

Mapag BK series butterfly valve for cryogenic applications

The Mapag BK series butterfly valve has been especially designed for use in cryogenic applications. Testing of the valve includes Cold shock test and it can be used for gaseous and liquid oxygen, LNG, nitrogen, hydrogen and other cryogenic fluids. The compact design of the valve permits rapid cool down and minimizes boil off loss.

Body

The body can be flanged, wafer, lug, or with butt weld ends. In addition the design includes side entry or top entry options. The body is full rated.

Disc

The standard disc is made of stainless steel and has triple offset design. The disc is also fully rated.

Shaft and drive shaft design

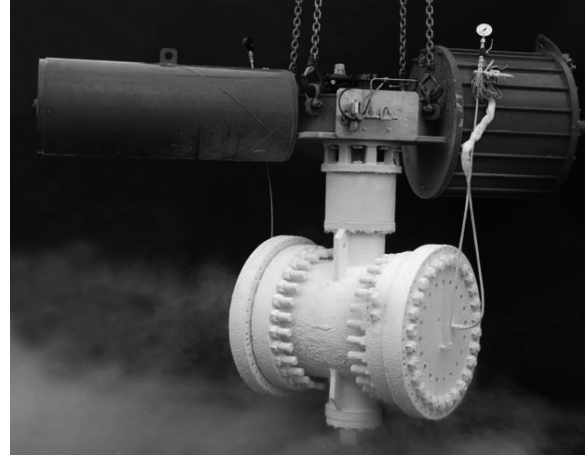
The series BK butterfly valve has a two piece shaft design which gives a high flow coefficient. Both shafts have two pairs of bearings. The axial bearings ensure the correct alignment of the disc. The axial bearings are located at the bottom and top of the valve body and protected from the flow media.

High safety factor has been included to bearing design. The gland packing is live-loaded to ensure minimum emissions and it's located after the outer bearing. The shaft to disc connection exceeds the strength of the top of the shaft. Overload will result in the failure of the external part of the shaft. The drive shaft is keyed to eliminate play. The shaft to disc connection exceeds the strength of the top of the shaft. Overload will result in the failure of the external part of the shaft.

Sealing element

The BK series butterfly valve has two flexible sealing elements located independently in the body and are designed for the cryogenic applications. The flexible sealing system ensures that the sealing remains consistent and tight even during rapid temperature changes and differentials within valve.

The triple offset design gives low opening and closing friction. There is no contact between the disc and sealing elements when the valve is fully opened. This extends the life of the cryogenic butterfly valve.



ISO 5211 mounting face

Series BK butterfly valve can be assembled with following type of actuators:

- manual gear actuator
- electric actuator
- pneumatic actuator
- hydraulic actuator

Optionally BK series valve can be supplied with any additional control equipment such as a solenoid valve, limit switch or positioner

Cold shock test by Mapag

The valve is cooled, when closed, from ambient temperature to -196°C / -320°F . During this cooling process stem and seat leakage is monitored. After the cooling process the valve stays in closed position for 30 minutes.

The acceptance criteria during the testing is following:

- a) continuous flow is not acceptable
- b) drops are acceptable, preferable no visible leakage

Function test: After the cooling process the valve shall be cycled a minimum of five cyclese

