

# Segment ball valve



## Segment ball valve

Segment ball valve is one type of ball valves. Its closure is a half ball with V type port which has sharp edges. During operating the valve, friction action will be occurred between its closures that producing a strong shearing force to the medium, and a fan-shaped area will be formed between V type port of the ball and the port of seat ring, so the section area of flow port can be changed, and the medium can be precisely regulated. It is a kind of regulating valve with angle rotation, having same sealing performance as common ball valves, so it simultaneously has both functions of regulating and on-off. Incorporating with pneumatic or electric actuators, it can be widely used in the automatic control systems in different industries.

## Product features:

**Integral structure of Body :** Both wafer type and flanged type V-type ball valves are with integral, side-entry structure which has strong rigidity, making it hard to be deformation and leakage.

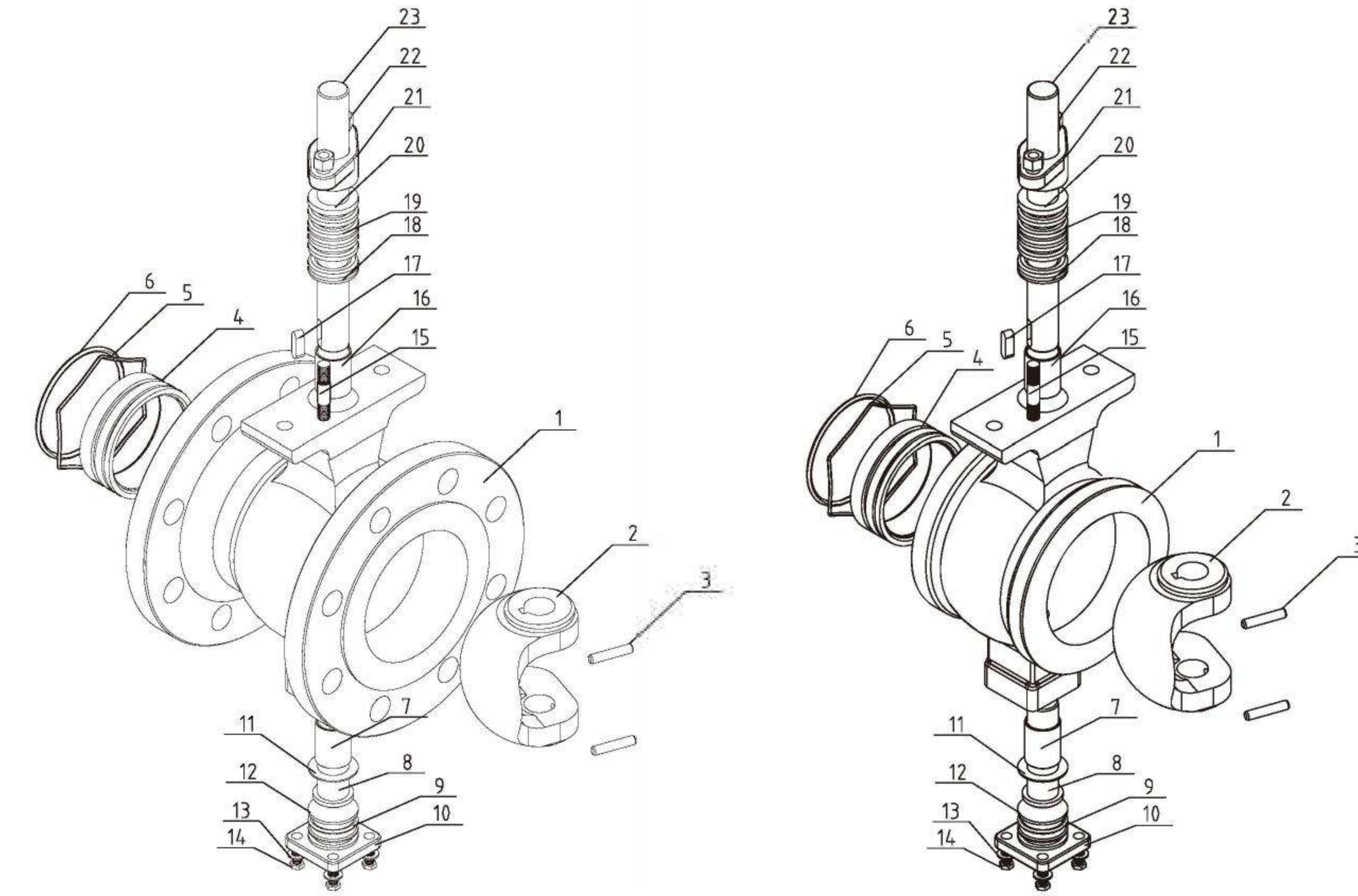
**With lower and upper self-lubricated bearings:** Lower and upper self-lubricated bearings are installed inside the body. So the contact surface with stem is bigger which have a high carrying capacity and low friction coefficient, that operating torque of valve is reduced.

**Seat rings can be metal seats or PTFE soft seats** depending on different working medium. Sealing face of metal seats will be overlaid with hard alloy, while ball surface is hardened with hard chromium plated or spraying overlay, plasma nitriding, etc, so as to increase working life of sealing faces and improve temperature resistance. PTFE or RPTFE seats have excellent sealing performance, high corrosion resistance and wide applications.

**Economical practicality:** Light body weight, small stem torque, so it can be installed with smaller pneumatic or electric actuators, high cost-effective compared to same size/class of other kinds of regulating valves.

**Wide applications:** With the shearing action between V port and seat ring, also with smooth body internal surface, so making the medium is not easy to be kept in the body. So it is not only suitable for liquid medium, but also better for using in control system of mediums contained fibers and solid particles.

**Precise control of small flow:** Through special machining on the V port for small sizes, which can achieve a precise control of low CV value.



