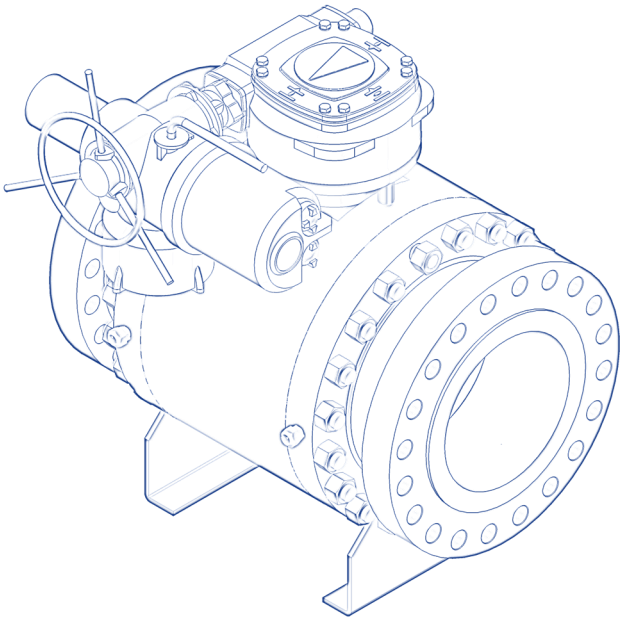
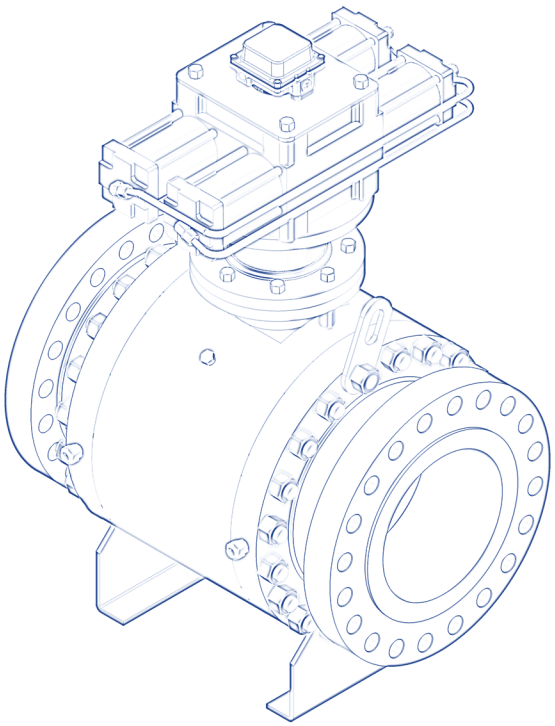
Forged 3 Piece Trunnion Mounted Ball Valves

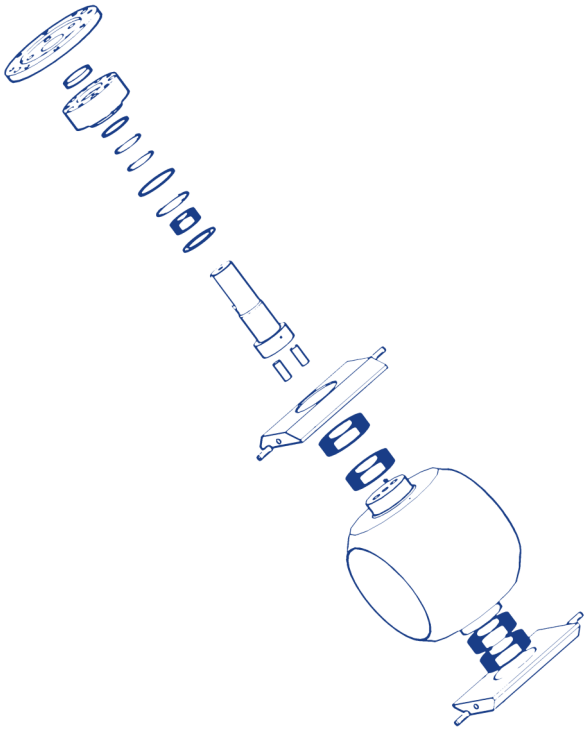
Series MS

Construction:

3 piece bolted side entry
Trunnion housings ≤ 4”
Trunnion retainer plates ≥ 6”
Metal Seated
Chrome carbide and tungsten carbide trims
Uni-directional or Bi-directional







Application:

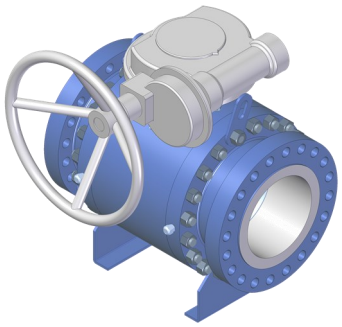
Slurry

Mining & Utilities

Petrochemical

Forged 3 Piece Trunnion Ball Valves for the Mining, Utilities & Petrochemical Industries

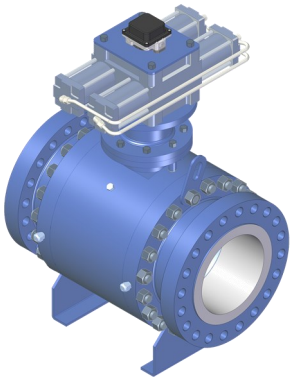
RGR valves have the strength of forged components combined with serviceability, cost efficiency and reliability.



All the pressure boundary parts including the ball, stem, seat rings and bearings retainers are forged components. The ball is supported in trunnion housings in sizes up to 4" and in bearing retainers in sizes up to 24".

RGR manufactures bare shaft valves and also supplies valves with any operator design type and configuration the client may require.

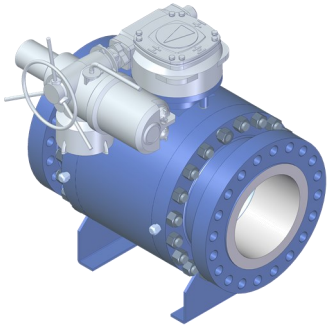
Operator size selection is based on in house torque tests performed during R&D of the valves.



Our in house capability allows us to design and manufacture valve control systems required by the particular application. All systems are subject to FAT's with end user approved procedures.

