

Forged 3 Piece Trunnion Mounted Ball Valves

Series PC

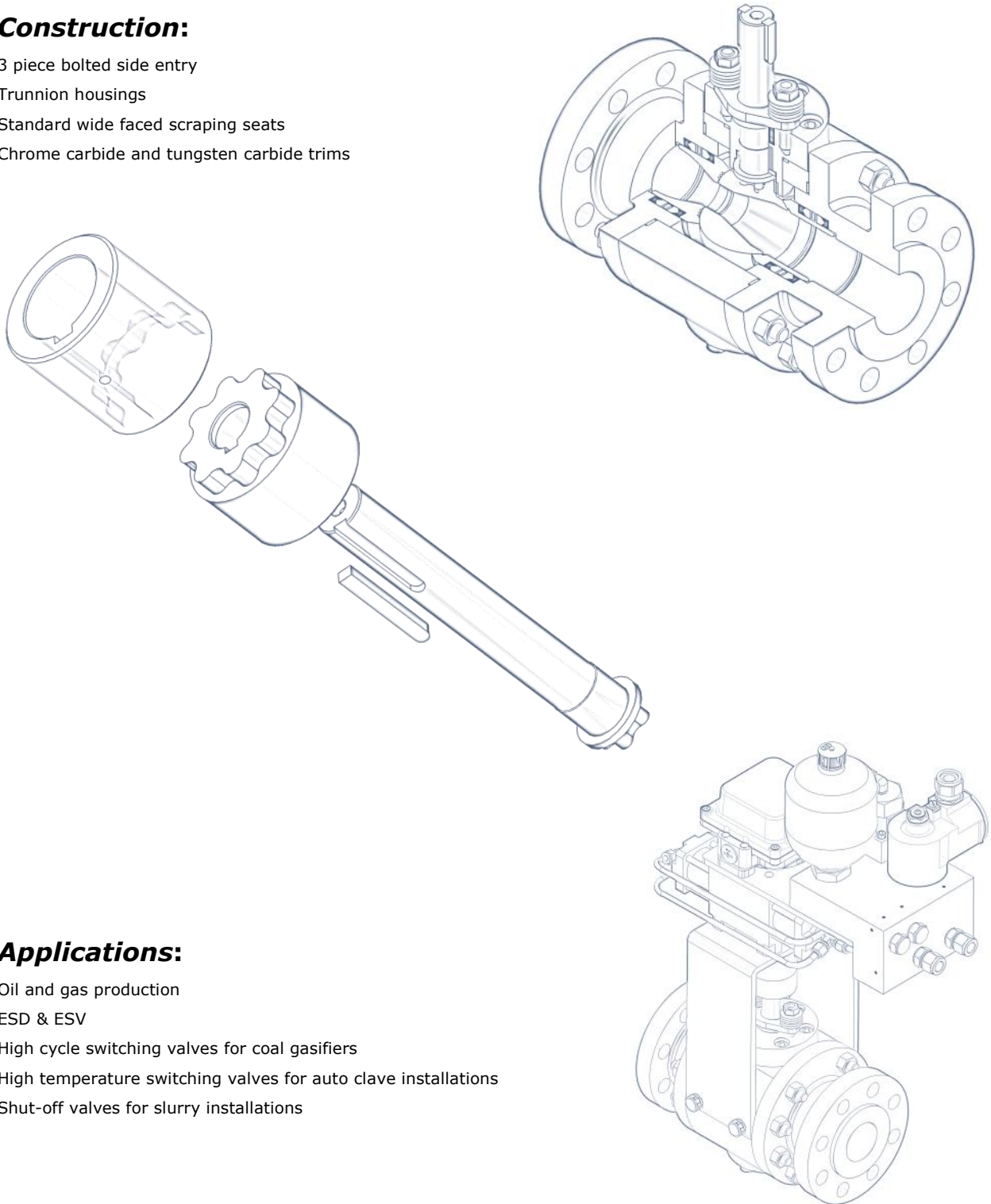
Construction:

3 piece bolted side entry

Trunnion housings

Standard wide faced scraping seats

Chrome carbide and tungsten carbide trims



Applications:

Oil and gas production

ESD & ESV

High cycle switching valves for coal gasifiers

High temperature switching valves for auto clave installations

Shut-off valves for slurry installations

Chemical & Petrochemical Industries



Forged 3 Piece Trunnion Ball Valves for the Petrochemical Industry

RGR purpose designs and manufactures series PC valves for high cycle switching and severe on-off applications.

The stem to ball union is based on our unique "flower drive" design and has proven to be reliable even under severe service conditions. Depending on the application, the flow paths through the ball and seats may be altered to guarantee the best performance of the valve package in a particular process.

Operation

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

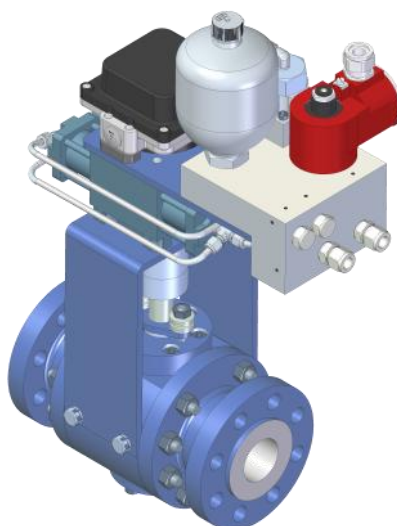
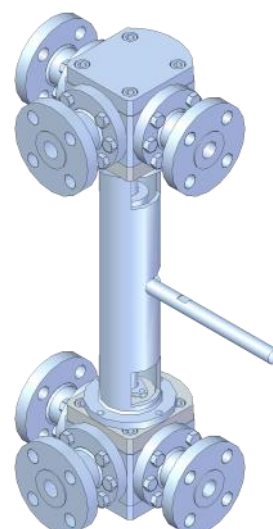
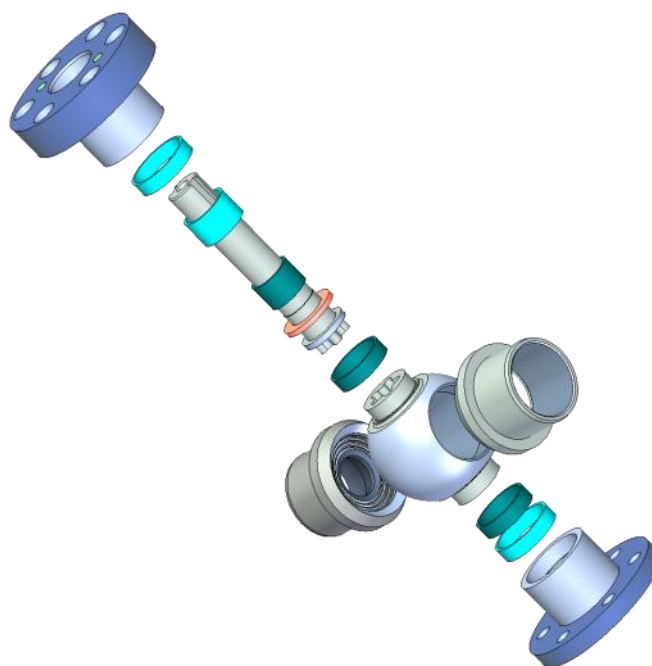
- manual – lever
- manual – worm gearing and hand wheel
- electric actuator – turning angle 0° to 90°
- electric actuator and worm gear
- pneumatic actuator – single-acting (air x spring) or double-acting (air x air)
- hydraulic actuator
- Gas-over-oil actuator

