

METRIC



CRYOGENIC VALVES



 **HABONIM**
Industrial Valves & Actuators

DEDICATED TO INNOVATION

Introduction

In light of the increasing demand for alternative sources of clean energy, Habonim's Cryogenic Ball Valve Division is certain to ensure Habonim's position in the forefront of the dynamic energy market. Under extremely low temperatures and in the harshest of environments, Habonim products consistently exhibit high flow capacity, tight shutoff, energy efficiency and long service-free life.

The result is a product unmatched in reliability, stability and most importantly, safety, for use in air separation plants, LNG storage, distribution and transportation, aerospace, petrochemical and medical industries.

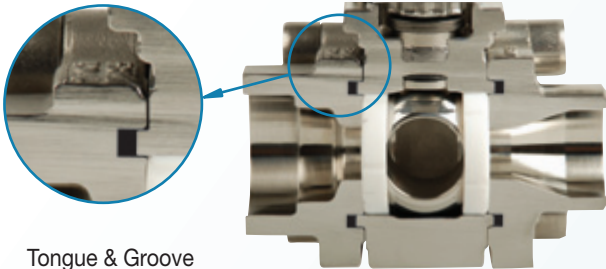
Technical Summary

Size Range:	1/4" -6" (DN6-DN150)
Series in Range:	Standard Bore C47C, C31C, C32C Full Bore CB47C, C73C, C74C, C77C, C78C
Application:	Air separation plants, LNG storage and distribution, LNG transportation, liquid and gaseous Oxygen for steel production
Service:	Helium, Hydrogen, Nitrogen, Argon, Oxygen, Methane, Carbon Dioxide, LNG
Pressure Range:	Vacuum 10^{-6} Torr to 100 Barg 1450 Psi
Temperature Range:	-269°C to +200°C (-452°F to +392°F)
Materials:	Austenitic stainless steel 316/316L
End Connections:	Flanged, Screwed, Butt weld, Extended Butt weld.
Standards:	BS 6364 & BS EN1626 - valves for cryogenic service, API 607 5 th edition & ISO 10497 - Testing of valves - Fire type-testing requirements, EN 12567 Isolating Valves for LNG (optional), BS EN 1473 Installation and equipment for Liquefied natural gas (design for onshore installation)
Operation:	Lever or gear operated, Pneumatic or Electric Actuated

Safety is Our Guide

Habonim's meticulous engineering approach and long experience in the valve industry has resulted in a unique cryogenic valve design.

As standard, the Habonim cryogenic valve design is fire-safe ready and suitable for hazardous and non-hazardous environments.



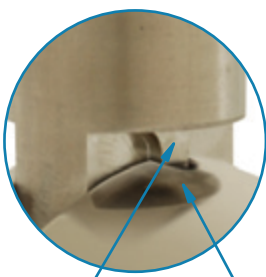
Tongue & Groove

Cryogenic valve body and interlocked end connector

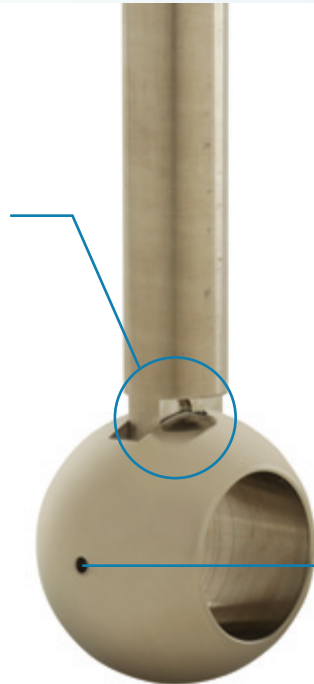
The Tongue & Groove design is used in all fire-safe valves and is now also implemented in the cryogenic valve series. This unique labyrinth design provides zero leakage to the atmosphere; it is intended to allow full compression of the expanded graphite body seal and accurate alignment of the body and ends.

Determining Orientation

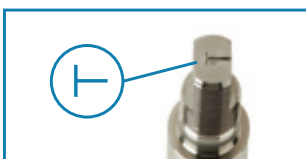
An integral rib machined off one of the stem flats, and a ball design with a matching groove in the direction of the relief hole.



Stem integral rib ball groove



Stem direction



"T" mark on stem showing the relief hole direction

Fire Safe design

The Anti static Fire-safe Cryogenic (FC) series, are designed and tested to the requirements of API 607 5th edition and ISO 10497-Fire type-testing.

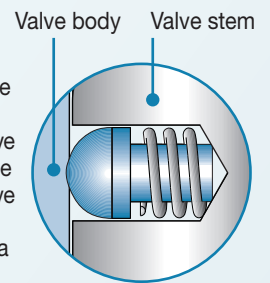
The valves contain soft seat rings. In the event of fire, a secondary fire lip on the end connector will come in contact with the ball and prevent leakage through the valve port. The fire-safe stem incorporates a machined fire lip, which prevent leakage once the thrust seal is burned off. As a rule all FC valves are fitted with expanded graphite body seals and stem packing.



Fire lip

Anti-Static

It is essential that all valve parts be electrically connected to overcome the electrical charge of a non-grounded apparatus. The Habonim cryogenic valve design guarantees electrical resistance of less than 10 ohms between the valve body and stem. This is achieved by permanent electrical continuity using a spring loaded stainless steel 304 ball assembled in the valve stem, maintaining contact with the valve body.



Valve body

Valve stem

Minimum thermal expansion

Solid construction with double the number of body bolts threaded to more than half their length, results in a reduction in linear thermal expansion of the bolts and a dramatic decrease in the likelihood of leakage from the body. In addition, spring washers are used to compensate for thermal contractions of valve parts during operation.



Relief hole

Complying with cryogenic standards, the Habonim cryogenic ball valve is designed with no trapped cavities, meaning total elimination of pressure build up due to thermal expansion.

Flow direction indicators



On extended bonnet top



On valve body

CRYOGENIC VALVES

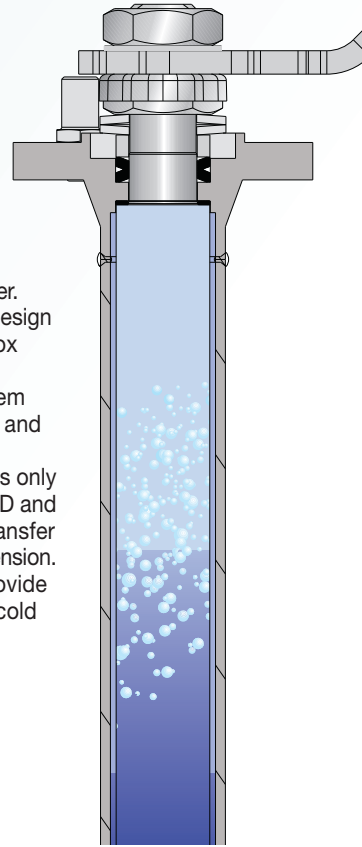
ISO 5211 Compliance

Where automation is required, the cryogenic ball valves are available with Habonim's unique pneumatic Compact 4-piston actuator. Both valve top pad and actuator mounting pattern are in full compliance with ISO 5211, making mounting actuators and accessories a simple maintenance operation. Although seven different valve series participate in the Habonim cryogenic line, only one mounting kit per size is required. This uniformity in design reduces the need for different non-standard mounting kits, easing logistics performance, saving storage space, and increasing flexibility in service. A limit switch or positioner can be mounted on the top actuator face using the NAMUR standard VDI+VDE top interface. For more information please refer to Bulletin B-360.

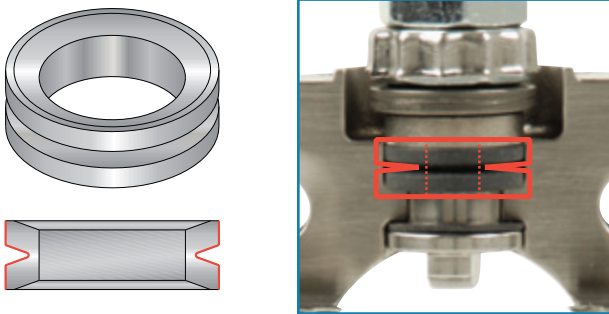


Efficient Heat Transfer

The Habonim cryogenic valve stem is designed to prevent stem being ejected when the operating or sealing devices are removed. A 316L solid stem, with enlarged diameter and wide stem-to-ball engagement, enables high torque transfer. The Habonim standard bonnet length design complies with BS6364 for non-cold-box applications. The extension prevents cryogenic liquids from reaching the stem packing by enabling the liquids to boil and to convert to gas. Habonim's unique bonnet design allows only a thin layer of flow between extension ID and stem OD, resulting in optimum heat transfer and minimum energy loss along the extension. Upon special request Habonim will provide extended bonnet length designed for cold box applications.



Hermetix™ Stem Packing



The Habonim cryogenic valve series for non-fire-safe applications uses a unique stem packing design patented by Habonim, the **Hermetix™**. The unique geometry of the **Hermetix™** ensures zero leakage and a maintenance-free product life. The flexible X shape of the **Hermetix™** allows a dynamic sealing arrangement in case of stem side load occurrence. Sealing is improved while increasing pressure and maintaining stem packing integrity due to relaxation of stem spring preload due to erosion of soft parts. This is a great advantage over linear motion valves like globe valves which by definition are prone to leakage and require a rigorous, time consuming, maintenance operation and product loss.

Inclination Limitation: 45 degrees

Habonim cryogenic extended bonnet valves for non-cold-box applications should be installed with the stem in the vertical upwards position or within 45° of vertical. Improper valve assembly will result in cryogenic flow coming in contact with the valve stem packing and leakage to the surroundings.



Seats and Seals

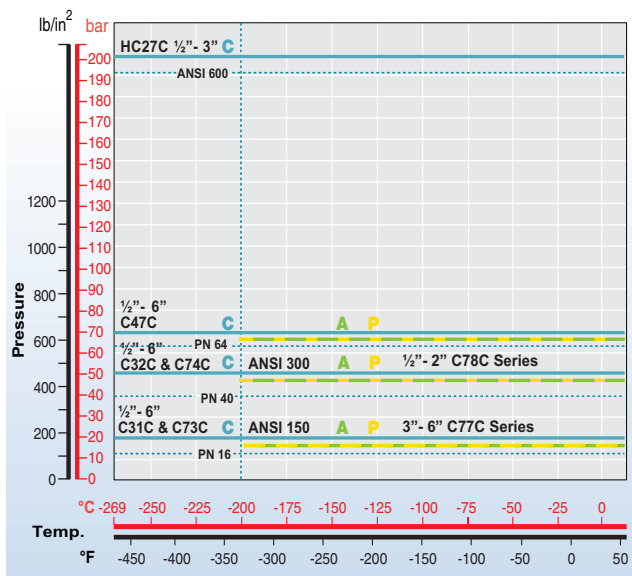
For temperatures down to -200°C/-328°F Habonim recommends the use of either TFM 1600™ or Habonim special NRG seats. For lower temperatures, Habonim recommends the use of PCTFE (KEL-F). The immediate effect is a lower operating torque, smaller actuator and a competitive product.

When PCTFE seats are sized for the application a high tensile 17-4PH stem (code M) must be used to overcome the high operating torque. Graphite/PTFE seals are used in the cryogenic series; PTFE and standard, Graphite for fire-safe applications. Both seal types are designed to accommodate the same body/end encapsulation.