## Parts List

N.O	Part name	Quantity	Material	Material	Material
1	Body	1	WCB	CF8	CF8M
2	valve core	1	CF8+hard chromium	CF8+hard chromium	CF8M+hard chromium
3	parallel pin	2	304	304	316
4	Seat	1	304+hard alloy overlaid	304+hard alloy overlaid	316++hard alloy overlaid
5	Spring	1	316	316	316
6	O-ring	1	Viton	Viton	Viton
7	Self-lubricated bearing		304+PTFE	304+PTFE	316+PTFE
8	Lower stem	1	20Cr13	304	316
9	O-ring	1	Viton	Viton	Viton
10	Lower cover	1	WCB	CF8	CF8M
11	Washer	1	PTFE	PTFE	PTFE
12	Adjusted gasket	1	PTFE	PTFE	PTFE
13	Flat gasket	4	Q235	304	304
14	Screw	4	25	304	304
15	Bolt	2	25	304	304
16	Self-lubricated bearing	1	304+PTFE	304+PTFE	316+PTFE
17	Key	1	20Cr13	304	316
18	Lower stem packing	1	PTFE	PTFE	PTFE
19	Middle stem packing	1 suit	PTFE	PTFE	PTFE
20	Upper stem packing	1	PTFE	PTFE	PTFE
21	Packing gland	1	WCB	CF8	CF8M
22	Nut	2	35	304	304
23	Upper stem	1	20Cr13	304	316

Product model

DN25–DN250 ( 1" –10" ) wafer type, flanged type  
 DN300–DN500 ( 12" –20" ) flanged type  
 Pressure rating:  
 DIN PN10、PN16、PN25  
 ANSI 150

Design standard

- End flanges ; GB/T 9113.1–2010 、JB/T 79.1–1994、HG 20592–2009  
 ASME B 16.5 EN 1092–1; 2001
- Pressure/temperature rating; GB/T 12224–2007 ASME B16.34–2003 ISO 7005–1
- Face to face  
 Wafer type:Manufacturer standard  
 Flanged type:ISA S75.04–1995, IEC/DIN 534–3–2
- working temperature :  
 Normal temperature  
 Middle temperature  
 High temperature
- Pressure test standard  
 Shell and seat test ; GB/T 4213–2007

Metal seat leakage rate; The below table will be used if customer doesn't have any special requirements. If the customer has special requirement, then leakage rate will be in accordance with spec GB/T 4213–2007 V class V.

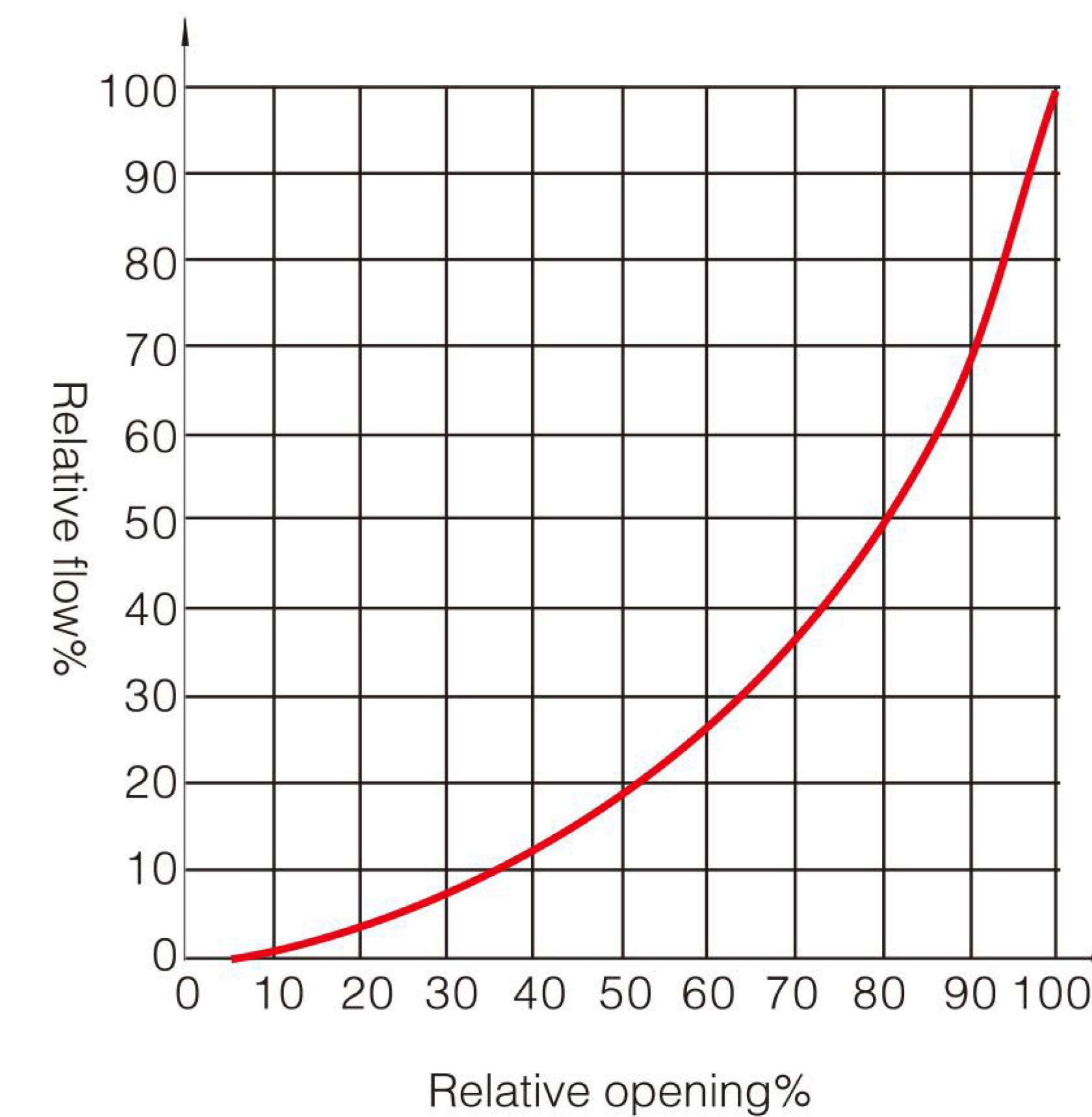
Shell test pressure shall be 1.5 times of PN, the pressure rating determined for material at 38 °C listed in ASTM B16.34.Stem packing and seat test pressure shall be 1.1 times the pressure rating determined for material at 38 °C listed in ASTM B16.34. Seat test shall be done under max. differential pressure. When max. differential pressure is not specified, then it will be tested under pressure at 1.0 MPa(hydrostatic pressure). When defined max. differential pressure is less than 0.6MPa, then it will be tested under pressure at 0.6 MPa. Test Fluid shall be fresh water containing a corrosion inhibitor.

