CONTROL BALL VALVES
NPS 6" – 28" Class 150 - 900

APPLICATION

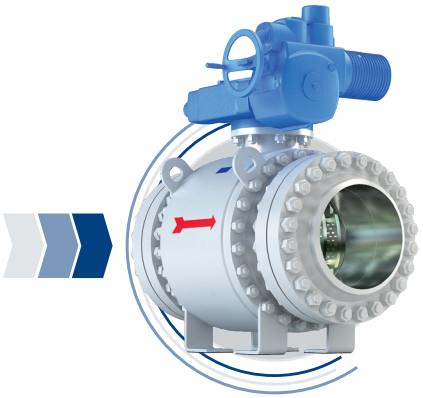
Control Ball Valves are designed to control working medium parameters (pressure, flowrate) by throttling flow at pipelines.

Depending on their application the following ball valves can be manufactured:

- Control ball valves;
- Shut-off control ball valves.

Working medium:

- natural gas at temperature from -15 °C to +100 °C;
- oil at temperature from -15 °C to +80 °C
- oil products at temperature from -15 °C to +60 °C.



CLIMATIC CATEGORY

Climatic categories:

- regions with temperate climate and ambient temperature from -40°C up to +40°C;
- regions with cold climate and ambient temperature from -60°C up to +40°C;
- regions with warm climate and ambient temperature from -10°C up to +50°C.

Ball valves with another climatic category can be manufactured upon Customer's request.

CONNECTION TO THE PIPELINE

Installation:

For Control Ball Valves without shut-off function – any (vertical, horizontal or sloping pipelines; actuator can be in upwards, downwards or slant position).

For Control Ball Valves with shut-off function – horizontal pipelines with actuator in upwards position. (Any other installation should be agreed.

The direction of the working medium is unidisectirnal and specified by the indicator at the body of Control Valve.

Connection to the pipeline:

- **butt-welded;**
- **flanged.**

Control Ball valves can be supplied with pup pieces (separately from the valve as well as already welded to the valve in the factory). Concentric reducers manufactured in accordance with the requirements documents of AK Transneft JSC are used for installation of shut-off control ball valve at pipelines of bigger diameter than the required nominal diameter of ball valves.

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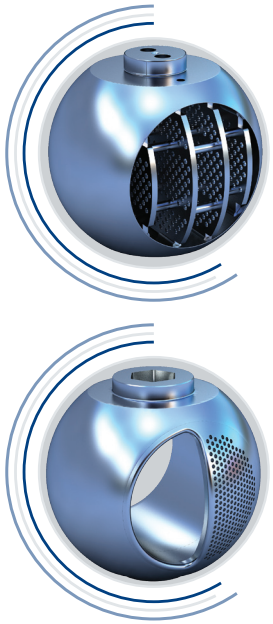
DESIGN FEATURES

UNIQUE DESIGN OF CONTROL VALVE CLOSURE



Control element of control valve (the ball) is designed to ensure a wide range of control and high flowrate capacity with minimal pipeline pressure reduction.

Low resistance factor is achieved by parallel leveling of the inner grids of the ball with working medium flow in the "open" position minimizing obstruction surface at the way of the flow. This design has been developed to allow smooth control of pressure drop while maintaining anti-cavitation effect, which allows to reduce significantly the noise levels.

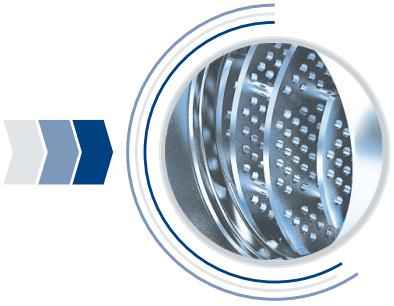
High flowrate is maintained due to the minimum resistance surface of the obturator to the working medium. System of protection against impurities inside the valve is provided by ball design: ball valve performs the function of self-cleaning by the medium flow in the "open" position.

Control valve has all the advantages of ball valves as a standard: reliability; ergonomic design, ease of installation, stable tightness index of shut-down element, and suitability for different types of medium.

