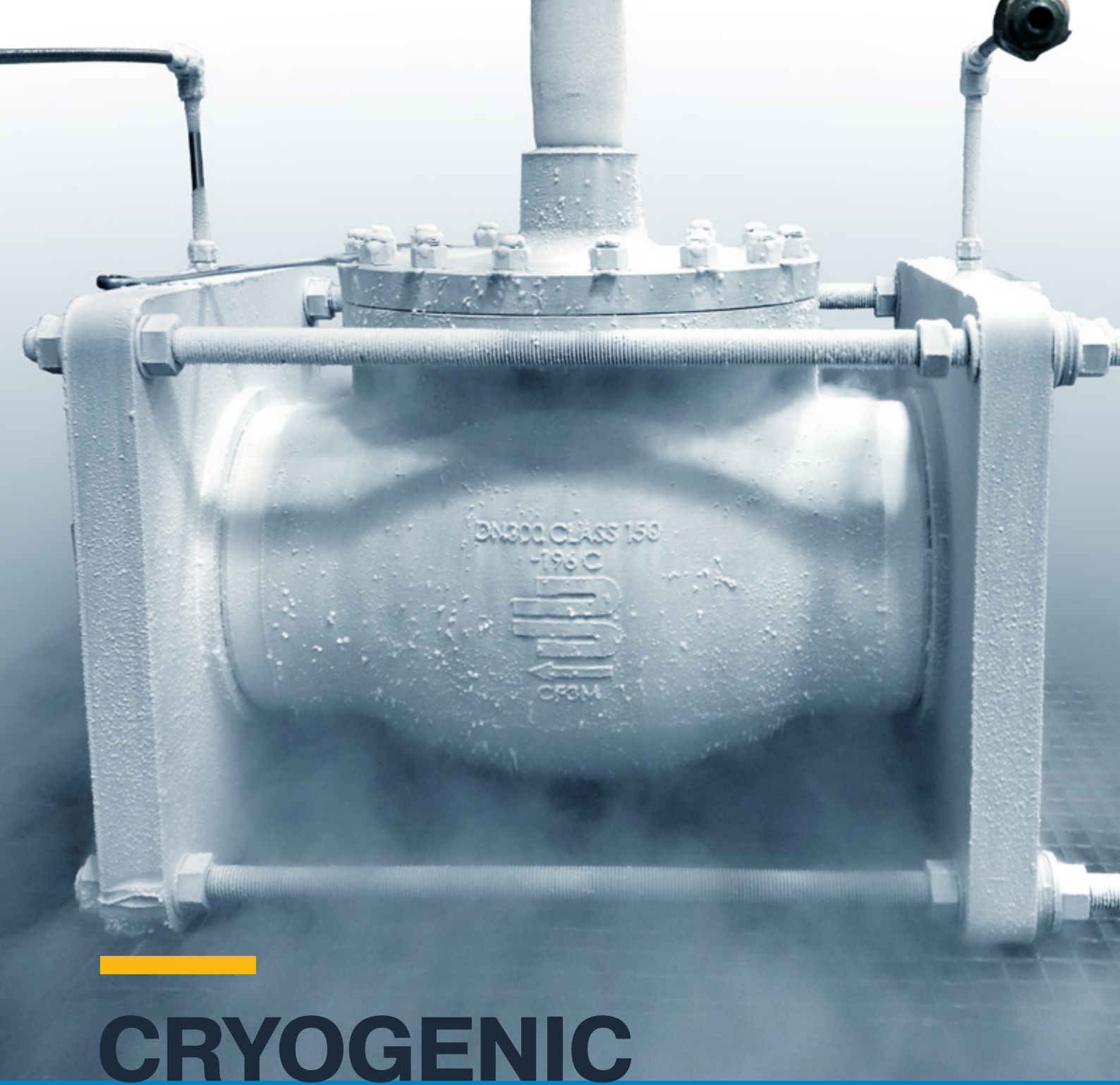


CRYOGENIC MARINE VALVES

Parker Bestobell Low Temperature Valves for Fuel Gas Supply Systems, Storage, Transportation and Production of Natural Gas and LNG.