Location of the operating device:

- directly on the upper flange of the ball valve on a bridge or 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

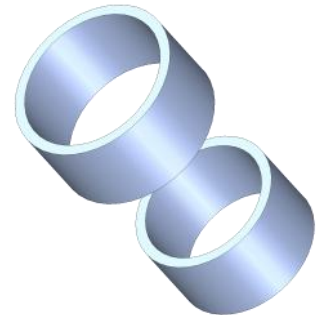
Anti Blow out proof stem construction with reliable “flower drive”



Wide metal seat surface contact between ball and seats ensures reliable tightness under extreme process conditions. Each seat is lapped to the ball surface.



Dual bearing configuration on both ball trunnions and the stem. Bearing materials depending on the application can be cobalt alloy; chrome carbide or tungsten carbide.



Gaskets on pressure boundary parts are spiral wound construction

Live loaded gland packing arrangement

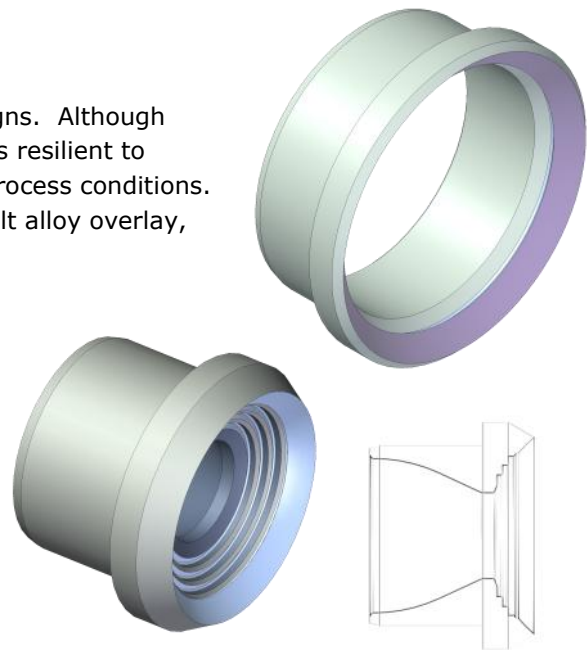


Design Features & Technical Specifications

All metal seats are wide faced large contact area designs. Although this results in more torque requirement, the design is resilient to leakage and has proven to perform reliably in harsh process conditions. The seat face may be either hard chrome plated, cobalt alloy overlay, tungsten carbide or chrome carbide.

Tungsten and chrome carbides are applied using the HVOF process.

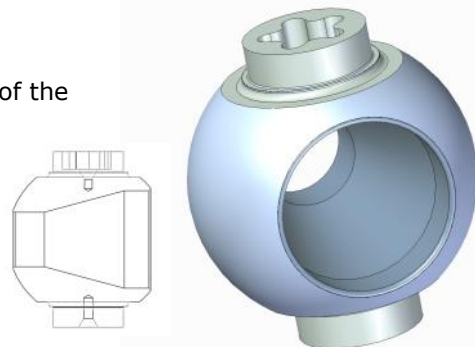
Depending on the application, the seats are designed with special labyrinths to resist abrasive and erosive damage caused by the process.



Apart from the standard conduit bore ball designs, the bore of balls may also be shaped to accommodate process requirements such as can be found in de-pressurise systems.



Tungsten carbide or chrome carbide are applied to the bore of the ball as well.

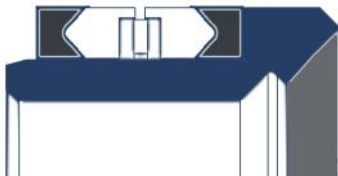


3 way ball valves may be supplied according to the client's requirements in either 90° or 120° configurations

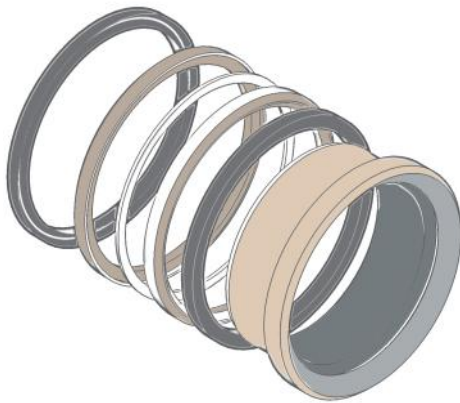


Design Features & Technical Specifications

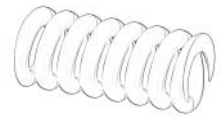
Solid proof seals of the spring assembly is standard for all designs



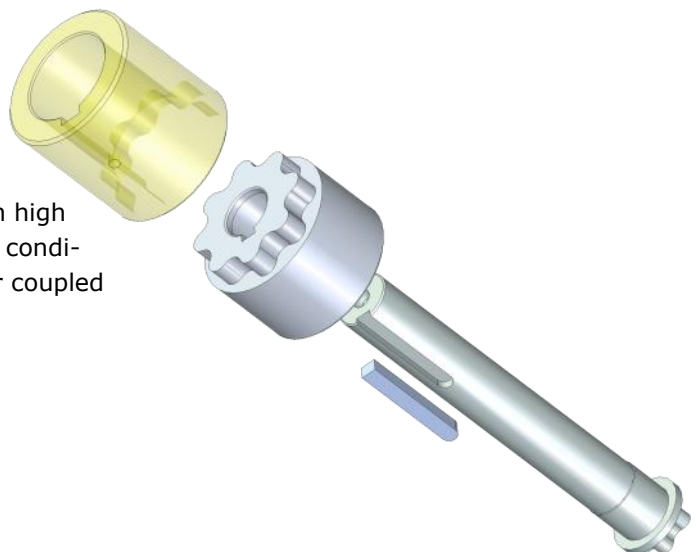
All metal seats are wide faced design for reliable tightness and long life service