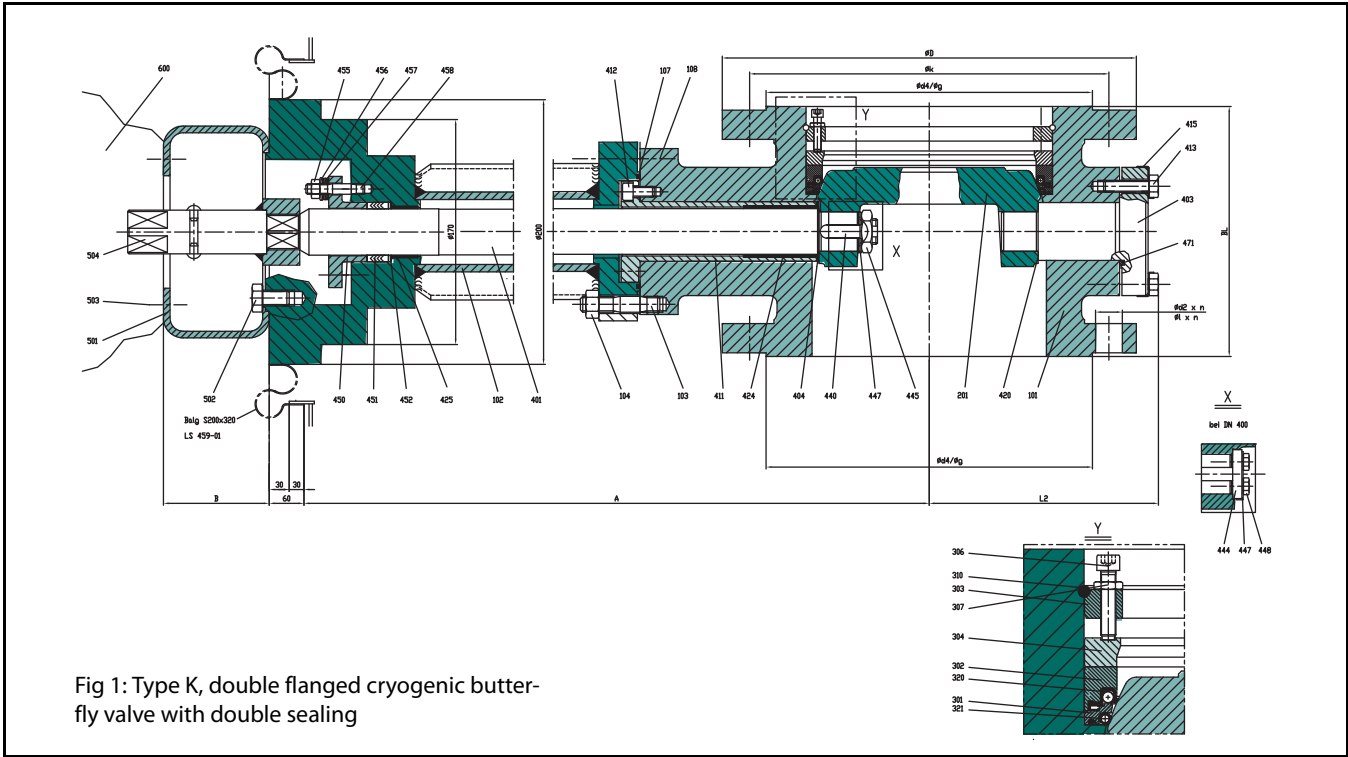


Fig 1: Type K, double flanged cryogenic butterfly valve with double sealing

NPS	Standard-dimensions					Flange-dimension											
						ANSI 16.5 CL150				ASME 16.47 serie B CL150				ASME B16.47 serie A CL150			
	A	ØD	B	BL	L2	Øk	Ød2/Øl	n	Ød4/Øg	Øk	Ød2/Øl	n	Ød4/Øg	Øk	Ød2/Øl	n	Ød4/Øg
6	80	279.4	80	210	160	241.3	22.4	8	215.9								
8	800	342.9	80	230	240	298.5	22.4	8	269.7								
10	800	406	80	250	230	362	25.4	12	323.9								
14	1 000	533.4	100	290	340	476.3	28.4	12	412.8								
16	1 000	596.9	120	310	340	539.8	28.4	16	469.9								
20	1 000	698.5	100	350	460	635	31.8	20	584.2								
24	1 000	812.8	100	390	540	749.3	35.1	20	692.2								
28	1 000	927.1	100	430	540									836.6	35	28	800.1
30	1 200	887.5	120	470	650	846.1	22.4	44	812.8	846.1	22.4	44	812.8				
32	1 200	941.3	120	470	650	900.2	22.4	44	863.6	900.2	22.4	48	863.6				

