

Cryogenic Valves



ACE VALVE



Cryogenic Valves



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Specification of Cryogenic Butterfly valves for LNG

THE CRYOGENIC LNG BUTTERFLY VALVE DESIGN

- Bi-directional design.
- With butt-welding ends or flanged ends.
- With inspection/ maintenance access (Side entry).
- Double offset shaft, Triple offset shaft.
- Valve may be fitted in any orientation.
- Extended bonnet / Shaft for safe access.

STANDARD COMPLIANCE

- BS 6364 Valves for Cryogenic service.
- Fire Safe approved in accordance with API 607.

PRODUCTION RANGE

- SIZE : DN 100mm (4 inch) ~ DN 2000mm (80 inch)
- FLANGE RATING : ASME B 16.5 Class 150LB, 300LB
- WORKING PRESSURE : Up to 50bar
- WORKING TEMPERATURE : -196 °C ~ +815 °C

Application

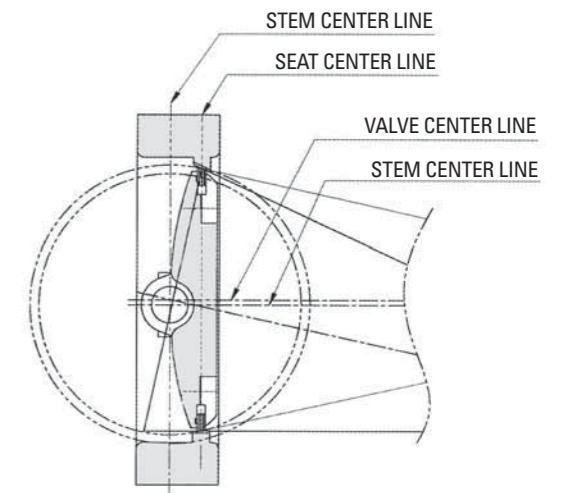
- Gas carrier (Liquefied Natural Gas, Acetylene, Ethylene)
- Receiving terminal
- Liquefied oxygen(-160 °C) plant



LNG Cryogenic Triple Eccentric Metal Seated Butterfly Valves

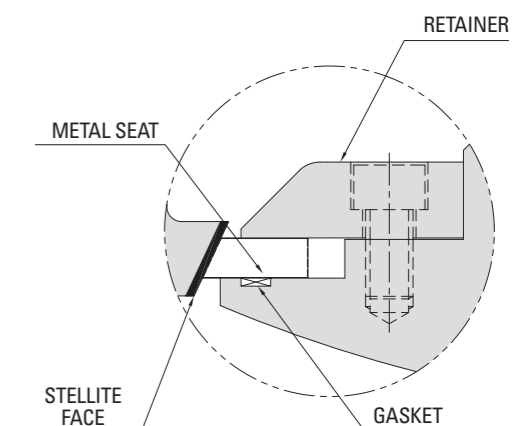
Triple eccentric design principle

Metal seated high pressure butterfly valves provide bi-directional bubble tight shut off which achieved by introducing state of the triple eccentric disc geometry. The valve shaft is off set against the seat and the center line of the valve body respectively. The seating edges are machined with a continuously changing slope from an angle on top of the oval seat ring to an angle at the opposite side. This geometry ensures that the seat ring stays clear of the seat except at the final shut off position which results long life seat.

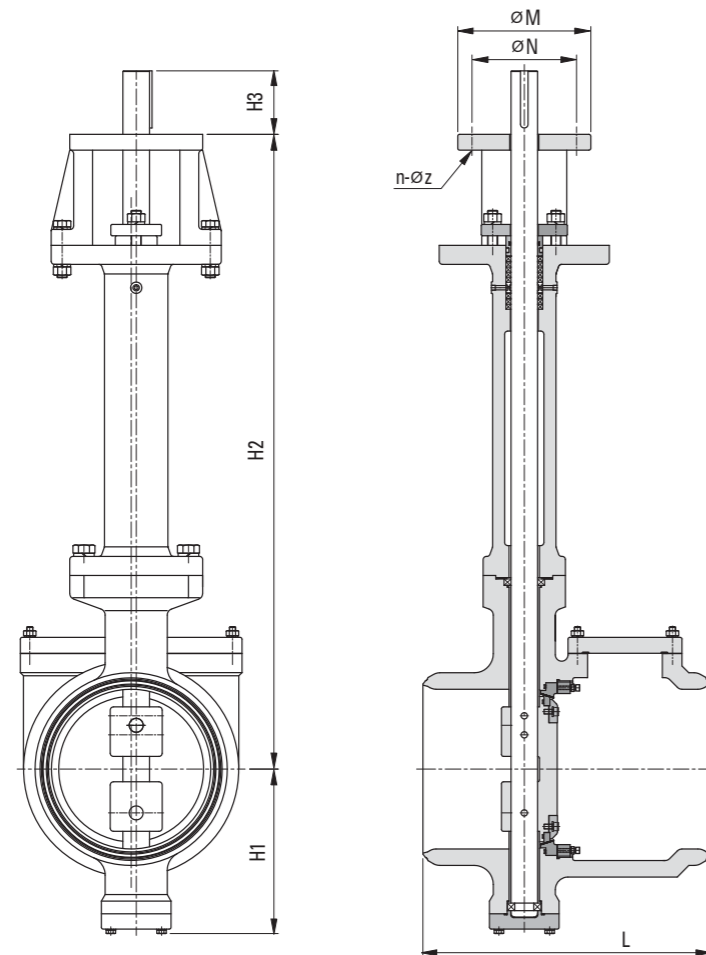


Metal to metal seat

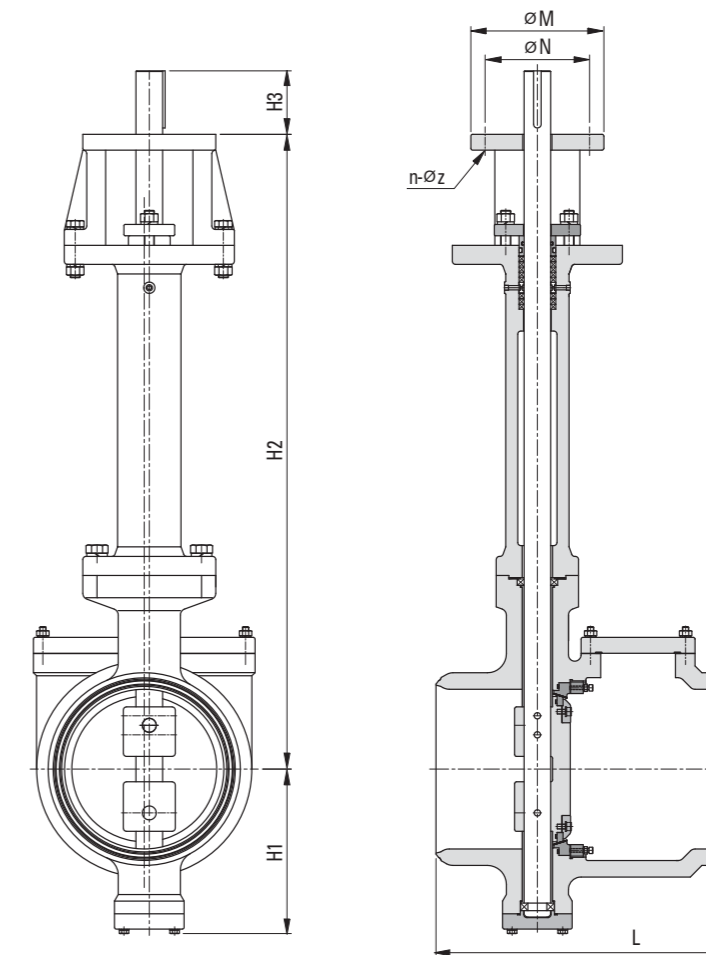
Various metal seals are available to comply with each temperature and pressure service applications. Solid metal seals are often used for temperatures above 510 °C and up to 815 °C or Cryogenic service. The seal leakage meets API 598 or API 6D. The solid metal seating valve can be operated in a temperature range of -196 °C to +815 °C. Valve for cryogenic application shall be provided with extended stem.



LNG Cryogenic Triple Eccentric Metal Seated Butt welding Type Butterfly Valve CLASS 150LB



LNG Cryogenic Triple Eccentric Metal Seated Butt welding Type Butterfly Valve CLASS 300LB



VALVE DIMENSIONS

(unit : mm)

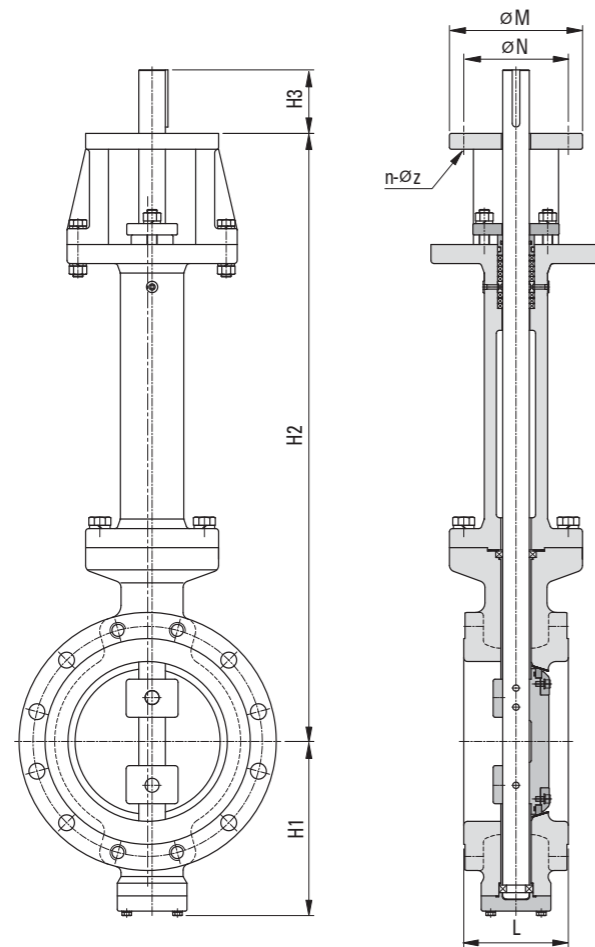
SIZE		L	H1	H2	H3	TOP FLANGE				WEIGHT APPROX. (kg)
inch	mm					TYPE	ØN	ØM	n-Øz	
4"	100	305	150	900	60	F10	102	125	4 - Ø12	52.5
6"	150	403	180	900	60	F10	102	125	4 - Ø12	73.1
8"	200	410	205	950	100	F16	165	210	4 - Ø23	91.7
10"	250	455	260	1000	100	F16	165	210	4 - Ø23	143.2
12"	300	480	295	1095	100	F16	165	210	4 - Ø23	183.3
14"	350	530	325	1140	100	F16	165	210	4 - Ø23	236.9
16"	400	555	350	1180	100	F25	254	300	8 - Ø19	309.0
18"	450	590	390	1220	100	F25	254	300	8 - Ø19	385.2
20"	500	625	435	1280	100	F25	254	300	8 - Ø19	535.6
24"	600	680	479	1485	150	F35	356	415	8 - Ø33	835.3
26"	650	750	530	1485	150	F35	356	415	8 - Ø33	957.6
28"	700	750	555	1510	150	F35	356	415	8 - Ø33	1359.6
30"	750	830	580	1550	180	F40	406	475	8 - Ø39	1650.0
32"	800	830	600	1570	180	F40	406	475	8 - Ø39	2070.0
36"	900	1000	700	1660	180	F40	406	475	8 - Ø39	2700.0
40"	1000	1200	770	1750	180	F40	406	475	8 - Ø39	3665.0
42"	1050	1200	830	1940	180	F40	406	475	8 - Ø39	4245.0
48"	1200	1300	910	2040	220	F48	483	560	12 - Ø39	5480.0
54"	1350	1400	1000	2365	220	F48	483	560	12 - Ø39	7784.0
60"	1500	1600	1100	2450	270	F60	603	685	20 - Ø39	10350.0
66"	1650	1800	1200	2550	270	F60	603	685	20 - Ø39	11100.0
72"	1800	2000	1350	2600	270	F60	603	685	20 - Ø39	12820.0
80"	2000	2300	1600	2800	400	F80	800	1000	20 - Ø45	15850.0