Operation

As a standard feature, ball valves can be supplied with the following operating devices:



manual – lever

manual – worm gearing and hand wheel

electric actuator – turning angle 0° to 90°

electric actuator and worm gear

pneumatic actuator – single-acting (air x spring) or double-acting (air x air)

hydraulic actuator

gas-over-oil actuator

Location of the operating device:

directly on the upper flange of the ball valve

on a bridge

on an extension piece

Installation or replacement of an operating device can be done under service conditions.

Operator mounting dimensions to ISO 5211

Design Features & Technical Specifications

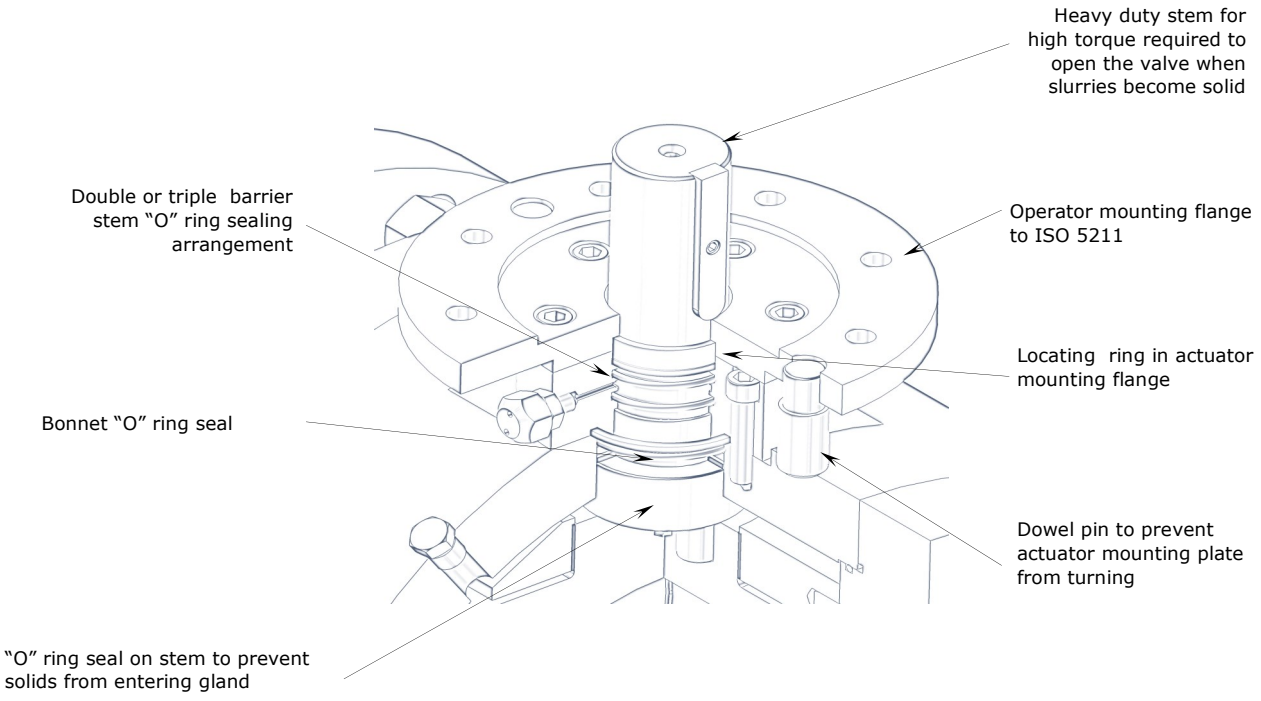
Ball valves are designed to fully open or close the bore in the piping system.

Applications	**:** Slurry Pipelines
Fluids	**:** All fluids with impurities and abrasive particles
Process pressure	**:** From 0 bar to the specified pressure class for the relevant body material and sealing elements used
Process temperature	**:** -40°C to +180°C
Ambient temperature	**:** from -50°C to +60°C
Installation	**:** Into any piping (horizontal, vertical, inclined), but taking into account the instructions applicable to installation of the actuator. Ball valves >Ø150 are equipped with support feet as a standard.
Testing	**:** Every ball valve is tested in accordance with API Specification 6D/ISO 14313 incorporating ISO 5208 and AP598. Alternative test standards and procedures are readily accommodated.
Test report	**:** EN 10204/3.1 Data Books are available on request

Technical Specifications	
Bore	**:** Full or reduced bore (API Specification 6D)
Connection	**:** Flanged ends and Clamp Type Ends
Body	**:** Split body, three-piece - NPS 2“ to NPS 24”
Seats	**:** Metal-to-metal seated 1 Upstream seat (Uni-directional) 2 Seats (Bi-directional)
Seat function	**:** SPE = SINGLE PISTON EFFECT
Stem mounting	**:** ABO = ANTI BLOW OUT – the stem is secured from being blown out of the ball valve body by the mechanical design of the stem and the bolted bonnet.
Actuator mounting	**:** ISO 5211