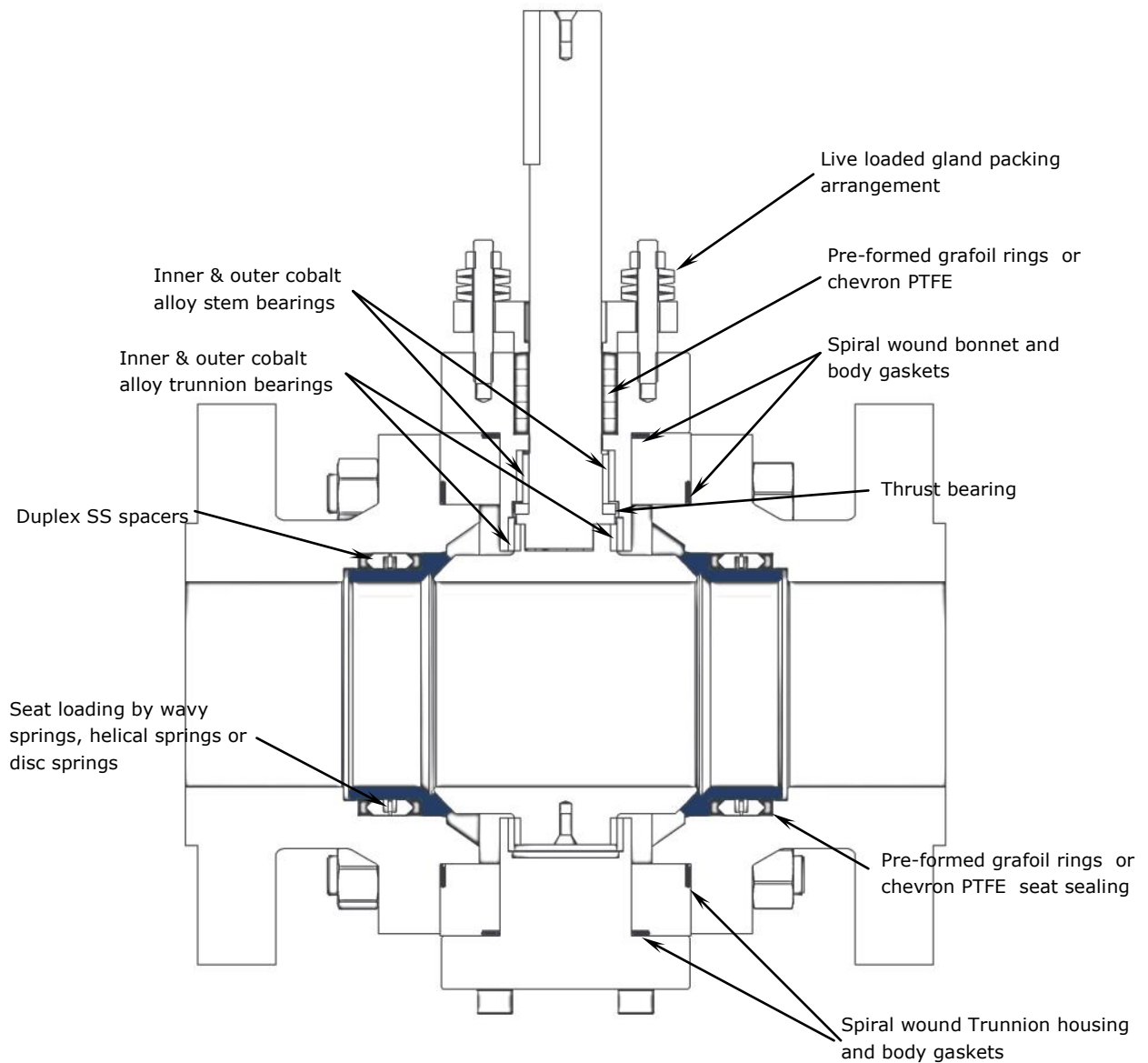
Depending on the application, mechanical spring loading may be disc springs, wavy springs or helical springs



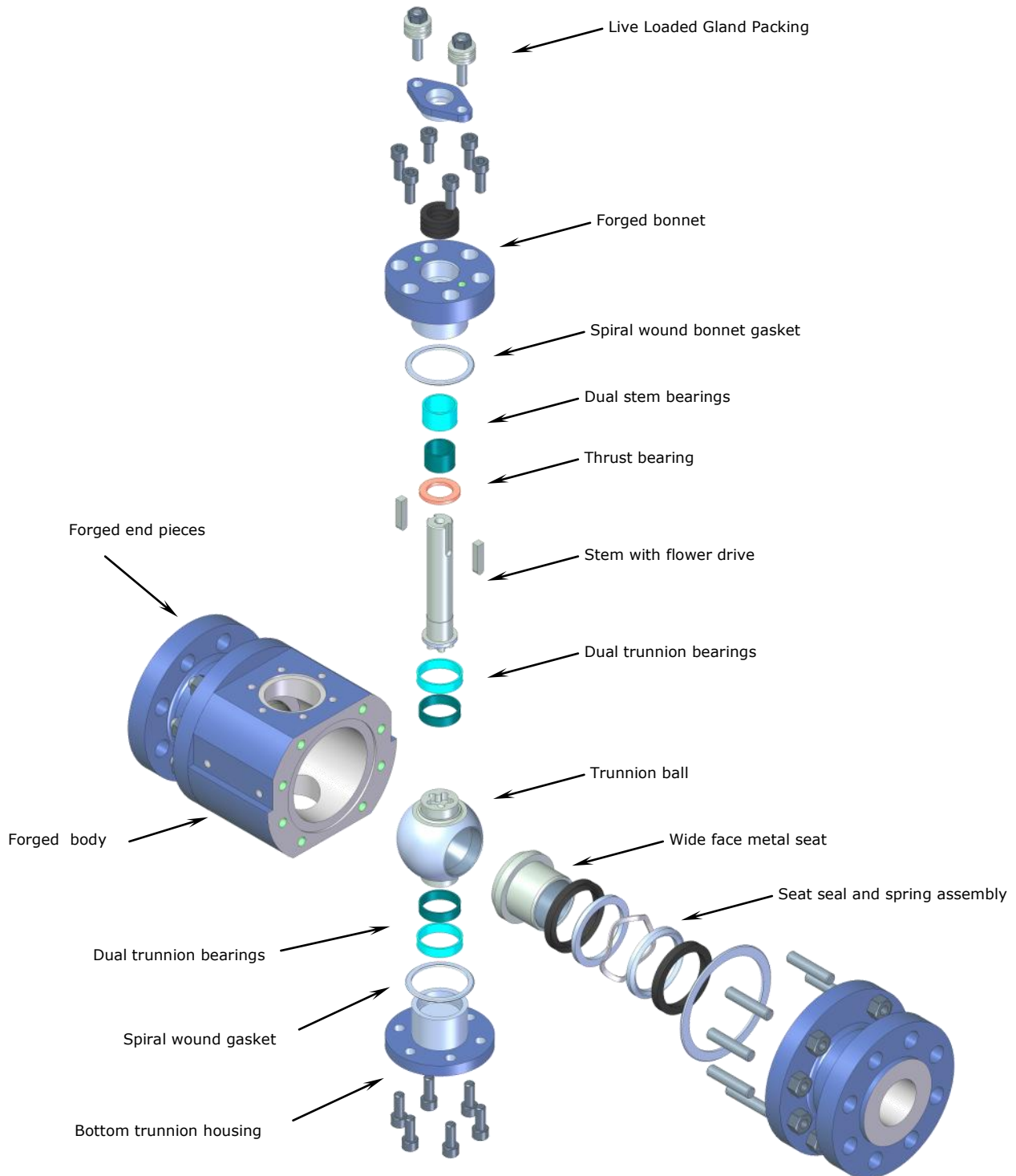
In applications where the valves are installed in high temperature service with dirty / acidic ambient conditions the stem to actuator couplings are flower coupled in order to facilitate easy maintenance.