VALVE DIMENSIONS

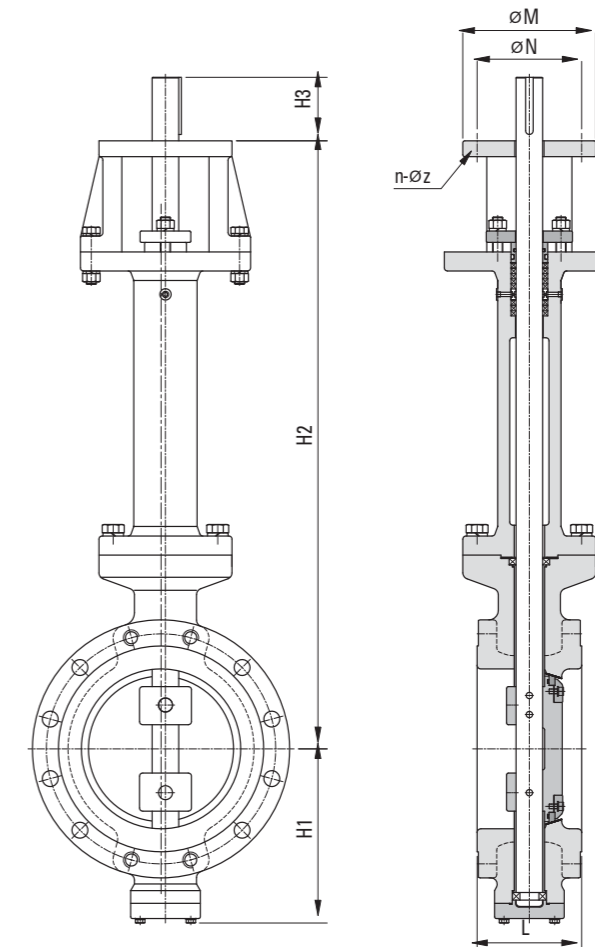
(unit : mm)

SIZE		L	H1	H2	H3	TOP FLANGE				WEIGHT APPROX. (kg)
inch	mm					TYPE	ØN	ØM	n-Øz	
4"	100	305	170	900	60	F10	102	125	4 - Ø12	57.0
6"	150	403	200	900	60	F10	102	125	4 - Ø12	80.0
8"	200	410	225	950	100	F16	165	210	4 - Ø23	101.0
10"	250	455	280	1000	100	F16	165	210	4 - Ø23	157.3
12"	300	480	306	1095	100	F25	254	300	8 - Ø19	201.0
14"	350	530	350	1140	100	F25	254	300	8 - Ø19	260.0
16"	400	555	390	1180	150	F35	356	415	8 - Ø33	335.0
18"	450	590	430	1220	150	F35	356	415	8 - Ø33	423.0
20"	500	625	468	1280	150	F35	356	415	8 - Ø33	575.0
24"	600	680	550	1485	180	F40	406	475	8 - Ø39	867.5
26"	650	750	585	1485	180	F40	406	475	8 - Ø39	1003.5
28"	700	750	615	1510	220	F48	483	560	12 - Ø39	1426.0
30"	750	830	660	1550	220	F48	483	560	12 - Ø39	1732.0
32"	800	830	715	1570	220	F48	483	560	12 - Ø39	2383.0
36"	900	1200	800	1660	220	F48	483	560	12 - Ø39	4142.0
40"	1000	1200	860	1750	220	F48	483	560	12 - Ø39	5590.0
42"	1050	1300	950	1940	270	F60	603	685	20 - Ø39	6454.0
48"	1200	1400	1000	2040	270	F60	603	685	20 - Ø39	8551.0
54"	1350	1550	1100	2365	220	F60	603	685	20 - Ø39	11928.0
60"	1500	1750	1200	2450	270	F60	603	685	20 - Ø39	16457.0
66"	1650	1900	1300	2550	270	F60	603	685	20 - Ø39	16800.0
72"	1800	2100	1500	2600	400	F80	800	1000	20 - Ø45	18600.0
80"	2000	2300	1750	2800	400	F80	800	1000	20 - Ø45	23350.0

LNG Cryogenic Triple Eccentric Metal Seated Flange Type Butterfly Valve CLASS 150LB



LNG Cryogenic Triple Eccentric Metal Seated Flange Type Butterfly Valve CLASS 300LB



VALVE DIMENSIONS

(unit : mm)

SIZE		L	H1	H2	H3	TOP FLANGE				WEIGHT APPROX. (kg)
inch	mm					TYPE	φN	φM	n-φz	
4"	100	127	161	900	60	F10	102	125	4 - φ12	47.5
6"	150	140	203	900	60	F10	102	125	4 - φ12	52.0
8"	200	152	230	9580	100	F16	165	210	4 - φ23	71.0
10"	250	165	274	1000	100	F16	165	210	4 - φ23	88.5
12"	300	178	300	1095	100	F16	165	210	4 - φ23	139.0
14"	350	190	345	1140	100	F16	165	210	4 - φ23	178.0
16"	400	216	380	1180	100	F25	254	300	8 - φ19	230.0
18"	450	222	407	1220	100	F25	254	300	8 - φ19	285.5
20"	500	229	445	1280	100	F25	254	300	8 - φ19	375.0
24"	600	267	519	1485	150	F35	356	415	8 - φ33	570.5
26"	650	292	570	1485	150	F35	356	415	8 - φ33	820.0
28"	700	292	590	1510	150	F35	356	415	8 - φ33	1170.0
30"	750	318	625	1550	180	F40	406	475	8 - φ39	1360.0
32"	800	318	645	1570	180	F40	406	475	8 - φ39	1650.0
36"	900	330	750	1660	180	F40	406	475	8 - φ39	2400.0
40"	1000	410	820	1750	180	F40	406	475	8 - φ39	3065.0
42"	1050	410	910	1940	180	F40	406	475	8 - φ39	3675.0
48"	1200	470	960	2040	220	F48	483	560	12 - φ39	4780.0
54"	1350	470	1045	2365	220	F48	483	560	12 - φ39	7074.0
60"	1500	530	1150	2450	270	F60	603	685	20 - φ39	9550.0
66"	1650	600	1250	2550	270	F60	603	685	20 - φ39	10300.0
72"	1800	670	1400	2600	270	F60	603	685	20 - φ39	12000.0
80"	2000	760	1650	2800	400	F80	800	1000	20 - φ45	15000.0

VALVE DIMENSIONS

(unit : mm)

SIZE		L	H1	H2	H3	TOP FLANGE				WEIGHT APPROX. (kg)
inch	mm					TYPE	φN	φM	n-φz	
4"	100	190	176	900	60	F10	102	125	4 - φ12	56.1
6"	150	210	223	900	60	F10	102	125	4 - φ12	78.1
8"	200	230	250	950	100	F16	165	210	4 - φ23	97.9
10"	250	250	310	1000	100	F16	165	210	4 - φ23	153.0
12"	300	270	340	1095	100	F25	254	300	8 - φ19	195.0
14"	350	290	380	1140	100	F25	254	300	8 - φ19	235.5
16"	400	310	425	1180	150	F35	356	415	8 - φ33	328.0
18"	450	330	445	1220	150	F35	356	415	8 - φ33	411.5
20"	500	350	480	1280	150	F35	356	415	8 - φ33	570.0
24"	600	390	570	1485	180	F40	406	475	8 - φ39	890.0
26"	650	410	605	1485	180	F40	406	475	8 - φ39	1003.0
28"	700	430	635	1510	220	F48	483	560	12 - φ39	1452.0
30"	750	450	680	1550	220	F48	483	560	12 - φ39	1723.5
32"	800	470	730	1570	220	F48	483	560	12 - φ39	2371.0
36"	900	510	820	1660	220	F48	483	560	12 - φ39	3510.0
40"	1000	550	860	1750	220	F48	483	560	12 - φ39	4475.0
42"	1050	570	950	1940	270	F60	603	685	20 - φ39	5286.0
48"	1200	630	1000	2040	270	F60	603	685	20 - φ39	7155.0
54"	1350	670	1100	2365	220	F60	603	685	20 - φ39	10073.0
60"	1500	790	1200	2450	270	F60	603	685	20 - φ39	14770.0
66"	1650	790	1300	2550	270	F60	603	685	20 - φ39	15450.0
72"	1800	870	1500	2600	270	F60	603	685	20 - φ39	17400.0
80"	2000	950	1750	2800	400	F80	800	1000	20 - φ45	22200.0

Cryogenic Butterfly Valves for LNG

Materials Specification for ACE Cryogenic Valves

All materials supplied for the valve components are suitable for operation in LNG installations, such as stainless steel 316 or 316L, stainless steel 304 or 316 for LPG. Impact test is carried out on pressure retaining parts (body, bonnet, disc) of cast material, according to ASTM Testing Procedures, with Charpy V Specimen, at-(negative) 196 °C.

- Following minimum test results are required:
- average (on 3 specimen) not less than 3.5 kgm/cm²
 - minimum (on 1 specimen) not less than 3 kgm/cm²

Fire Safe Design

Valve is designed to be fire safe construction. Sealing system is designed to have a KEL-F seal ring inserted into disc for sizes of 2" and larger. This KEL-F seal ring is replaceable to make it possible easy maintenance. In addition, soft sealing by KEL-F seal will perform an excellent and flexible sealing characteristic with minimum leakage at critical service condition at temperature of negative 196 °C celsius. In emergency of fire accident, even if this KEL-F seal ring is destroyed, sealing system can be secured by secondary metal to metal sealing. The valve provided with metal seat only shall be maintained the same condition in emergency of accident.

Physical Properties of "KEL-F"

HIGH COMPRESSIVE STRENGTH AND SUPERIOR CREEPING RESISTANCE
 "KEL-F" (polychlorotrifluoroethylene: PCTFE) has high compressive strength and creeping resistance, and is superior to "TEFLON"(polytetrafluoroethylen: PTFE), please refer to the attached data. Even under intense low temperature(liquefied H2 : -255 °C), "KEL-F" has superior elastic memory and tendency. The valve provided with metal seat only shall be maintained the some condition in emergency of accident.

RESISTANCE AGAINST LOW AND HIGH TEMPERATURE
 "KEL-F" is applicable under intense temperature condition from -200 °C to +200 °C without hindrance.

WATER AND MOISTURE RESISTANCE
 "KEL-F" is superior characters of anti-moisture and complete water resistance; moisture absorption is nil. Even in water or high humidity conditions, "KEL-F" has perfect stability of dimensional and electrical characters.

FACILITIES AGAINST IMPACT FORCE AND WEAR OUT
 "KEL-F" has superior facilities to resist impact force and wear out, and suitable for a long life service.

MINIMUM SHRINKAGE
 Even at liquefied N2 temperature (-196 °C) condition, shrinkage and deformation are very small and ignorable.

CONCLUSION
 "KEL-F" is the most suitable material for seal-rings of cryogenic valves by above mentioned reasons.

