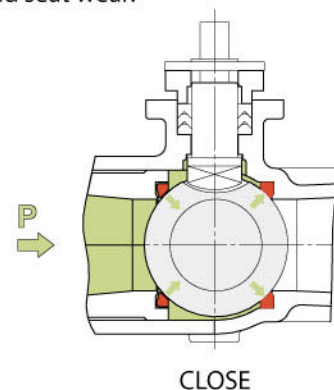
Velocity increases just before valve closure and when the ball is cracked off its seat. At these points, the seats are only partially supported by the ball.

The equalising grooves prevent seat damage from increased line velocity around the unsupported section of the seats. They reduce damage from cold flow (where seats are damaged by extrusion around the ball - a weakness of PTFE under pressure).

Pressure equalising grooves ensure that the upstream seat is free floating. Force acting on the downstream seat is limited to pressure exerted on the surfaces of the ball only and not the ball plus the upstream seat surfaces combined (piston effect).

See sketch below.

Advantage of this feature is lower valve break torque and seat wear.



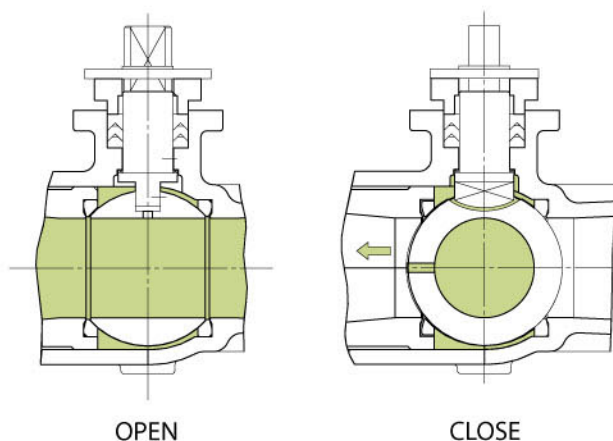
- UNI-body design has no body joints and minimises leak paths.
- Testing - All valves have 100% seating and body test.
- Stock - Repair Kits comprising seats, body seal, gland packing, thrust washer & stem bearing.

#### ■ CAVITY PRESSURE RELIEF HOLES:

Heating of volatile fluid trapped in the body cavity can cause pressure build-up, permanently distorting the seats or the ball, unless properly relieved with cavity pressure relief holes.

**Valve Open (standard)** - with the valve in the open position, pressure equalisation between the body cavity and the line is achieved by a hole in the ball beneath the stem slot. This is standard on all EMICO ball valves. (see sketch below)

**Valve Closed (optional)** - internal Pressure equalising vent (hole drilled in upstream side of ball) can be supplied for certain applications e. g. ammonia, chlorine, LPG. (see sketch below)



## DESIGN & INSPECTION STANDARDS

- Pressure/Temperature Ratings:  
Body - ASME B16.34 (Class 150 & 300)  
Seat - As per EMICO charts
- General Valve Design: ASME B16.34
- Shell Wall Thickness: ASME B16.34
- Construction: Cast UNI-BODY & INSERT
- Face to Face Dimensions: ASME B16.10
- Flange Dimensions: ASME B16.5
- Materials: Per Relevant ASTM Standards
- Pressure Test: API 598 (Sealing - Bubble Tight Bi-Directional)
- Fire Safe Test: API 607 Ed. 5/ISO 10497-5: 2004
- Materials & Test Certification: EN 10204-2004 3.1
- NACE: MR0175
- Marking: MSS SP25

## MATERIALS SELECTION

### BODY:

Carbon Steel, Low Temperature Carbon Steel, Special Alloy, Duplex and Super Duplex, Monel, Inconel, Hastelloy, Titanium, etc.

### BALL:

Stainless Steel, Special Alloy, Duplex and Super Duplex, Monel, Inconel, Hastelloy, Titanium, etc.