Max. allowable leakage rate of seat test

Size	Max. allowable leakage rate of metal seat	Max. allowable leakage rate of soft seat
DN25 ( 1" )	1.50ml/min	0.15ml/min
DN32 ( 1 1/4" )	1.80ml/min	0.18ml/min
DN40 ( 1 1/2" )	2.40ml/min	0.24ml/min
DN50 ( 2" )	3.00ml/min	0.30ml/min
DN65 ( 2 1/2" )	3.90ml/min	0.39ml/min
DN80 ( 3" )	4.80ml/min	0.48ml/min
DN100 ( 4" )	6.00ml/min	0.60ml/min
DN125 ( 5" )	7.50ml/min	0.75ml/min
DN150 ( 6" )	9.00ml/min	0.90ml/min
DN200 ( 8" )	12.00ml/min	1.20ml/min
DN250 ( 10" )	15.00ml/min	1.50ml/min
DN300 ( 12" )	18.00ml/min	1.80ml/min
DN350 ( 14" )	21.00ml/min	2.10ml/min
DN400 ( 16" )	24.00ml/min	2.40ml/min
DN450 ( 18" )	26.00ml/min	2.60ml/min
DN500 ( 20" )	30.00ml/min	3.00ml/min

Flow characteristics

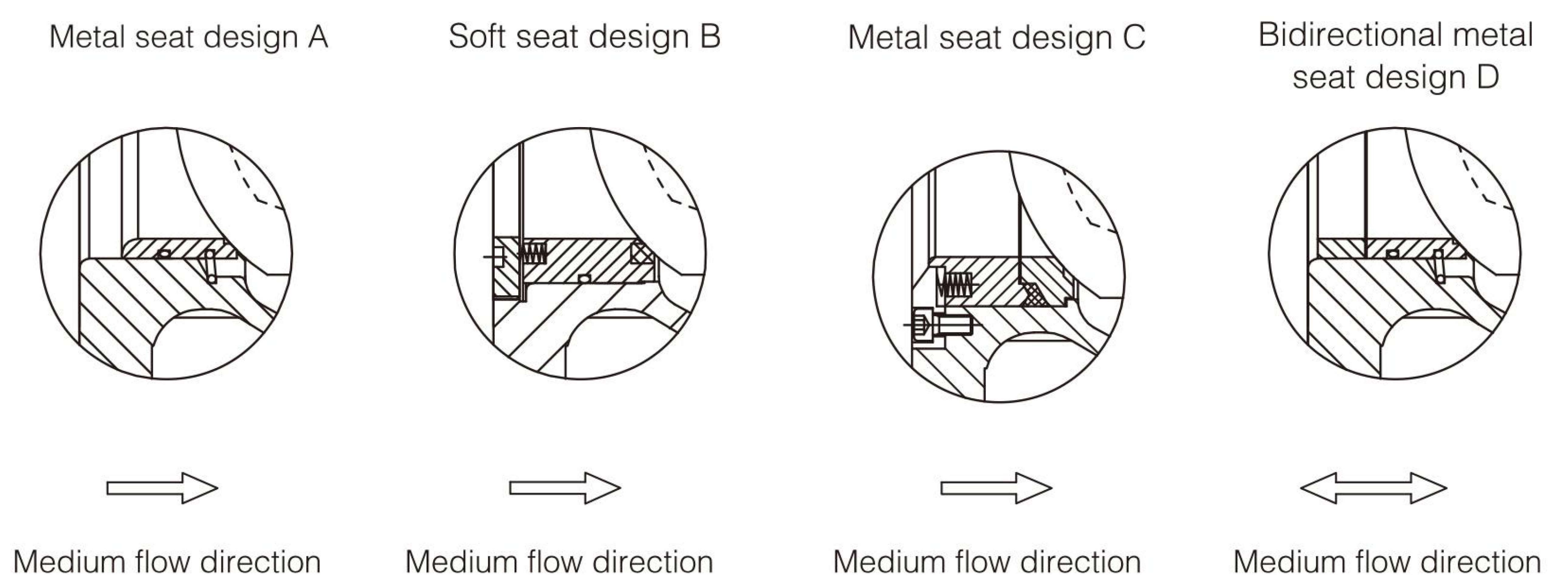
The intrinsic flow characteristic of V type regulating ball valve approximates the characteristic of equal percentum , see Fig.1.