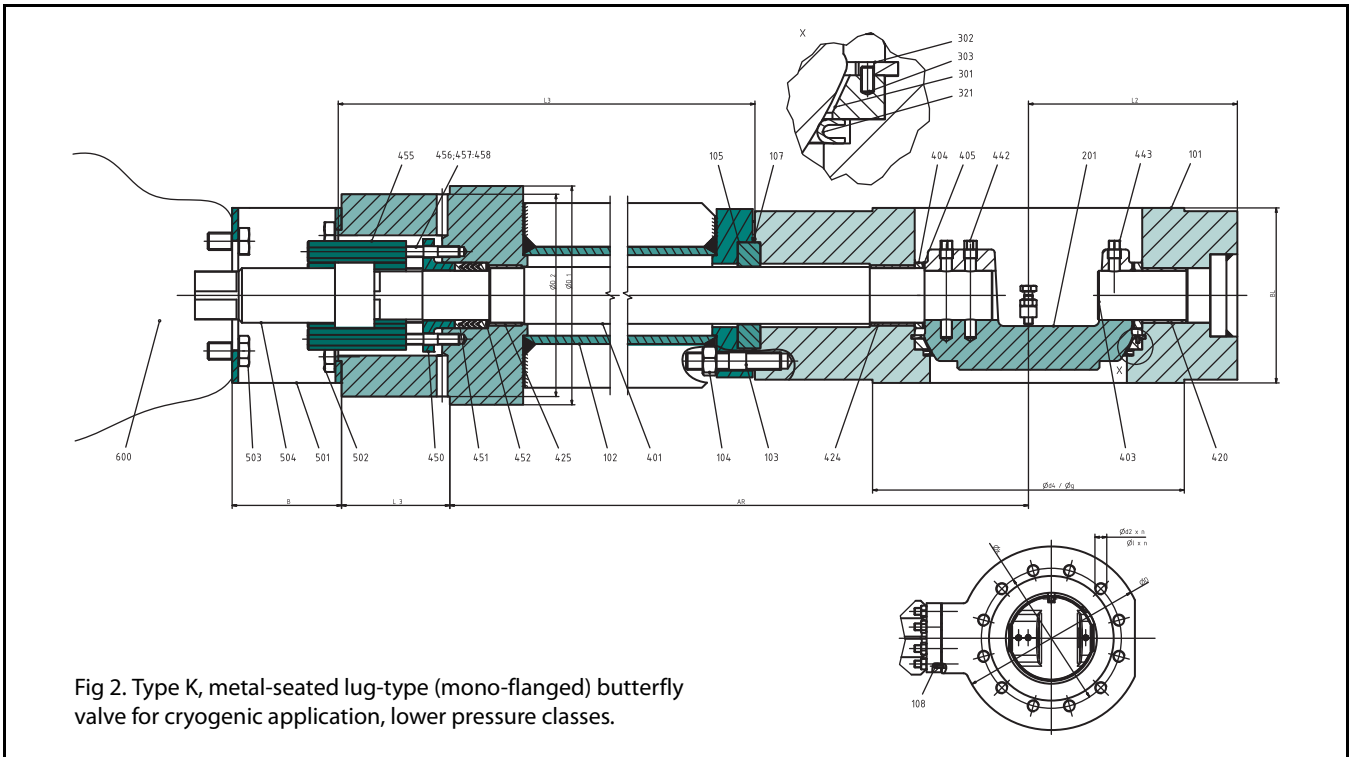


Fig 2. Type K, metal-seated lug-type (mono-flanged) butterfly valve for cryogenic application, lower pressure classes.