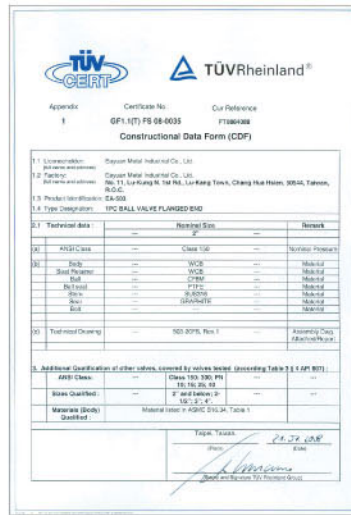
## EXTERNAL COATING

Carbon Steel valves are usually protected with manufacturer's standard paint finish or phosphating. Valves can also be supplied with special paint finish.

## ACCESSORIES

Lever handle, Gear operator, Spring Return or Double Acting Pneumatic Actuators.

EMICO EA503 & EA507 ball valves have independently-witnessed fire tests to API 607 Ed 5/ISO 10497-5:2004  
These tests were performed and witnessed by TÜV Rheinland Taiwan.



EMICO fire safe ball valves are designed & manufactured to an approved fire safe test standard to minimise both external and internal fluid leakages in the event of a plant fire.

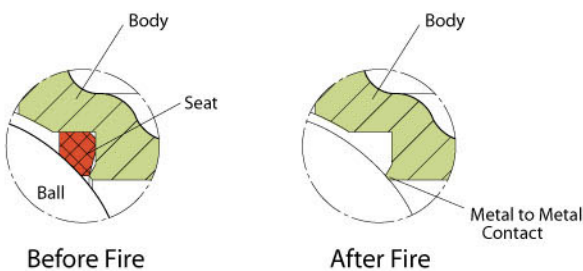
During a fire, PTFE soft seals are damaged or destroyed. Examples of how metal-to-metal contact is achieved at all sealing areas are illustrated below.

**Fig.1:** contact between the ball and the fire safe lip of the body, & **Fig.2:** contact between the stem shoulder and machined backseat of the body.

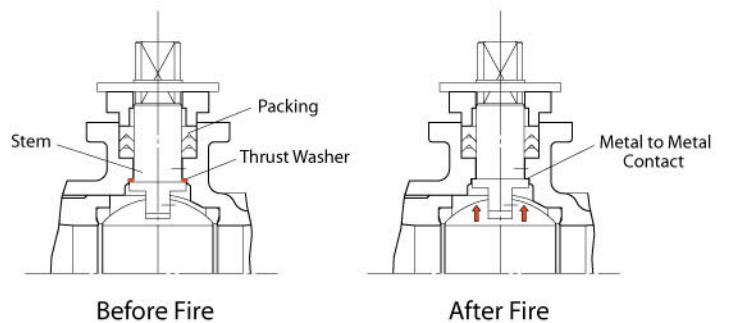
**Fig.1:** covers internal leakage and **Fig.2:** external leakage.

All fire safe valves are fitted with flexible graphite body seals and graphite stem packing.