CV values of standard products

Size	CV values
DN25 ( 1" )	36
DN32 ( 1 1/4" )	56
DN40 ( 1 1/2" )	94
DN50 ( 2" )	152
DN65 ( 2 1/2" )	262
DN80 ( 3" )	358
DN100 ( 4" )	540
DN125 ( 5" )	906
DN150 ( 6" )	1424
DN200 ( 8" )	2176
DN250 ( 10" )	3532
DN300 ( 12" )	5732
DN350 ( 14" )	8245
DN400 ( 16" )	10651
DN450 ( 18" )	12878
DN500 ( 20" )	16343

Structural sketch of different seat design



Application of different seat structure

Metal seat design A		Metal seat design A	
Seat	304/316+Stellite	Seat	304/316+Stellite
Spring	17-7PH/316	Spring	17-7PH/316
O-ring	Viton	O-ring	High temp. resistance Viton
Stem packing	PTFE	Stem packing	Graphite
Ball+hardened treatment	Hard chromium plated /Nitriding/WC coating/STL coating	Ball+hardened treatment	Hard chromium plated /Nitriding/WC coating/STL coating
Suitable temperature range	-29°C–450°C	Suitable temperature range	-29°C–450°C
Suitable medium	Water/Oil/Solid particles/Suspensions	Suitable medium	Water/Oil/Solid particles/Suspensions



Soft seat design B	
Seat	304+PTFE/316+PTFE
Spring	17-7PH or Inconel
O-ring	Viton
Stem packing	PTFE
Ball+hardened treatment	Hard chromium plated/Nitriding
Suitable temperature range	-29°C-450°C
Suitable medium	Water/Oil/Steam/Gas

Metal seat design C	
Seat	304/316+Stellite
Spring	17-7PH/316/Inconel
O-ring	Graphite
Ball+hardened treatment	Nitriding/WC coating/STL coating
Stem packing	Graphite
Suitable temperature range	-29°C-450°C
Suitable medium	Steam/Solid particles

Bidirectional metal seat design D	
Seat	304/316+Stellite
Spring	17-7PH/316
O-ring	Viton
Stem packing	PTFE
Ball+hardened treatment	Hard chromium plated/ Nitriding/WC coating /STL coating
Suitable temperature range	-29°C-450°C
Suitable medium	Water/Oil/Solid particles/Suspensions

Actuator Selection

Selection table of actuator for V type ball valve												
DN	Pneumatic actuator				Equipped with GT Small fine series of actuators			Electric operation	Gearbox operation	Air tube	Air supply pressure (Mpa)	
	ZS	Manual operation	ZDS	Manual operation	DA	SR	Manual operation					
25	ZS36-63	26:1	ZDS45-100	38:1	63	26:1	75	28:1	05	1	Φ6 × 1(G1/4)	0.5-0.7
32	ZS36-63	26:1	ZDS45-100	38:1	63	26:1	75	28:1	05	1		
40	ZS36-80	28:1	ZDS45-100	38:1	83	28:1	92	38:1	10	1		
50	ZS45-80	28:1	ZDS45-100	38:1	92	28:1	105	38:1	10	1		
65	ZS45-80	28:1	ZDS55-125	38:1	92	28:1	105	38:1	20	2	Φ8 × 1.5(G1/4)	
80	ZS45-100	38:1	ZDS55-125	38:1	105	38:1	125	38:1	20	2		
100	ZS45-100	38:1	ZDS55-125	54:1	105	38:1	125	54:1	40	2		
125	ZS55-100	54:1	ZDS55-125	54:1	125	54:1	140	54:1	40	3	Φ10 × 2(G3/8)	
150	ZS55-125	54:1	ZDS63-160	80:1	140	54:1	160	80:1	40	3		
200	ZS63-160	54:1	ZDS63-200	80:1	160	54:1	210	80:1	60	4	Φ12 × 2(G1/2)	
250	ZS80-200	80:1	ZDS80-250	78:1	190	80:1	210	78:1	100	5		
300	ZS80-250	80:1	ZDS100-300	78:1	240	80:1	270	78:1	150	5		
350	ZS100-300	78:1	ZDS125-300	98:1	270	78:1	300	98:1	200	5	Φ12 × 2(G1/2)	
400	ZS100-300	78:1	ZDS125-350	98:1	300	78:1	350	98:1	6	6		
450	ZS125-350	320:1	ZDS125-400	320:1	350	320:1	400	320:1	6	6		
500	ZS125-350	320:1	ZDS125-400	320:1	350	320:1	400	320:1	6D	6D		

Note: ZS series actuators are developed and manufactured by Hiton itself. See the catalog of ZS actuators for more information. All the above actuators are recommended for valves with Nominal pressure at 1.6MPa while air supply pressure at 0.5MPa. If the Nominal pressure of valve is more than 1.6MPa, or the medium is high temperature such as steam, then it is recommended to use higher models.