Body and Trim Material

At extremely low temperatures extra care must be taken when designing equipment and selecting materials. All metal parts in the Habonim cryogenic valve series are made from austenitic stainless steel CF8M/CF3M for cast parts, and 316/316L for rolled bar parts.

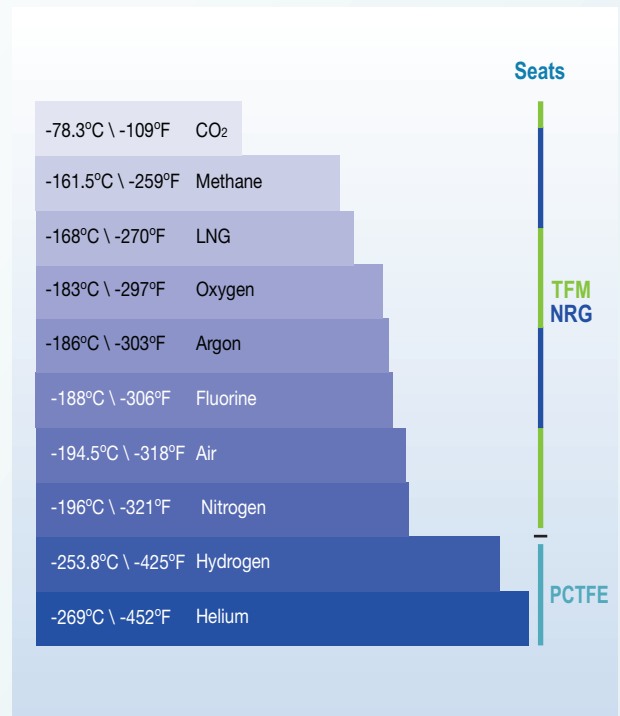
Pressure / Temperature Rating



Quality Control

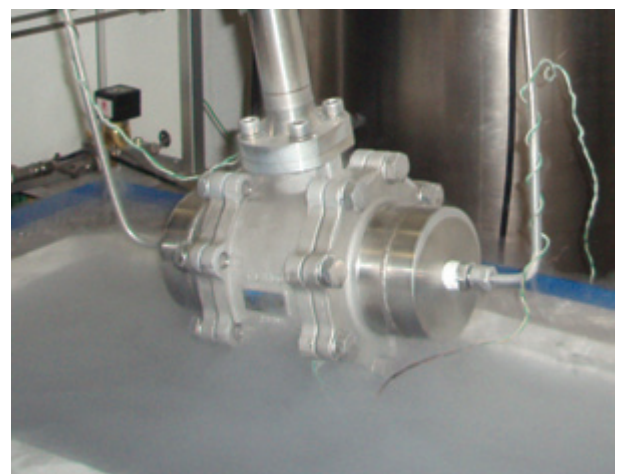
As an ISO 9001 certified manufacturer, Habonim is committed to the highest degree of excellence. Habonim cryogenic valves are produced under special conditions to ensure tight machining tolerances, high quality surface finish and meticulous material selection. The quality control department is responsible for ensuring that all the specifications throughout the process, including material acquisition, machining, welding, cleaning, assembly, pressure testing, packing and final inspection are maintained at the highest level. 3.1 certification and full material test reports are available for customer use.

Boiling Point of Cryogenics



Cleaning Assembly and Testing

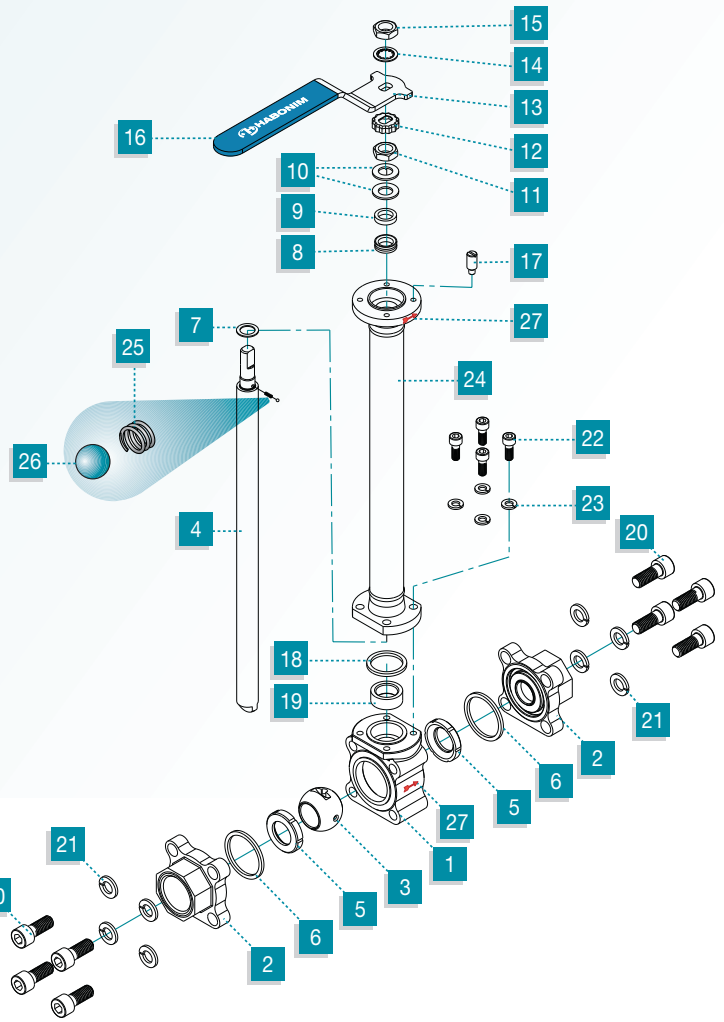
Valve parts less ball, stem, and original soft parts are hydrostatically tested 1.5xPressure Rating. The valve is then disassembled and cleaned in an ultrasonic bath and degreased to ensure a high level of cleanliness. The valve is assembled in a clean room and 100% line tested with helium at 80 psi and checked with a helium leak detector (Acceptance criteria 1×10^{-5} cc/sec). After testing, the valve ends are capped and the valves are individually packed in a hermetically sealed polyethylene bag ensuring valve integrity up to the point of installation. **Cryogenic Testing:** In certain cases, a cryogenic valve test, operational test at cryogenic temperatures, or fire test, can be performed.



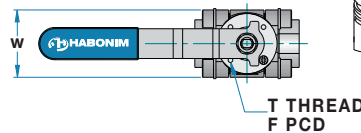
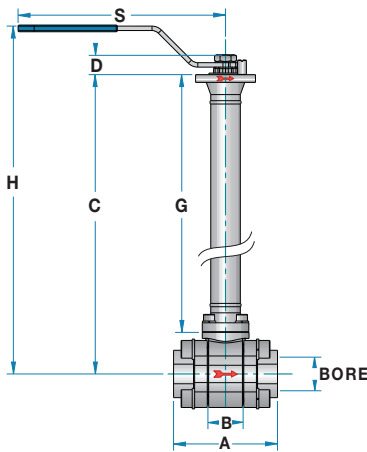
CRYOGENIC VALVES

1/2"-2" C47C Material Specification

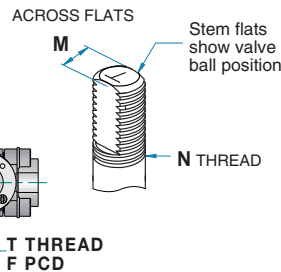
Item	Description	Material Specifications	Qty.
1	Body	S.St. ASTM A351 CF8M	1
2	End connector	S.St. ASTM A351 CF3M/CF8M	2
3	Ball	S.St. ASTM A351 CF8M, 17-4PH	1
4	Stem	S.St. ASTM A479 316/316L, 17-4PH	1
5	Seat	TFM, NRG, PCTFE	2
6	Body seal	PTFE, Graphite	2
7	Stem thrust seal	NRG	1
8	Stem packing	Hermetix™, Graphite	1
9	Follower	S.St. ASTM B783 316L	1
10	Disc spring	S.St. ASTM A693 17-7PH	2
11	Stem nut	S.St. ASTM A194 316	1
12	Locking clip	S.St. ASTM A164 304	1
13	Handle	S.St. ASTM A240 430	1
14	Serrated washer	S.St. AISI 410	1
15	Handle nut	S.St. ASTM A194 316	1
16	Sleeve	Vinyl plastisol	1
17	Stop pin	S.St. ASTM A582 303	1
18	Bonnet seal	PTFE, Graphite	1
19	Stem bearing	PTFE	1
20	Body bolt	S.St. DIN 912 A2-70	8
21	Spring washer	DIN 127 A2	8
22	Bonnet bolet	S.St. ISO 4014 A2-70	4
23	Spring washer	DIN 127 A2	4
24	Bonnet	S.St. AISI 316L	1
25	Anti static spring	S.St. AISI 302	1
26	Anti static ball	S.St. AISI 304	1
27	Flow arrow	S.St. ASTM A167 304	2