CAVITATION-FREE OPERATION

Cavitation may appear during control valve operation. Cavitation is a process of vaporation and the following devaporation of air and gas bubbles in the liquid flow which are deteriorated coming to the area of high pressure. Cavitation may seriously damage hard surfaces and become the reason of loud noise. In order to solve this problem grid blocks are provided at the inner grids of the ball of PTPA shut-off control ball valves. These grid blocks divide medium flow and suppress cavitation effect.

Information concerning adjustable measure of valve cavitation in required technological conditions for all modes - Kcs should be submitted to manufacturer for identification of possible cavitation in control valves. Adjustable measure of the beginning of valve cavitation - Kc is identified by experiment or calculations while adjustment of a control ball valve.



The condition of cavitation-free operation of control valves is that cavitation measure does not exceed the factor of the appearing of cavitation in working conditions (for all modes):

$$Kcs < Kc$$

Methods of identification of control ball valve hydraulic and cavitational characteristics are based on ST Central Design Bureau of Automatic equipment 029. Methods of calculation of ball valve hydraulic and cavitational characteristics ensuring cavitation-free operation is based on ST Central Design Bureau of Automatic equipment 040.

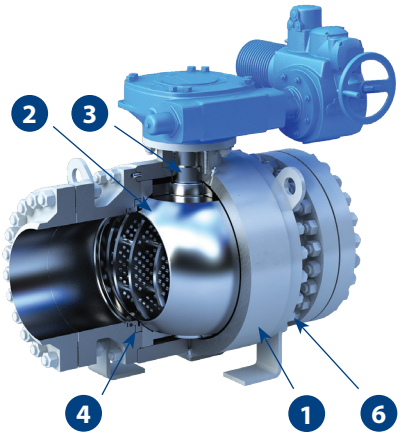
SPLIT-BODY DESIGN

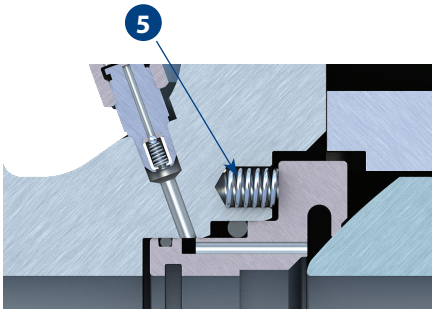
Split-body design increases valve maintainability, allows to use it for aggressive working medium and conduct:

- components replacement;
- maintenance without dismantling.

MATERIAL SPECIFICATION

Main components are chosen individually in each specific case and depend on operation requirements and working medium characteristics (presence of aggressive components, temperature etc.). Upon Customer's request main components can be changed in compliance with international safety standards and operational characteristics.





Metal-to-metal seats

№	Component	Material
1	Body	Carbon steel
2	Ball	ASTM A350-10 + Tungsten Carbide
3	Stem	A182 F316
4	Seats	ASTM A350-10 + Tungsten Carbide
5	Seat Spring	Inconel X-750
6	Bolting	ASTM A320 L7M/ A194 8M

ACTUATOR

Control Ball valves can be operated by electric actuator.

Specifying actuator-valve connection type it is necessary to take into account the fact that maximum torque rating of control ball valve should be increased at 25% (Max. torque * 1,25).

After electric actuator is switched off, ball valve control element retains its position.

Upon Customer's request Control ball valves can be supplied with actuators of other manufacturers.

HYDRAULIC PARAMETERS AND CHARACTERISTICS

Opening angle	Cavitation factor, Kc	Pressure build-up factor, F
10°	0,92	0,96
15°	0,92	0,96
20°	0,92	0,96
30°	0,92	0,96
40°	0,9	0,95
50°	0,87	0,94
60°	0,8	0,91
70°	0,64	0,84
80°	0,4	0,71
90°	0,25	0,55

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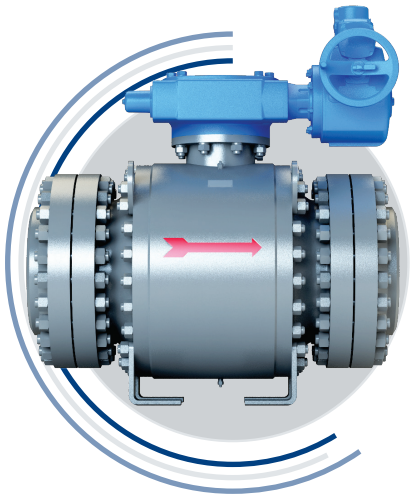
CAPACITY