Selection of accessories

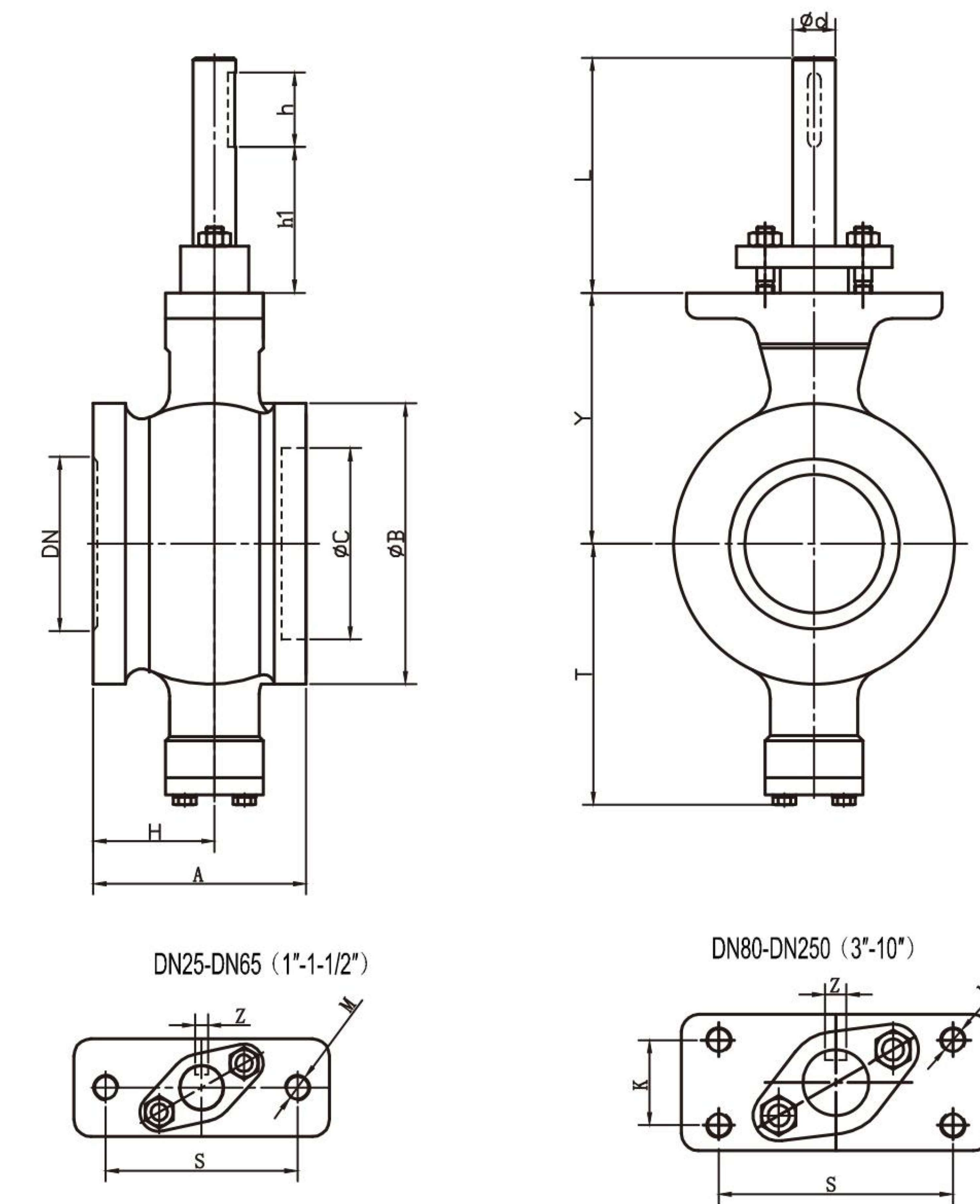
Regulating Segment ball valve:

1. Pneumatic regulating type: Body+ Yoke+ Pneumatic actuator + Electric valve positioned + Air filter
2. Electric regulating type: Body+ Yoke+ Regulating type electric actuator

On/off V type ball valve:

1. Pneumatic on/off type: Body+ Yoke+ Pneumatic actuator+ Solenoid valve+ Limit switch+ Air filter
2. Electric on/off type: Body+ Yoke+ On/off type electric actuator

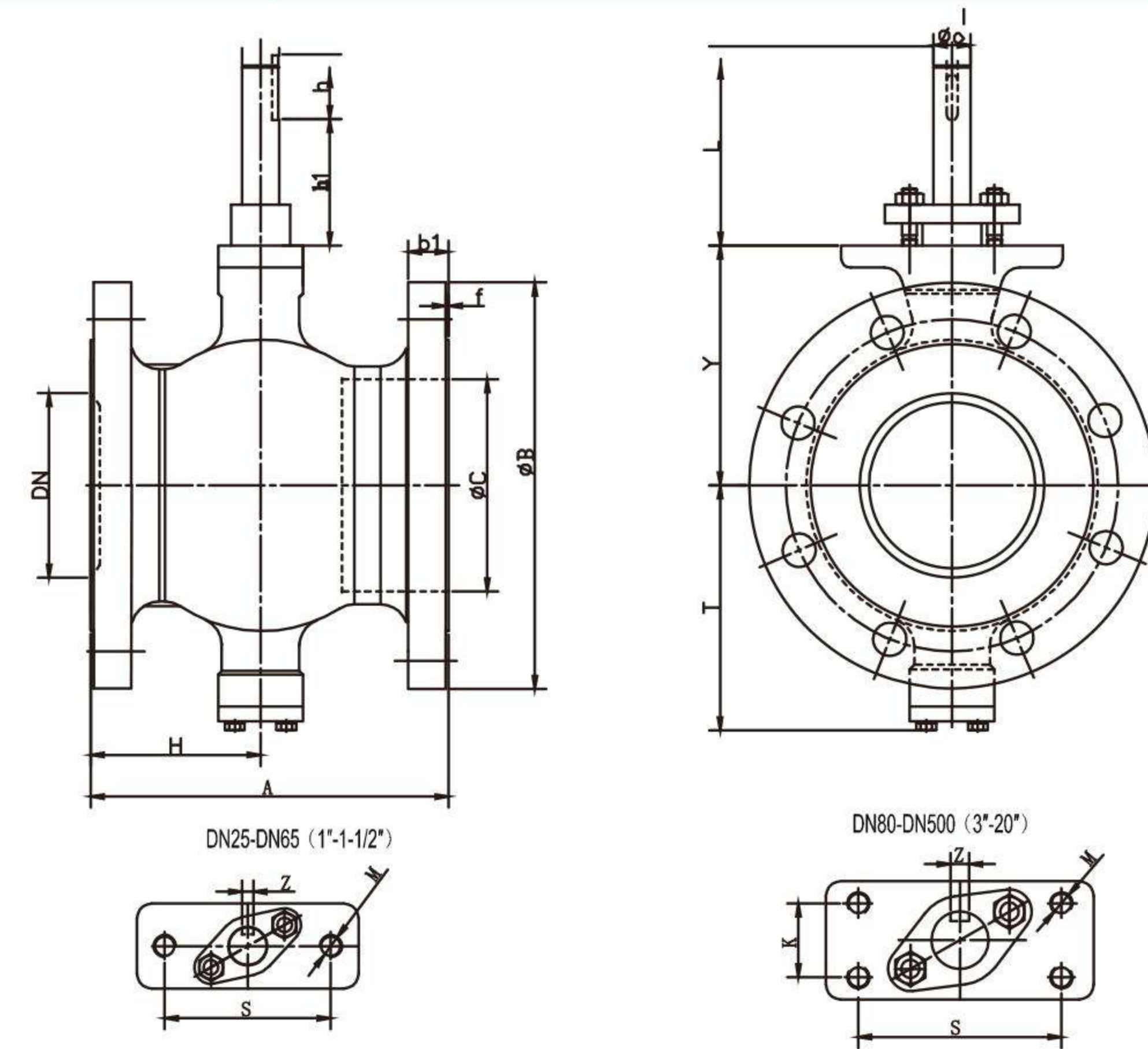
overall dimension table of Wafer Segment ball valve