Cryogenic Butterfly Valves for LNG

Schema of Cryogenic Butterfly valve

ACE cryogenic valves are widely used throughout the world, from liquefaction plants, to liquefied gas carries, receiving tank terminals as well as peak shaving plants, in a critical and hazardous service conditions down to the temperature as low as -196 °C. The materials used throughout are of austenite stainless steel which maintains its strength at low temperature and the sealing system is a soft sealing, fire safe type incorporating Kel-F ring inserts into disc which ensures trouble-free operation. The metal seated exchangeable double eccentric or triple eccentric butterfly valve is available. The valves are of extended bonnet construction to create an insulation gas column between the plastic stem packing and the cold fluid. This prevents hardening and shrinking the packing and allows the external operating section of the valve remain "warm" The valve of butt-welding end has side entry maintenance system to make the replacement of sealing ring without removing the valves from the pipes. All valves are tested at cryogenic temperature which can examine the performance as critical as in an actual service condition.

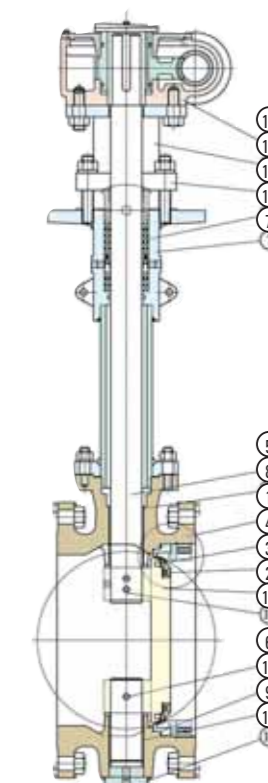
Operations

The following operation of the valve is available, the choice depending upon the valve location and the type of work and service for which the valve is used.

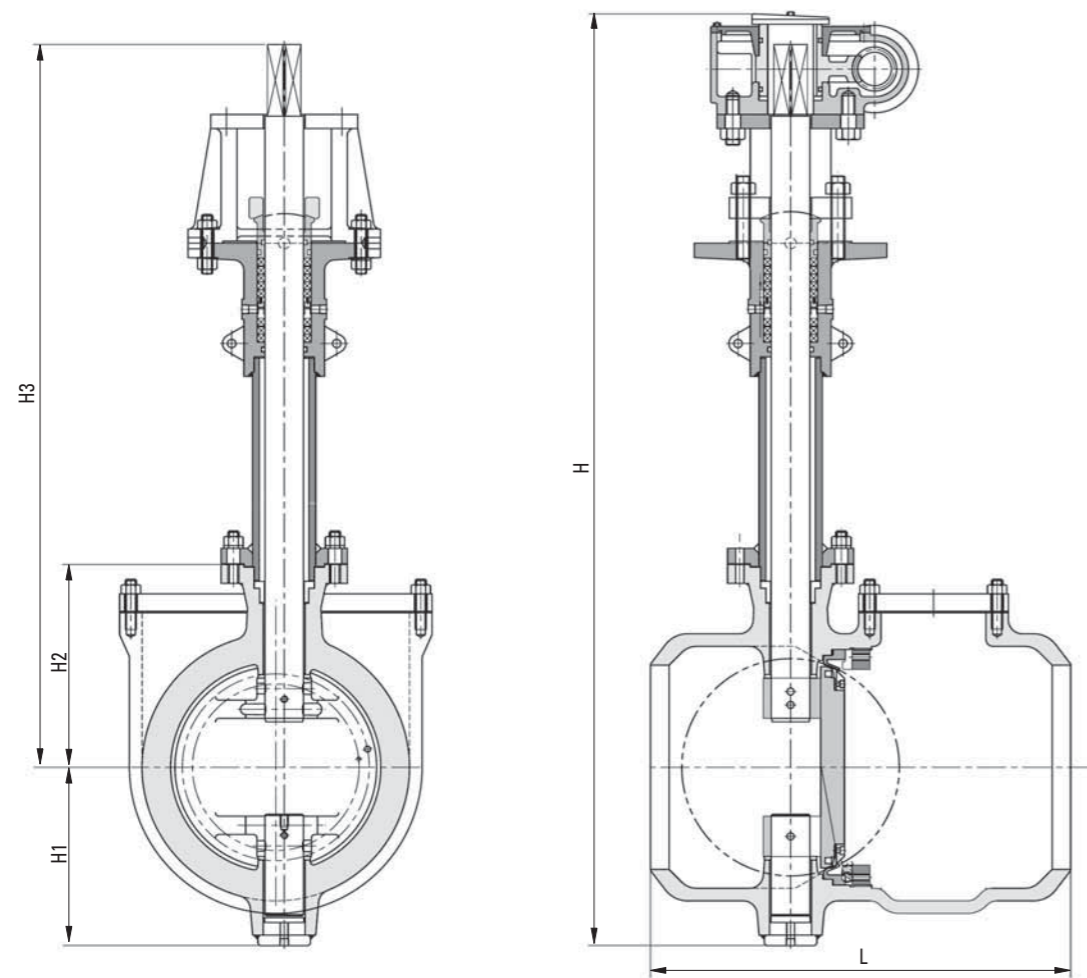
- Manual lever operation
- Manual worm gear operation
- Single or double acting pneumatic actuator operation
- Hydraulic actuator operation
- Electric motor actuator operation

Construction of Materials

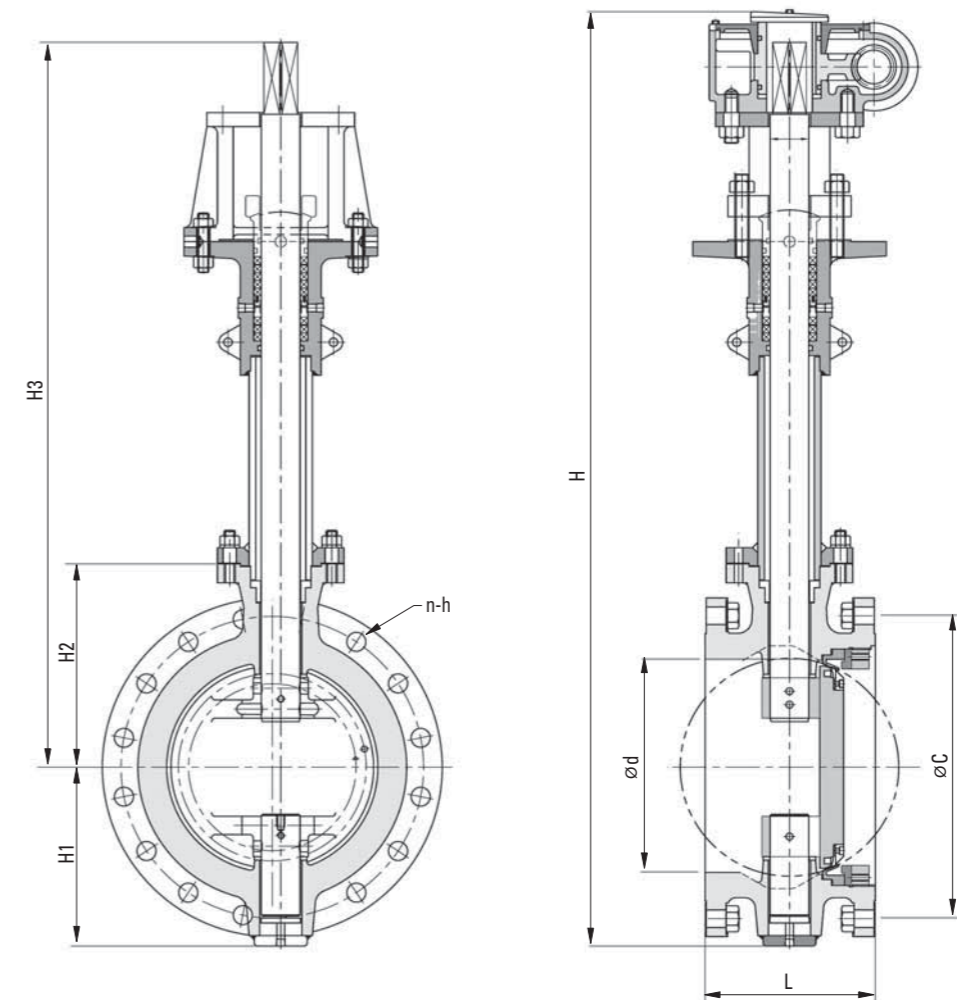
NO.	PART NAME	MATERIAL
1	BODY	STAINLESS STEEL
2	DISC	STAINLESS STEEL
3	RETAINER	STAINLESS STEEL
4	SEAT	PCTFE
5	UPPER-STEM	STAINLESS STEEL
6	LOWER-STEM	STAINLESS STEEL
7	YOKE	STAINLESS STEEL
8	BEARING	STAINLESS STEEL
9	BEARING	STAINLESS STEEL
10	GASKET	NON ASBESTOS
11	BOTTOM COVER	STAINLESS STEEL
12	STAND	STAINLESS STEEL
13	PACKING GLAND	STAINLESS STEEL
14	PACKING	PTFE, RTFE, GRAPHITE
15	DISC PIN	STAINLESS STEEL
16	GEAR BOX ASS'Y	ASS'Y



LNG Cryogenic Double Eccentric Butt-welding Type Butterfly Valve CLASS 150LB and CLASS 300LB



LNG Cryogenic Double Eccentric Flange Type Butterfly Valve CLASS 150LB and 300LB



VALVE DIMENSIONS

(unit : mm)

SIZE		L	H	H1	H2	H3	TOP FLANGE			WEIGHT APPROX. (kg)	
inch	mm						TYPE	ØN	ØM		n-Øz
4"	100	450	868	110	150	608	F14	140	175	4-18	60
5"	125	450	960	120	160	680	F14	140	175	4-18	75
6"	150	530	1075	135	180	760	F14	140	175	4-18	97
8"	200	530	1202	167	215	820	F16	165	210	4-22	129
10"	250	565	1358	220	245	893	F16	165	210	4-22	175
12"	300	600	1543	255	290	998	F16	165	210	4-22	220
14"	350	660	1650	280	310	1060	F16	165	210	4-22	286
16"	400	680	1878	298	375	1205	F16	165	210	4-22	379
18"	450	720	2010	325	390	1295	F16	165	210	4-22	477
20"	500	765	2295	370	425	1500	F25	254	300	8-18	652
22"	550	800	2440	380	450	1610	F25	254	300	8-18	728
24"	600	840	2635	425	490	1720	F25	254	300	8-18	1032
26"	650	890	2765	435	520	1810	F25	254	300	8-18	1187
28"	700	1015	2940	480	560	1900	F30	298	350	8-23	1640
32"	800	1210	3250	540	730	2080	F30	298	350	8-23	2060
36"	900	1450	3580	610	810	2270	F30	298	350	8-23	2520
40"	1000	1680	3920	675	880	2510	F35	356	415	8-32	2980
44"	1100	1900	4380	740	960	2720	F40	406	475	8-39	3350
48"	1200	2150	4820	800	1040	2920	F40	406	475	8-39	3810

VALVE DIMENSIONS

(unit : mm)