NPS	Class	Flow performance	Nominal capacity in "open" position Kvy, m^3/hour	Minimum capacity Kvmin, m^3/hour
150	150-600	Equal Percentage	744	11
200	150-600		1206	18
250	150-600		1972	30
300	150-600		2744	41
350	150-600		3448	51
400	150-600		4689	70
500	150-600		7661	96,9
600	150-600		12533	187,63
700	150-600		17149	257

OPERATIONAL CHARACTERISTICS



Reliability factors:

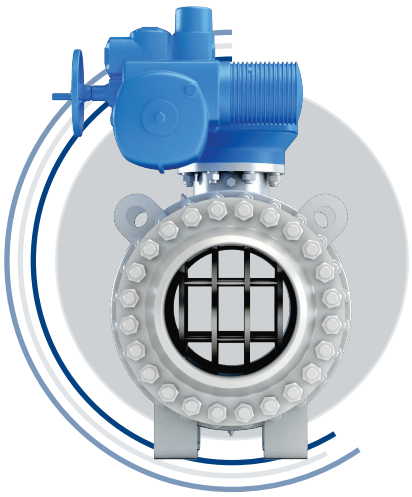
- **service life** - 30 years;
- **designed lifetime** of removable and component parts, gaskets - 15 years.
- **warranty period** - 24 months from the day of putting into operation.

Control ball valves of all sizes ensure operation if differential working pressure at closure is ΔP when opening and closing up to PN.

Specific differential working pressure at closure when opening and closing is specified in datasheets.

Full travel time of ball valve is selected in accordance with the requirements indicated in a datasheet.

SCOPE OF SUPPLY



The package includes:

- Fully assembled shut-off control ball valve according to specification;
- Quick wearing parts kit, tools and accessories specified at the time of order;
- Electric actuator with operation manual and documentation;
- Supply documents package.

Following valve equipment is specified at the time of the order:

- Electric actuator / actuator of some specific manufacturer;
- Counter flanges, fasteners and gaskets;
- Centering rings (coils).

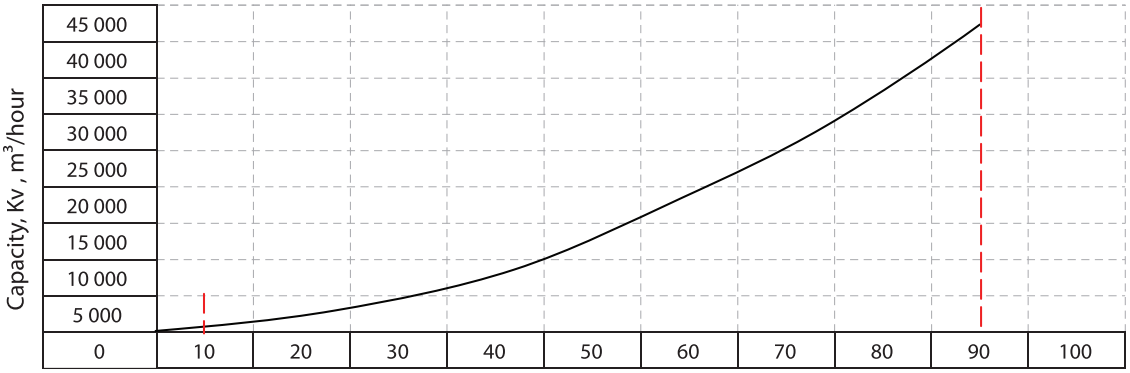
FLOWRATE CHARACTERISTICS

Nominal diameter of control valve is specified in accordance with the index of maximum (from all modes) rated discharge capacity of control valve i.e. so that nominal capacity of control valve should not be less than maximal for design conditions.