DN	A	H	B	C	T	Y	L	L	φd	h	S	K	M	Z	Actuator
25	50	30	68	38	81	73	97	76	16	35	75	/	2-M10	5	32
32	60	35	76	45	86	78	93	75	16	35	75	/	2-M10	5	40
40	60	35	84	50	90	80	95	77	16	35	75	/	2-M10	5	76
50	75	43	100	62	93	90	98	78	16	35	75	/	2-M10	5	90
65	100	50	118	73	108	105	98	78	16	35	75	/	2-M10	5	100
80	100	57	132	93	123	118	105	74	20	35	90	28	4-M10	6	140
100	115	65	158	115	138	130	103	72	20	35	90	28	4-M10	6	150
125	129	78	184	134	148	145	102	75	25	40	90	28	4-M10	8	200
150	160	95	216	164	170	170	119	89	30	50	110	40	4-M12	8	300
200	200	120	268	206	200	201	122	92	30	50	110	40	4-M12	8	500
250	240	148	326	260	240	237	144	107	40	60	135	40	4-M16	12	800

Note: Stem projection length L has 2 options, one is long type which is suitable for ZS pneumatic actuator as stem can be inserted into the actuator, short type will be used if stem adapter is available.

Overall dimension table of Flanged V type ball valve



PN16

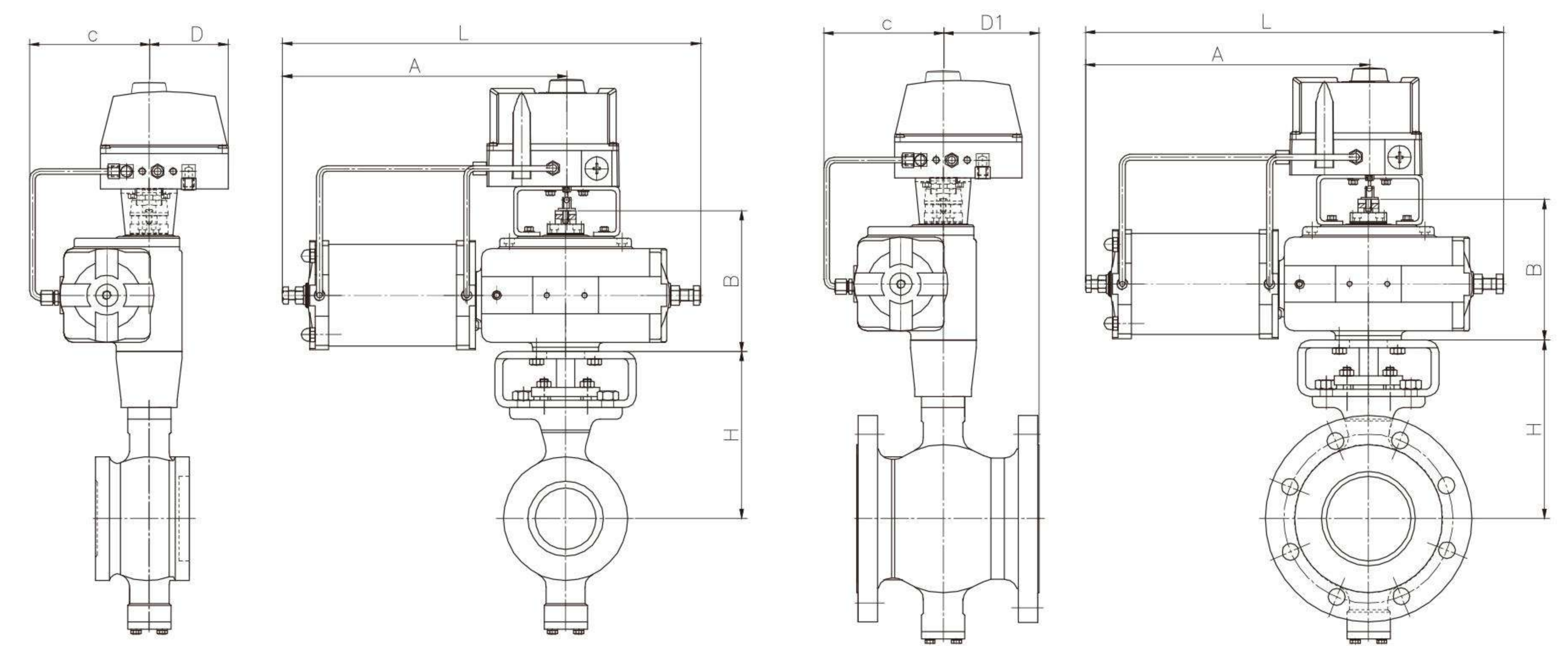
DN	A	H	B	b1	f	C	T	Y	L	L	d	h	S	K	M	Z	Actuator
25	102	51	115	16	2	38	81	73	92	76	16	35	75	/	2-M10	5	32
32	102	51	140	18	2	45	86	78	93	75	16	35	75	/	2-M10	5	40
40	114	57	150	18	2	50	90	80	95	77	16	35	75	/	2-M10	5	76
50	124	60	165	20	2	62	93	90	98	78	16	35	75	/	2-M10	5	90
65	145	70	185	20	2	73	108	105	98	78	16	35	75	/	2-M10	5	100
80	165	75	200	20	2	93	123	118	105	74	20	35	90	28	4-M10	6	140
100	194	92	220	22	2	115	138	130	103	72	20	35	90	28	4-M10	6	150
125	194	97	250	22	2	134	148	145	102	75	25	40	90	28	4-M10	8	200
150	229	110	285	24	2	164	170	170	119	89	30	50	110	40	4-M12	8	300
200	243	120	340	24	2	206	200	201	122	92	30	50	110	40	4-M12	8	500
250	297	148	405	26	2	260	240	237	144	107	40	60	135	40	4-M16	12	800
300	338	190	460	28	2	316	286	282	148	110	40	60	135	40	4-M16	12	1400
350	400	221	520	30	2	372	330	337	163	125	50	60	140	64	4-M16	14	2000
400	400	220	580	32	2	420	367	372	208	172	60	80	170	80	4-M20	18	2900
450	520	290	640	40	2	470	422	432	240	172	70	90	190	90	4-M24	20	3400
500	600	320	715	44	2	516	490	498	250	180	80	100	190	90	4-M24	22	5000