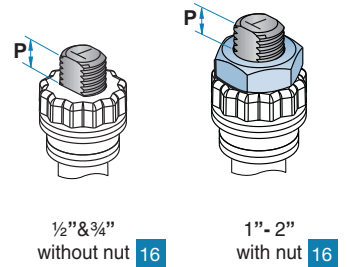
Valve Dimensions



STEM DIMENSIONS



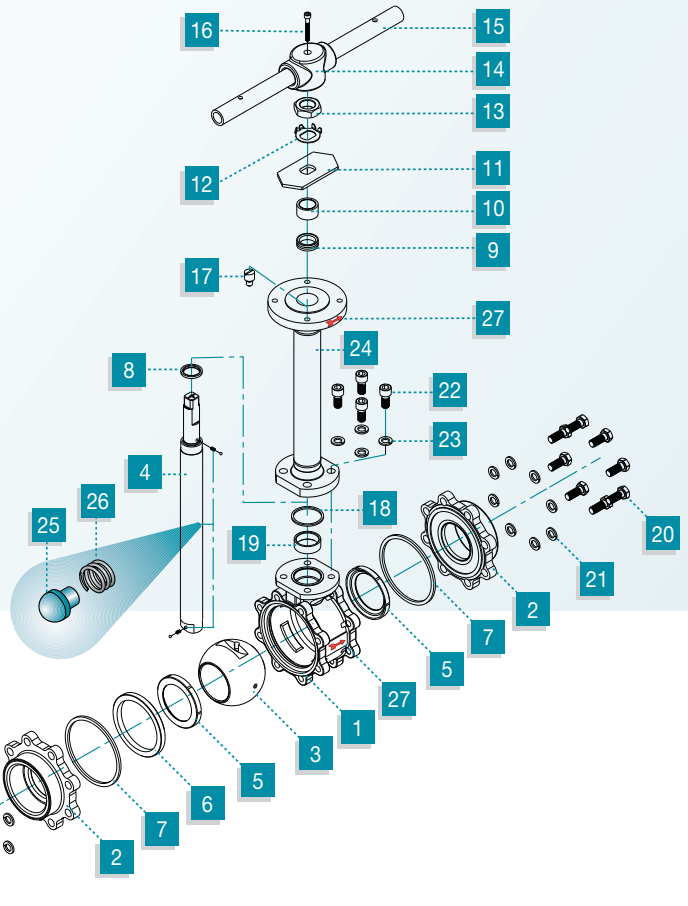
PREPARATION FOR ACTUATION



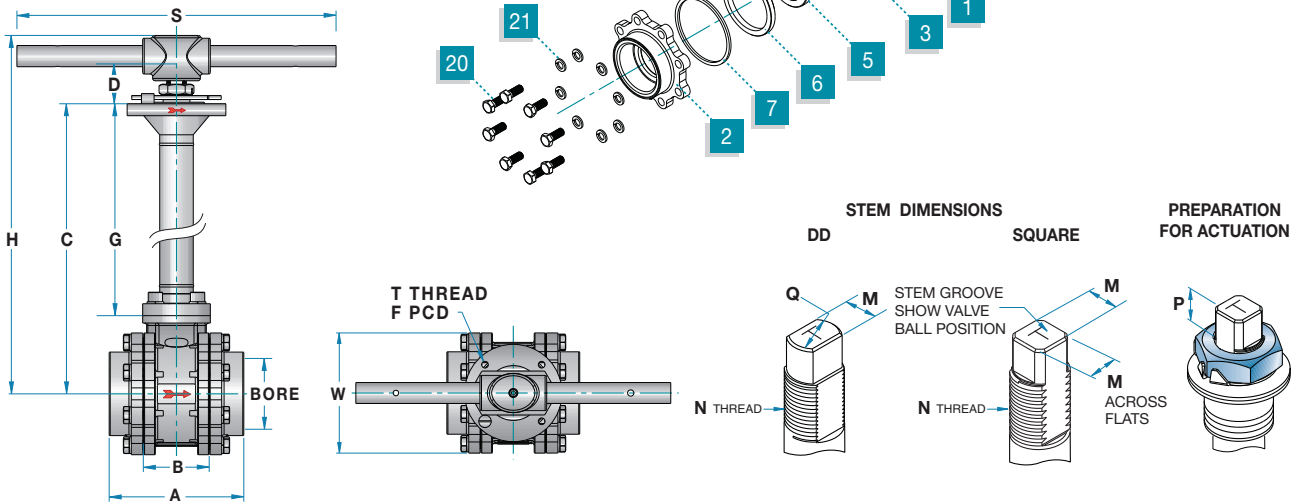
Size			Bore	A	B	C	D	H	G	S	W	T	F	M	N	P	Weight kg./lb
RB	FB	Unit															
1/2"		mm	11.15	66	20.6	333	8.9	366	304	150	46	M5	36	5.5	3/8"UNF	7.2	1.6
		inch	0.44	2.60	0.81	13.11	0.35	14.41	11.97	5.91	1.81	M5	1.42	0.217	3/8"UNF	0.283	3.5
3/4"	1/2"	mm	14.3	71	24.5	335	8.9	368	304	150	52.1	M5	36	5.5	3/8"UNF	7.2	1.8
		inch	0.56	2.80	0.96	13.19	0.35	14.49	11.97	5.91	2.05	M5	1.42	0.217	3/8"UNF	0.283	4.0
1"	3/4"	mm	20.6	94	31.7	342	17.5	383	304	187	60.5	M5	42	7.54	7/16"UNF	7.2	3
		inch	0.81	3.70	1.25	13.46	0.69	15.08	11.97	7.36	1.20	M5	1.65	0.297	7/16"UNF	0.283	6.6
1 1/4"	1"	mm	25.4	108	41.25	347	17.5	388	304	187	68.8	M5	42	7.54	7/16"UNF	7.2	3.7
		inch	1.00	4.25	1.62	13.66	0.69	15.28	11.97	7.36	2.71	M5	1.65	0.297	7/16"UNF	0.283	8.15
1 1/2"	1 1/4"	mm	31.8	115.5	48.4	347	29.5	400	304	237	79.2	M6	50	8.71	9/16"UNF	8	4.9
		inch	1.25	4.55	1.91	13.66	1.16	15.75	11.97	9.33	3.12	M6	1.97	0.343	9/16"UNF	0.315	10.8
2"	1 1/2"	mm	38.1	127	56.3	352	29.5	405	304	237	90.7	M6	50	8.71	9/16"UNF	8.5	6.1
		inch	1.5	5.00	2.22	13.86	1.16	15.94	11.97	9.33	3.57	M6	1.97	0.343	9/16"UNF	0.335	13.4

2½"-6" C47C

Item	Description	Material Specifications	Qty.
1	Body	S.St. ASTM A351 CF8M	1
2	End connector	S.St. ASTM A351 CF3M/CF8M	2
3	Ball	S.St. ASTM A351 CF8M	1
4	Stem	S.St. ASTM A276 316/316L, 17-4PH	1
5	Seat	TFM, NRG , PCTFE	2
6	Seat retaining ring	S.St. ASTM A351 CF8M	1
7	Body seal	PTFE, Graphite	2
8	Stem thrust seal	NRG	1
9	Stem packing	Hermetix™, Graphite	1
10	Follower	S.St. ASTM B783 316L	1
11	Stop plate	S.St. ASTM A240 430	1
12	Tab lock washer	S.St. ASTM A240 304	1
13	Stem nut	S.St. ASTM A194 316	1
14	Wrench head	S.St. ASTM A351 CF8M	1
15	Wrench handle	S.St. ASTM 316L	1
16	Wrench bolt	S.St. AISI 304	1
17	Stop pin	S.St. ASTM A582 303	1
18	Bonnet seal	PTFE, Graphite	1
19	Stem bearing	PTFE	1
20	Body bolt	S.St. ISO 4014 A2-70	16
21	Spring washer	DIN 127 A2	16
22	Bonnet bolet	S.St. ISO 4014 A2-70	4
23	Spring washer	DIN 127 A2	4
24	Bonnet	S.St. AISI 316L	1
25	Anti static spring	S.St. AISI 302	2
26	Anti static plunger	S.St. AISI 304	2
27	Flow arrow	S.St. ASTM A167 304	2



Valve Dimensions

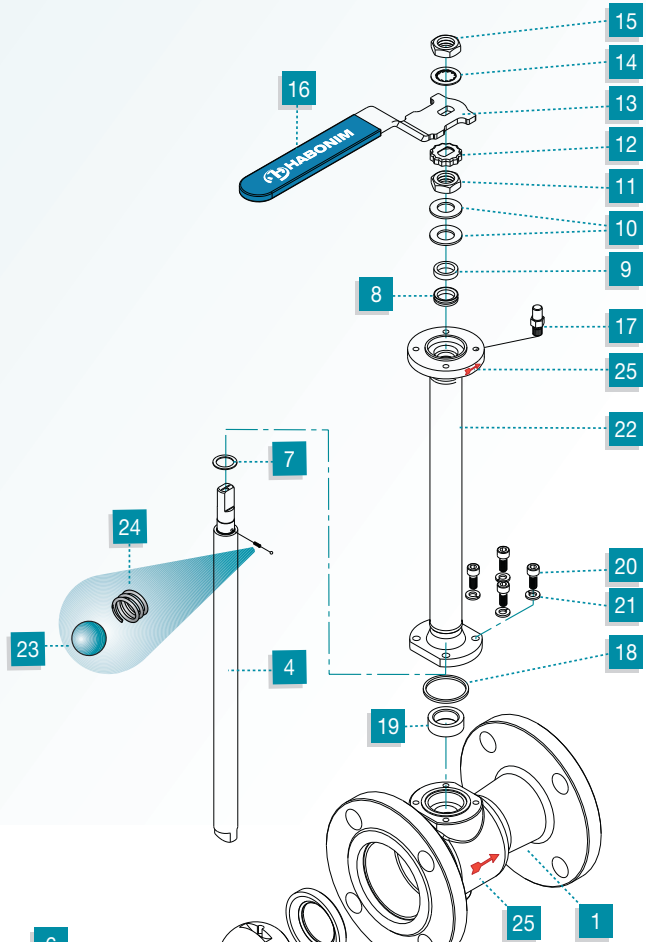


Size			Bore	A	B	C	D	H	G	S	W	T	F	M		Q	N	P	Weight kg./lb
RB	FB	Unit												Square	DD				
2 ½"	2"	mm	50.8	158	72.6	398	41.6	464	328.5	401	108	M8	70	***	13.9	***	M20	31.15	12
		inch	2.00	6.22	2.86	15.67	1.64	18.27	12.93	15.79	4.25	M8	2.76	***	0.547	***	M20	1.226	26.4
3"	2 ½"	mm	63.5	169	83.3	442	46.6	528	343.5	401	153	M10	102	18.9	15.9	22.7	1"-14 UNS-2A	16.7	20
		inch	2.50	6.65	3.28	17.40	1.83	20.79	13.52	15.79	6.02	M10	4.02	0.744	0.626	0.894	1"-14 UNS-2A	0.657	44
4"	3"	mm	82.6	214	108.8	458	46.6	544	343.5	610	191.5	M10	102	18.9	15.9	22.7	1"-14 UNS-2A	16.7	30.5
		inch	3.25	8.43	4.28	18.03	1.83	21.42	13.52	24.02	7.54	M10	4.02	0.744	0.626	0.894	1"-14 UNS-2A	0.657	67.2
4"	4"	mm	100	239	123	469	46.6	555	343.5	610	217	M10	102	18.9	15.9	22.7	1"-14 UNS-2A	16.7	37.3
		inch	3.94	9.41	4.84	18.46	1.83	21.85	13.52	24.02	8.54	M10	4.02	0.744	0.626	0.894	1"-14 UNS-2A	0.657	154
6"	6"	mm	111.1	283	146	542	69.2	665	385	916	266	M12	125	28.45	23.75	35.2	1½"-12 UNF-1A	26.2	70
		inch	4.37	11.14	5.75	21.34	2.72	26.18	15.16	36.06	10.47	M12	4.92	1.120	0.935	1.386	1½"-12 UNF-1A	1.031	154

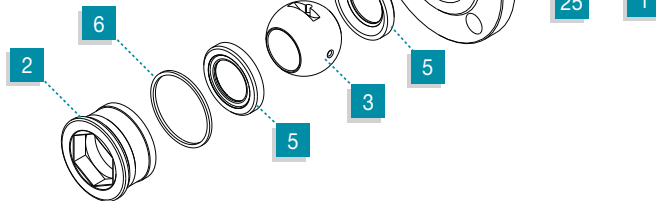
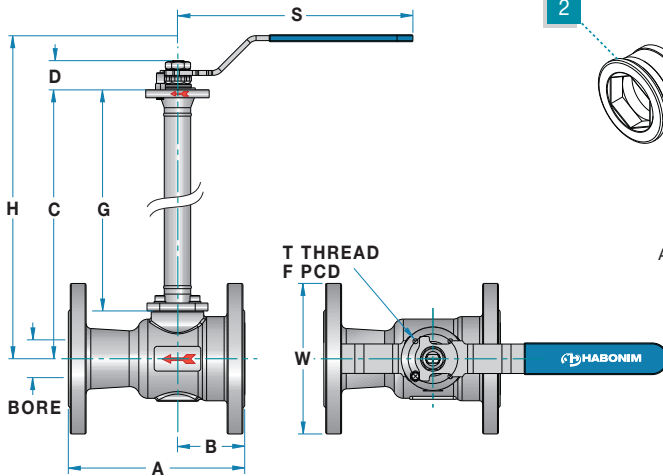
CRYOGENIC VALVES