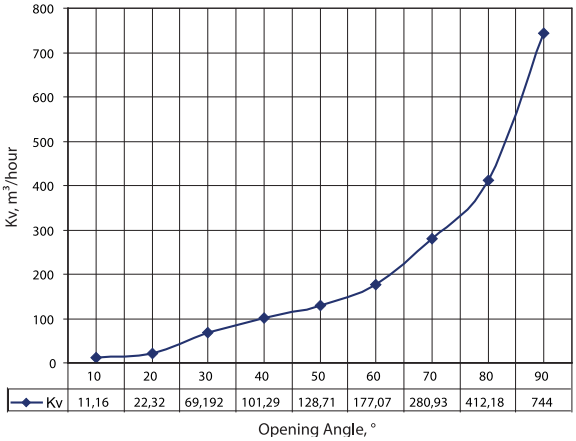
Dependence diagrams of discharge capacity from control element position are identified by experiment or calculations.

Control ball valves should ensure required metering characteristic in the range of ball turning from 25˚ to 90˚ from "closed" position.

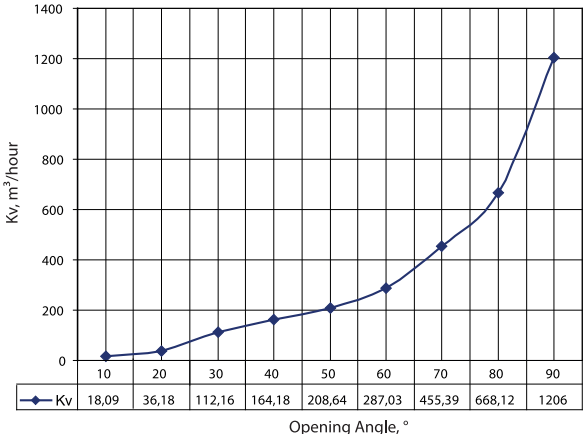
Valve flow performance to the obturator position