150Lb

inch	A	H	B	b1	f	C	T	Y	L	L	d	h	S	K	M	Z	Actuator
1	102	51	108	14.5	2	38	81	73	92	76	16	35	75	/	2-M10	5	40
1 1/4	102	51	115	14.5	2	45	86	78	93	75	16	35	75	/	2-M10	5	46
1 1/2	114	57	127	14.5	2	50	90	80	95	77	16	35	75	/	2-M10	5	90
2	124	60	152	16.3	2	62	93	90	98	78	16	35	75	/	2-M10	5	115
2 1/2	145	70	180	18	2	73	108	105	98	78	16	35	75	/	2-M10	5	120
3	165	75	191	19.5	2	93	123	118	105	74	20	35	90	28	4-M10	6	180
4	194	92	230	24	2	115	138	130	103	72	20	35	90	28	4-M10	6	200
5	194	97	255	24.3	2	134	148	145	102	75	25	40	90	28	4-M10	8	220
6	229	110	280	26	2	164	170	170	119	89	30	50	110	40	4-M12	8	350
8	243	120	340	29	2	206	200	201	122	92	30	50	110	40	4-M12	8	600
10	297	148	405	30.6	2	260	240	237	144	107	40	60	135	40	4-M16	12	900
12	338	190	485	32.2	2	316	286	282	148	110	40	60	135	40	4-M16	12	1600
14	400	221	535	35.4	2	372	330	337	163	125	50	60	140	64	4-M16	14	2400
16	400	220	595	37	2	420	367	372	208	152	60	80	170	80	4-M20	18	3500

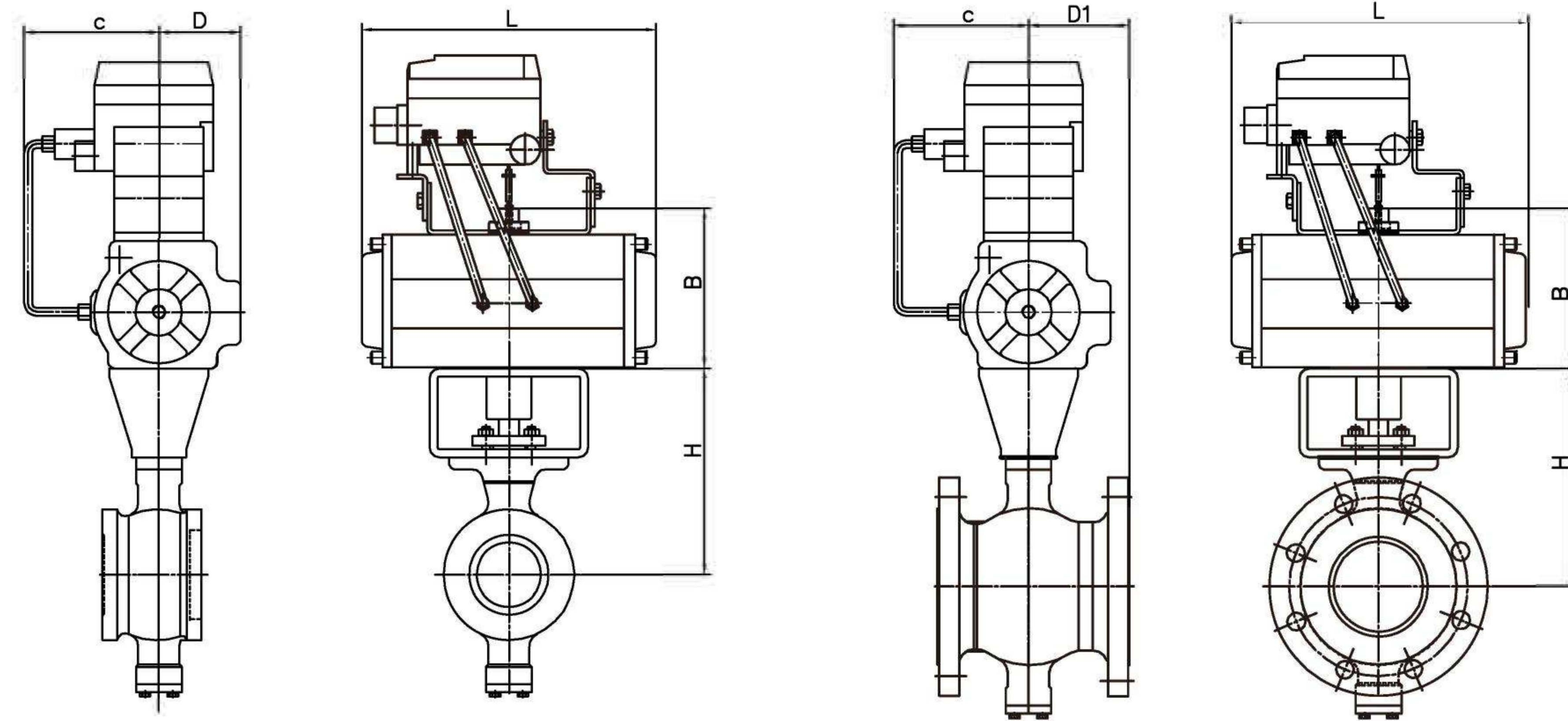
Note: Stem projection length L has 2 options, one is long type which is suitable for ZS pneumatic actuator as stem can be inserted into the actuator, short type will be used if stem adapter is available.