PN10 - PN16 - CL150																		
DIN/NPS	Standard-dimensions									Flange-dimension								
	AR min *	ØD	B	BL	L2	ØD1	ØD2	L3	DIN 2501-PN10			DIN 2501-PN16			ANSI B16.5-CL150			
									Øk	Ød2	n	Øk	Ød2	n	Øk	Øl	n	
100/4	860	240	80	64	110	200	170	60	180	M16	8	180	M16	8	190.5	5/8"-11UNC	8	
150/6	860	285	120	76	145	200	170	60	240	M20	8	240	M20	8	241.3	3/4"-10UNC	8	
200/8	860	340	160	89	175	200	170	60	295	M20	12	295	M20	12	298.5	3/4"-10UNC	8	
250/10	860	425	80	114	200	200	170	60	350	M20	12	355	M24	12	362	7/8"-9UNC	12	
300/12	860	485	120	114	240	200	170	60	400	M20	12	410	M24	12	431.8	7/8"-9UNC	12	
350/14	860	533	62	127	290	200	170	60	460	M20	16	470	M24	16	476.3	1"-8UN	12	
400/16	1060	597	120	140	300	200	180	102	515	M24	16	525	M27	16	539.8	1"-8UN	16	
450/18	1060	635	120	140	379	200	180	102	565	M24	20	585	M27	20	628.6	1 1/8"-8UN	16	
500/20	1060	715	120	152	370	200	-	102	620	M24	20	650	M30	20	635	1 1/8"-8UN	20	
600/24	1060	818	200	178	410	200	-	102	725	M27	20	770	M33	20	749.3	1 3/8"-8UN	20	
															ANSI B16.47 - CL150			
700/28	1060	927	102	229	500	200	170	102	840	M27	24	840	M33	24	863.6	1 1/4"-8UN	28	

Preferred dimensions in addition to AR min.: AR min. + 200 mm and AR min + 400 mm

PN25 - PN40 - CL300																		
DIN/NPS	Standard-dimensions									Flange-dimension								
	AR min *	ØD	B	BL	L2	ØD1	ØD2	L3	DIN 2501-PN25			DIN 2501-PN40			ANSI B16.5-CL300			
									Øk	Ød2	n	Øk	Ød2	n	Øk	Øl	n	
100/4	860	250	80	96	110	200	170	60	190	M20	8	190	M20	8	200	3/4"-10UNC	8	
150/6	860	356	80	116	170	200	190	60	250	M24	8	250	M24	8	269.7	3/4"-10UNC	12	
200/8	860	420	100	160	191	200	185	99	310	M24	12	320	M27	12	330.2	7/8"-9UNC	12	
250/10	860	460	200	170	220	200	190	102	370	M27	12	385	M30	12	387.4	1"-8UN	26	
300/12	1060	530	200	200	280	200	190	102	430	M27	16	450	M30	16	450.8	1 1/8"-8UN	26	
350/14	1060								490	M30	16	510	M33	16	514.4	1 1/8"-8UN	30	
400/16	1060	660	200	230	385	260	230	102	550	M33	16	585	M36	16	571.5	1 1/4"- UN	20	
450/18	1060								600	M33	20	610	M36	20	628.6	1 1/4"- UN	24	
500/20	1060	775	200	280	440	300	285	102	660	M33	20	670	M39	20	685.8	1 1/4"- UN	24	

Preferred dimensions in addition to AR min.: AR min. + 200 mm and AR min + 400 mm

PN63 - PN100 - CL600																		
DIN/NPS	Standard-dimensions									Flange-dimension								
	AR min *	ØD	B	BL	L2	ØD1	ØD2	L3	DIN 2501-PN25			DIN 2501-PN40			ANSI B16.5-CL300			
									Øk	Ød2	n	Øk	Ød2	n	Øk	Øl	n	
100/4	860	277	80	96	130	200	180	60	200	M24	8	210	M27	8	215.9	7/8"-9UNC	8	
150/6	860	356	80	116	170	200	-	60	280	M30	8	290	M30	12	292.1	1"-8UN	12	
200/8	860	420	100	160	191	200	180	99	345	M33	12	360	M33	12	349.2	1 1/8"-8UN	12	
250/10	860	460	200	170	220	200	-	102	400	M33	12	430	M36	12	431.8	1 1/4"- UN	16	
300/12	1060	530	200	200	320	200	-	102	460	M33	16	500	M39	16	489	1 1/4"- UN	20	
350/14	1060								525	M36	16	560	M45	16	527	1 3/8"- UN	20	
400/16	1060								585	M39	16	620	M45	16	603.2	1 1/2"- UN	20	

Preferred dimensions in addition to AR min.: AR min. + 200 mm and AR min + 400 mm