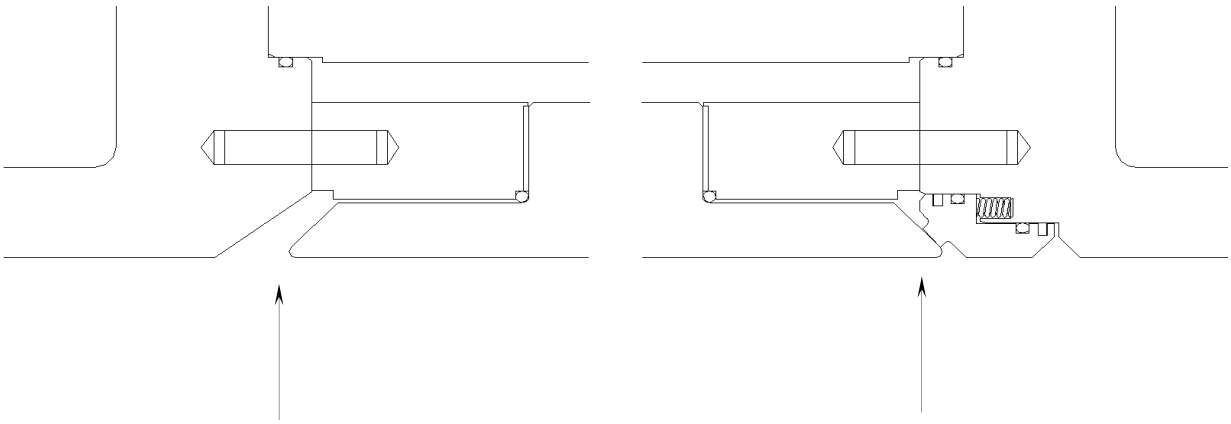
Fire Safe Design	***:*** The design is completely fire safe in accordance with ISO 10497:2004.
Vibration Proof	***:*** The general arrangement and especially the seating of the ball and the delimitation of the ball position guarantee a reliable functional ability of the ball valve even when the piping system vibrates.
Valve Testing	***:*** Each valve is tested for body integrity and seat tightness. The body test pressure is 1.5 x PN. The seat test pressure for metal seated valves is 1.1 x PN. The seat test pressure for soft seats is 6 bar air. The test medium is treated water.
Valve Tightness	***:*** ISO 5208 Rate D for Metal seats
Materials	***:*** The selection of materials of individual components depend on the process conditions and the relevant piping specifications. For the production of components exposed to internal pressure – pressure boundary parts – only materials with EN 10204/ 3.1 & 3.2 certificates are used; bolting components exposed to internal pressure have EN 10204/2.2 certificates; materials of components in contact with the fluid have EN 10204/2.1 certificates.
Wetted Parts	***:*** Internal Components can be HVOF coated with Tungsten Carbide

Bonnet Sealing Arrangements



Seating Arrangements

FLOW DIRECTION



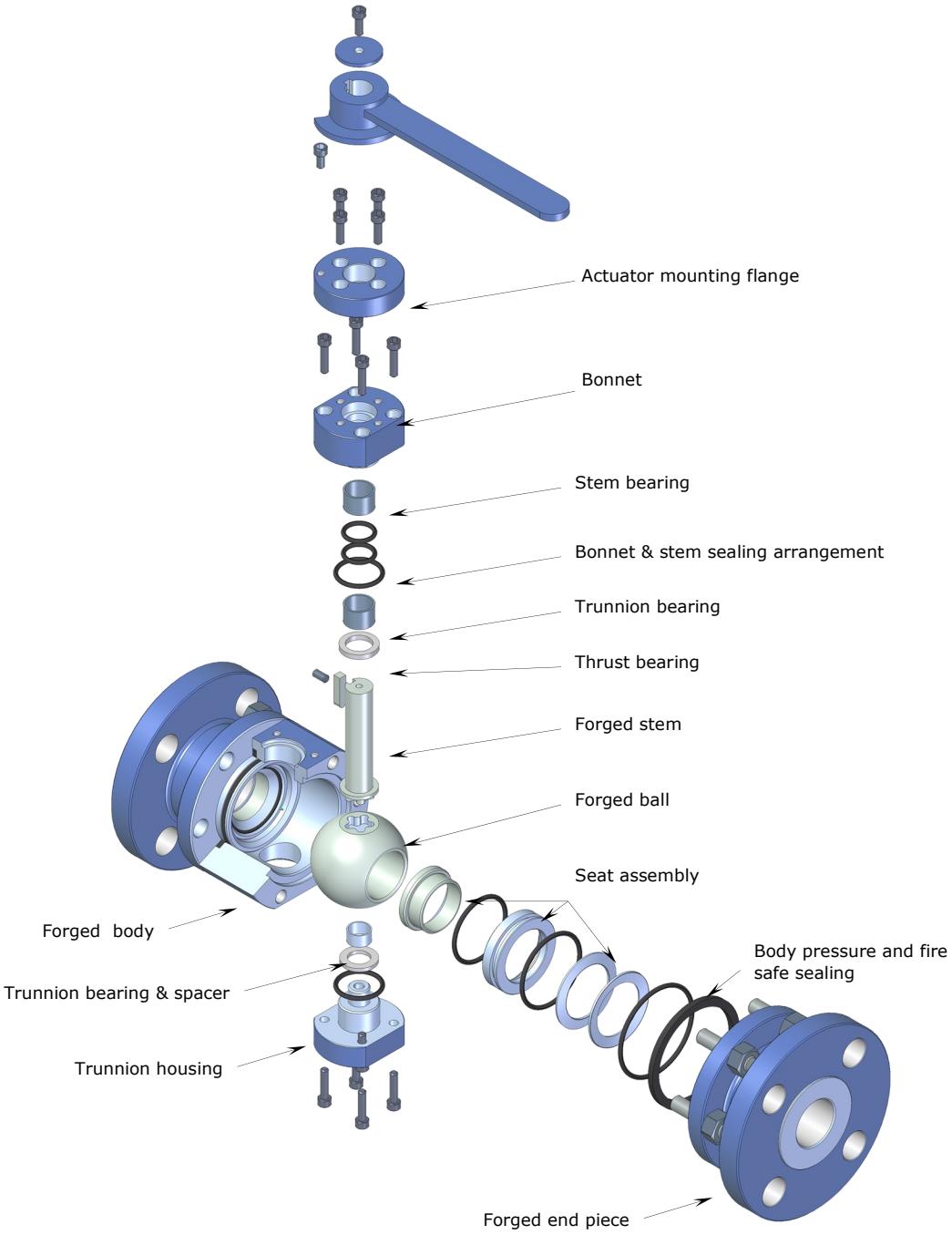
No Seat is required on the Downstream side of the valve for Uni-directional applications.

The Ball cavity is open to the low pressure side when the valve is closed. This reduces the risk of slurry hardening and jamming of the ball.