SIZE		Ød	L	H	H1	H2	H3	ASME 150LB			ASME 300LB			WEIGHT APPROX. (kg)
inch	mm							ØC	n	h	ØC	n	h	
4"	100	100	136	868	110	150	608	190.50	8	5/8	200.00	8	3/4	51
5"	125	125	200	960	120	160	680	216.00	8	3/4	235.00	8	3/4	58
6"	150	150	210	1075	135	180	760	241.50	8	3/4	270.00	12	3/4	71
8"	200	200	210	1202	167	215	820	298.50	8	3/4	330.00	12	7/8	89
10"	250	250	226	1358	220	245	893	362.00	12	7/8	387.50	16	1	139
12"	300	300	242	1543	255	290	998	432.00	12	7/8	451.00	16	1 1/8	178
14"	350	350	290	1650	280	310	1060	476.00	12	1	514.50	20	1 1/8	230
16"	400	400	310	1878	298	375	1205	539.50	16	1	571.50	20	1 1/4	300
18"	450	450	340	2010	325	390	1295	578.00	16	1 1/8	628.50	24	1 1/4	374
20"	500	500	370	2295	370	425	1500	635.00	20	1 1/8	686.00	24	1 1/4	520
22"	550	550	450	2440	380	450	1610	692.20	20	1 1/4	692.15	24	1 1/4	584
24"	600	600	550	2635	425	490	1720	749.50	20	1 1/4	813.00	24	1 1/2	811
26"	650	650	550	2765	435	520	1810	806.50	24	1 1/4	806.45	24	1 1/2	812
28"	700	700	650	2940	480	560	1900	863.50	28	1 1/4	863.60	28	1 1/2	1320
32"	800	800	800	3250	540	730	2080	914.40	28	1 1/2	1054.10	28	1 7/8	1830
36"	900	900	1050	3580	610	810	2270	1095.80	32	1 1/2	1168.40	32	2	2380
40"	1000	1000	1300	3920	675	880	2510	1200.20	36	1 1/2	1155.70	32	1 5/8	2920
44"	1100	1100	1550	4380	740	960	2720	1314.40	40	1 1/2	1263.60	32	1 3/4	3470
48"	1200	1200	1800	4820	800	1040	2920	1422.40	44	1 1/2	1371.60	32	1 7/8	4060

Specification of Cryogenic Butterfly valves for LPG

THE CRYOGENIC LPG BUTTERFLY VALVE DESIGN

- Bi-directional design.
- End connection : Flanged, Wafer and lug.
- Double offset shaft.
- Valve may be fitted in any orientation.
- Extended bonnet / Shaft for safe access.

STANDARD COMPLIANCE

- API 609 Valves for Cryogenic service.
- Fire Safe approved in accordance with API 607.

PRODUCTION RANGE

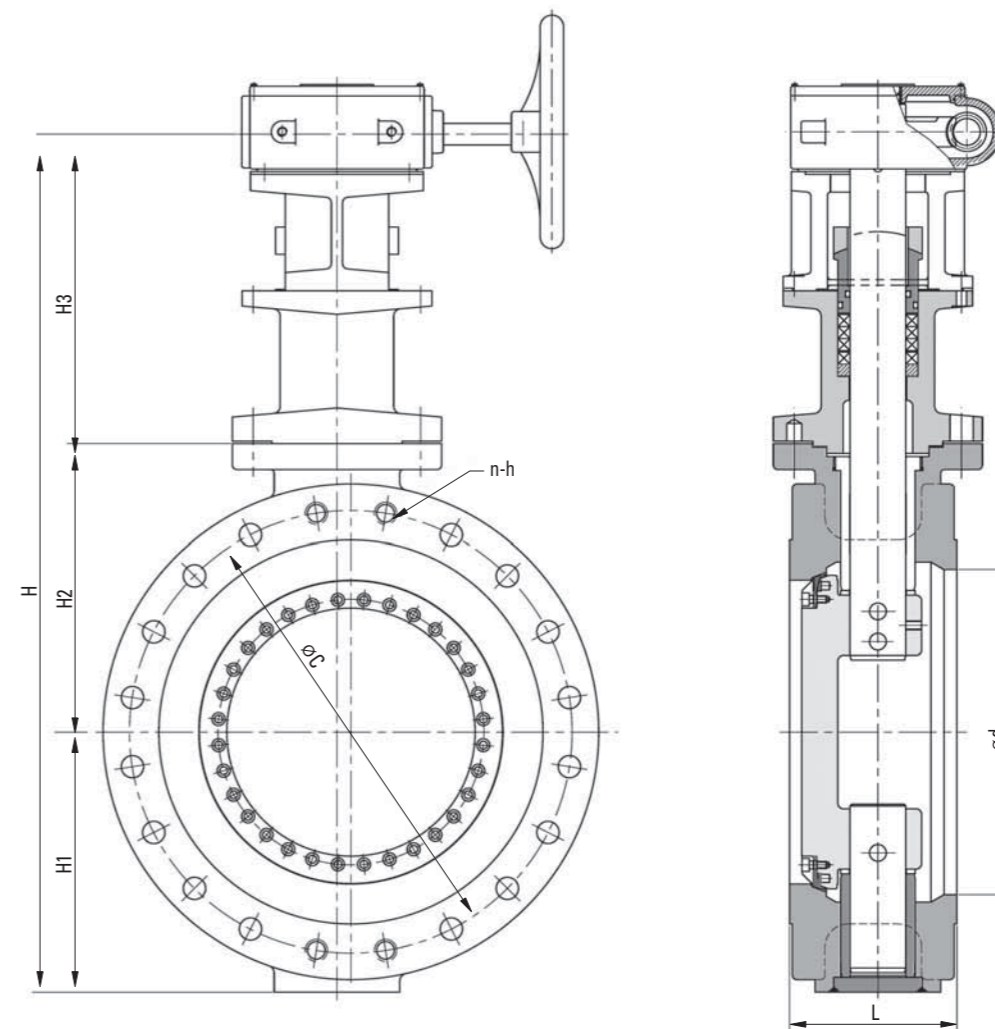
- SIZE : DN 25mm (1 inch) ~ DN 1200mm (48 inch)
- FLANGE RAITNG : ASME B 16.5 Class 150LB, 300LB
- WORKING PRESSURE : Up to 50bar
- WORKING TEMPERATURE : -46 °C ~ +250 °C

Application

- Gas carrier (Liquefied Propane Gas)
- Receiving terminal



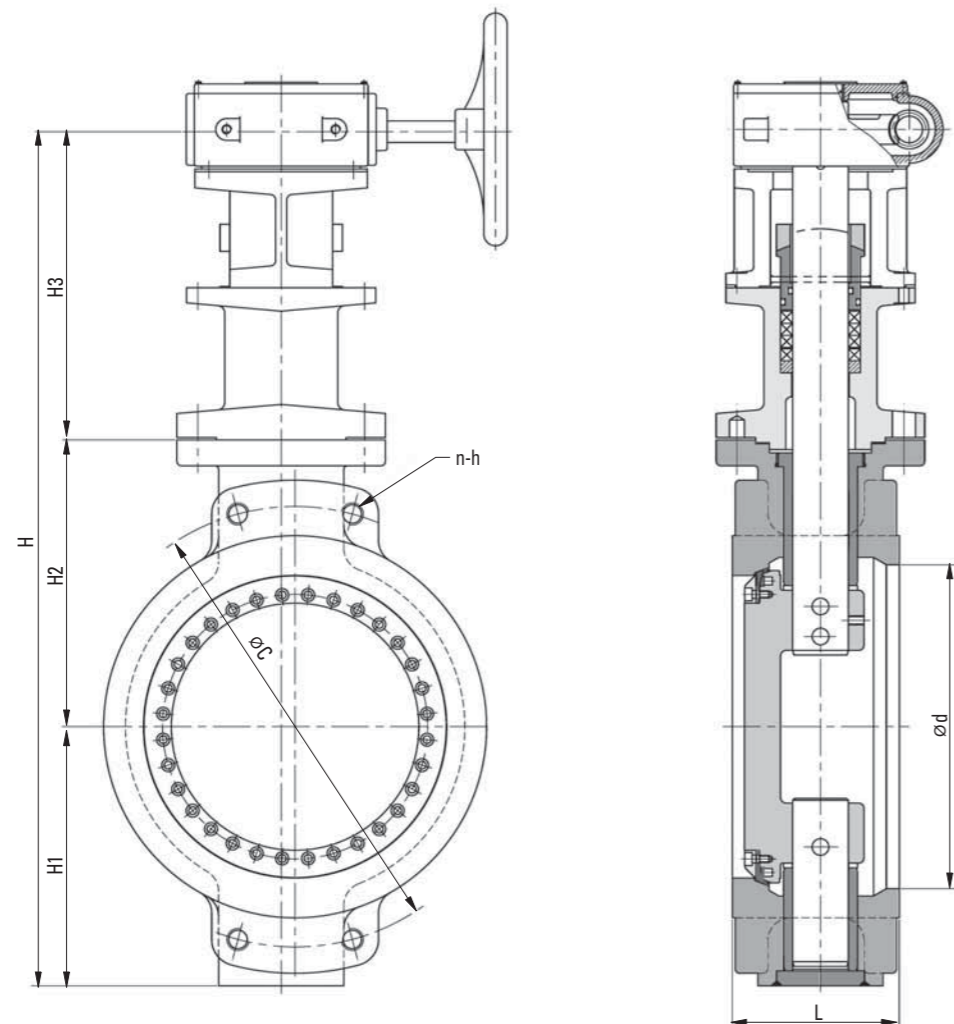
LPG Cryogenic Double Eccentric Flange Type Butterfly Valve CLASS 150LB and CLASS 300LB



VALVE DIMENSIONS

SIZE		ø d	L	H	H1	H2	H3	ASME 150LB			ASME 300LB			WEIGHT APPROX. (kg)
inch	mm							ø C	n	h	ø C	n	h	
3"	80	80	90	280	56	80	144	152.50	4	5/8	168.00	8	3/4	40
4"	100	100	136	398	85	110	203	190.50	8	5/8	200.00	8	3/4	48
5"	125	125	200	508	110	140	258	216.00	8	3/4	235.00	8	3/4	55
6"	150	150	270	662	150	175	337	241.50	8	3/4	270.00	12	3/4	67
8"	200	200	270	792	180	210	402	298.50	8	3/4	330.00	12	7/8	84
10"	250	250	300	940	220	242	478	362.00	12	7/8	387.50	16	1	132
12"	300	300	320	1082	250	283	549	432.00	12	7/8	451.00	16	1 1/8	170
14"	350	350	385	1200	280	310	610	476.00	12	1	514.50	20	1 1/8	215
16"	400	400	410	1310	305	340	665	539.50	16	1	571.50	20	1 1/4	285
18"	450	450	440	1414	325	370	719	578.00	16	1 1/8	628.50	24	1 1/4	352
20"	500	500	470	1554	365	400	789	635.00	20	1 1/8	686.00	24	1 1/4	500
22"	550	550	550	1734	410	445	879	692.20	20	1 1/4	692.15	20	1 1/4	560
24"	600	600	550	1924	450	500	974	749.50	20	1 1/4	813.00	24	1 1/2	790
26"	650	650	550	2235	545	595	1095	806.50	24	1 1/4	806.45	24	1 1/2	805
28"	700	700	650	2570	650	710	1210	863.50	28	1 1/4	863.60	28	1 1/2	1290
32"	800	800	800	2904	755	815	1334	914.40	28	1 1/2	1054.10	28	1 5/8	1810
36"	900	900	1050	3227	850	910	1467	1085.80	32	1 1/2	1168.40	32	2	2340
40"	1000	1000	1300	3600	940	990	1670	1200.20	36	1 1/2	1155.70	32	1 5/8	2880
44"	1100	1100	1550	4020	1035	1090	1895	1314.40	40	1 1/2	1263.60	32	1 3/4	3430
48"	1200	1200	1800	4347	1140	1195	2012	1422.40	44	1 1/2	1371.60	32	1 7/8	4020

LPG Cryogenic Double Eccentric Semi-Lug Type Butterfly Valve CLASS 150LB and CLASS 300LB



VALVE DIMENSIONS

(unit : mm)