**Fig. 1-Ball/Body Contact**



**Fig. 2-Stem/Body Contact**

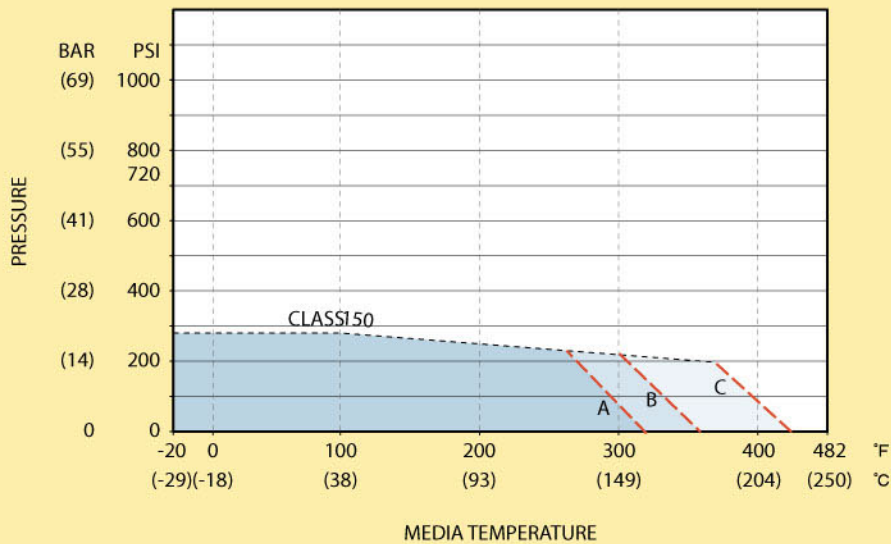
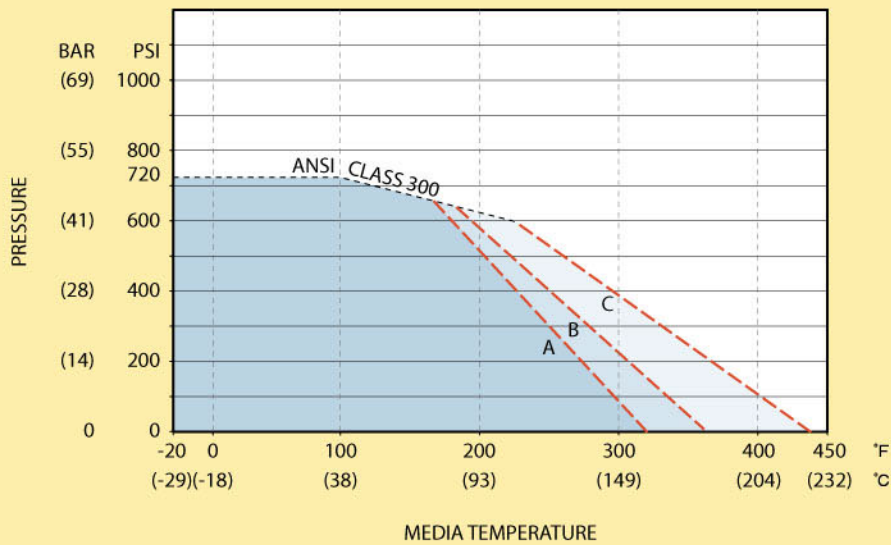


size: 1" ~ 8"

## PRESSURE - TEMPERATURE RATINGS

Pressure-Temperature ratings of ball valves are determined by sealing materials used in addition to valve shell materials e.g. seats, packing, gaskets. It is difficult to determine the P/T ratings under all kinds of situations and media, but we have prepared general ratings charts on non-shock fluid service below, based on manufacturers design recommendations and past experiences.