1/2"-2" C31C/C32C Material Specification

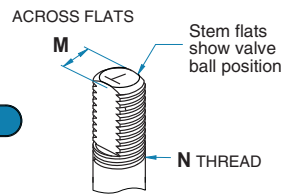
Item	Description	Material Specifications	Qty.
1	Body	S.St. ASTM A351 CF8M	1
2	Plug	S.St. ASTM A351 CF8M	1
3	Ball	S.St. ASTM A351 CF8M, 17-4PH	1
4	Stem	S.St. ASTM A479 316/316L, 17-4PH	1
5	Seat	TFM, NRG , PCTFE	2
6	Body seal	PTFE, Graphite	1
7	Stem thrust seal	NRG	1
8	Stem packing	Hermetix™, Graphite	1
9	Follower	S.St. ASTM B783 316L	1
10	Disc spring	S.St. ASTM A693 17-7PH	2
11	Stem nut	S.St. ASTM A194 316	1
12	Locking clip	S.St. ASTM A164 304	1
13	Handle	S.St. ASTM A194 430	1
14	Serrated washer	S.St. AISI 410	1
15	Handle nut	S.St. ASTM A194 316	1
16	Sleeve	Vinil plastisol	1
17	Stop pin	S.St. ASTM A582 303	1
18	Bonnet seal	PTFE, Graphite	1
19	Stem bearing	PTFE	1
20	bonnet bolt	S.St. ISO 4014 A2-70	4
21	Spring washer	DIN 127 A2	4
22	Bonnet	S.St. AISI 316L	1
23	Anti static spring	S.St. AISI 302	1
24	Anti static ball	S.St. AISI 304	1
25	Flow arrow	S.St. ASTM A167 304	2



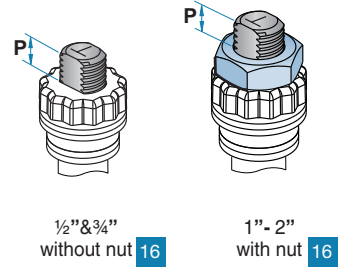
Valve Dimensions



STEM DIMENSIONS



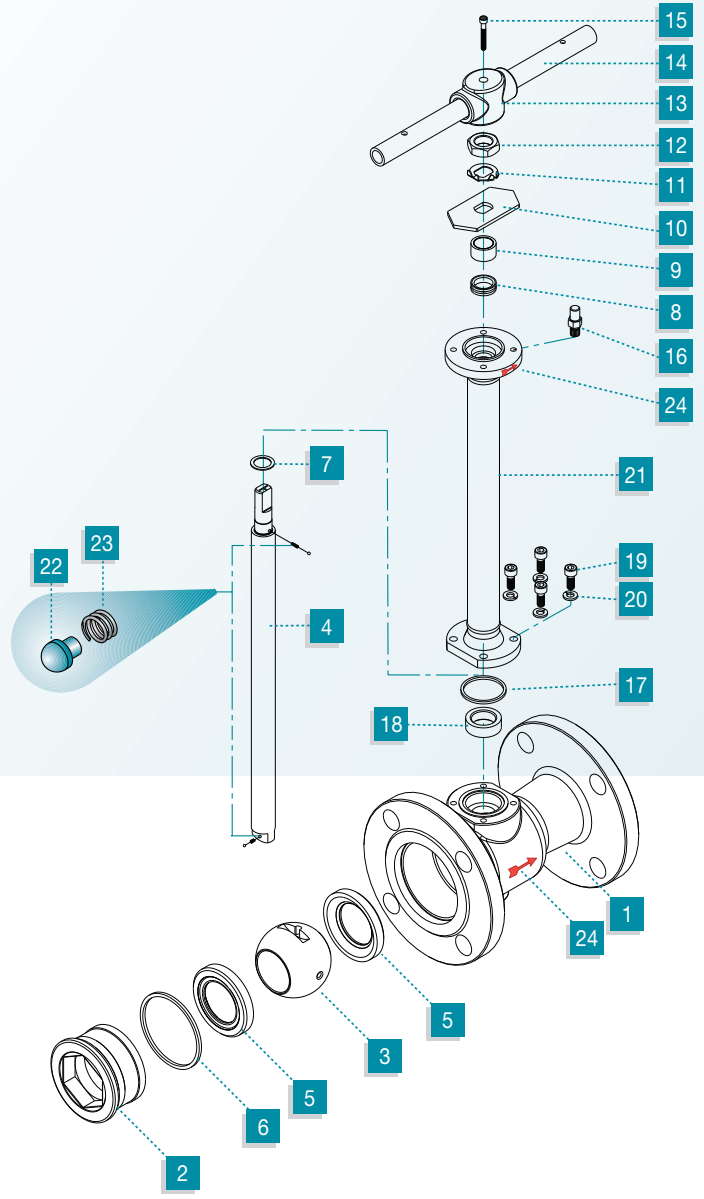
PREPARATION FOR ACTUATION



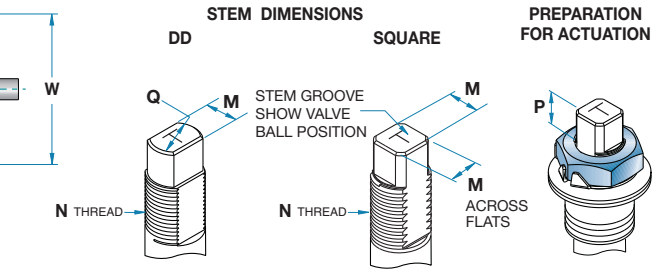
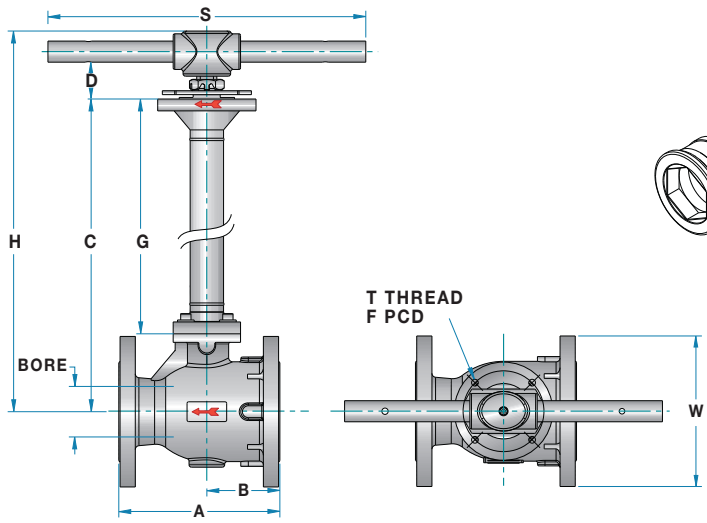
Valve Size	Bore	A		B	C	D	H	G	S	W	T	F	M	N	P	Weight kg./lb		
		150	300													150	300	
1/2"	mm	11.1	108	140	46	333	8.9	366	304	150	89	M5	36	5.5	3/8"UNF	7.2	2.4	3.1
	inch	0.44	4.25	5.51	1.81	13.11	0.35	14.41	11.97	5.91	3.50	M5	1.42	0.217	3/8"UNF	0.283	5.3	6.8
3/4"	mm	14.3	117	152	49.3	335.4	8.9	368	304	150	98	M5	36	5.5	3/8"UNF	7.2	3	4
	inch	0.56	4.61	5.98	1.94	13.20	0.35	14.49	11.97	5.91	3.86	M5	1.42	0.217	3/8"UNF	0.283	6.6	8.8
1"	mm	20.6	127	165	57.2	342.1	17.5	386	304	187	108	M5	42	7.54	7/16"UNF	7.2	4.2	5.5
	inch	0.81	5.00	6.50	2.25	13.47	0.69	15.20	11.97	7.36	4.25	M5	1.65	0.297	7/16"UNF	0.283	9.25	12.1
1 1/2"	mm	31.8	165	190	62.3	347.5	29.5	402	304	237	127	M6	50	8.71	9/16"UNF	8	7	10.2
	inch	1.25	6.50	7.48	2.45	13.68	1.16	15.83	11.97	9.33	5.00	M6	1.97	0.343	9/16"UNF	0.315	15.4	22.5
2"	mm	38.1	178	216	67.8	352.25	29.5	407	304	237	152	M6	50	8.71	9/16"UNF	8.5	9.1	11.8
	inch	1.50	7.01	8.50	2.67	13.87	1.16	16.02	11.97	9.33	5.98	M6	1.97	0.343	9/16"UNF	0.335	20	26

3"-6" C31C/C32C

Item	Description	Material Specifications	Qty.
1	Body	S.St. ASTM A351 CF8M	1
2	Plug	S.St. ASTM A351 CF8M	1
3	Ball	S.St. ASTM A351 CF8M	1
4	Stem	S.St. ASTM A479 316/316L, 17-4PH	1
5	Seat	TFM, NRG, PCTFE	2
6	Body seal	PTFE, Graphite	1
7	Stem thrust seal	NRG	1
8	Stem packing	Hermetix™, Graphite	1
9	Follower	S.St. ASTM B783 316L	1
10	Stop plate	S.St. ASTM A240 430	1
11	Tab lock washer	S.St. ASTM A240 304	1
12	Stem nut	S.St. ASTM A194 316	1
13	Wrench head	S.St. ASTM A351 CF8M	1
14	Wrench handle	S.St. ASTM 316L	1
15	wrench bolt	S.St. AISI 304	1
16	Stop pin	S.St. ASTM A582 303	1
17	Bonnet seal	PTFE, Graphite	1
18	Stem bearing	PTFE	1
19	Bonnet bolet	S.St. ISO 4014 A2-70	4
20	Spring washer	DIN 127 A2	4
21	Bonnet	S.St. AISI 316L	1
22	Anti static spring	S.St. AISI 302	2
23	Anti static plunger	S.St. AISI 304	2
24	Flow arrow	S.St. ASTM A167 304	2