Design Features & Technical Specifications



Series PC - 1.5" - 24"



Flow coefficient C_v & flow resistance coefficient

\varnothing inch	C_v 90°	ζ 90	\varnothing inch	C_v 90°	ζ 90
2	480	0.06	16	37700	0.04
3	1200	0.05	18	48000	0.03
4	2120	0.05	20	59500	0.03
6	5100	0.05			
8	9300	0.04			
10	15200	0.04			
12	22400	0.04			
14	28300	0.04			

Design Features & Technical Specifications

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

<i>Applications</i>	: Control Valve Isolation Catalyst Slurry Handling Coal Slurry Handling & Removal Gasifier Depressurizing Units Ash Handling Petrochemical industry Chemical industry
<i>Fluids</i>	: Liquids and gases – fluids with or without impurities and abrasive particles
<i>Process pressure</i>	: From 0 bar to the specified pressure class for the relevant body material and sealing elements used
<i>Process temperature</i>	: -45°C to +435°C
<i>Ambient temperature</i>	: from -45°C to +60°C, depending on type of operator
<i>Installation</i>	: Into any piping (horizontal, vertical, inclined), but taking into account the instructions applicable to installation of the actuator. Ball valves >Ø150 are equipped with stands as a standard.
<i>Testing</i>	: Every ball valve is tested in accordance with ASME B16.5; ISO 5208 or AP598. Alternative test standards and procedures are readily accommodated as well.
<i>Test report</i>	: EN 10204/3.1 as a standard
<i>DESIGN</i>	
<i>Bore</i>	: Full or reduced bore (ASME B16.34)
<i>Connection</i>	: Flanged ends. (ASME B16.5, ASME B16.10)
<i>Body</i>	: Split body, three-piece - NPS 3/4" to NPS 20"
<i>Seats</i>	: Soft seated (CTFE, PTFE, NYLON) Metal-to-metal seated
<i>Seat function</i>	: SPE = SINGLE PISTON EFFECT DOUBLE BLOCK & BLEED
<i>Stem mounting</i>	: 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.
<i>Actuator mounting</i>	: ISO 5211
<i>Fire Safe</i>	: ISO 10497:2004
<i>Anti Static</i>	: Yes

Design Features & Technical Specifications

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.

Materials

: The selection of materials of individual components and especially of those exposed to internal pressure and those in contact with the fluid depends on service conditions (fluid, pressure, temperature).

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.

Accessories

Stem extension

: Stem extensions are offered when the process temperature may exceed 300°C for extended periods.

Limit Switch Units

: For automated applications RGR will issue end user approved / preferred items

Solenoid Valves

: We readily supply and size our own range of valves or end user preferred units.

SUMMARY OF BASIC STANDARDS AND REGULATIONS

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 Steels

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

NACE (National Association of Corrosion Engineers)

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

Resistance in Sour Oilfield Environments.