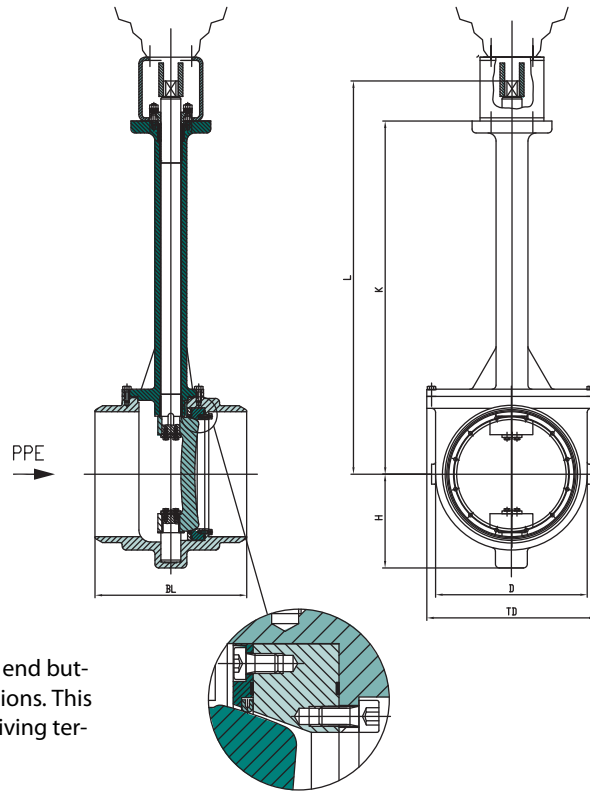


Fig 3: Type K, top entry butt weld end butterfly valve for cryogenic applications. This type is used specially in LNG receiving terminals.

DN	100	150	200	250	300	350	440	450	500	600	700	750	800	900
NPS	4	6	8	10	12	14	16	18	20	24	28	30	32	36
BL	250	330	400	440	480	530	570	620	670	760	850	880	930	990
H	130	155	210	230	260	280	315	350	380	430	390	525	560	610
K	375	405	430	460	490	515	545	570	595	650	705	730	765	820
L	505	545	600	650	675	725	780	850	915	1055	1070	1115	1135	1190
D	150	205	260	320	375	420	480	535	590	700	810	860	925	1040
ID	175	240	300	375	435	490	555	610	670	790	900	950	1020	1140
MdLo(150)	110	225	610	900	1080	1760	2600	3300	4500	7600	10400	12000	14800	20000
MdLo(300)	175	450	1050	1840	2400	3900	6300	5800	11400	17100	26000	27000	34000	44000
weight	85	140	180	270	360	450	580	725	860	1310	1965	2210	2490	3490