SIZE		ød	L	H	H1	H2	H3	ASME 150LB			ASME 300LB			WEIGHT APPROX. (kg)
inch	mm							øC	n	h	øC	n	h	
3"	80	80	90	280	56	80	144	152.5	4	5/8	168	8	3/4	37
4"	100	100	90	398	85	110	203	190.50	8	5/8	200.00	8	3/4	41
5"	125	125	105	508	110	140	258	216.00	8	3/4	235.00	8	3/4	51
6"	150	150	115	662	150	175	337	241.50	8	3/4	270.00	12	3/4	60
8"	200	200	125	792	180	210	402	298.50	8	3/4	330.00	12	7/8	72
10"	250	250	135	940	220	242	478	362.00	12	7/8	387.50	16	1	120
12"	300	300	150	1082	250	283	549	432.00	12	7/8	451.00	16	1 1/2	150
14"	350	350	180	1200	280	310	610	476.00	12	1	514.50	20	1 1/2	190
16"	400	400	195	1310	305	340	665	539.50	16	1	571.50	20	1 1/4	265
18"	450	450	200	1414	325	370	719	578.00	16	1 1/2	628.50	24	1 1/4	338
20"	500	500	210	1554	365	400	789	635.00	20	1 1/2	686.00	24	1 1/4	470
22"	550	550	220	1734	410	445	879	692.20	20	1 1/4	692.15	24	1 1/4	535
24"	600	600	225	1924	450	500	974	749.50	20	1 1/4	813.00	24	1 1/2	755

Specification of Cryogenic Gate & Globe Valves

THE CRYOGENIC GATE & GLOBE VALVE DESIGN

- Bolted bonnet outside screw and yoke design.
- End connection : Flange or Buttwelding
- Extended bonnet
- Self pressure relief device
- Metal to metal Seal

STANDARD COMPLIANCE

- BS 6364 Valves for Cryogenic service.
- Fire safe approved in accordance with BS 6755, API 6F(A).

PRODUCTION RANGE

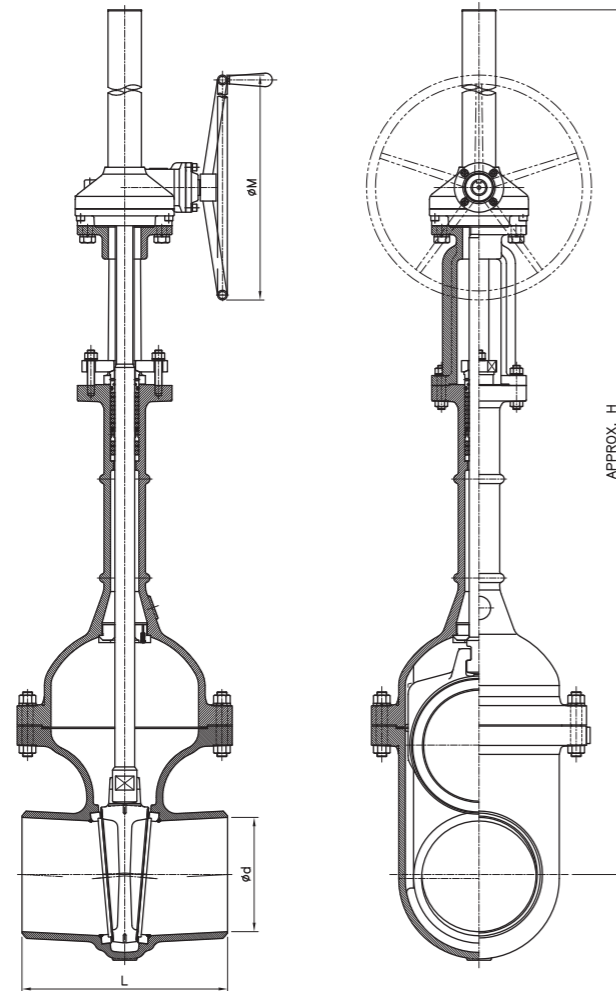
- SIZE : Cryogenic Gate valve : DN 50mm (2 inch) ~ DN 1200mm (48 inch)
Cryogenic Globe valve : DN 50mm (2 inch) ~ DN 600mm (24 inch)
- FLANGE RATING : ASME B 16.5 Class 150LB, 300LB
- WORKING PRESSURE : Up to 50bar
- WORKING TEMPERATURE : -196 °C ~ +815 °C

Application

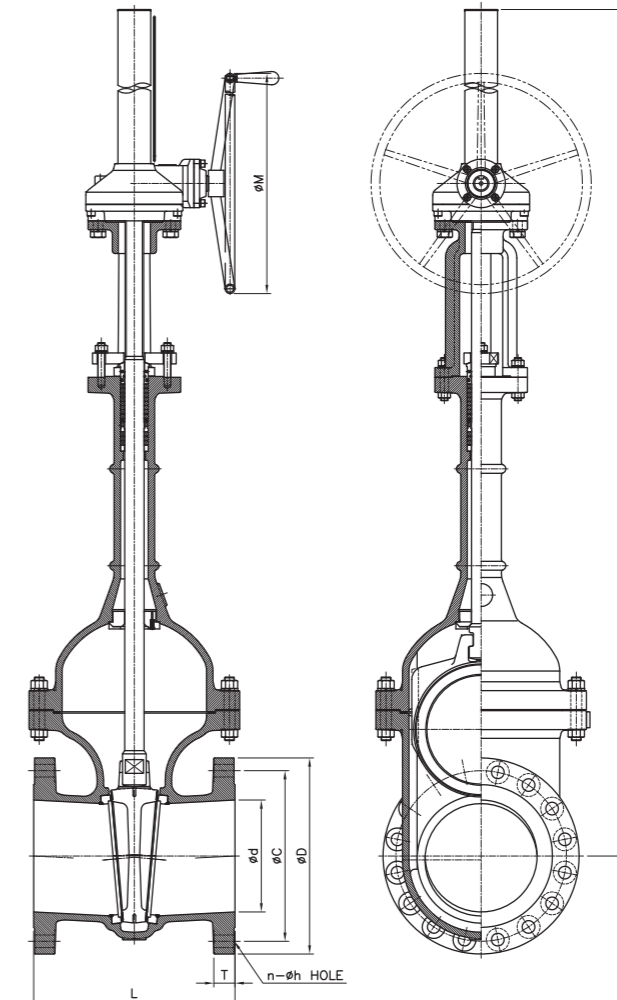
- Gas carrier (Liquefied Natural Gas, Acetylene, Ethylene)
- Receiving terminal
- Liquefied oxygen(-160 °C) plant



LNG Cryogenic Butt welding Type Gate Valve CLASS 150LB and CLASS 300LB



LNG Cryogenic Flange Type Gate Valve CLASS 150LB and CLASS 300LB



CLASS 150LB (unit : mm)

SIZE		L	REFERENCE		WEIGHT APPROX. (kg)
inch	mm		H	øM	
2"	50	178	1135	200	21
3"	80	203	1290	200	36
4"	100	229	1350	250	48
6"	150	267	1520	300	75
8"	200	292	1790	355	112
10"	250	330	2010	400	161
12"	300	356	2250	450	342
14"	350	381	2650	500	380
16"	400	406	2865	560	554
18"	450	432	3105	560	704
20"	500	457	2310	630	811
24"	600	508	3710	630	1492
28"	700	610	3794	710	2202
30"	750	610	3994	710	2340
36"	900	711	4384	800	4401
40"	1000	762	4801	900	4373
42"	1050	813	4944	900	4686
48"	1200	864	5715	900	6580

CLASS 300LB (unit : mm)

SIZE		L	REFERENCE		WEIGHT APPROX. (kg)
inch	mm		H	øM	
2"	50	216	1169	200	25
3"	80	282	1307	250	44
4"	100	305	1371	250	48
6"	150	403	1547	355	117
8"	200	419	1819	400	148
10"	250	457	2022	450	209
12"	300	502	2352	500	356
14"	350	762	2848	560	535
16"	400	838	3012	630	861
18"	450	914	3191	630	1115
20"	500	991	3418	630	1249
24"	600	1143	3810	710	1795
28"	700	1346	3962	710	3094
30"	750	1397	4116	800	3973
36"	900	1727	4481	900	5850
40"	1000	1930	5021	900	6500
42"	1050	1981	5299	900	7250
48"	1200	2215	6312	900	9320

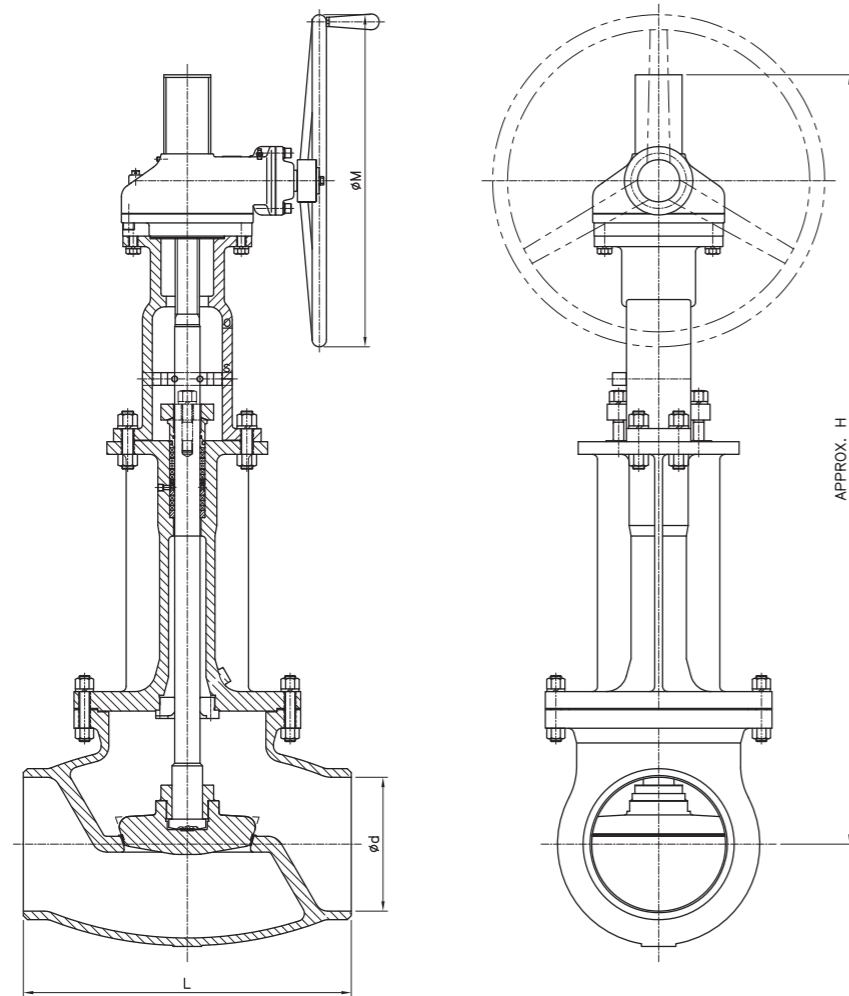
CLASS 150LB (unit : mm)