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

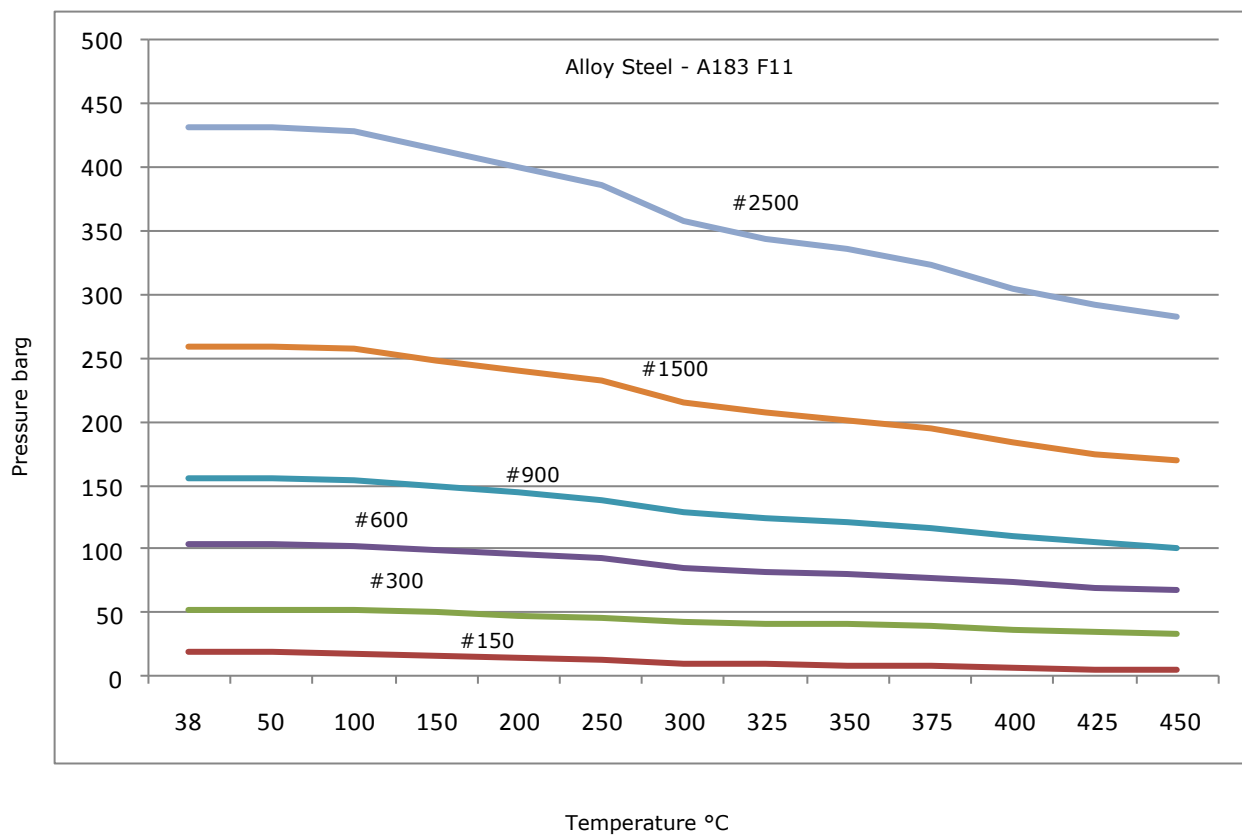
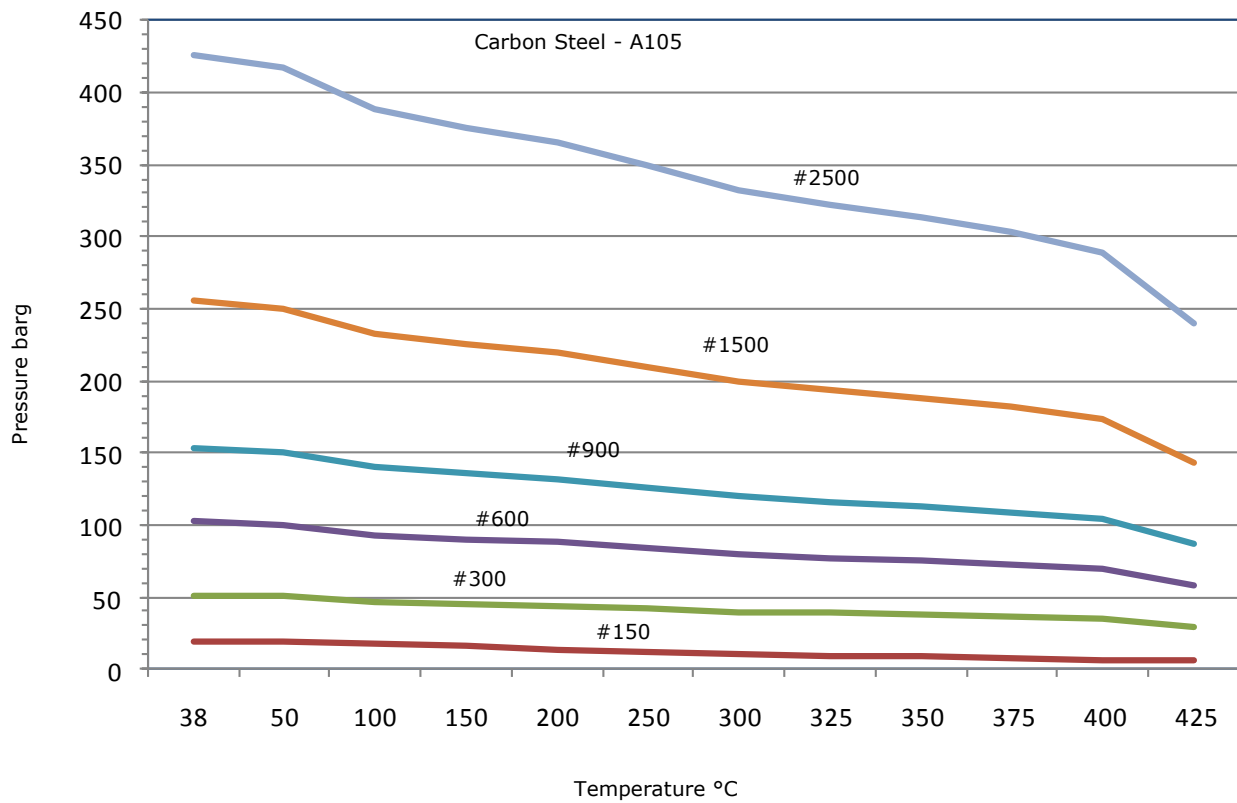
BSI (British Standards Institution)

- 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

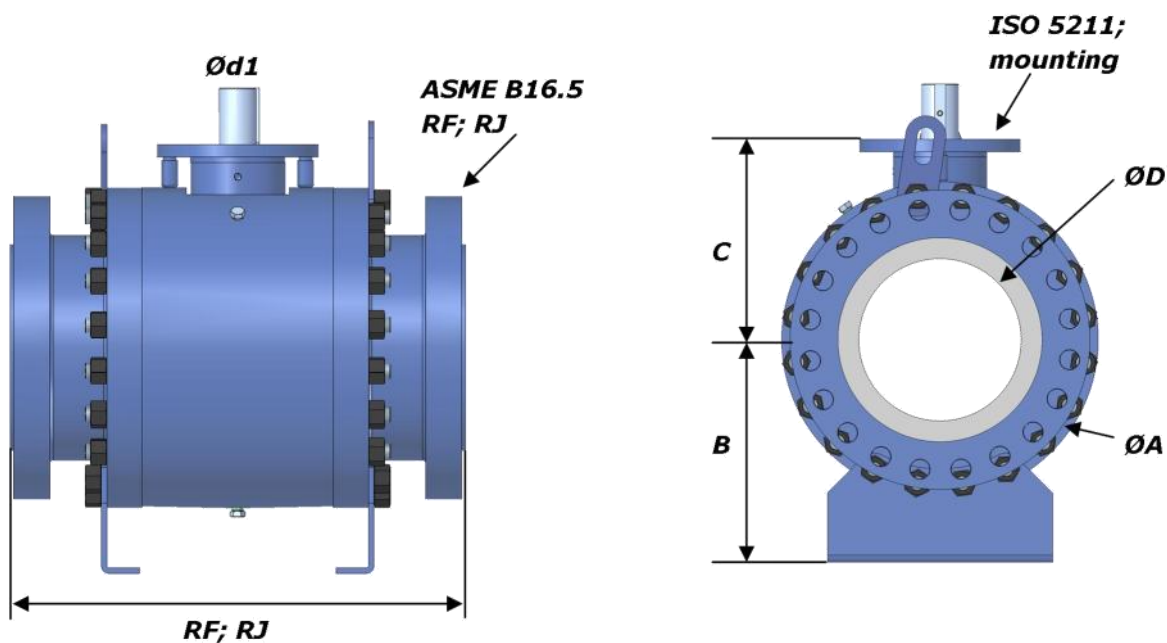
- of May 1997 on the approximation of the laws of the Member States concerning pressure equipment