### PRESSURE & TEMPERATURE RATING



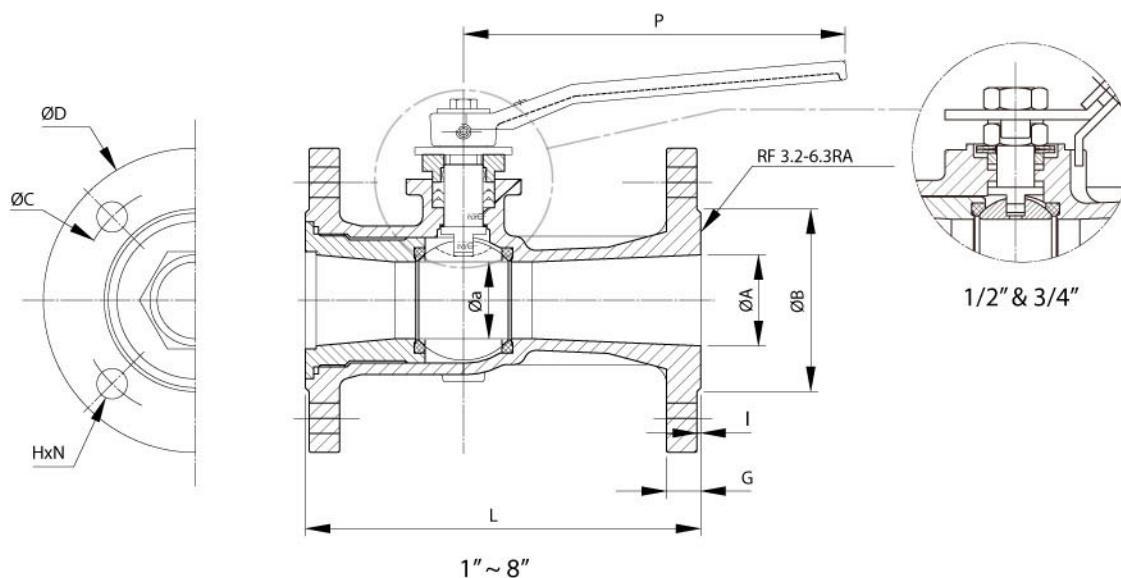
Seat materials: A=PTFE, B=RPTFE (15% Glass Fiber Reinforced PTFE is standard seat material for EMICO ball valves), C=PTFE+50% S.S.

Body Pressure ratings shown for WCB carbon steel valves. Stainless steel ball valves have slightly lower body ratings.



## Dimensions

### Class 150 & 300 Carbon Steel & Stainless Steel Ball Valves



Dimensions of EA 503

Size	a	A	B	C	D	G	I	L	H	N	ISO5211
1/2"	12.7	16	35	60.5	89	11.1	1.6	108	16	4	F03
3/4"	15.8	20	43	70.0	98	11.1	1.6	117	16	4	F03
1"	20.0	25	51	79.5	108	11.1	1.6	127	16	4	F04
1-1/2"	32.0	38	73	98.5	127	14.3	1.6	165	16	4	F05
2"	38.0	50	92	120.5	152	15.9	1.6	178	19	4	F07
2-1/2"	50.0	65	105	139.5	178	17.5	1.6	190	19	4	F07
3"	58.0	80	127	152.5	190	19.1	1.6	203	19	4	F10
4"	76.0	100	157	190.5	229	23.9	1.6	229	19	8	F10
6"	111.0	150	216	241.5	279	25.4	1.6	267	22	8	F10
8"	144.0	200	270	298.5	343	28.6	1.6	292	22	8	F12

Dimensions of EA 507

Size	a	A	B	C	D	G	I	L	H	N	ISO5211
1/2"	12.7	16	35	66.5	95	14.3	1.6	140	16	4	F03
3/4"	15.8	20	43	82.5	117	15.7	1.6	152	19	4	F03
1"	20.0	25	51	89.0	124	17.5	1.6	165	19	4	F04
1-1/2"	32.0	38	73	114.5	156	20.7	1.6	190	22	4	F05
2"	38.0	50	92	127.0	165	22.3	1.6	216	19	8	F07
3"	58.0	80	127	168.0	210	28.6	1.6	283	22	8	F10
4"	76.0	100	157	200.0	254	31.8	1.6	305	22	8	F10
6"	111.0	150	216	270.0	318	36.6	1.6	403	22	12	F10
8"	144.0	200	270	330.0	381	41.3	1.6	419	25	12	F12