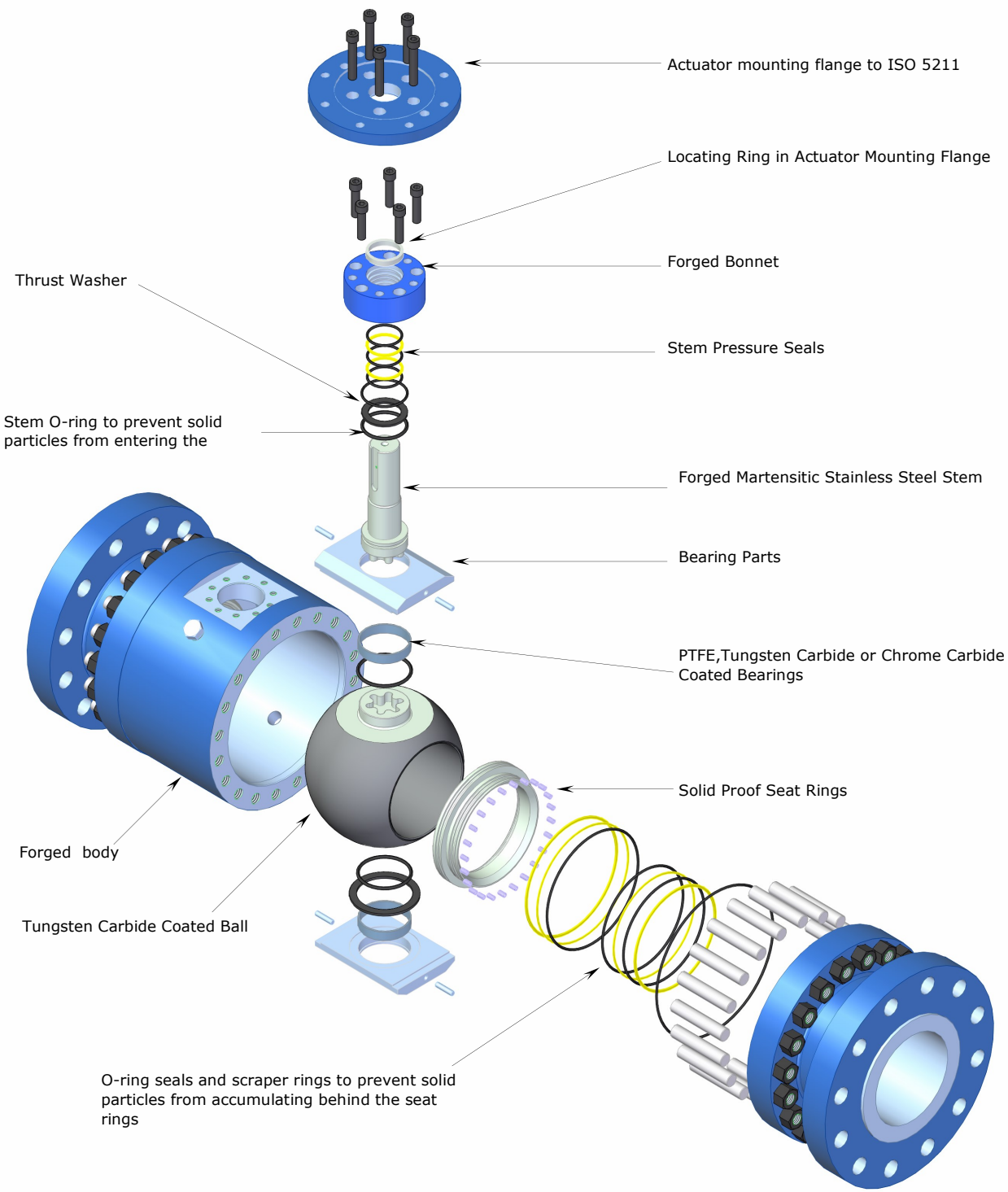
Spring loaded solids proof Seat on Upstream and Downstream of Valve (Bi-directional)

Spring loaded solids proof seat on Upstream side of valve only (Uni-directional)

Series MS - 2" - 4"


Actuator mounting flange
Bonnet
Stem bearing
Bonnet & stem sealing arrangement
Trunnion bearing
Thrust bearing
Forged stem
Forged ball
Seat assembly
Forged body
Body pressure and fire safe sealing
Trunnion bearing & spacer
Trunnion housing
Forged end piece

Series MS - 6" - 24"



SUMMARY OF BASIC STANDARDS AND REGULATIONS

API (American Petroleum Institute)

API SPECIFICATION 6D - Specification for Pipeline Valves (Gate, Plug, Ball and Check Valves)

API STANDARD 608 - Metal Ball Valves – Flanged, Threaded and Welding Ends

API 598— Seat Leakage Testing

API SPECIFICATION Q1 - Specification for Quality Programs for the Petroleum, Petrochemical and Natural Gas Industry

ASME (American Society of Mechanical Engineers)

ASME B16.5 - Pipe Flanges and Flanged Fittings NPS ½" to 24"

ASME B16.10 - Face-to-Face and End-to-End Dimensions of Valves

ASME B16.25 - Butt welding Ends

ASME B16.34 - Valves – Flanged, Threaded and Welding End

ASTM (American Society of Testing Materials)

A105/A105M - Standard Specification for Carbon Steel Forgings for Piping Applications

A182/A182M - Standard Specification for Forged or Rolled Alloy-Steel Pipe Flanges, Forged Fittings, and Valves and Parts for High-Temperature Service

A193/A193M - Standard Specification for Alloy Steel and Stainless

Steel Bolting Materials for High-Temperature Service

A194/A194M - Standard Specification for Carbon and Alloy Steel Nuts

A193—Alloy Steel bolting

Nuts for Bolts for High-Pressure or High-Temperature Service or Both

A320/A320M - Standard Specification for Alloy Steel Bolting

Materials for Low-Temperature Service

A350/A350M - Standard Specification for Carbon and Low-Alloy Steels

Steel Forgings Requiring Notch Toughness for Piping Components

MSS (Manufacturers Standardization Society of the Valve and Fittings Industry, Inc)

MSS SP-6 - Standard Finishes for Contact Faces of Pipe Flanges and Connecting-End Flanges of Valves and Fittings

MSS SP-25 - Standard Marking System for Valves, Fittings, Flanges and Unions

Resistance in Sour Oilfield Environments

NACE (National Association of Corrosion Engineers)

MR 0175-2003 - Standard Material Requirements. Metals for Sulfide Stress Cracking and Stress Corrosion Cracking

ISO (International Organization for Standardization)

ISO 5208 - Industrial valves – Pressure testing of valves

ISO 5211 - Industrial valves – Part-turn actuator attachments

ISO 10497 -Testing of valves – Fire type-testing requirements

BSI (British Standards Institution)