Pressure / Temperature Graphs



DIMENSIONS – API Specification 6D (RF, BW, RTJ), ASME B16.5, ASME B16.25

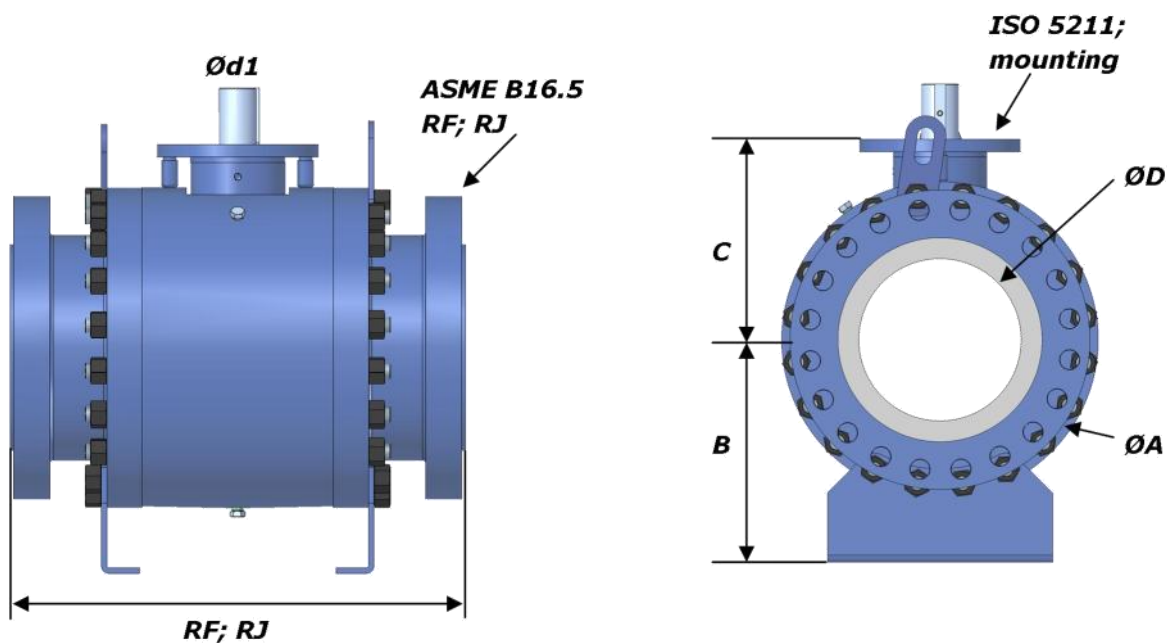
- full bore
- 3-piece split body, side entry



Class 150											
NPS	Dimensions [mm]									ISO 5211	RF
	ØD	L _{RF}	L _{BW}	L _{RJ}	ØA	B	C	E	Ød1		
2 a) "	50	178	216	191	160	84	122	56	25	F07	178
3 a) "	80	203	283	216	220	110	176	65	35	F10	203
4 a) "	100	229	305	241	250	125	197	75	40	F12	229
6 "	150	394	457	406	324	220	240	85	45	F14	394
8 "	201	457	521	470	405	260	285	95	55	F16	457
10 "	252	533	559	546	470	295	330	100	65	F25	533
12 "	303	610	635	622	560	330	378	105	70	F25	610
14 "	334	686	762	699	620	370	415	120	75	F30	686
16 "	385	762	838	775	690	410	450	140	75	F30	762
18 "	436	864	914	876	759	450	475	140	90	F30	864
20 "	487	914	991	927	845	485	510	140	90	F35	914
22 "	540				921	632	537	155	120	F35	
24 "	591	1067	1143	1080	988	670	572	155	120	F35	1067
26 "	635	1143	1245	(1)	1060	718	622	155	120	F35	1143
28 "	686	1245	1346	(1)	1137	753	657	155	120	F35	1245

DIMENSIONS – API Specification 6D (RF, BW, RTJ), ASME B16.5, ASME B16.25

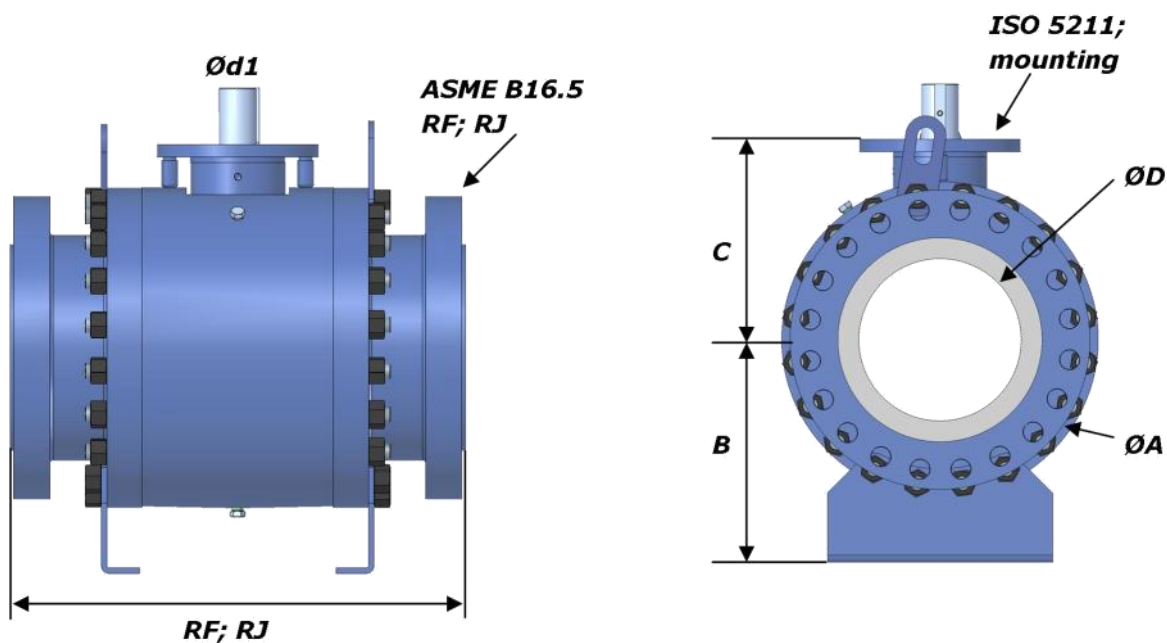
- full bore
- 3-piece split body, side entry



Class 300											
NPS	Dimensions [mm]									ISO 5211	Weight [kg]
	ØD	L _{RF}	L _{BW}	L _{RJ}	ØA	B	C	E	Ød1		RF
2 "	50	216	216	232	160	84	122	56	25	F07	22
3 "	75	283	283	298	220	110	176	65	35	F10	60
4 "	100	305	305	321	250	125	197	75	40	F12	82
6 "	150	403	403	419	324	220	240	85	45	F14	185
8 "	201	502	521	518	416	260	285	95	55	F16	285
10 "	252	568	559	584	470	295	330	100	65	F25	485
12 "	303	648	635	664	570	330	378	105	70	F25	730
14 "	334	762	762	778	620	370	415	120	75	F30	1020
16 "	385	838	838	854	690	410	450	140	75	F30	1405
18"	438	914	914	930	768	450	455	140	90	F30	1960
20 "	487	991	991	1010	845	587	510	140	90	F35	2150
22"	540	1092	1092	1114	930	632	537	155	120	F35	2858
24"	591	1143	1143	1165	997	670	572	155	120	F35	3429
26"	635	1245	1245	1270	1070	718	622	155	120	F35	4336
28"	686	1346	1346	1372	1149	753	657	155	120	F35	4958