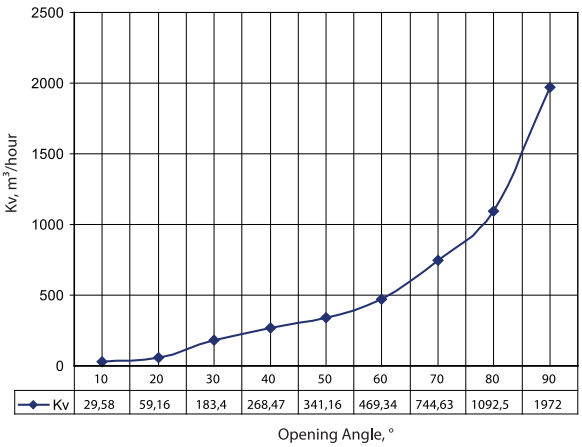
Valve flow performance, DN150



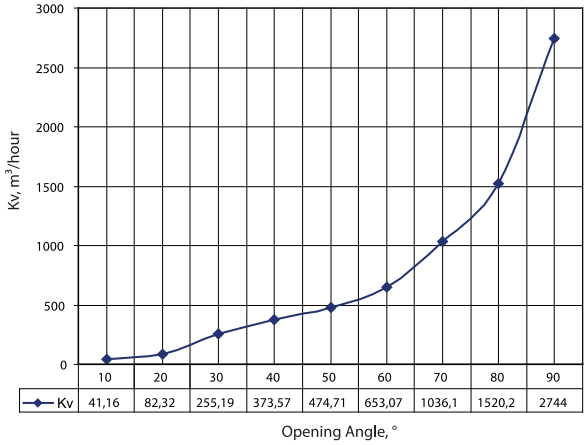
Valve flow performance, DN200



Valve flow performance, DN250



Valve flow performance, DN300



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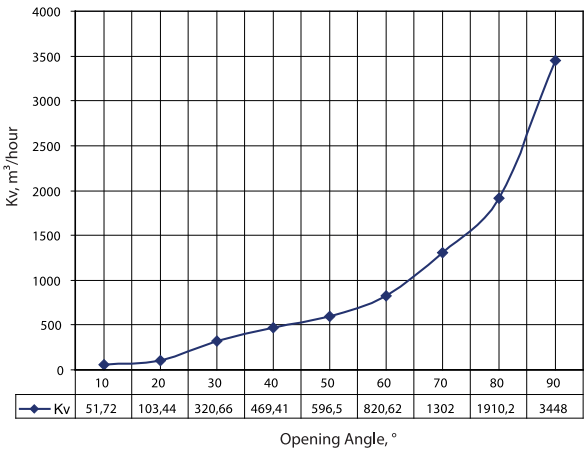
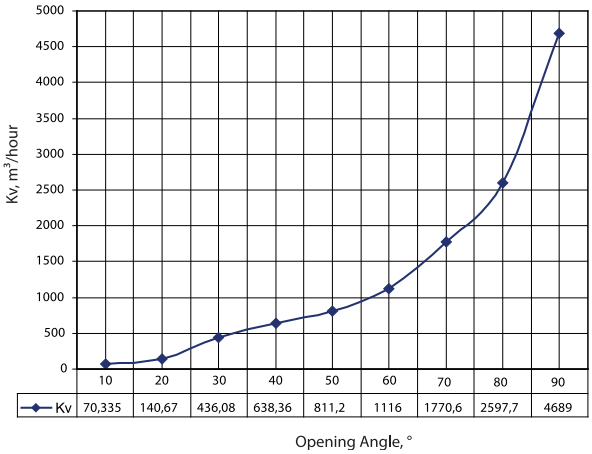
FLOWRATE CHARACTERISTICS

Valve flow performance, DN350



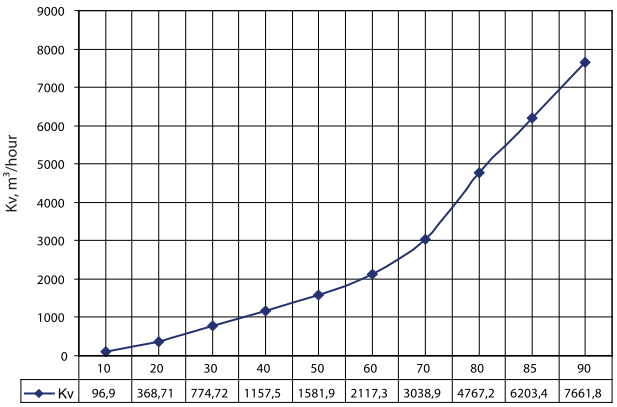
Opening Angle, °	10	20	30	40	50	60	70	80	90
Kv	51,72	103,44	320,66	469,41	596,5	820,62	1302	1910,2	3448

Valve flow performance, DN400



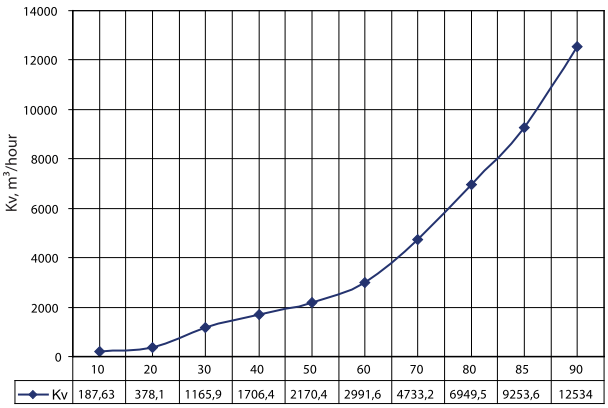
Opening Angle, °	10	20	30	40	50	60	70	80	90
Kv	70,335	140,67	436,08	638,36	811,2	1116	1770,6	2597,7	4689

Valve flow performance, DN500



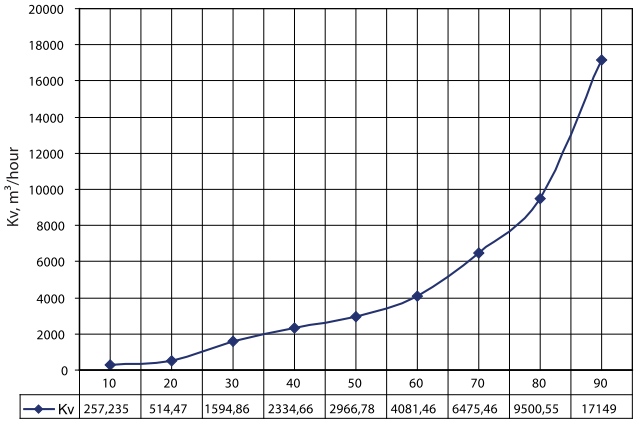
Opening Angle, °	10	20	30	40	50	60	70	80	85	90
Kv	96,9	368,71	774,72	1157,5	1581,9	2117,3	3038,9	4767,2	6203,4	7661,8