SIZE		L	FLANGE				REFERENCE		WEIGHT APPROX. (kg)
inch	mm		øD	øC	n-øh	T	H	øM	
2"	50	178	150	120.7	4-ø19	19.5	835	200	22
3"	80	203	190	152.4	4-ø19	24.3	990	200	36
4"	100	229	230	190.5	8-ø19	24.3	1050	250	52
6"	150	267	280	241.3	8-ø22	25.9	1220	300	85
8"	200	292	345	298.5	8-ø22	29	1490	355	132
10"	250	330	405	263	12-ø25	30.6	1710	400	182
12"	300	356	485	431.8	12-ø25	32.2	1950	450	264
14"	350	381	535	476.3	12-ø29	35.4	2250	500	418
16"	400	406	595	593.8	16-ø29	37	2465	560	594
18"	450	432	635	577.9	16-ø32	40.1	2705	560	803
20"	500	457	700	635	20-ø32	43.3	2910	630	935
24"	600	508	815	749.3	20-ø35	48.1	3310	630	1826
28"	700	610	927	863.6	28-ø35	71.4	3794	710	2290
30"	750	610	985	914.4	28-ø35	74.7	3994	710	2430
36"	900	711	1169	1085.9	32-ø42	90.4	4384	800	4550
40"	1000	762	1290	1200.2	36-ø42	90.5	4801	900	4860
42"	1050	813	1346	1257.3	36-ø42	96.8	4944	900	4910
48"	1200	864	1511	1422.4	44-ø42	110	5715	900	8310

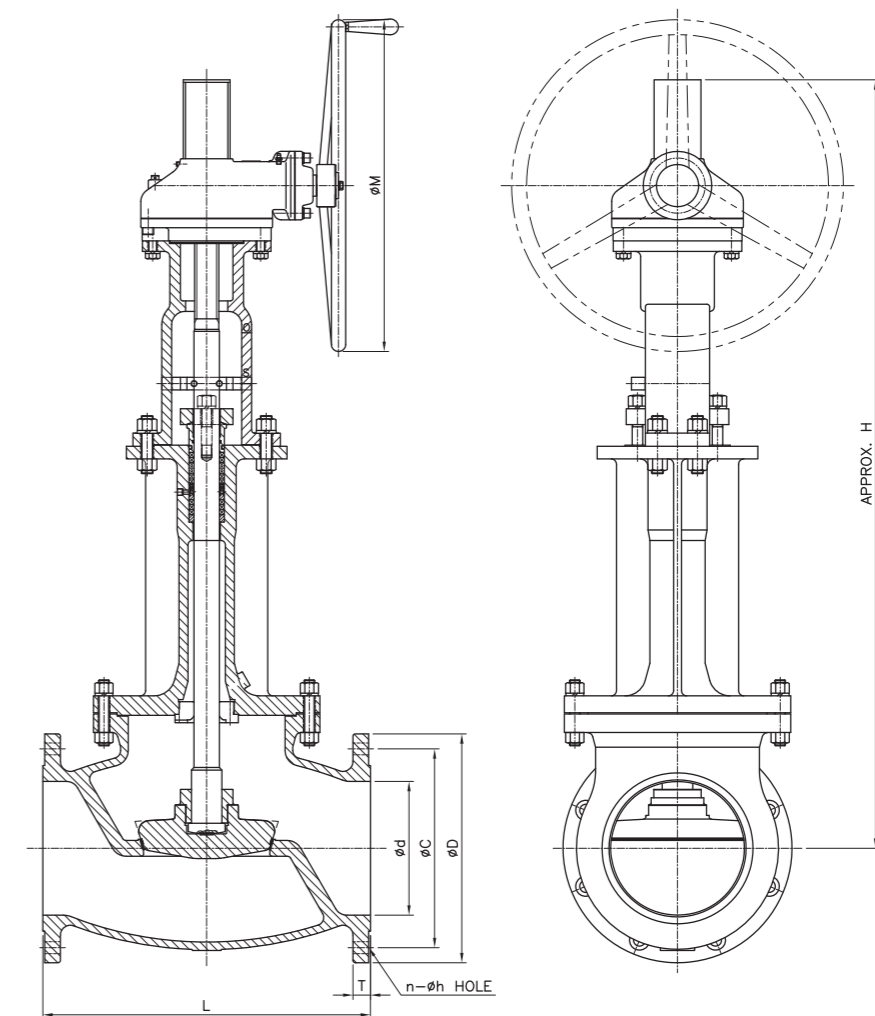
CLASS 300LB (unit : mm)

SIZE		L	FLANGE				REFERENCE		WEIGHT APPROX. (kg)
inch	mm		øD	øC	n-øh	T	H	øM	
2"	50	216	165	127	8-ø19	22.7	869	200	28
3"	80	282	210	168.3	8-ø22	29	1007	250	47
4"	100	305	255	200	8-ø22	32.2	1071	250	52
6"	150	403	320	269.9	12-ø22	37	1247	355	145
8"	200	419	380	330.2	12-ø25	41.7	1519	400	184
10"	250	457	445	387.4	16-ø29	48.1	1722	450	243
12"	300	502	520	450.8	16-ø32	51.3	2052	500	406
14"	350	762	585	514.4	20-ø32	54.4	2448	560	608
16"	400	838	650	571.5	20-ø35	57.6	2612	630	956
18"	450	914	710	628.6	24-ø35	60.8	2791	630	1323
20"	500	991	775	685.8	24-ø35	64	3018	630	1495
24"	600	1143	915	812.8	24-ø41	70.3	3410	710	2221
28"	700	1346	1035	939.8	28-ø45	86	3962	710	3219
30"	750	1397	1092	997	28-ø48	92	4116	800	4129
36"	900	1727	1270	1168.4	32-ø54	104.7	4481	900	6049
40"	1000	1930	1238	1155.7	32-ø45	114.3	5021	900	6340
42"	1050	1981	1289	1206.5	32-ø45	119.1	5299	900	7010
48"	1200	2215	1469	1371.6	32-ø51	133.4	6312	900	9200

LNG Cryogenic Butt welding Type Globe Valve CLASS 150LB and CLASS 300LB



LNG Cryogenic Flange Type Globe Valve CLASS 150LB and CLASS 300LB



CLASS 150LB (unit : mm)

SIZE		L	REFERENCE		WEIGHT APPROX. (kg)
inch	mm		H	øM	
2"	50	203	816	200	22
3"	80	241	963	250	43
4"	100	292	985	250	56
6"	150	406	1053	355	110
8"	200	495	1271	355	198
10"	250	622	1326	450	279
12"	300	698	1640	500	368
14"	350	787	2064	710	606
16"	400	914	2099	710	815
18"	450	978	2479	900	1386
20"	500	978	2699	900	1720
24"	600	1295	2942	900	1914

CLASS 300LB (unit : mm)

SIZE		L	REFERENCE		WEIGHT APPROX. (kg)
inch	mm		H	øM	
2"	50	267	838	250	29
3"	80	318	988	250	55
4"	100	356	1035	355	79
6"	150	444	1215	450	166
8"	200	559	1363	560	236
10"	250	622	1709	710	469
12"	300	711	1913	900	701
14"	350	838	2301	900	943
16"	400	864	2339	900	1418
18"	450	978	2530	900	1794
20"	500	1016	2807	900	2226
24"	600	1346	2986	900	2477

CLASS 150LB (unit : mm)

SIZE		L	FLANGE				REFERENCE		WEIGHT APPROX. (kg)
inch	mm		øD	øC	n-øh	T	H	øM	
2"	50	203	150	120.7	4-ø19	19.5	816	200	26
3"	80	241	190	152.4	4-ø19	24.3	963	250	50
4"	100	292	230	190.5	8-ø19	24.3	985	250	71
6"	150	406	280	241.3	8-ø22	25.9	1053	355	162
8"	200	495	345	298.5	8-ø22	29.0	1271	355	230
10"	250	622	405	362.0	12-ø25	30.6	1326	450	286
12"	300	698	485	431.8	12-ø25	32.2	1640	500	398
14"	350	787	535	476.3	12-ø29	35.4	2064	710	640
16"	400	914	595	539.8	16-ø29	37.0	2099	710	858
18"	450	978	635	577.9	16-ø32	40.1	2479	900	1479
20"	500	978	700	635.0	20-ø32	43.3	2699	900	1811
24"	600	1295	815	749.3	20-ø35	48.1	2942	900	2014

CLASS 300LB (unit : mm)

SIZE		L	FLANGE				REFERENCE		WEIGHT APPROX. (kg)
inch	mm		øD	øC	n-øh	T	H	øM	
2"	50	267	165	127.0	8-ø19	22.7	838	250	35
3"	80	318	210	168.3	8-ø22	29.0	988	250	65
4"	100	356	255	200.0	8-ø22	32.2	1035	355	100
6"	150	444	320	269.9	12-ø22	37.0	1215	450	194
8"	200	559	380	330.2	12-ø25	41.7	1363	560	275
10"	250	622	445	387.4	16-ø29	48.1	1709	710	501
12"	300	711	520	450.8	16-ø32	51.3	1913	900	784
14"	350	838	585	514.4	20-ø32	54.4	2301	900	996
16"	400	864	650	571.5	20-ø35	57.6	2339	900	1496
18"	450	978	710	628.6	24-ø35	60.8	2530	900	1974
20"	500	1016	775	685.8	24-ø35	64.0	2807	900	2417
24"	600	1346	915	812.8	24-ø41	70.3	2986	900	2690

Specification of Cryogenic Swing Check Valves

THE CRYOGENIC SWING CHECK VALVE DESIGN

- Bolted cover swing check design.
- End connection : Flange or Butt welding.
- Metal to metal Seal.

STANDARD COMPLIANCE

- BS 6364 Valves for Cryogenic service.
- Fire safe approved in accordance with BS 6755, API 6F(A).

PRODUCTION RANGE

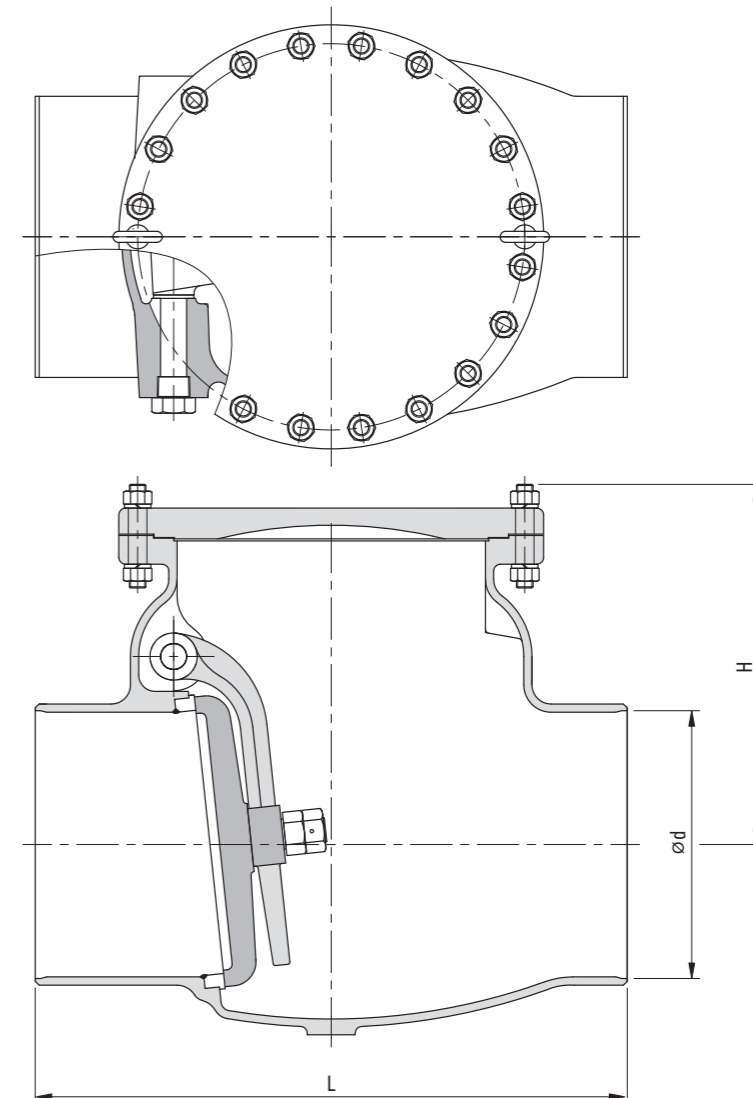
- SIZE : DN 50mm (2 inch) ~ DN 600mm (24 inch)
- FLANGE RATING : ASME B 16.5 Class 150LB, 300LB
- WORKING PRESSURE : Up to 50bar
- WORKING TEMPERATURE : -196 °C ~ +815 °C