Valve Dimensions

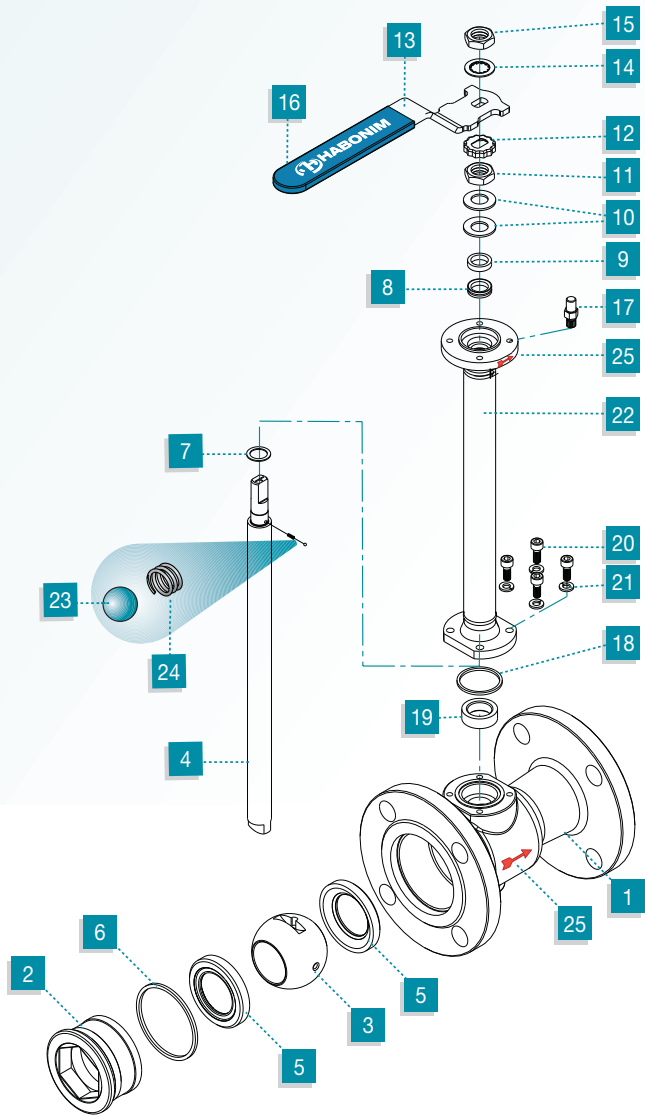


Valve Size	Bore	A		B	C	D	H	G	S	W	T	F	M		Q	N	P	Weight kg./lb		
		150	300										SQ.	DD				150	300	
3"	mm	63.7	203	284	92.1	441.8	46.6	528	343.5	401	190	M10	102	102	15.9	22.7	1"-14 UNS-2A	16.7	24.3	29
	inch	2.5	7.99	11.18	3.63	17.39	1.83	20.79	13.52	15.79	7.48	M10	4.02	4.02	0.626	0.894	1"-14 UNS-2A	0.657	53.5	63.9
4"	mm	82.8	229	305	101.6	457.6	46.6	543.5	343.5	610	228.6	M10	102	102	15.9	22.7	1"-14 UNS-2A	16.7	36.5	44.6
	inch	3.26	9.02	12.01	4.00	18.02	1.83	21.40	13.52	24.02	9.00	M10	4.02	4.02	0.626	0.894	1"-14 UNS-2A	0.657	80.4	92.3
6"	mm	111.3	267	403.2	108	542.4	69.2	666	385	916	280	M12	125	125	23.75	35.2	1½"-12 UNF-1A	26.2	70	98
	inch	4.38	10.51	15.87	4.25	21.35	2.72	26.22	15.16	36.06	11.02	M12	4.92	4.92	0.935	1.386	1½"-12 UNF-1A	1.031	154	216

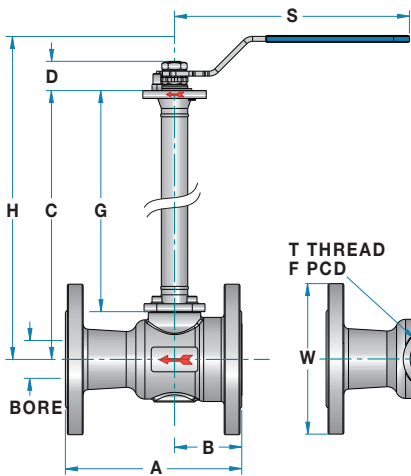
CRYOGENIC VALVES

1/2"-1" C73C/C74C Material Specification

Item	Description	Material Specifications	Qty.
1	Body	S.St. ASTM A351 CF8M	1
2	Plug	S.St. ASTM A351 CF8M	1
3	Ball	S.St. ASTM A351 CF8M, 17-4PH	1
4	Stem	S.St. ASTM A479 316/316L, 17-4PH	1
5	Seat	TFM, NRG, PCTFE	2
6	Body seal	PTFE, Graphite	1
7	Stem Thrust seal	NRG	1
8	Stem packing	Hermetix™, Graphite	1
9	Follower	S.St. ASTM B783 316L	1
10	Disc spring	S.St. ASTM A693 17-7PH	2
11	Stem nut	S.St. ASTM A194 316	1
12	Locking clip	S.St. ASTM A164 304	1
13	Handle	S.St. ASTM A194 430	1
14	Serrated washer	S.St. AISI 410	1
15	Handle nut	S.St. ASTM A194 316	1
16	Sleeve	Vinyl plastisol	1
17	Stop pin	S.St. ASTM A582 303	1
18	Bonnet seal	PTFE, Graphite	1
19	Stem bearing	PTFE	1
20	Bonnet bolet	S.St. ISO 4014 A2-70	4
21	Spring washer	DIN 127 A2	4
22	Bonnet	S.St. AISI 316L	1
23	Anti static spring	S.St. AISI 302	1
24	Anti static ball	S.St. AISI 304	1
25	Flow arrow	S.St. ASTM A167 304	2

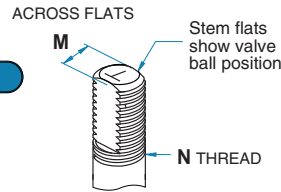


Valve Dimensions

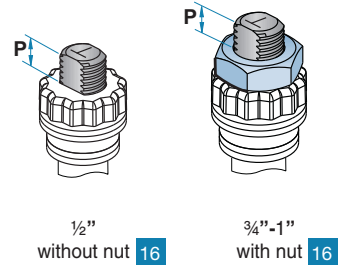


T THREAD
F PCD

STEM DIMENSIONS



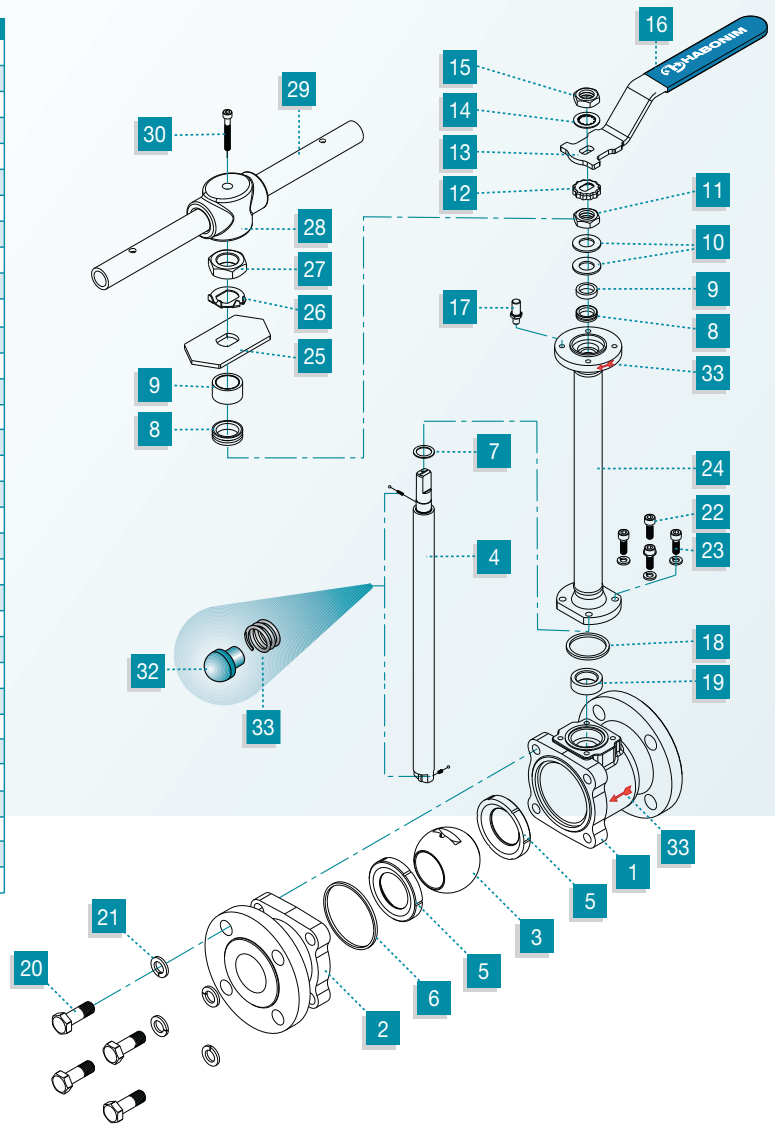
PREPARATION FOR ACTUATION



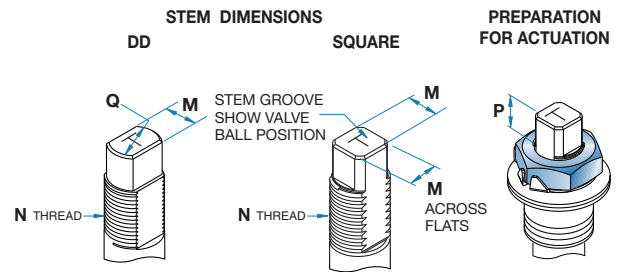
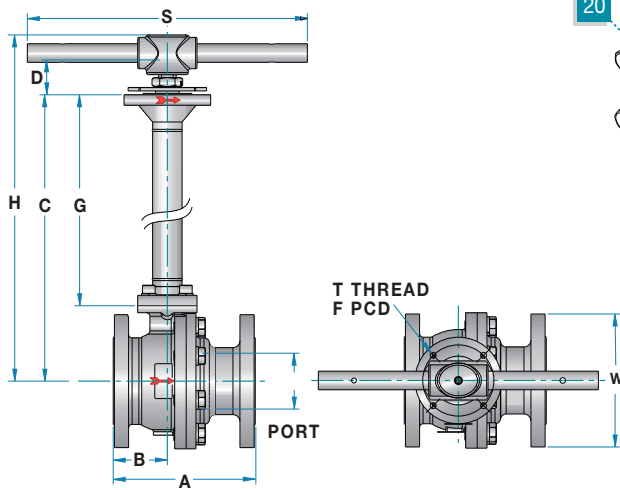
Valve Size	Bore	A		B	C	D	H	G	S	W	T	F	M	N	P	Weight kg./lb		
		150	300													150	300	
1/2"	mm	14.3	108.2	140	48	335.4	8.9	368	304	150	89	M5	36	5.5	3/8"UNF	7.2	2.6	3.1
	inch	0.56	4.26	5.51	1.89	13.20	0.35	14.49	11.97	5.91	3.50	M5	1.42	0.217	3/8"UNF	0.283	5.7	6.8
3/4"	mm	20.6	117	152	58	342.1	17.5	386	304	187	98	M5	42	7.54	7/16"UNF	7.2	3.8	4.9
	inch	0.81	4.61	5.98	2.28	13.47	0.69	15.20	11.97	7.36	3.86	M5	1.65	0.297	7/16"UNF	0.283	8.4	10.8
1"	mm	25.4	127	165	63.5	346.6	17.5	390	304	187	108	M5	42	7.54	7/16"UNF	7.2	4.6	6
	inch	1.00	5.00	6.50	2.50	13.65	0.69	15.35	11.97	7.36	4.25	M5	1.65	0.297	7/16"UNF	0.283	10.1	13.2