Valve flow performance, DN600



Opening Angle, °	10	20	30	40	50	60	70	80	85	90
Kv	187,63	378,1	1165,9	1706,4	2170,4	2991,6	4733,2	6949,5	9253,6	12534

Valve flow performance, DN700

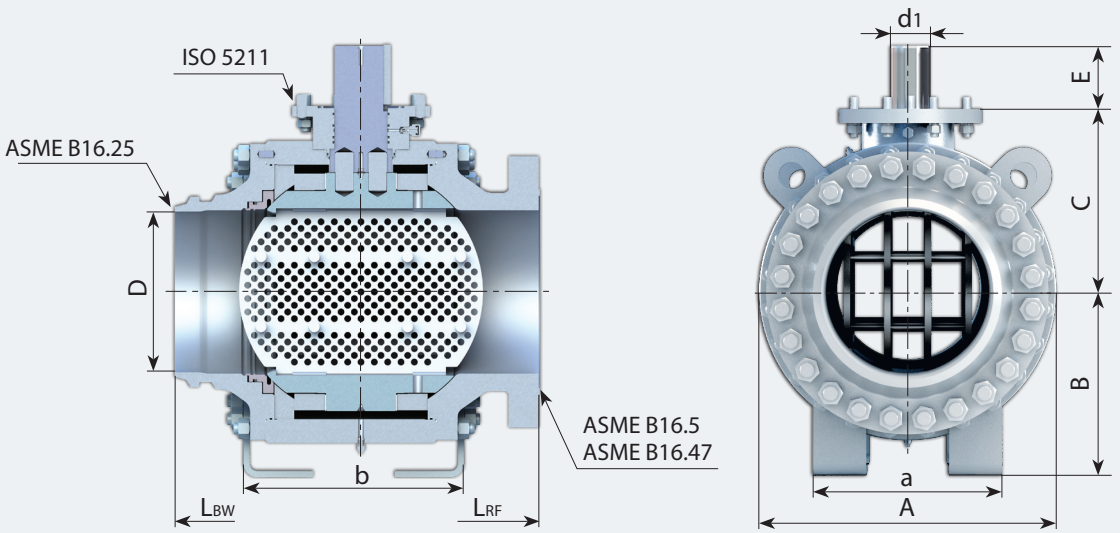


Opening Angle, °	10	20	30	40	50	60	70	80	90
Kv	257,235	514,47	1594,86	2334,66	2966,78	4081,46	6475,46	9500,55	17149

MAIN DIMENSIONS

CONTROL BALL VALVES

DN 6” – 28” Class 150 - 600 for liquid medium



NPS	Series	Class	Dimensions, mm									Weight*, kg	
			A	B	C	D	d	E	LBW	LRF	a x b	BW	RF
6“	PT60170	150	350	230	260	152	27	65	457	403	228x258	135	150
		400	370				40	80	559	559		240	285
		600											
8“	PT60170	150	480	300	329	205	60	83	675	675	400x440	465	505
		400					72	111	703	703		476	546
		600							723	723			568
10“	PT60168	150	530	353	362	252	60	80	688	688	557x487	745	799
		400					72	130	788	788		818	908
		600										824	964
12“	PT60168	150	615	390	406	303	72	107	444	444	470x527	825	877
		400	640	410	408		98	127	490	490	470x572	1070	1174
		600							509	509		1105	1285
14“	PT60168	150	682	425	431	335	98	127	762	762	500x613	1230	1312
		400	710	440	430		160	179	889	889		1405	1580
		600										1430	1679
16“	PT60168	150	762	480	472	385	98	127	838	838	550x652	1630	1734
		400	780	490	471		160	179	902	902	530x682	1874	2096
		600							991	991		1915	2247
20“	PT60168	150	905	555	538	487	160	179	1029	1029	670x809	2849	2993
		400	953		575		180	222	1134	1134		3222	3505
		600										3167	3595
24“	PT60168	150	1035	630	630	589	98	133	1067	1067	620x1011	3681	3876
		400	1065		644		180	207	1232	1232	626x1041	3925	4362
		600							1397	1397	526x1041	4074	4684
28“	PT60168	150	1310	779	768	684	220	244	1319	1319	730x915	7392	7656
		400	1345		803		280	310	1459	1459		8194	9054
		600											