BS 5351 - British Standard Specification for Steel ball valves for the petroleum, petrochemical and allied industries

DIRECTIVE 97/23/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

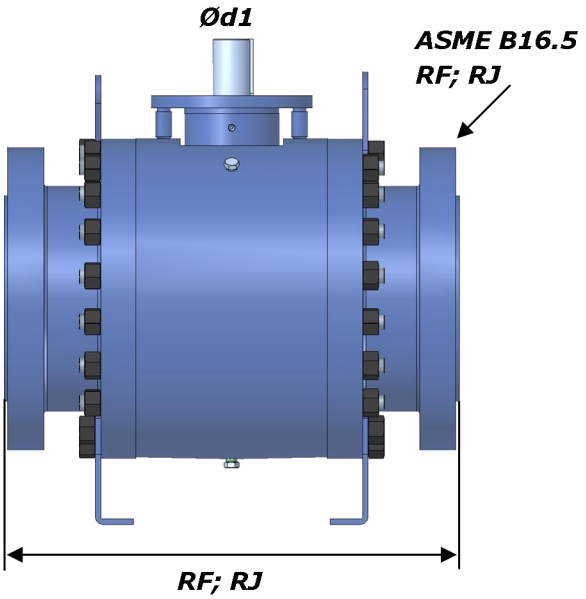
of May 1997 on the approximation of the laws of the Member States concerning pressure equipment

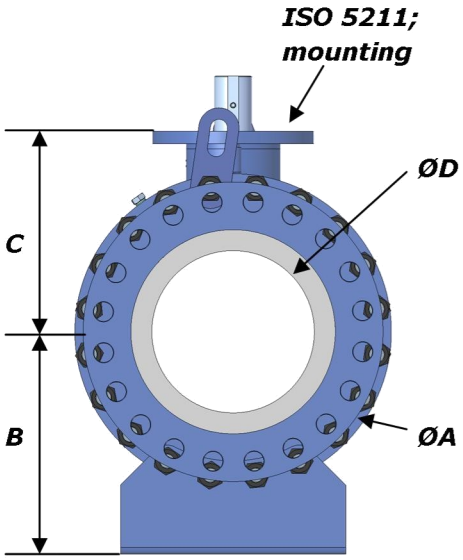
Minimum bore allowable (Information)

DN (mm)	NPS (inches)	ASME 150 to 600	ASME 900	ASME 1500	ASME 2500
15	1/2	13	13	13	13
20	3/4	19	19	19	19
25	1	25	25	25	25
32	1 1/4	32	32	32	32
40	1 1/2	38	38	38	38
50	2	49	49	49	42
65	2 1/2	62	62	62	52
80	3	74	74	74	62
100	4	100	100	100	87
150	6	150	150	144	131
200	8	201	201	192	179
250	10	252	252	239	223
300	12	303	303	287	265
350	14	334	322	315	
400	16	385	373	360	
450	18	436	423		
500	20	487	471		
550	22	538	522		
600	24	589	570		
650	26	633	617		
700	28	684	665		
750	30	735	712		
800	32	779	760		
850	34	830	808		
900	36	874	855		
950	38	925			
1000	40	976			
1050	42	1020			
1200	48	1166			
1350	54	1312			
1400	56	1360			
1500	60	1458			

DIMENSIONS – API Specification 6D (RF, RJ), ASME B16.5

- full bore
- 3-piece split body, side entry



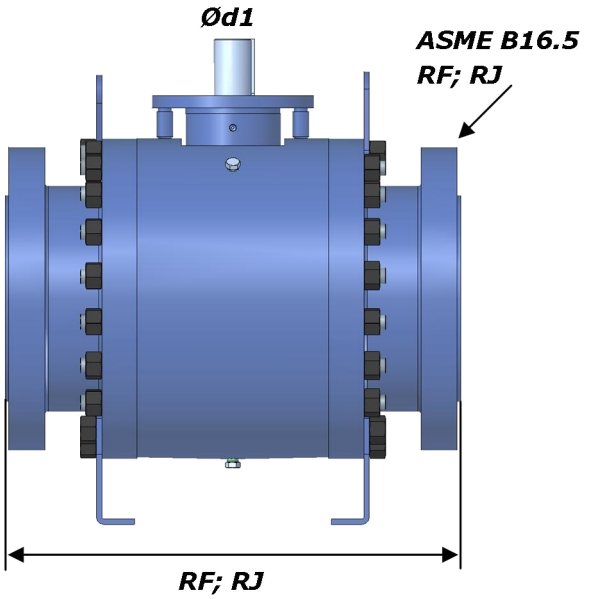


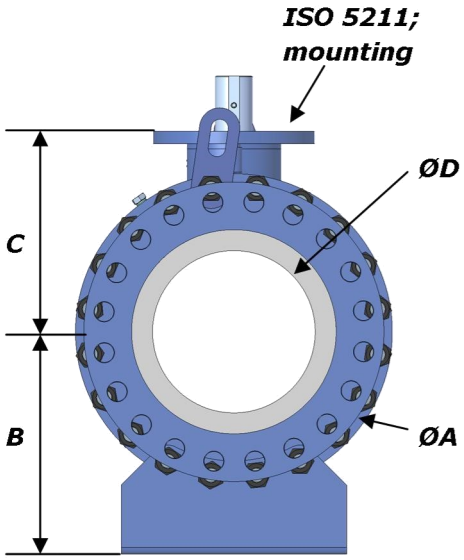
Class 150											Weight [kg]
NPS	Dimensions [mm]									ISO 5211	
	ØD	L_{RF}	L_{BW}	L_{RJ}	ØA	B	C	E	Ød1		RF/RJ
2"	50	178	216	191	160	84	122	56	25	F07	24
3"	80	203	283	216	220	110	176	65	35	F10	39
4"	100	229	305	241	250	125	197	75	40	F12	81
6 "	150	394	457	406	324	220	240	85	45	F14	165
8 "	201	457	521	470	405	260	285	95	55	F16	326
10 "	252	533	559	546	470	295	330	100	65	F25	600
12 "	303	610	635	622	560	330	378	105	70	F25	715
14 "	334	686	762	699	620	370	415	120	75	F30	1298
16 "	385	762	838	775	690	410	450	140	75	F30	1936
18"	436	864	914	876	759	450	475	140	90	F30	2332
20 "	487	914	991	927	845	485	510	140	90	F35	2662
22"	540				921	632	537	155	120	F35	3674
24"	591	1067	1143	1080	988	670	572	155	120	F35	4980