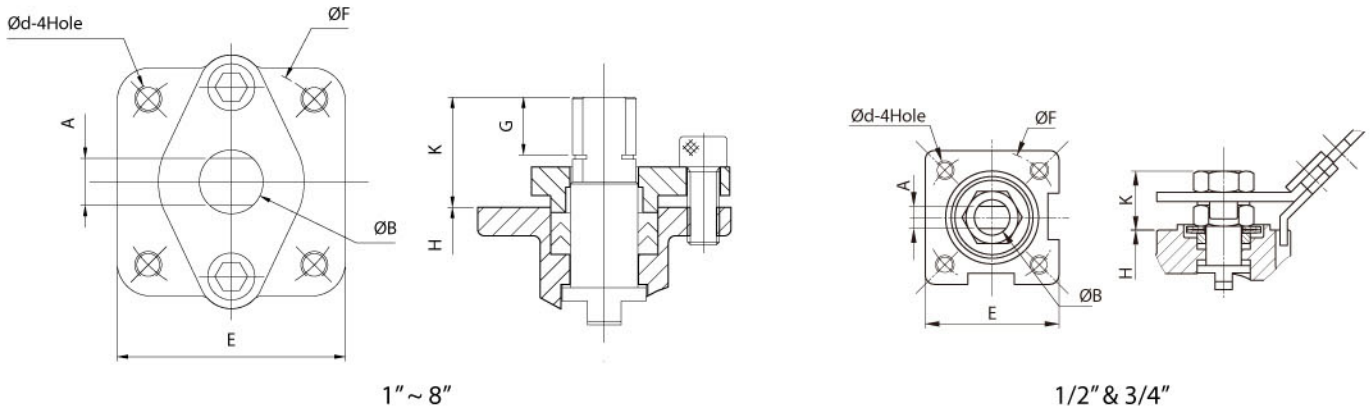
#### Test Pressure class 150

- Shell Test (Hydrostatic) - 2948 kpa (428psi): Carbon Steel
- Shell Test (Hydrostatic) - 2859 kpa (415psi): Stainless Steel
- Seat Test (Air) - 550kpa (80psi)

#### Test Pressure class 300

- Shell Test (Hydrostatic) - 7757 kpa (1125psi): Carbon Steel
- Shell Test (Hydrostatic) - 7585 kpa (1100psi): Stainless Steel
- Seat Test (Air) - 550kpa (80psi)

## Dimensions of ISO Actuator Mounting Pad EMICO, Fig Nos. EA503 & EA507



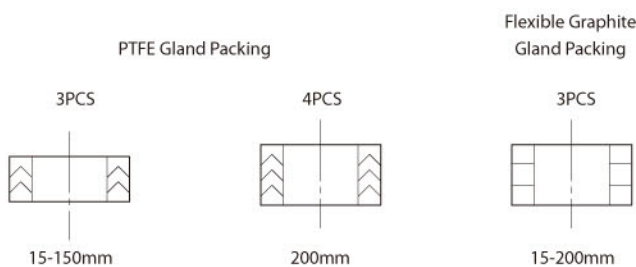
Dimensions of EA 503

Size	A	B	d	E	F	G	K	H	ISO5211
1/2"	6	9.5	M 5	36	36	---	15.9	24.0	F03
3/4"	6	9.5	M 5	36	36	---	14.8	29.3	F03
1"	8	12.0	M 6	48	50	7.5	19.4	38.5	F04
1-1/2"	10	15.0	M 6	48	50	13.2	27.1	50.6	F05
2"	14	19.0	M 8	68	70	17.3	33.3	60.5	F07
3"	16	24.0	M10	96	102	24.5	44.5	89.9	F10
4"	16	24.0	M10	96	102	24.5	44.5	108.7	F10
6"	20	30.0	M10	92	102	24.5	48.2	140.0	F10
8"	26	38.0	M12	115	125	32.5	63.0	182.0	F12