* The weight is indicated without the weight of actuator.
Beveling, type of connecting flange may be changed upon Customer's request.

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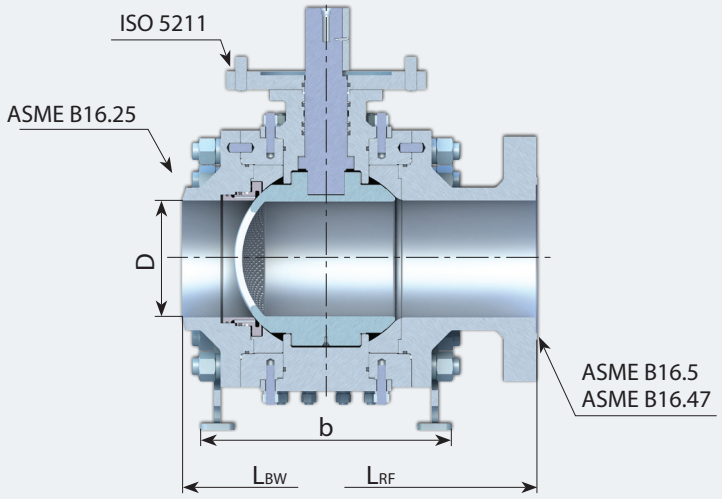
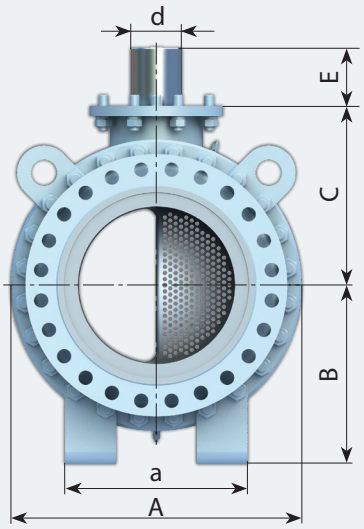
MAIN DIMENSIONS

CONTROL BALL VALVES

DN 8" – 28" Class 150 - 900 for gaseous medium





NPS	Series	Class	Dimensions, mm									Weight*, kg	
			A	B	C	D	d	E	LBW	LRF	a x b	BW	RF
8"	PT60170	150	480	300	329	205	60	83	675	675	400x440	465	505
		400					72	111	703	703		476	546
		600							723	723		476	568
		900							737	737		485	587
12"	PT60168	150	615	390	400	303	72	107	750	750	470x602	942	994
		400	640	410	409		98	127	795	795		1103	1207
		600							855	855		1131	1311
		900	655	400	401		160	208	890	890	470x607	1239	1439
16"	PT60168	150	762	480	472	385	98	127	843	843	560x682	1603	1707
		400	780	490	471		160	179	911	911		1831	2053
		600							959	959		1853	2185
		900	800		492		180	222	1021	1021	572x712	2034	2436
20"	PT60168	150	905	555	544	487	98	127	1029	1029	670x809	2708	2852
		400			538		160	179	1134	1134		2922	3205
		600										2860	3288
		900	928	572	547			177	1220	1220	712x827	3177	3773
28"	PT60168	150	1285	779	728	684	160	180	1260	1260	730x1015	7005	7269
		400			750		180	200	1460	1460		7141	8001
		600										7141	8001
		900							1580	1580		7399	8797

* The weight is indicated without the weight of actuator.
Beveling, type of connecting flange may be changed upon Customer's request.