Application

- Gas carrier (Liquefied Natural Gas, Acetylene, Ethylene)
- Receiving terminal
- Liquefied oxygen(-160 °C) plant



LNG Cryogenic Butt welding Type Swing Check Valve CLASS 150LB and CLASS 300LB



CLASS 150LB

(unit : mm)

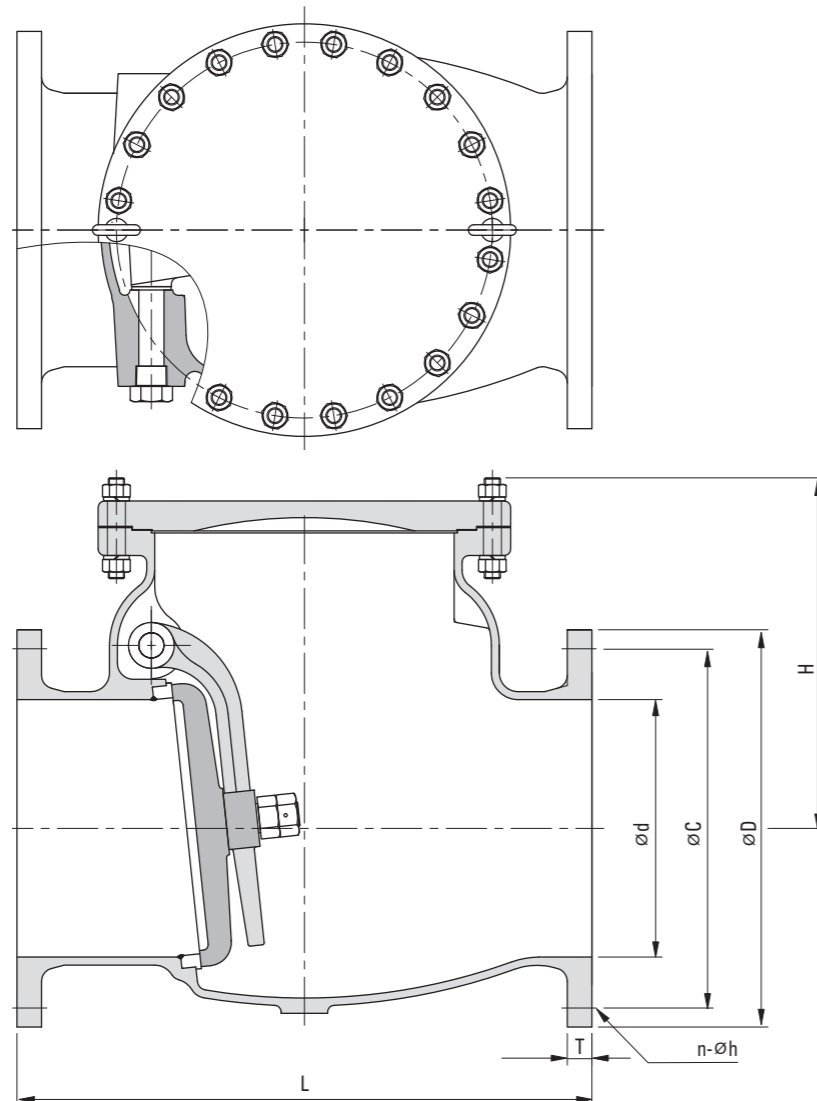
SIZE		L	REFERENCE		WEIGHT APPROX. (kg)
inch	mm		H	H	
2"	50	203	140	12	
3"	80	241	170	22	
4"	100	292	210	32	
6"	150	356	250	62	
8"	200	495	280	92	
10"	250	622	320	201	
12"	300	698	340	291	
14"	350	787	395	356	
16"	400	864	450	377	
18"	450	978	530	638	
20"	500	978	570	775	
24"	600	1295	670	1022	

CLASS 300LB

(unit : mm)

SIZE		L	REFERENCE		WEIGHT APPROX. (kg)
inch	mm		H	H	
2"	50	267	160	18	
3"	80	318	185	33	
4"	100	356	230	48	
6"	150	444	295	104	
8"	200	533	345	171	
10"	250	622	390	196	
12"	300	711	445	390	
14"	350	838	470	545	
16"	400	864	510	522	
18"	450	978	545	797	
20"	500	1016	600	936	
24"	600	1346	690	1517	

LNG Cryogenic Flange Type Swing Check Valve CLASS 150LB and CLASS 300LB



CLASS 150LB (unit : mm)

SIZE		L	FLANGE				REFERENCE		WEIGHT APPROX. (kg)
inch	mm		øD	øC	n-h	T	H		
2"	50	203	150	120.7	4-19	19.5	140	16	
3"	80	241	190	152.4	4-19	24.3	170	30	
4"	100	292	230	190.5	8-19	24.3	210	44	
6"	150	356	280	241.3	8-22	25.9	250	78	
8"	200	495	345	298.5	8-22	29.0	280	118	
10"	250	622	405	362.0	12-25	30.6	320	236	
12"	300	698	485	431.8	12-25	32.2	340	344	
14"	350	787	535	476.3	12-29	35.4	395	422	
16"	400	864	595	539.8	16-29	37.0	450	524	
18"	450	978	635	577.9	16-32	40.1	530	729	
20"	500	978	700	635.0	20-32	43.3	570	893	
24"	600	1295	815	749.3	20-35	48.1	670	1187	

CLASS 300LB (unit : mm)

SIZE		L	FLANGE				REFERENCE		WEIGHT APPROX. (kg)
inch	mm		D	øC	n-øh	T	H		
2"	50	267	165	127.0	8-ø19	22.7	160	24	
3"	80	318	210	168.3	8-ø22	29.0	185	45	
4"	100	356	255	200.0	8-ø22	32.2	230	68	
6"	150	444	320	269.9	12-ø22	37.0	295	137	
8"	200	533	380	330.2	12-ø25	41.7	345	220	
10"	250	622	445	387.4	16-ø29	48.1	390	270	
12"	300	711	520	450.8	16-ø32	51.3	445	495	
14"	350	838	585	514.4	20-ø32	54.4	470	680	
16"	400	864	650	571.5	20-ø35	57.6	510	796	
18"	450	978	710	628.6	24-ø35	60.8	545	1004	
20"	500	1016	775	685.8	24-ø35	64.0	600	1190	
24"	600	1346	915	812.8	24-ø41	70.3	690	1896	

Specification of Cryogenic Ball Valves

THE CRYOGENIC BALL VALVE DESIGN

- End connection : Flange or Butt welding
- With inspection / maintenance access (Side entry, Top entry).
- Valve may be fitted in any orientation.
- Extended bonnet / Shaft for safe access.

STANDARD COMPLIANCE

- BS 6364 Valves for Cryogenic service.
- Fire safe approved in accordance with API 607.

PRODUCTION RANGE

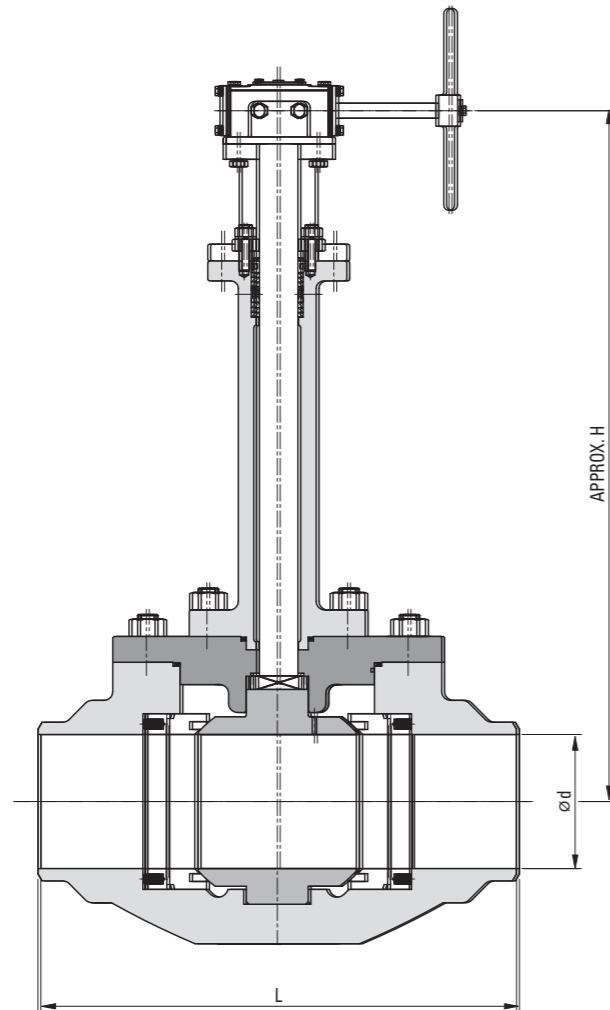
- SIZE : DN 50mm (2 inch) ~ DN 1500mm (60 inch)
- FLANGE RATING : ASME B 16.5 Class 150LB, 300LB
- WORKING PRESSURE : Up to 51.7 bar
- WORKING TEMPERATURE : -196 °C ~ +815 °C

Application

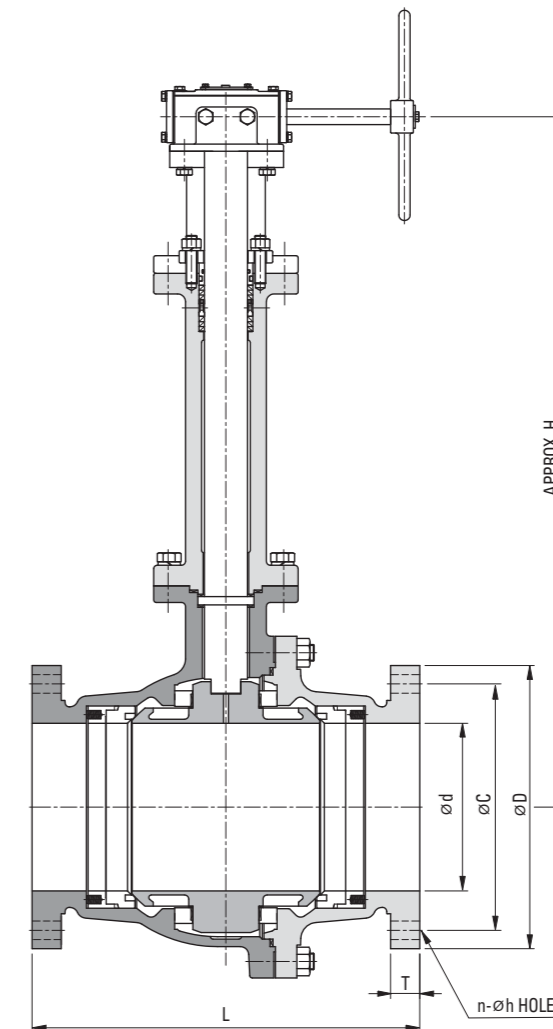
- Gas carrier (Liquefied Natural Gas, Acetylene, Ethylene)
- Receiving terminal
- Liquefied oxygen(-160 °C) plant