Overall dimensions of body and double acting actuator



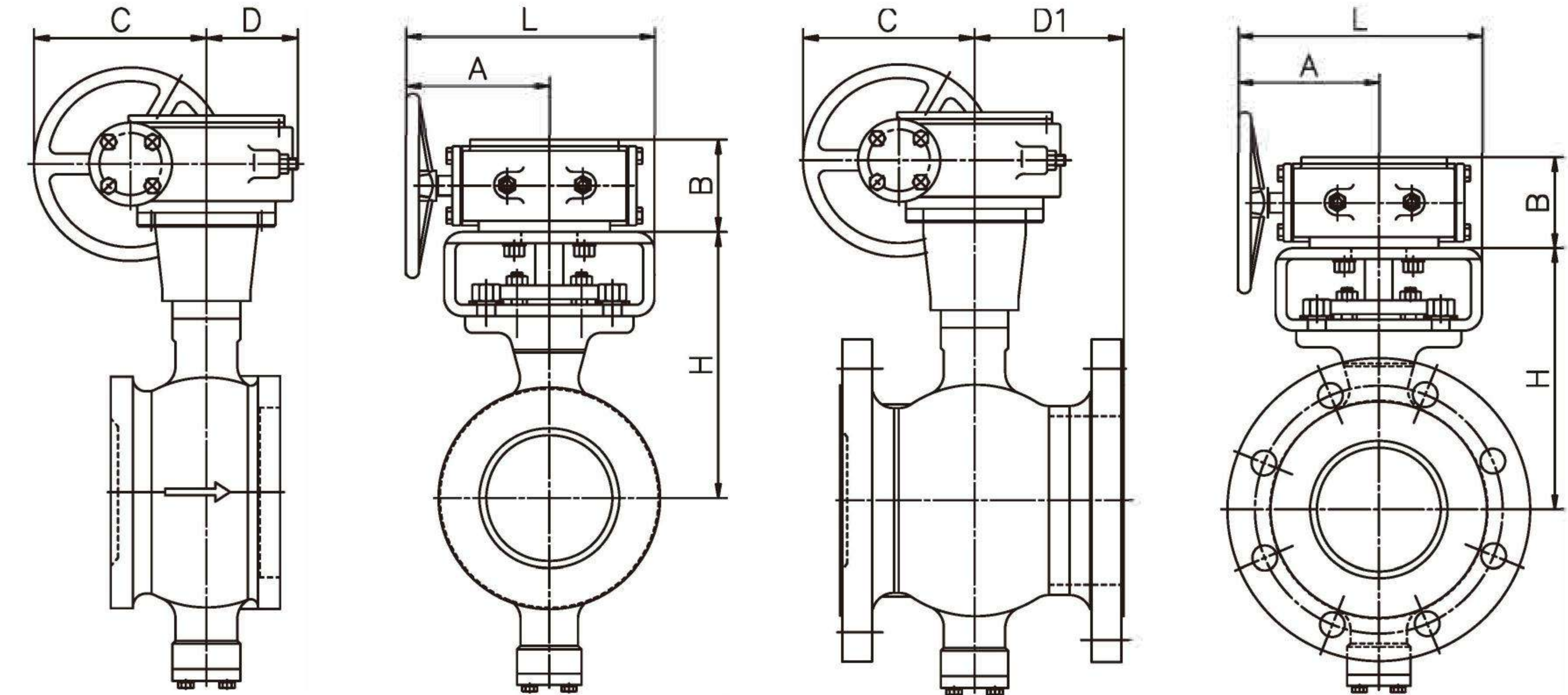
DN	A	L	B	H	C	D	D1
25	270	390	140	133	105	85	85
32	270	390	140	138	105	85	85
40	275	395	140	140	115	85	85
50	275	395	140	150	115	85	85
65	296	440	150	165	125	85	85
80	300	445	150	178	135	85	90
100	300	445	150	190	135	85	102
125	343	507	155	205	155	85	97
150	343	507	155	235	170	85	129
200	418	617	190	265	200	85	123
250	502	742	224	317	260	92	149
300	520	760	224	362	280		148
350	605	900	277	437	330		179
400	620	900	277	492	330		180
450	770	1200	330	570	400		230
500	770	1200	330	640	400		280

Overall dimensions of body and small type pneumatic actuator



DN	L	B	H	C	D	D1
25	168	108	163	120	36	85
32	168	108	168	120	36	85
40	204	129	170	130	46	85
50	262	137	180	130	50	85
65	262	137	195	130	50	85
80	268	153	210	145	56	90
100	268	153	220	145	56	102
125	300	175	235	160	68	97
150	390	192	270	160	75	129
200	460	217	300	175	87	123
250	525	260	375	195	103	149
300	600	319	420	220		148
350	720	356	500	250		179
400	740	378	550	260		180
450	740	378	650	260		230
500	860	432	720	260		280

Overall dimensions of body and gearbox



DN	A	L	B	H	C	D	D1
25	145	200	70	133	170	60	60
32	145	200	70	138	170	60	60
40	145	200	70	140	170	60	60
50	145	200	70	150	170	60	64
65	145	200	70	165	170	60	75
80	145	200	70	178	170	60	90
100	145	200	70	190	170	60	100
125	170	235	74	205	190	75	97
150	170	235	74	235	190	75	120
200	190	265	90	265	220	83	125
250	215	325	100	317	270	106	150
300	215	325	100	362	270		150
350	260	370	125	437	300		180
400	260	370	125	492	300		180
450	260	370	125	570	300		230
500	270	415	130	640	340		280