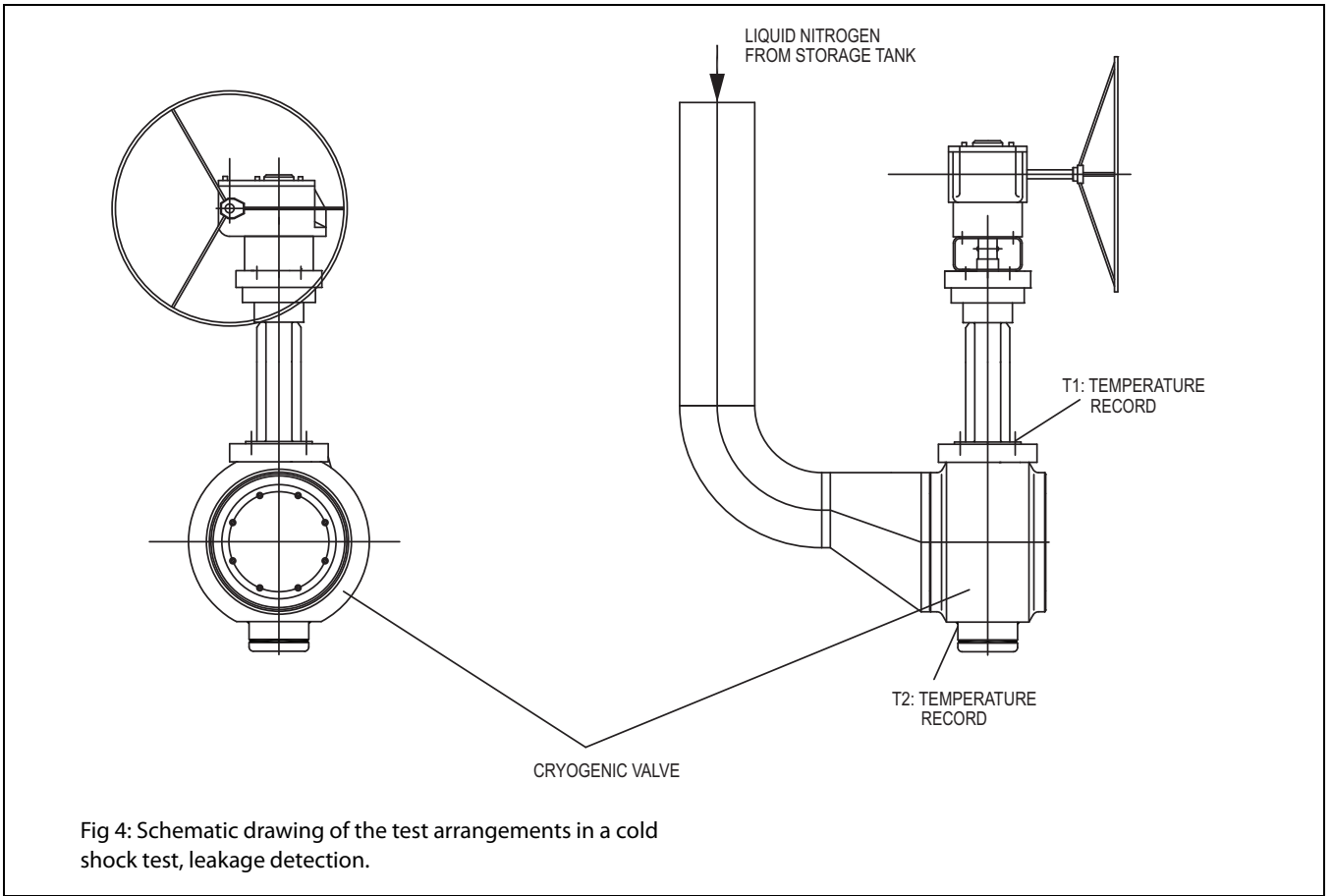


Fig 4: Schematic drawing of the test arrangements in a cold shock test, leakage detection.

Subject to change without prior notice.

Metso Automation Inc.

Europe, Vanha Porvoontie 229, P.O. Box 304, FI-01301 VANTAA, Finland.

Tel. +358 20 483 150. Fax +358 20 483 151

Von-Holzapfel-Str. 4, 86497 Horgau, Germany, Tel. +49 (0) 8294 8695-0,
fax + 49 (0) 8294 8695-4681, mapag.sales@metso.com

North America, 44 Bowditch Drive, P.O. Box 8044, Shrewsbury, MA 01545, USA.

Tel. +1 508 852 0200. Fax +1 508 852 8172

South America, Av. Independência, 2500- Iporanga, 18087-101, Sorocaba-São Paulo, Brazil.

Tel. +55 15 2102 9700. Fax +55 15 2102 9748/49

Asia Pacific, 20 Kallang Avenue, Lobby B, #06-00, PICO Creative Centre, Singapore 339411, Singapore.

Tel. +65 6511 1011. Fax +65 6250 0830

China, 19/F, the Exchange Beijing, No. 118, Jianguo Lu Yi, Chaoyang Dist, 100022 Beijing, China.

Tel. +86-10-6566-6600. Fax +86-10-6566-2575

Middle East, Roundabout 8, Unit AB-07, P.O. Box 17175, Jebel Ali Freezone, Dubai,
United Arab Emirates. Tel. +971 4 883 6974. Fax +971 4 883 6836

www.metso.com/valves