1½"-6" C73C/C74C

Item	Description	Material Specifications	Qty.
1	Body	S.St. ASTM A351 CF8M	1
2	End	S.St. ASTM A351 CF8M	1
3	Ball	S.St. ASTM A351 CF8M	1
4	Stem	S.St. ASTM A479 316/316L, 17-4PH	1
5	Seat	TFM, NRG, PCTFE	2
6	Body seal	PTFE, Graphite	1
7	Stem Thrust seal	NRG	1
8	Stem packing	Hermetix™, Graphite	1
9	Follower	S.St. ASTM B783 316L	1
10	Disc spring	S.St. ASTM A693 17-7PH	2
11	Stem nut	S.St. ASTM A194 316	1
12	Locking clip	S.St. ASTM A164 304	1
13	Handle	S.St. ASTM A194 430	1
14	Serrated washer	S.St. AISI 410	1
15	Handle nut	S.St. ASTM A194 316	1
16	Sleeve	Vinil plastisol	1
17	Stop pin	S.St. ASTM A582 303	1
18	Bonnet seal	PTFE, Graphite	1
19	Stem bearing	PTFE	1
20	Body bolt	S.St. ISO 4014 A2-70	4-6-10
21	Spring washer	DIN 127 A2	4
22	Bonnet bolet	S.St. ISO 4014 A2-70	4
23	Spring washer	DIN 127 A2	4
24	Bonnet	S.St. AISI 316L	1
25	Stop plate	S.St. ASTM A240 430	1
26	Tab lock washer	S.St. ASTM A240 304	1
27	Stem nut	S.St. ASTM A194 316	1
28	Wrench head	S.St. ASTM A351 CF8M	1
29	Wrench handel	S.St. ASTM 316L	1
30	Wrench bolt	S.St. AISI 304	1
31	Anti static spring	S.St. AISI 302	2
32	Anti static plunger	S.St. AISI 304	2
33	Flow arrow	S.St. ASTM A167 304	2



Valve Dimensions

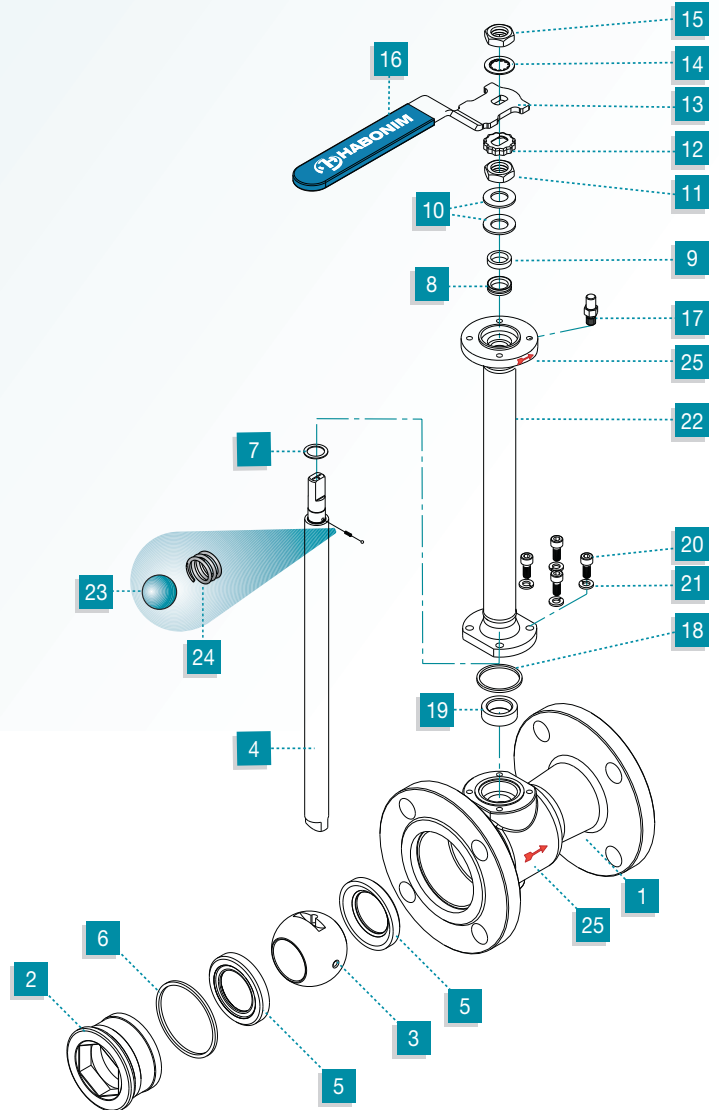


Valve Size	Bore	A		B		C	D	H	G	S	W	T	F	M		Q	N	P	Weight kg./lb		
		150	300	150	300									SQ.	DD				150	300	
1½"	mm	38.1	165	190	68	80.4	352.25	29.5	407	304	237	127	M6	50	***	8.71	***	9/16"UNF	8.5	8.5	11.7
	inch	1.50	6.50	7.48	2.68	3.17	13.87	1.16	16.02	11.97	9.33	5.00	M6	1.97	***	0.343	***	9/16"UNF	0.335	18.7	25.8
2"	mm	51	178	216	69	75	398.5	41.6	464	328.5	255	152	M8	70	***	13.9	***	M20	31.15	14.5	16.5
	inch	2.0	7.01	8.50	2.72	2.95	15.69	1.64	18.27	12.93	10.04	5.98	M8	2.76	***	0.547	***	M20	1.226	32	36.4
3"	mm	80	203	283	77.5	96.4	451.5	46.6	537.5	343.5	401	190.5	M10	102	18.9	15.9	22.7	1"-14 UNS-2A	16.7	28.5	31.5
	inch	3.1	7.99	11.14	3.05	3.80	17.78	1.83	21.16	13.52	15.79	7.50	M10	4.02	0.744	0.626	0.894	1"-14 UNS-2A	0.657	62.8	69.4
4"	mm	100	229	305	84.5	104.5	467.5	46.6	553.5	343.5	610	230	M10	102	18.9	15.9	22.7	1"-14 UNS-2A	16.7	40.5	45.5
	inch	3.94	9.02	12.01	3.33	4.11	18.41	1.83	21.79	13.52	24.02	9.06	M10	4.02	0.744	0.626	0.894	1"-14 UNS-2A	0.657	88.1	100.2
6"	mm	150	394	403	163.5	174.5	564	69.2	687.5	385	916	328	M12	125	28.45	23.75	35.2	1½"-12 UNF-1A	26.2	95.5	102.5
	inch	5.91	15.51	15.87	6.44	6.87	22.20	2.72	27.07	15.16	36.06	12.91	M12	4.92	1.120	0.935	1.386	1½"-12 UNF-1A	1.031	211.4	225.8

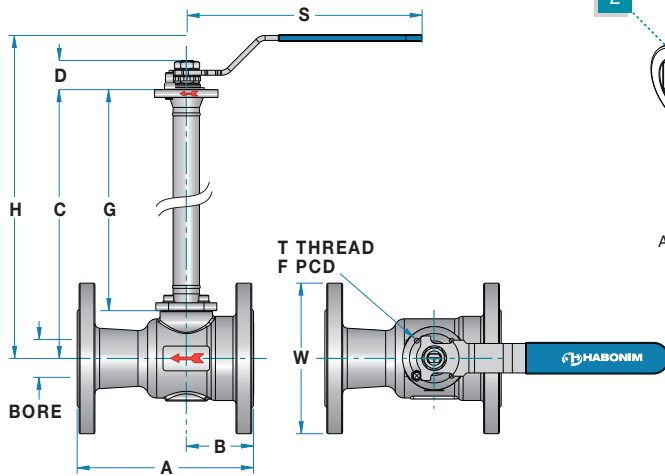
CRYOGENIC VALVES

1/2"-1" (DN15-DN25) C78C Material Specification

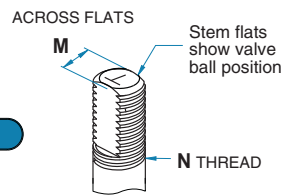
Item	Description	Material Specifications	Qty.
1	Body	S.St. DIN 17445 GR 1.4408	1
2	Plug	S.St. DIN 17445 GR 1.4408	1
3	Ball	S.St. DIN 17440 GR 1.4401, 17-4PH	1
4	Stem	S.St. DIN 17440 GR 1.4401,17-4PH	1
5	Seat	TFM, NRG , PCTFE	2
6	Body seal	PTFE, Graphite	1
7	Stem Thrust seal	NRG	1
8	Stem packing	Hermetix™, Graphite	1
9	Follower	S.St. DIN 17440 GR 1.4401	1
10	Disc spring	S.St. DIN 17224 GR 1.4568	2
11	Stem nut	S.St. DIN 17440 GR 1.4401	1
12	Locking clip	S.St. DIN 17440 GR 1.4401	1
13	Handle	S.St. DIN 17440 GR 1.4401	1
14	Serrated washer	S.St. 17440 GR 1.4401	1
15	Handle nut	S.St. 17440 GR 1.4401	1
16	Sleeve	Vinil plastisol	1
17	Stop pin	S.St. DIN 17440 GR 1.4305	1
18	Bonnet seal	PTFE, Graphite	1
19	Stem bearing	PTFE	1
20	Bonnet bolet	S.St. ISO 4017 A2-70	4
21	Spring washer	DIN 127 A2	4
22	Bonnet	S.St. AISI 316L	1
23	Anti static spring	S.St. DIN 17440 GR 1.4401	1
24	Anti static ball	S.St. DIN 17224 GR 1.4310	1
25	Flow arrow	S.St. ASTM A167 304	2