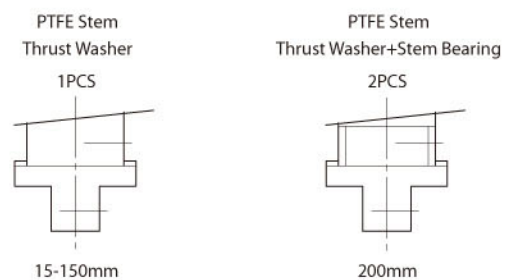
Dimensions of EA 507

Size	A	B	d	E	F	G	K	H	ISO5211
1/2"	6	9.5	M 5	36	36	---	15.9	24.0	F03
3/4"	6	9.5	M 5	36	36	---	15.9	29.3	F03
1"	8	12.0	M 6	48	50	7.5	19.4	38.5	F04
1-1/2"	10	15.0	M 6	48	50	13.2	27.1	50.6	F05
2"	14	19.0	M 8	68	70	17.3	33.3	60.5	F07
3"	16	24.0	M10	96	102	24.5	44.5	89.9	F10
4"	16	24.0	M10	96	102	24.5	44.5	108.7	F10
6"	20	30.0	M10	92	102	24.5	48.2	140.0	F10
8"	26	38.0	M12	115	125	32.5	63.0	182.0	F12

### Stem Packing Details



### Thrust Washer & Stem Bearing Details



### Name Plate Details

 ISO-9001	FIG SIZE		BODY		F. S.	
	CLASS		TRIM		P/T	
			SEAT		MF' D	

## Construction and Materials

NO.	Parts	EA503C/EA507C	EA503F/EA507F
1	Body	A216 WCB	A351 CF8M
2	End Cap	A216 WCB	A351 CF8M
3	Seats	PTFE+15%G. F. REINFORCED	
4	Ball	A351 CF8M	A351 CF8M
5	Stem	SUS 316	SUS 316
6	Body Gasket	FLEXIBLE GRAPHITE	
7	Thrust Washer	PTFE	
8	Stem Packing	FLEXIBLE GRAPHITE	
9	Gland Bush	PTFE	
10	Gland Flange	CF8	
11	Gland Bolts	SUS 304	
12	Stopper	SUS 304	
13	Snap Ring	STEEL	
14	Handle	WCB	
15	Flat Washer	STEEL	
16	Handle Bolt	SUS 304	
17	Static Device	SUS 304	
18	Spring	SUS 304	
19	Socket Screw	Steel	

All part numbers are corresponding with those shown in valve assembly drawings.

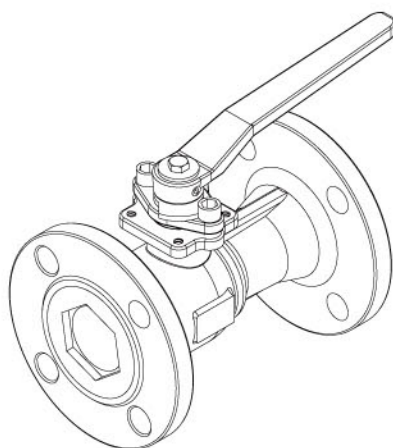
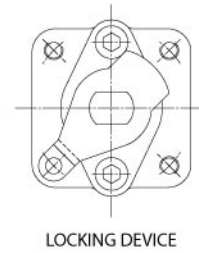
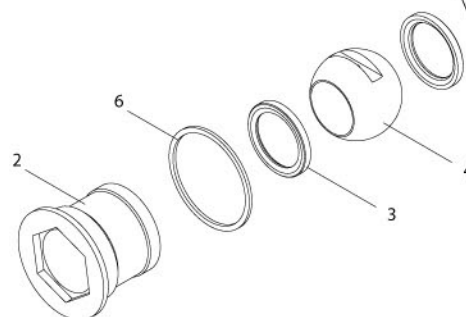


Illustration shows size 3" design.