LNG Cryogenic Butt welding Type Ball Valve CLASS 150LB and CLASS 300LB



LNG Cryogenic Flange Type Ball Valve CLASS 150LB and CLASS 300LB



CLASS 150LB (unit : mm)

SIZE		ød	L	REFERENCE		WEIGHT APPROX. (kg)
inch	mm			H	H	
2"	50	50	292	750	34	
3"	80	76	356	850	70	
4"	100	100	432	850	112	
6"	150	152	559	870	232	
8"	200	203	660	900	424	
10"	250	254	787	950	605	
12"	300	305	838	1000	825	
14"	350	337	889	1150	1025	
16"	400	387	991	1150	1394	
18"	450	438	1092	1250	1912	
20"	500	489	1194	1300	2477	
24"	600	591	1397	1400	3894	
26"	650	635	1448	1450	4508	
28"	700	686	1549	1460	5684	
30"	750	737	1651	1500	6863	
32"	800	781	1778	1520	8372	
36"	850	876	2083	1610	10905	
40"	1000	978	2310	1700	14596	
42"	1050	1028	2430	1890	16676	
48"	1200	1168	2720	1990	26213	
56"	1400	1362	3170	2330	34077	
60"	1500	1460	3350	2400	44300	

CLASS 300LB (unit : mm)

SIZE		ød	L	REFERENCE		WEIGHT APPROX. (kg)
inch	mm			H	H	
2"	50	50	292	750	43	
3"	80	76	356	850	77	
4"	100	100	432	850	127	
6"	150	152	559	870	267	
8"	200	203	660	900	480	
10"	250	254	787	950	666	
12"	300	305	838	1000	898	
14"	350	337	889	1150	1102	
16"	400	387	991	1150	1533	
18"	450	438	1092	1250	2103	
20"	500	489	1194	1300	2714	
24"	600	591	1397	1400	4347	
26"	650	635	1448	1450	5135	
28"	700	686	1549	1460	6285	
30"	750	737	1651	1500	7601	
32"	800	781	1778	1520	9400	
36"	850	876	2083	1610	12265	
40"	1000	978	2310	1700	16398	
42"	1050	1028	2430	1890	19161	
48"	1200	1168	2720	1990	29279	
56"	1400	1362	3170	2330	38062	
60"	1500	1460	3350	2400	49480	

CLASS 150LB (unit : mm)

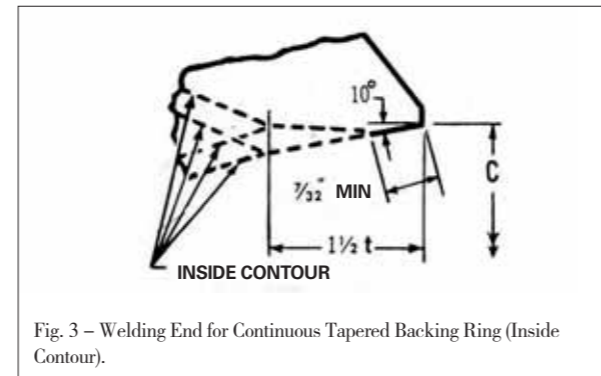
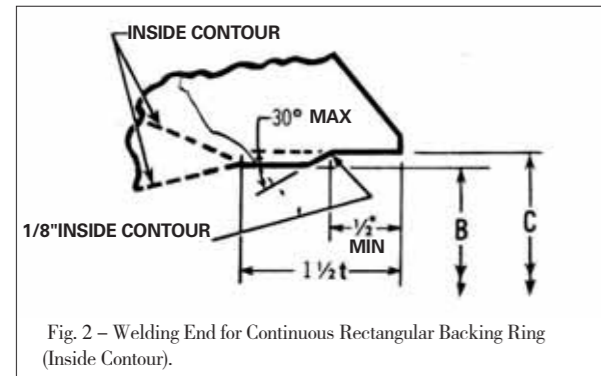
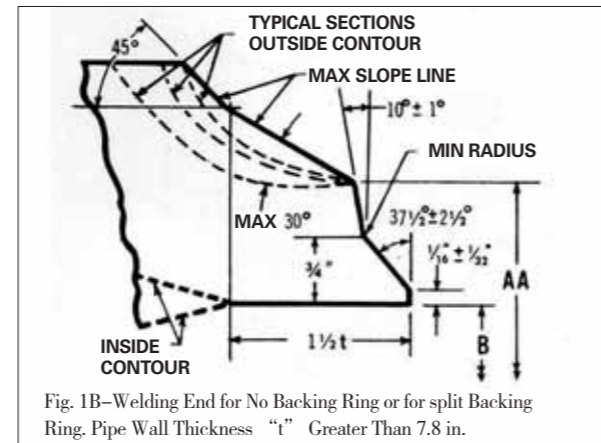
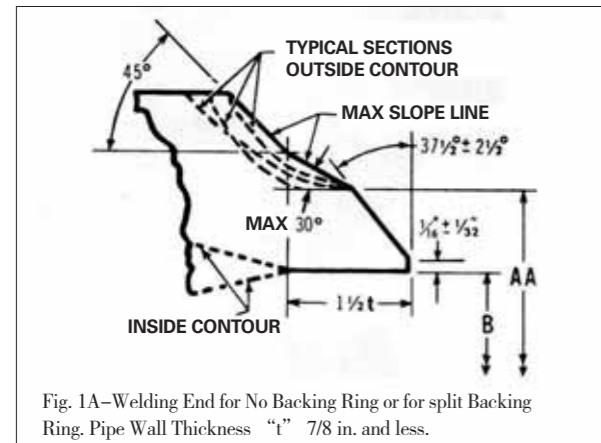
SIZE		ød	L	FLANGE				REFERENCE	WEIGHT APPROX. (kg)
inch	mm			øD	øC	n-øh	T		
2"	50	50	178	150	120.7	4-ø19	16.3	750	32
3"	80	76	203	190	152.4	4-ø19	19.5	850	50
4"	100	100	229	230	190.5	8-ø22	24.3	850	74
6"	150	152	394	280	241.3	8-ø22	25.9	870	158
8"	200	203	457	345	298.5	8-ø22	29	900	259
10"	250	254	533	405	362	12-ø25	30.6	950	383
12"	300	305	610	485	431.8	12-ø25	32.2	1000	526
14"	350	337	686	535	476.3	12-ø29	35.4	1150	724
16"	400	387	762	595	539.8	16-ø29	37	1150	1032
18"	450	438	864	635	577.9	16-ø32	40.1	1250	1337
20"	500	489	914	700	635	20-ø32	43.3	1300	1794
24"	600	591	1067	815	749.3	20-ø35	48.1	1400	2779
26"	650	635	1140	870	806.4	24-ø35	66.7	1450	3197
28"	700	686	1240	925	863.6	28-ø35	69.9	1460	3883
30"	750	737	1290	985	914.4	28-ø35	73.1	1500	4698
32"	800	781	1370	1060	977.9	28-ø41	79.4	1520	5215
36"	850	876	1520	1170	1085.8	32-ø41	88.9	1610	8248
40"	1000	978	1700	1290	1200.2	36-ø41	88.9	1700	12379
42"	1050	1028	1860	1345	1257.3	36-ø41	95.3	1890	14365
48"	1200	1168	2080	1510	1422.4	44-ø41	106.4	1990	22045
56"	1400	1362	2250	1745	1651	48-ø48	122.3	2330	28658
60"	1500	1460	2400	1855	1759	52-ø48	130.2	2400	37256

CLASS 300LB (unit : mm)

SIZE		ød	L	FLANGE				REFERENCE	WEIGHT APPROX. (kg)
inch	mm			øD	øC	n-øh	T		
2"	50	50	216	165	127	8-ø19	22.7	750	36
3"	80	76	283	210	168.3	8-ø22	29	850	60
4"	100	100	305	255	200	8-ø22	32.2	850	80
6"	150	152	457	320	269.9	8-ø22	37	870	179
8"	200	203	502	380	330.2	12-ø22	41.7	900	293
10"	250	254	568	445	387.4	16-ø29	48.1	950	438
12"	300	305	648	520	450.8	16-ø32	51.2	1000	643
14"	350	337	762	585	514.4	20-ø32	54.4	1150	863
16"	400	387	838	650	571.5	20-ø35	57.6	1150	1288
18"	450	438	914	710	628.6	24-ø35	60.8	1250	1651
20"	500	489	991	775	685.8	24-ø35	63.9	1300	2135
24"	600	591	1143	915	812.8	24-ø41	70.3	1400	3266
26"	650	635	1245	970	876.3	28-ø45	77.8	1450	3964
28"	700	686	1346	1035	939.8	28-ø45	84.2	1460	4736
30"	750	737	1397	1090	997	28-ø48	90.5	1500	5574
32"	800	781	1524	1150	1054.1	28-ø51	96.9	1520	6175
36"	850	876	1727	1270	1168.4	32-ø54	103.2	1610	11360
40"	1000	978	1910	1240	1155.7	32-ø45	112.8	1700	13168
42"	1050	1028	1970	1290	1206.5	32-ø45	117.5	1890	15408
48"	1200	1168	2160	1465	1371.6	32-ø51	131.8	1990	23980
56"	1400	1362	2450	1710	1600.2	28-ø61	152.4	2330	31172
60"	1500	1460	2590	1810	1701.8	32-ø61	162	2400	40525

Butt welding end Dimensions for Valves (ASME B16.25)

NOMINAL PIPE SIZE (INCHES)	3	4	5	6	8	10	12	14	16	18	20	24
AA DIAMETER (INCHES)	3 19/32	4 5/8	5 11/16	6 25/32	8 25/32	10 15/16	12 31/32	14 1/4	16 1/4	18 9/32	20 5/16	24 3/8



A - Nominal outside diameter of pipe, inches.
 AA - Nominal outside diameter for cast steel valves, inches (see table).
 B - Nominal inside diameter of pipe, inches.
 t - Nominal wall thickness of pipe, inches.
 C - A-0.031 - 1.75t - 0.010.
 Regardless of tolerances specified for dimensions A and B, the thickness of the welding end shall never be less than 87 1/2 percent of the nominal thickness of the pipe.
 For complete dimensions, details, and tolerances, see ASME B 16.25.

OUTSIDE CONTOUR

When the thickness at the welding end of the valve is greater than that of the mating pipe, and when the additional thickness increases the outside diameter, a taper weld having a slope not exceeding 1:3 may be employed, or the greater outside diameter may be extended back in a manner within the maximum slope lines indicated in Figs. 1A and 1B. The transition shall be of a shape avoiding sharp re-entrant angles and abrupt changes in slope. The profile of the outside contour shall be at the manufacturer's option provided above conditions are met.

INSIDE CONTOUR

For a joint without a continuous backing ring, the inside contour of the valve end shall be bored to a diameter B to a depth of 1/2t. The inside diameter of a valve end beyond this machined surface may be either larger or smaller than the inside diameter of the pipe. The transition shall be of a shape avoiding sharp re-entrant angles and abrupt changes in slope. See Figs. 1A and 1B. (Transition shape also applies to Fig. 2 and 3.)

For a joint with a continuous rectangular backing ring, the inside contour of the valve end shall be a straight bore of diameter C, 1/2 in. deep. This depth is based on a backing ring 3/4 in. wide; but if a wider ring is used, the depth shall be increased to provide the 1/8 in. minimum end clearance indicated. See Fig. 2.

For a joint with a continuous tapered backing ring, the inside contour of the valve end shall be tapered from diameter C at the lip, tapering at 10 deg. to a taper length of 7/32 in. minimum. Beyond this taper length, the bore may be a straight diameter of dimension B, or the 10 deg. taper may be extended to the inside port diameter. See Fig. 3.

* See Figs. 1A and 1B for Outside Contours.

Low Temperature Leak Test