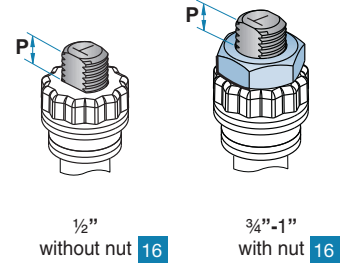
Valve Dimensions



STEM DIMENSIONS



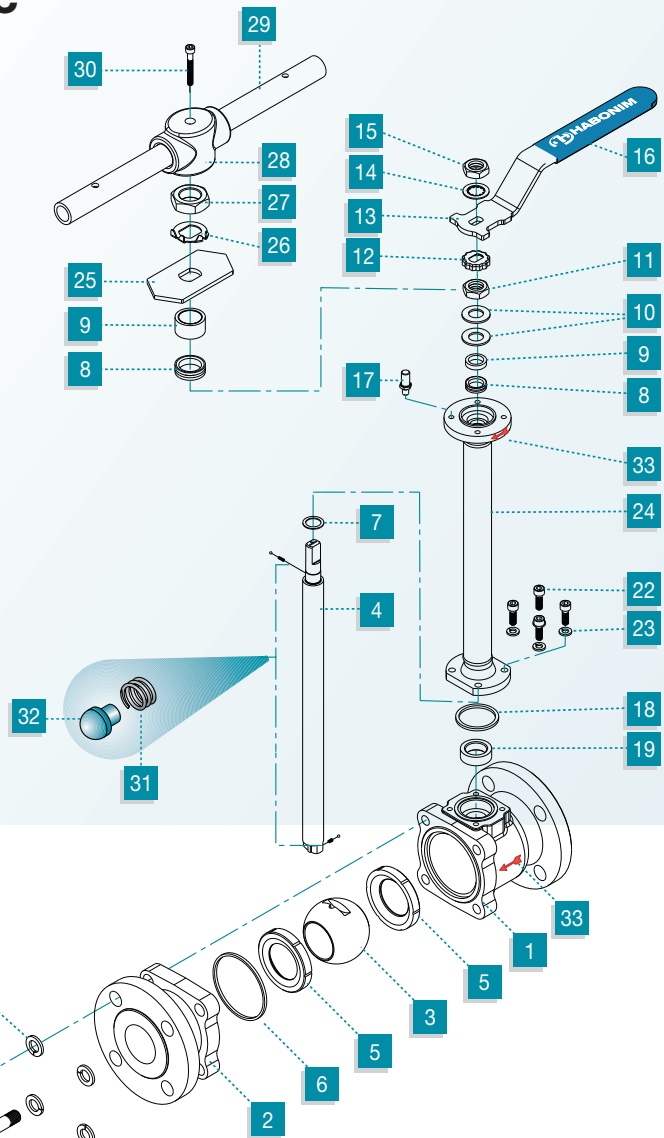
PREPARATION FOR ACTUATION



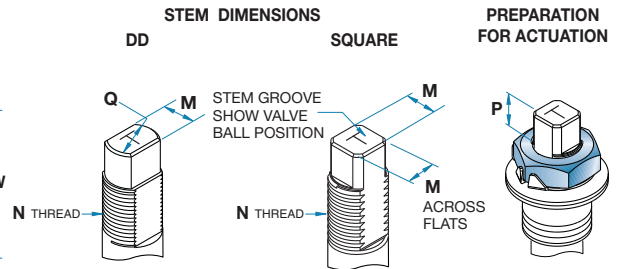
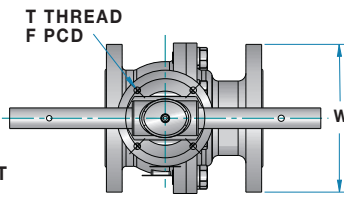
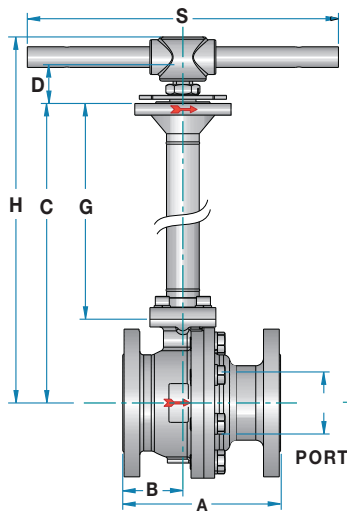
Valve Size	Bore	A		B	C	D	H	G	S	W	T	F	M	N	P	Weight kg./lb		
		F1	F4													F1	F4	
1/2"	mm	14.3	130	115	46	335.4	8.9	368	304	150	95	M5	36	5.5	3/8"UNF	7.2	3.1	3
	inch	0.56	5.12	4.53	1.81	13.20	0.35	14.49	11.97	5.91	3.74	M5	1.42	0.217	3/8"UNF	0.283	6.8	6.75
3/4"	mm	20.6	150	120	56.6	342.2	17.5	386	304	187	105	M5	42	7.54	7/16"UNF	7.2	4.65	4.5
	inch	0.81	5.91	4.72	2.23	13.47	0.69	15.20	11.97	7.36	4.13	M5	1.65	0.297	7/16"UNF	0.283	10.2	9.9
1"	mm	25.4	160	125	61.5	346.7	17.5	390	304	187	115	M5	42	7.54	7/16"UNF	7.2	5.6	5.3
	inch	1.00	6.30	4.92	2.42	13.65	0.69	15.35	11.97	7.36	4.53	M5	1.65	0.297	7/16"UNF	0.283	12.3	11.8

1½"-6" (DN40-DN150) C77C/C78C

Item	Description	Material Specifications	Qty.
1	Body	S.St. DIN 17445 GR 1.4408	1
2	End	S.St. DIN 17445 GR 1.4408	1
3	Ball	S.St. DIN 17440 GR 1.4401	1
4	Stem	S.St. DIN 17440 GR 1.4401, 17-4PH	1
5	Seat	TFM, NRG, PCTFE	2
6	Body seal	PTFE, Graphite	1
7	Stem thrust seal	NRG	1
8	Gland packing	Hermetix™, Graphite	1
9	Follower	S.St. DIN 17440 GR 1.4401	1
10	Disc spring	S.St. DIN 17224 GR 1.4568	2
11	Stem nut	S.St. DIN 17440 GR 1.4401	1
12	Locking clip	S.St. DIN 17224 GR 1.4310	1
13	Handle	S.St. DIN 17440 GR 1.4401	1
14	Serrated washer	S.St. DIN 17440 GR 1.4401	1
15	Handle nut	S.St. DIN 17440 GR 1.4401	1
16	Sleeve	Vinil plastisol	1
17	Stop pin	S.St. DIN 17440 GR 1.4305	1
18	Bonnet seal	PTFE, Graphite	1
19	Stem bearing	PTFE	1
20	Body bolt	S.St. ISO 4017 A2-70	4-6-10
21	Spring washer	DIN 127 A2	4
22	Bonnet bolet	S.St. ISO 4017 A2-70	4
23	Spring washer	DIN 127 A2	4
24	Bonnet	S.St. AISI 316L	1
25	Stop plate	Carbon St. zinc plated	1
26	Tab lock washer	S.St. DIN 17224 GR 1.4310	1
27	Stem nut	S.St. DIN 17440 GR 1.4401	1
28	Wrench head	S.St. DIN 17445 GR 1.4408	1
29	Wrench handel	S.St. DIN 17440 GR 1.4401	1
30	Wrench bolt	S.St. AISI 304	1
31	Anti static spring	S.St. DIN 17440 GR 1.4401	2
32	Anti static plunger	S.St. DIN 17224 GR 1.4310	2
33	Flow arrow	S.St. ASTM A167 304	2



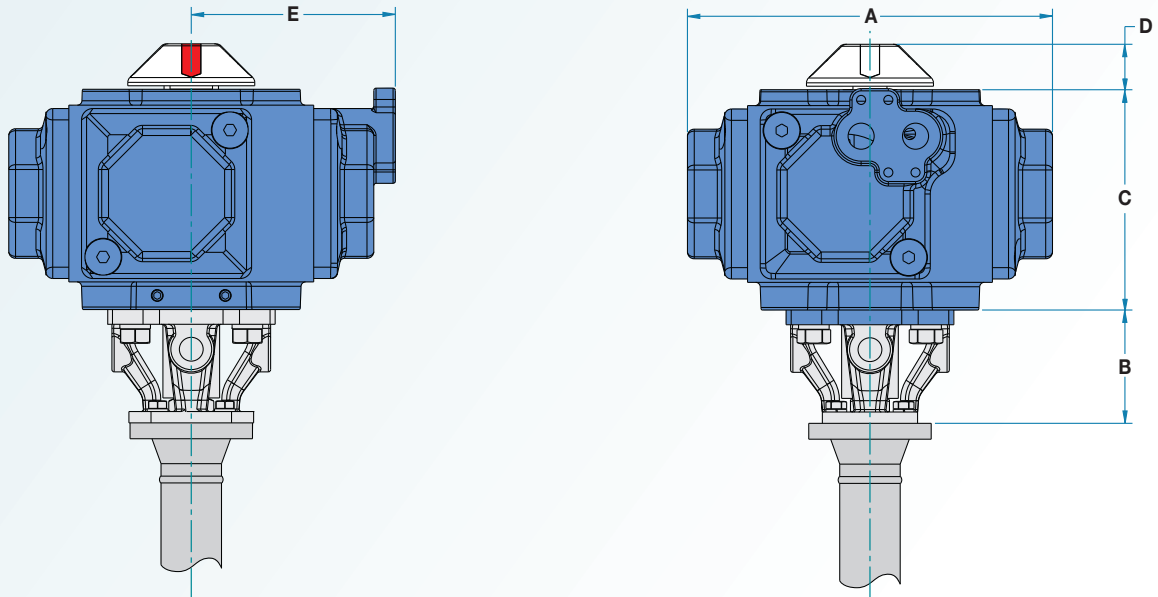
Valve Dimensions



Valve Size	Bore	A		B	C	D	H	G	S	W	T	F	M		Q	N	P	Weight kg./lb		
		F1	F4										SQ.	DD				F1	F4	
1½"	mm	38.1	200	140	65.9	352.25	29.5	407	304	237	150	M6	50	***	8.71	***	9/16"UNF	8.5	12.8	12.2
	inch	1.50	7.87	5.51	2.59	13.87	1.16	16.02	11.97	9.33	5.91	M6	1.97	***	0.343	***	9/16"UNF	0.335	28.2	26.9
2"	mm	51	230	150	60.7	398.5	41.6	464	328.5	255	165	M8	70	***	13.9	***	M20	31.15	16.5	14.5
	inch	2.0	9.06	5.91	2.39	15.69	1.64	18.27	12.93	10.04	6.50	M8	2.76	***	0.547	***	M20	1.226	36.3	31.2
3"	mm	80	310	180	77.5	451.5	46.6	537.5	343.5	401	200	M10	102	18.9	15.9	22.7	1"-14UNS-2A	16.7	28.5	26.5
	inch	3.1	12.20	7.09	3.05	17.78	1.83	21.16	13.52	15.79	7.87	M10	4.02	0.744	0.626	0.894	1"-14UNS-2A	0.657	62.8	58.4
4"	mm	100	350	190	84.5	467.5	46.6	553.5	343.5	610	225	M10	102	18.9	15.9	22.7	1"-14UNS-2A	16.7	40.5	36.5
	inch	3.94	13.78	7.48	3.33	18.41	1.83	21.79	13.52	24.02	8.86	M10	4.02	0.744	0.626	0.894	1"-14UNS-2A	0.657	89.2	80.4
6"	mm	150	350	***	163.5	564	69.2	687.5	385	916	328	M12	125	28.45	23.75	35.2	1½"-12UNF-1A	26.2	87.5	***
	inch	5.91	13.78	***	6.44	22.20	2.72	27.07	15.16	36.06	12.91	M12	4.92	1.120	0.935	1.386	1½"-12UNF-1A	1.031	192.7	***

CRYOGENIC VALVES

Actuation



Dimensions

Size	A S/R		A D/A		B		C		D		E	
	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch
C15	110	4.33	86	3.39	40	1.57	68.8	2.71	20	0.79	66	2.60
C20	131	5.16	102	4.02	40	1.57	80.5	3.17	20	0.79	77.2	3.04
C25	161	6.34	132	5.20	50	1.97	97	3.82	20	0.79	90	3.54
C30	186	7.32	151	5.94	60	2.36	116	4.57	20	0.79	105	4.13
C35	222	8.74	182	7.17	60	2.36	135	5.31	20	0.79	114	4.49
C45	269	10.59	221	8.70	80	3.15	164	6.46	20	0.79	147	5.79
C60	360	14.17	285	11.22	80	3.15	218	8.58	30	1.18	141	5.55
C75	437	17.20	342	13.46	80	3.15	270	10.63	30	1.18	166	6.54