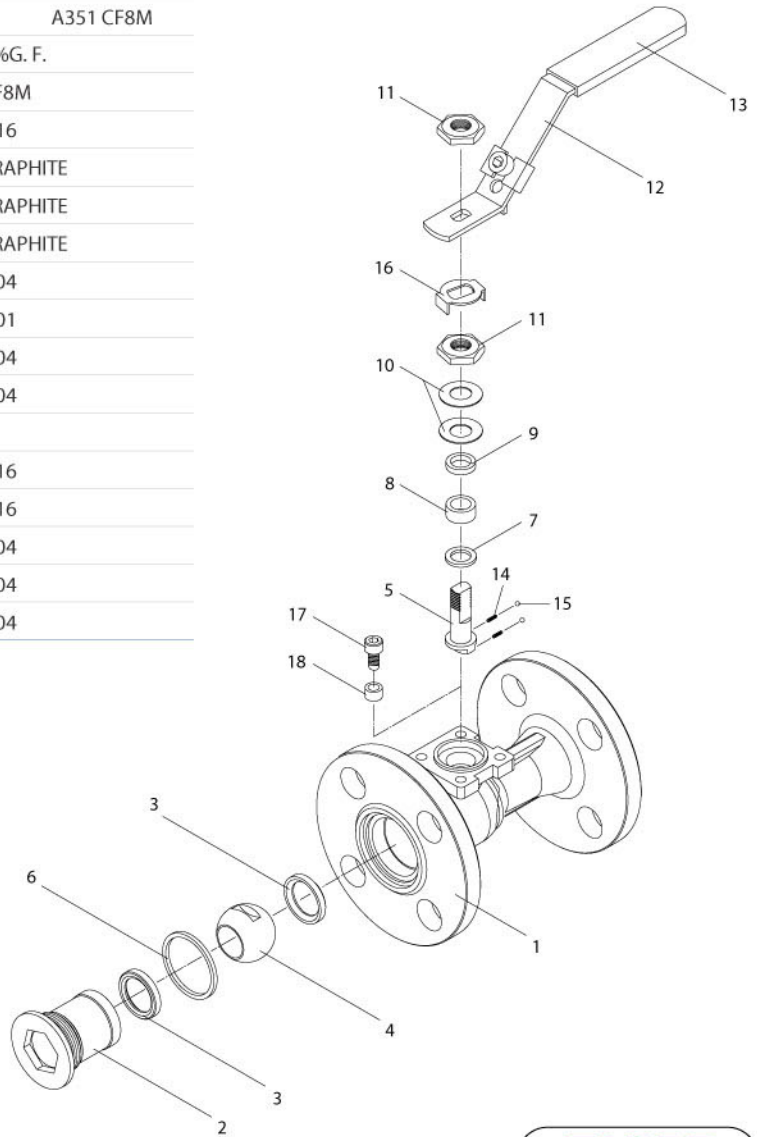
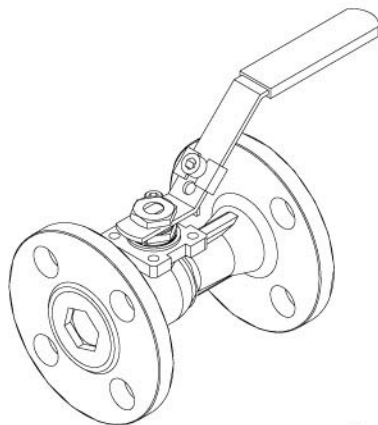
size: 1" ~ 8"



## Uni-body, Cast Steel Flanged Ball Valves

### Construction and Materials

NO.	Parts	EA503C	EA503F
1	Body	A216 WCB	A351 CF8M
2	Seat Retainer	A216 WCB	A351 CF8M
3	Seats	PTFE+15%G. F.	
4	Ball	A351 CF8M	
5	Stem	SUS 316	
6	Body Gasket	FLEXIBLE GRAPHITE	
7	Thrust Washer	FLEXIBLE GRAPHITE	
8	Stem Packing	FLEXIBLE GRAPHITE	
9	Gland Ring	SUS 304	
10	Belleville Spring Washer	SUS 301	
11	Lever Nut	SUS 304	
12	Handle	SUS 304	
13	Plastic Coating	PVC	
14	Spring	SUS 316	
15	Static Device	SUS 316	
16	Locking Tab	SUS 304	
17	Stop Screw	SUS 304	
18	Stop Screw Ring	SUS 304	



size: 1/2" & 3/4"



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