DIMENSIONS – API Specification 6D (RF, BW, RTJ), ASME B16.5, ASME B16.25

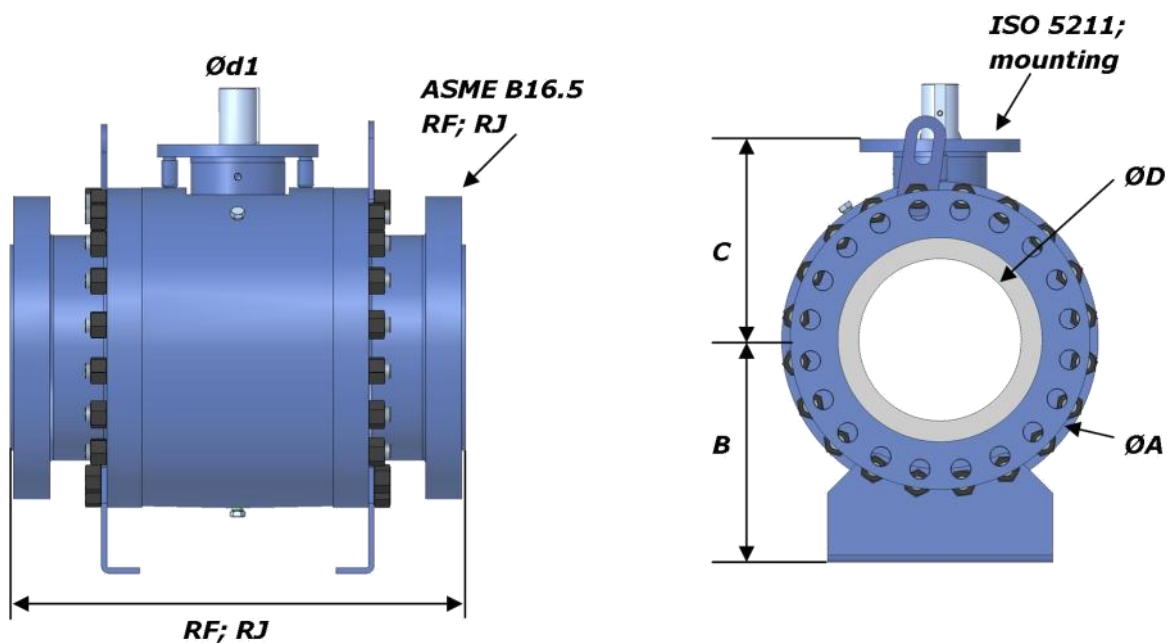
- full bore
- 3-piece split body, side entry



Class 600											
NPS	Dimensions [mm]									ISO 5211	Weight [kg]
	ØD	L _{RF}	L _{BW}	L _{RJ}	ØA	B	C	E	Ød1		
2 "	50	292	292	295	175	93	131	56	25	F07	35
3 "	75	356	356	359	238	119	191	65	35	F10	76
4 "	100	432	432	435	265	130	209	75	40	F12	107
6 "	150	559	559	562	336	230	265	85	45	F14	250
8 "	201	660	660	664	425	280	310	95	55	F16	465
10 "	252	787	787	791	490	300	350	100	65	F25	740
12 "	303	838	838	841	580	340	390	105	70	F25	990
14 "	334	889	889	892	630	380	425	120	75	F30	1260
16 "	385	991	991	994	710	420	460	140	75	F30	1680
18"	438	1092	1092	1095	784	562	480	140	90	F30	1778
20 "	487	1194	1194	1200	860	460	520	140	90	F35	2620
22"	540	1295	1295	1305	949	651	537	155	120	F35	3570
24"	591	1397	1397	1407	1019	689	572	155	120	F35	4277
26"	635	1448	1448	1461	1092	740	622	155	120	F35	5430
28"	686	1549	1549	1562	1172	775	657	155	120	F35	6210

DIMENSIONS – API Specification 6D (RF, BW, RTJ), ASME B16.5, ASME B16.25

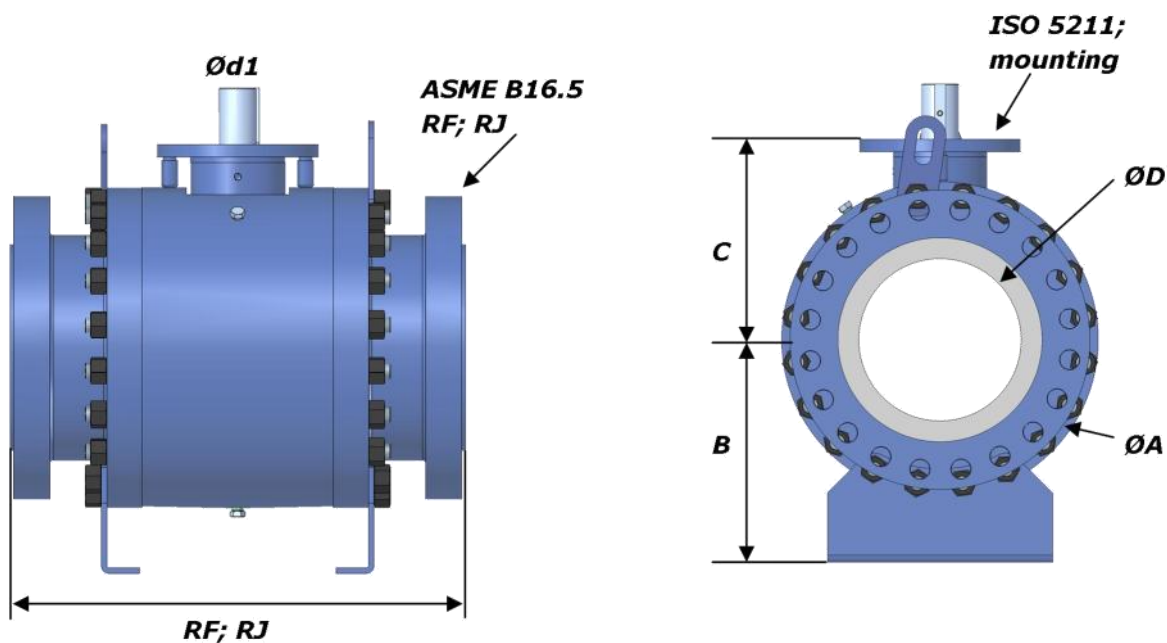
- full bore
- 3-piece split body, side entry