	Operating Pressures				
Pressure (barg)	19.6	19.2	17.7	15.8	13.8
Temp (°C)	-29 to 38	50	100	150	200
Data based on A105 & A350 gr LF2 forged materials					

DIMENSIONS – API Specification 6D (RF, RJ), ASME B16.5

- full bore
- 3-piece split body, side entry



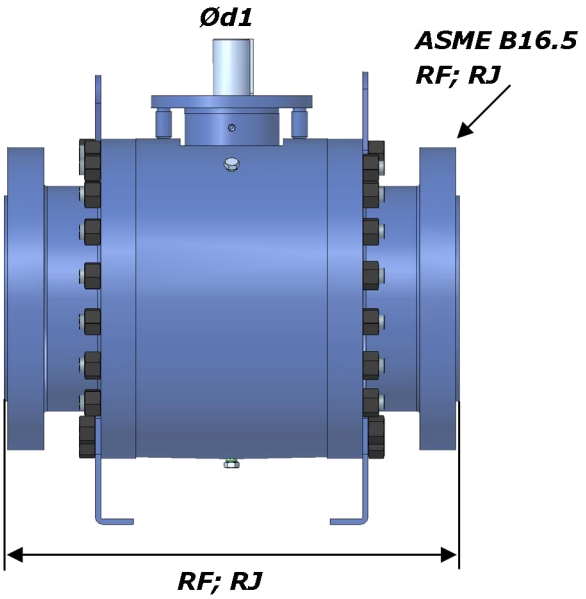


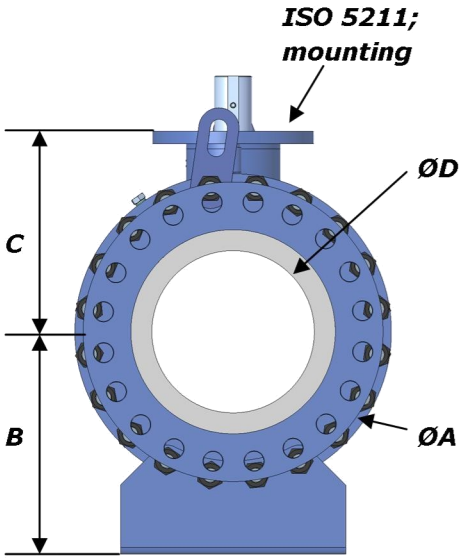
Class 300											Weight [kg]
NPS	Dimensions [mm]									ISO 5211	
	ØD	L_{RF}	L_{BW}	L_{RJ}	ØA	B	C	E	Ød1		RF/RJ
2 "	50	216	216	232	160	84	122	56	25	F07	26
3 "	75	283	283	298	220	110	176	65	35	F10	49
4 "	100	305	305	321	250	125	197	75	40	F12	95
6 "	150	403	403	419	324	220	240	85	45	F14	193
8 "	201	502	521	518	416	260	285	95	55	F16	348
10 "	252	568	559	584	470	295	330	100	65	F25	660
12 "	303	648	635	664	570	330	378	105	70	F25	890
14 "	334	762	762	778	620	370	415	120	75	F30	1450
16 "	385	838	838	854	690	410	450	140	75	F30	2060
18"	438	914	914	930	768	450	455	140	90	F30	2530
20 "	487	991	991	1010	845	587	510	140	90	F35	2900
22"	540	1092	1092	1114	930	632	537	155	120	F35	4020
24"	591	1143	1143	1165	997	670	572	155	120	F35	4950

	Operating Pressures				
Pressure (barg)	51.1	50.1	46.6	45.1	43.8
Temp (°C)	-29 to 38	50	100	150	200
Data based on A105 & A350 gr LF2 forged materials					