Actuator Sizing Tables

TFM1600 (A) NRG (P) Seats

AIR PRESS.	D/A ACTUATOR			S/R ACTUATOR			
	58 Psi	72 Psi	80 Psi & above	58 Psi	72 Psi	80 Psi	100 Psi
	4 bar	5 bar	5.5 bar	4 bar	5 bar	5.5 bar	7 bar
Valve Size							
1/4"-1/2"	C15	C15	C15	C20-2A2B	C20-2B	C15-1B2	C15-2
3/4"	C15	C15	C15	C20-2A2B	C20-2B	C20-2C	C15-2
1"	C20	C20	C15	C25-2A2B	C25-2B	C25-2C	C20-3
1 1/4"	C20	C20	C20	C25-2A2B	C25-2B	C25-2C	C25-3
1 1/2"	C25	C25	C20	C30-2A2B	C30-2B	C25-2C	C25-3
2"	C25	C25	C25	C30-2A2B	C30-2B	C30-2C	C30-3
2 1/2"	C30	C30	C30	C35-2A2B	C35-2B	C35-2C	C35-3
3"	C35	C35	C35	C45-2A2B	C45-2B	C45-2C	C35-3
4"	C45	C45	C45	C60-2A2B	C60-2B	C60-2C	C45-3
6"	C60	C60	C60	C75-2A2B	C75-2B	C75-2C	C60-3

PCTFE (C) Seats

AIR PRESS.	D/A ACTUATOR			S/R ACTUATOR			
	58 Psi	72 Psi	80 Psi & above	58 Psi	72 Psi	80 Psi	100 Psi
	4 bar	5 bar	5.5 bar	4 bar	5 bar	5.5 bar	7 bar
Valve Size							
1/4"-3/4"	C20	C20	C20	C20-2A2B	C20-2B	C20-2C	C20-3
1"-1 1/4"	C25	C25	C20	C30-2A2B	C30-2B	C25-2C	C25-3
1 1/2"	C30	C30	C25	C35-2A2B	C35-2B	C30-2C	C30-3
2"	C30	C30	C30	C35-2A2B	C35-2B	C35-2C	C35-3
2 1/2"	C35	C35	C30	C45-2A2B	C45-2B	C35-2C	C35-3
3"	C45	C45	C35	C60-2A2B	C60-2B	C45-2C	C45-3
4"	C60	C60	C45	C75-2A2B	C75-2B	C60-2C	C60-3
6"	C75	C75	C60	***	***	C75-2C	C75-3

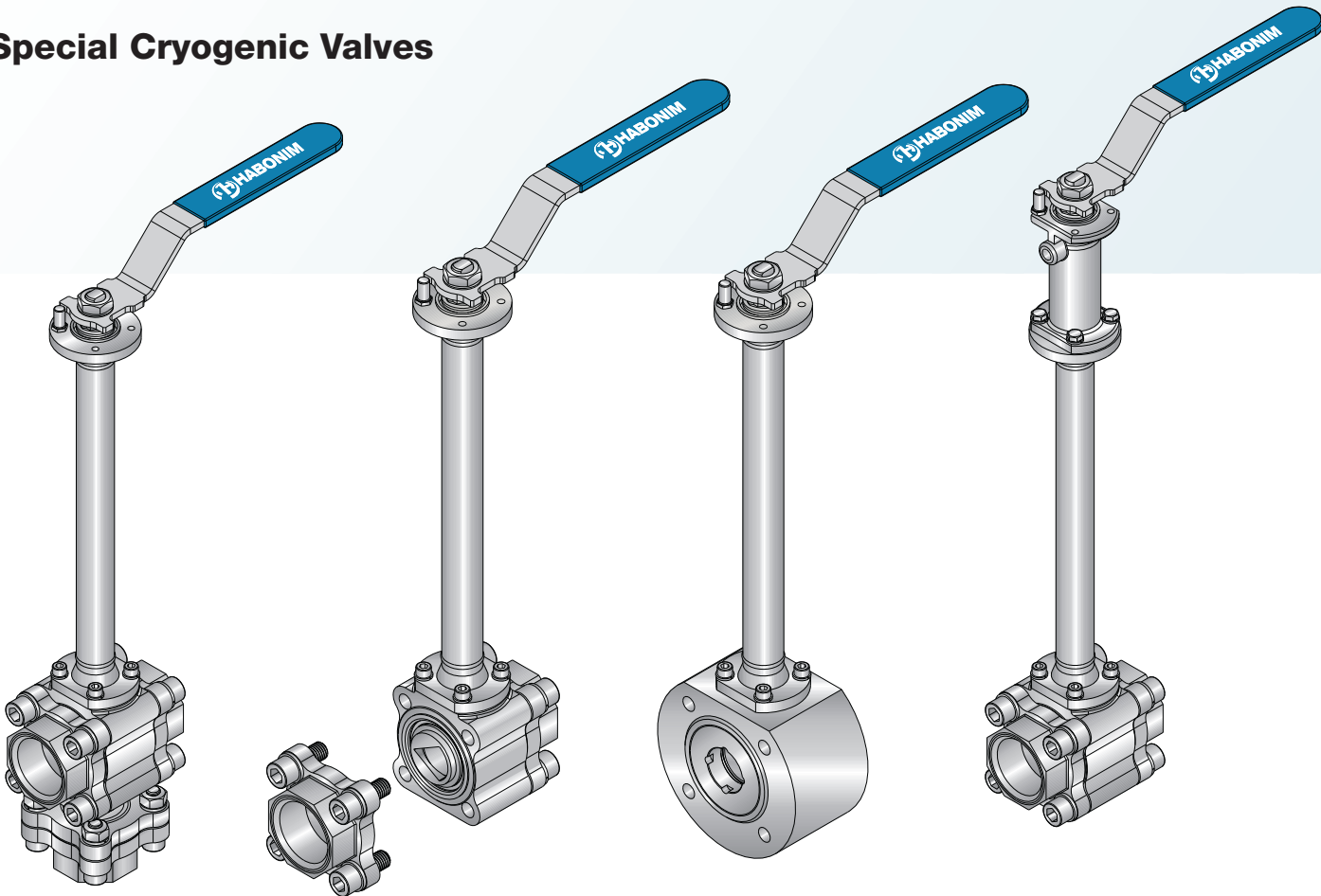
Cv/Kv - Flow coefficients

Valve Size	C47C		C31C, C32C		C73C, C74C, C77C, C78C	
	Cv	Kv	Cv	Kv	Cv	Kv
¼"	3	2.6	***	***	***	***
⅜"	5	4.3	***	***	***	***
½"	8	7	7	6	30	26
¾"	12	10	10	9	50	43
1"	32	28	30	26	100	86
1¼"	57	49	***	***	***	***
1½"	80	69	90	78	250	216
2"	104	90	130	112	480	414
2½"	240	207	***	***	***	***
3"	320	276	350	302	1300	1121
4"	580	500	720	621	2400	2069
4" F.B.	760	655	***	***	***	***
6"	820	707	880	758	5400	4655

Limit Stem Input Torque

Valve Size	316 S/S		17-4PH	
	Nm	In-Lb	Nm	In-Lb
¼"	13.2	117	91	800
⅜"	13.2	117	91	800
½"	13.2	117	91	800
¾"	13.2	117	91	800
1"	24.4	216	165	1460
1¼"	24.4	216	165	1460
1½"	48.6	430	268	2370
2"	48.6	430	268	2370
2½"	99	875	497	4400
3"	385	3400	1920	17000
4"	385	3400	1920	17000
4" F.B.	385	3400	1920	17000
6"	1570	13900	7500	66300

Special Cryogenic Valves



Diverter

Diverting cryogenic valves are available in bottom entry or side entry. The valves have balls with "T" or "L" port configurations.

Control

The ProfiX™ control valves are available in cryogenic applications giving the advantage of precise control with tight shutoff.

Wafer Style

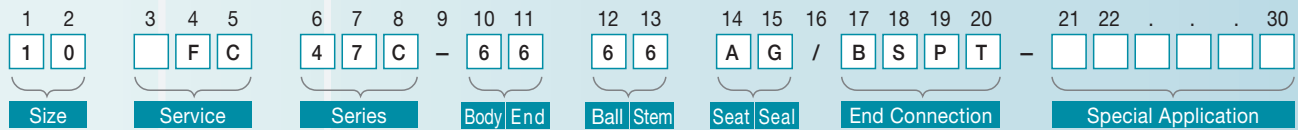
Habonim wafer style cryogenic valves offer an ideal economic solution for exotic materials.

Emission Control

Cryogenic valve is available with a Fugitive Emission Bonnet offering a high integrity solution for stem leakage of toxic gases or high cycle applications.

CRYOGENIC VALVES

How to order The HABONIM Cryogenic Ball Valve Identification Code



Size		
Code	inch	mm
02	¼"	6
03	3/8"	10
05	½"	15
07	¾"	20
10	1"	25
12	1¼"	32
15	1½"	40
20	2"	50
25	2½"	65
30	3"	80
40	4"	100
60	6"	150

Service	
B	Full bore
C*	Cryogenic
D	Diverter bottom entry
F	Firesafe
N	Control
S	Diverter side entry

Series	
47C	3 Piece Design
31C	ANSI 150
32C	ANSI 300
73C	ANSI 150 Full Bore
74C	ANSI 300 Full Bore
77C	PN16 Full Bore
78C	PN40 Full Bore
27C	3pc. High Pressure design

Body / End	
6	S. St. 316 (L)

Ball / Stem	
6	S. St. 316 (L)
M	S. St. 17-4PH

Seat	
A	TFM
C	PCTFE
P	NRG

Seal	
G	Expanded Graphite
T	PTFE

End Connection **	
BSPT	BS 21
DIN	DIN 2999 (BSPP)
NPT	B1.20.1
BW	Buttweld Sch 5, 10, 40, 80, 160
XBW	Extended Buttweld
SW	Socketweld
XSW	Extended Socket Weld
BWO	OD tube
ETO	Extended OD tube
SWO	Socketweld OD tube
TC	Tri-Clamp

Special Application	
VB30	Characterized control ball
NACE	Nace service
WR	DD Stem
FF	Flat Face

Flange connection	
150	ANSI 150 RF
300	ANSI 300 RF
PN16	DIN RF
PN40	DIN RF
600	ANSI 600 RF
900	ANSI 900 RF

All Habonim cryogenic valves come with an Anti-Static device and are assembled ready for Oxygen service as standard

* When using the prefix "C" the valve will always have a ball with pressure relief hole on the upstream side.
 ** Other end connection are available on request.

Standards of Compliance

Cryogenic valve design and test:	BS 6364 EN 12567 BS ISO 21011 & BS EN 1626 EN 1473 ISO 10497 API 607 5th Ed. NACE MR-0175 ISO15156-1/2/3	Specification for valves for cryogenic service Isolating valves for LNG (optional) Cryogenic vessels - Valves for cryogenic service Installation and equipment for liquefied natural gas Testing of valves Fire type-testing requirements (Upon request)
General valve design:	ANSI B16.10 ANSI B16.25 ANSI B16.34 ISO 17292	Face to face and end dimensions of valves Butt welding end of valves Valves - Flanged threaded and welding ends Anti-static
Quality Assurance	ISO9001-2008	
Certification:	PED 97/23/EC BS EN 10204	Module H 3.1/3.2 certification full material traceability (optional)

How to order

Ordering Example:

Cryogenic Valve:
10 C47C - 6666PT / BW

Size 1" (10), Cryogenic (C), 3-piece (47P), S.St Body (6)
 S.St Ends (6), S.St Ball (6), S.St Stem (6), NRG
 Seats (P), PTFE Body Seals (T), Buttweld ends (BW).

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In accordance with our policy to strive for continuous improvement of the product, we reserve the right to alter the dimensions, technical data and information included in this catalogue when required.

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