Class 900											Weight [kg]
NPS	Dimensions [mm]									ISO 5211	RF
	ØD	L _{RF}	L _{BW}	L _{RJ}	ØA	B	C	E	Ød1		
2 "	50	368	368	371	175	93	131	56	25	F10	35
3 "	80	381	381	384	238	119	191	65	35	F12	76
4 "	100	457	457	460	265	130	209	75	40	F14	107
6 "	150	610	610	613	336	230	265	85	50	F16	250
8 "	201	737	737	740	425	280	310	95	60	F25	465
10 "	252	838	838	841	490	300	350	100	75	F25	740
12 "	303	965	965	968	580	340	390	115	80	F30	990
14 "	322	1029	1029	1038	630	380	425	140	80	F30	1260
16 "	373	1130	1130	1140	710	420	460	140	80	F35	1680
18"	423	1219	1219	1232	784	562	480	140	90	F35	1778
20 "	471	1321	1321	1334	860	460	520	140	90	F35	2620
22"	522	(1)	(1)	(1)				155	120	F35	
24"	570	1549	1549	1568	1019	689	572	155	120	F40	4277
26"	617	1651	1651	1674	1092	740	622	155	120	F40	5430
28"	665	1753	1753	1775	1172	775	657	165	150	F40	6210

DIMENSIONS – API Specification 6D (RF, BW, RTJ), ASME B16.5, ASME B16.25

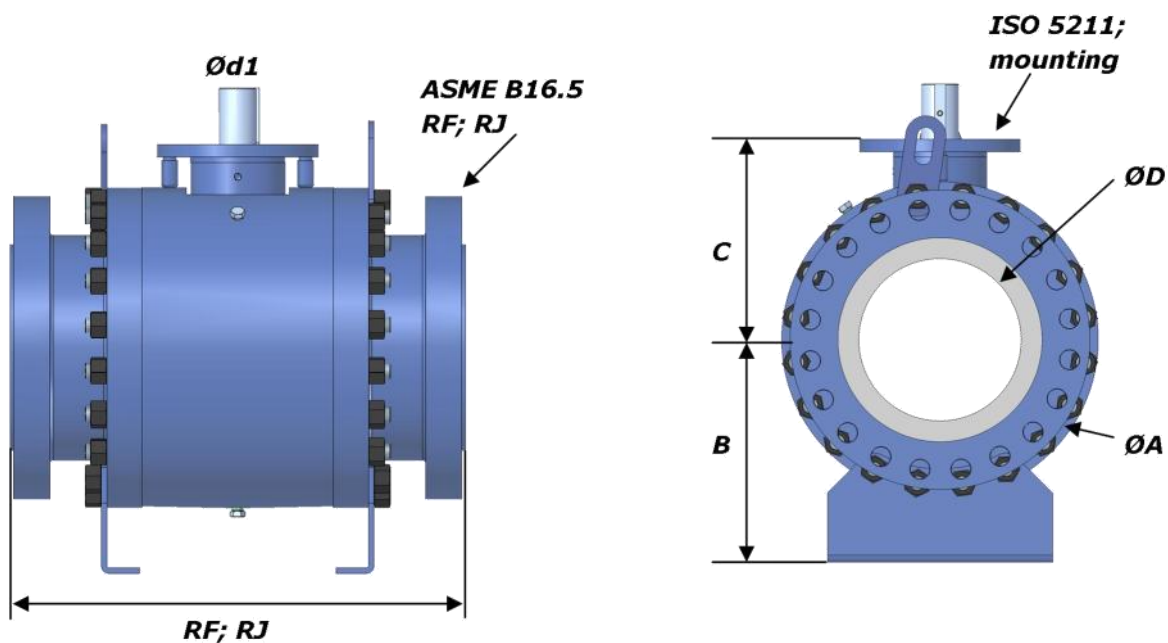
- full bore
- 3-piece split body, side entry



Class 1500										Weight [kg]	
NPS	Dimensions [mm]									ISO 5211	RF
	ØD	L _{RF}	L _{BW}	L _{RJ}	ØA	B	C	E	Ød1		
2 "	50	368	368	371	175	93	131	60	30	F12	35
3 "	80	470	470	473	238	119	191	70	40	F14	76
4 "	100	546	546	549	265	130	209	85	45	F14	107
6 "	150	705	705	711	336	230	265	95	55	F16	250
8 "	201	832	832	841	425	280	310	100	65	F25	465
10 "	252	991	991	1000	490	300	350	115	80	F30	740
12 "	303	1130	1130	1146	580	340	390	140	85	F30	990
14 "	322	1257	1257	1276	630	380	425	140	85	F35	1260
16 "	373	1384	1384	1407	710	420	460	150	90	F35	1680
18"	423	1219	1219	1232	784	562	480	150	100	F40	1778
20 "	471	1321	1321	1334	860	460	520	150	110	F40	2620

DIMENSIONS – API Specification 6D (RF, BW, RTJ), ASME B16.5, ASME B16.25

- 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
2 "	50	368	368	371	175	93	131	60	30	F12	35
3 "	80	470	470	473	238	119	191	70	40	F14	76
4 "	100	546	546	549	265	130	209	85	45	F14	107
6 "	150	705	705	711	336	230	265	95	55	F16	250
8 "	201	832	832	841	425	280	310	100	65	F25	465
10 "	252	991	991	1000	490	300	350	115	80	F30	740
12 "	303	1130	1130	1146	580	340	390	140	85	F30	990

Part No. Make-up

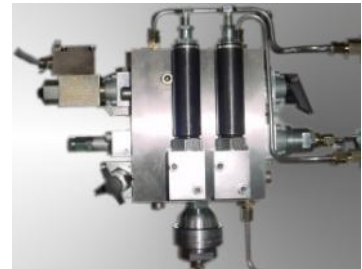
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
6"	PL	90	A	R	N	D	F	F	C	F	C	C	B	G	C	B	A

1	Size
Inch	2", 3", 4", ...
2	Body Style
	PC / PL / PP
	For 3-way add Y. L pattern, "L", T pattern, "T". Example :- PCYL
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	Butt Weld
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
E	Electroless Nickel
H	Hard Chrome
S	Cobalt Based Alloy
C	Chrome Carbide
T	Tungsten Carbide
N	None

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
E	Electroless Nickel
H	Hard Chrome
F	Flash Chrome
S	Cobalt Alloy
C	Chrome Carbide
T	Tungsten Carbide
N	None
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
S	Soft Seated SPE
P	Soft Seated DPE
M	Metal Seated SPE
D	Metal Seated DPE
Y	To be specified

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
E	Electroless Nickel
H	Hard Chrome
S	Cobalt Based Alloy
C	Chrome Carbide
T	Tungsten Carbide
N	None
16	Soft Seal Materials
E	ED Viton
C	Carbon Filled Teflon
L	Nylon
T	PTFE
Y	To be specified
N	None
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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