DIMENSIONS – API Specification 6D (RF, RJ), ASME B16.5

- full bore
- 3-piece split body, side entry



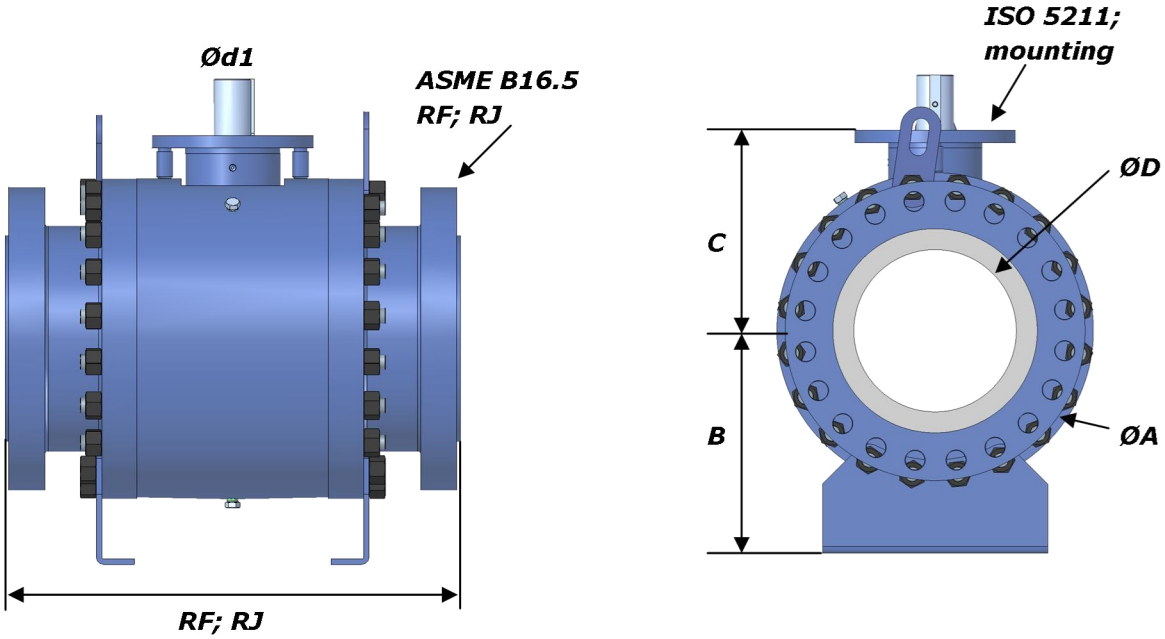


Class 600											Weight [kg]
NPS	Dimensions [mm]									ISO 5211	
	ØD	L_{RF}	L_{BW}	L_{RJ}	ØA	B	C	E	Ød1		RF/RJ
2 "	50	292	292	295	175	93	131	56	25	F07	32
3 "	75	356	356	359	238	119	191	65	35	F10	57
4 "	100	432	432	435	265	130	209	75	40	F12	116
6 "	150	559	559	562	336	230	265	85	45	F14	250
8 "	201	660	660	664	425	280	310	95	55	F16	460
10 "	252	787	787	791	490	300	350	100	65	F25	840
12 "	303	838	838	841	580	340	390	105	70	F25	1010
14 "	334	889	889	892	630	380	425	120	75	F30	1540
16 "	385	991	991	994	710	420	460	140	75	F30	2200
18"	438	1092	1092	1095	784	562	480	140	90	F30	2800
20 "	487	1194	1194	1200	860	460	520	140	90	F35	3340
22"	540	1295	1295	1305	949	651	537	155	120	F35	4500
24"	591	1397	1397	1407	1019	689	572	155	120	F35	6600

	Operating Pressures				
Pressure (barg)	102.1	100.2	93.2	90.2	87.6
Temp (°C)	-29 to 38	50	100	150	200
Data based on A105 & A350 gr LF2 forged materials					

DIMENSIONS – API Specification 6D (RF, RJ), ASME B16.5

- full bore
- 3-piece split body, side entry

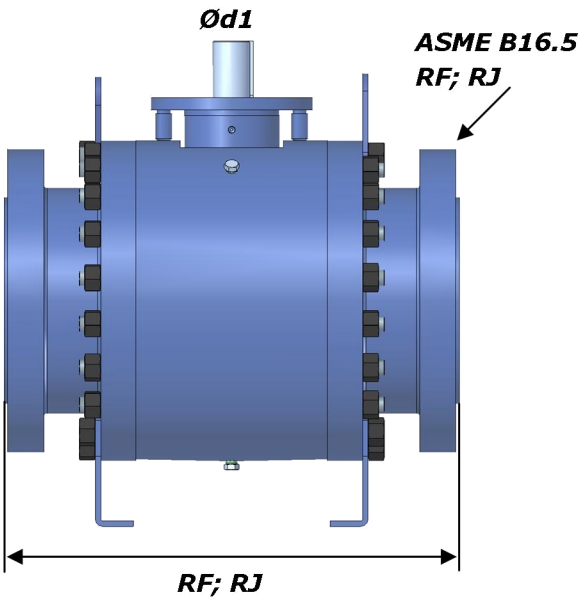


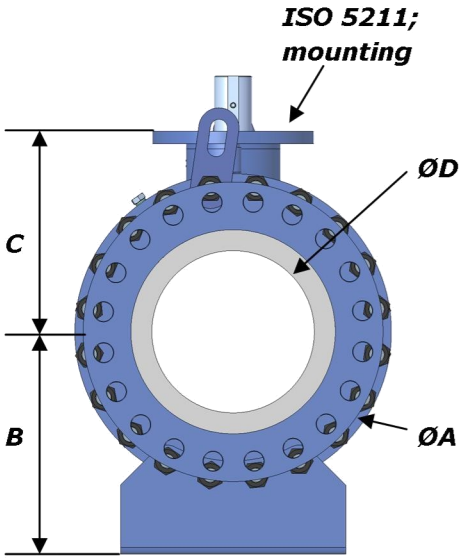
Class 900											Weight [kg]
NPS	Dimensions [mm]									ISO 5211	
	ØD	L_{RF}	L_{BW}	L_{RJ}	ØA	B	C	E	Ød1		RF/RJ
2 "	50	368	368	371	175	93	131	56	25	F10	50
3 "	80	381	381	384	238	119	191	65	35	F12	75
4 "	100	457	457	460	265	130	209	75	40	F14	132
6 "	150	610	610	613	336	230	265	85	50	F16	297
8 "	201	737	737	740	425	280	310	95	60	F25	570
10 "	252	838	838	841	490	300	350	100	75	F25	1050
12 "	303	965	965	968	580	340	390	115	80	F30	1230
14 "	322	1029	1029	1038	630	380	425	140	80	F30	2220
16 "	373	1130	1130	1140	710	420	460	140	80	F35	2860
18"	423	1219	1219	1232	784	562	480	140	90	F35	4110
20 "	471	1321	1321	1334	860	460	520	140	90	F35	5480
22"	522	(1)	(1)	(1)				155	120	F35	
24"	570	1549	1549	1568	1019	689	572	155	120	F40	

	Operating Pressures				
Pressure (barg)	153.2	150.4	139.8	135.2	131.4
Temp (°C)	-29 to 38	50	100	150	200
Data based on A105 & A350 gr LF2 forged materials					

DIMENSIONS – API Specification 6D (RF, RJ), ASME B16.5

- full bore
- 3-piece split body, side entry



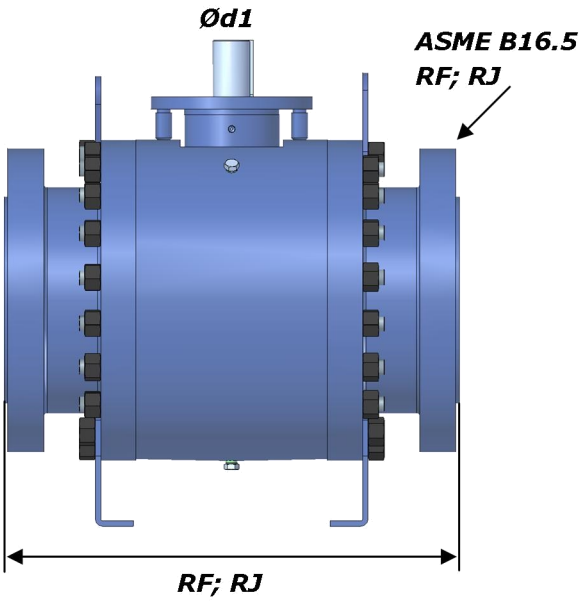


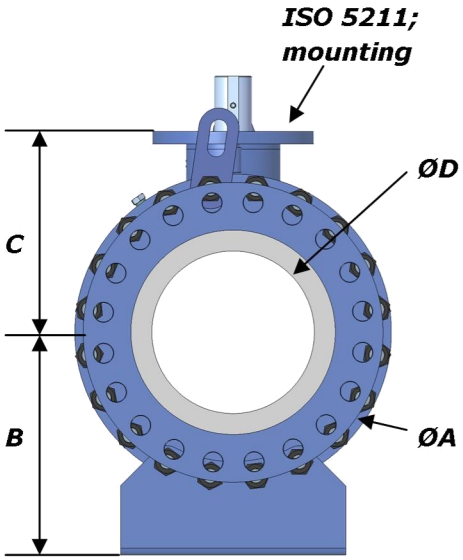
Class 1500											Weight [kg]
NPS	Dimensions [mm]									ISO 5211	
	ØD	L_{RF}	L_{BW}	L_{RJ}	ØA	B	C	E	Ød1		RF/RJ
2 "	50	368	368	371	175	93	131	60	30	F12	55
3 "	80	470	470	473	238	119	191	70	40	F14	99
4 "	100	546	546	549	265	130	209	85	45	F14	198
6 "	150	705	705	711	336	230	265	95	55	F16	424
8 "	201	832	832	841	425	280	310	100	65	F25	810
10 "	252	991	991	1000	490	300	350	115	80	F30	1590
12 "	303	1130	1130	1146	580	340	390	140	85	F30	2150
14 "	322	1257	1257	1276	630	380	425	140	85	F35	3770
16 "	373	1384	1384	1407	710	420	460	150	90	F35	5450
18"	423	1219	1219	1232	784	562	480	150	100	F40	6900
20 "	471	1321	1321	1334	860	460	520	150	110	F40	10000

	Operating Pressures				
Pressure (barg)	255.3	250.6	233	225.4	219
Temp (°C)	-29 to 38	50	100	150	200
Data based on A105 & A350 gr LF2 forged materials					

DIMENSIONS – API Specification 6D (RF, RJ), ASME B16.5

- full bore
- 3-piece split body, side entry





Class 2500											Weight [kg]
NPS	Dimensions [mm]									ISO 5211	
	ØD	L_{RF}	L_{BW}	L_{RJ}	ØA	B	C	E	Ød1		RF/RJ
2 "	50	368	368	371	175	93	131	60	30	F12	
3 "	80	470	470	473	238	119	191	70	40	F14	
4 "	100	546	546	549	265	130	209	85	45	F14	
6 "	150	705	705	711	336	230	265	95	55	F16	
8 "	201	832	832	841	425	280	310	100	65	F25	
10 "	252	991	991	1000	490	300	350	115	80	F30	
12 "	303	1130	1130	1146	580	340	390	140	85	F30	

	Operating Pressures				
Pressure (barg)	425.5	417.7	388.3	375.6	365
Temp (°C)	-29 to 38	50	100	150	200
Data based on A105 & A350 gr LF2 forged materials					

Part No. Make-up

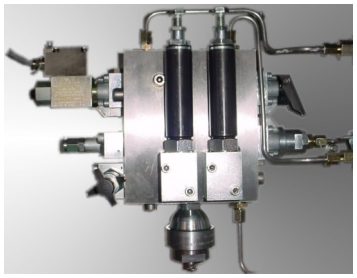
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
6”	MS	90	A	R	N	D	F	F	C	F	C	C	B	G	C	B	A

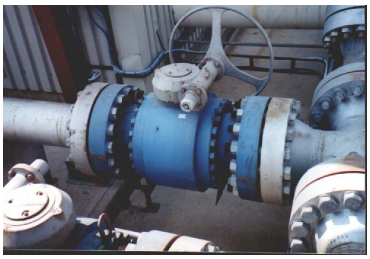
1	Size
Inch	2”, 3”, 4”, ...
2	**Body Style**
	MS
3	**Pressure Class**
15	ASME 150
30	ASME 300
60	ASME 600
90	ASME 900
150	ASME 1500
250	ASME 2500
4	**F/F Dimensions**
A	ASME B16.10
Y	To be specified
5	**End Connections**
R	Raised Face
S	Raised Face SF
J	Ring Type Joint
B	Clamp
6	**Material Selection**
N	NACE Approved
A	Standard
7	**Stem Material**
S	ASTM A 182 gr F316
A	ASTM A 580 gr 431
Y	To be specified
8	**Stem Coating Materials**
C	Chrome Carbide
T	Tungsten Carbide

9	Body Materials
A	ASTM A105
F	ASTM A 350 gr LF2
S	ASTM A 182 gr F316
C	Cast 316
B	ASTM A 182 gr F11
Y	To be specified
10	**Ball Material**
C	ASTM A105
F	ASTM A 350 gr LF2
S	ASTM A 182 gr F316
A	ASTM A 580 gr 431
B	ASTM A 182 gr F11
Y	To be specified
11	**Ball Coating Materials**
C	Chrome Carbide
T	Tungsten Carbide
12	**Trunnion Bearings**
M	Glacier DU
A	Cobalt Alloy - Single
S	Cobalt Alloy - Dual
C	Chrome Carbide - Dual
T	Tungsten Carbide - Dual
13	**Seating Design**
M	Metal Seated SPE

14	Seat Materials
C	ASTM A105
F	ASTM A 350 gr LF2
S	ASTM A 182 gr F316
A	ASTM A 580 gr 431
B	ASTM A 182 gr F11
Y	To be specified
15	**Seat Coating Materials**
C	Chrome Carbide
T	Tungsten Carbide
16	**Soft Seal Materials**
E	ED Viton
C	O-rings
L	NBR
T	EPDM
17	**Fasteners**
B	B7 / 2H
L	L7 / L7M
18	**Operators**
L	Lever
G	Manual Gear
A	Actuator
N	None

Photo Gallery





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