Parker

SIMPLEX TURBULO

Contents

If you have questions about the products contained in this catalog, or their applications, please contact:
Instrumentation Products Division Europe
phone 0044 114 224 0000
parker.com/ipd

INTRODUCTION

Parker Bestobell is a global leader in the design and manufacture of high-performance cryogenic valves for **marine transportation, storage, and Fuel Gas Supply Systems (FGSS)** handling ultra-low temperature liquefied gases, principally Liquefied Natural Gas (LNG).

With over 150 years of manufacturing heritage and more than 50 years of expertise in cryogenic valve technology, Parker Bestobell has established itself as a trusted name in LNG flow control solutions. Our products are relied upon by leading gas companies, shipbuilders, and Original Equipment Manufacturers (OEMs) worldwide, delivering safe, efficient, and leak-free operation in the most demanding cryogenic environments.

Our comprehensive product range is Type-Approved by all major classification societies and is currently in service on **over 30% of all the global LNG carrier fleet***, as well as numerous low-and high-pressure FGSS installations.

Our products meet all relevant pressure and safety requirements of ASME B31.3 and BS EN 1626 cryogenic standards, with pressure ratings **up to Class 300** and valve bore sizes ranging **from DN15 (1/2") to DN350 (14").** For high-pressure FGSS applications, valves are available with ratings **up to Class 4500.**

Many of our valve designs result from close collaboration with customers to address specific technical and operational needs.

Parker's core philosophy is to deliver reliable, efficient, and cost-effective cryogenic equipment, purpose-built for each unique application.

Please note that due to our commitment to continuous product development, the information in this catalogue may be updated without prior notice. All dimensions provided are approximate and subject to change.

While every effort has been made to ensure this catalogue contains accurate and comprehensive product information, it remains the responsibility of the system designer or end user to ensure the chosen product is suitable for the intended application. For further assistance, please contact your local Parker representative.

With thousands of distributor outlets, Parker stores, and support personnel worldwide, we offer local availability backed by global expertise – ensuring reliable supply and service wherever your operations are located.

Over
200
Active LNG vessels
Operate with Parker Bestobell cryogenic valve technology*

* According to International Gas Union (IGU), the global LNG carrier fleet consisted of 701 active vessels as of the end of February 2024.

⚠ WARNING
The products described in this catalog can expose you to chemicals, including Lead, which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.p65warnings.ca.gov.

GENERAL TECHNICAL INFORMATION

Design

Parker Bestobell valves are specifically designed and engineered for use with Group 1 gases in Zone 1 explosive atmospheres.

All materials used in the valve construction offer full traceability, supported by BS EN 10204 3.1 and 3.2 certification.

The valve range is type-approved by leading Classification Societies, including Det Norske Veritas (DNV), Bureau Veritas (BV), American Bureau of Shipping (ABS), Lloyd's Register (LR) and Nippon Kaiji Kyokai (ClassNK), and is fully compliant with The International Code of the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk (IGC Code).

Code/Specification	Description
ASME B16.34	Valves Flanged, Threaded, and Welding End
ASME B16.5	Pipe Flanges & Flanged Fittings
ASME B31.3	Process Piping
BS EN 13648	Cryogenic vessels. Safety devices for protection against excessive pressure
BS EN 12266	Industrial valves. Testing of metallic valves. Pressure tests, test procedures and acceptance criteria
BS EN 1626	Cryogenic vessels. Valves for cryogenic service
BS EN 10204	Metallic Products: Types of Inspection Documents
ISO 21011	Cryogenic vessels: Valves for cryogenic service

Construction Materials

All materials are sourced from long-standing, reputable suppliers and conform not only to recognised national and international standards, but also to Parker's enhanced internal specifications. These additional requirements ensure material suitability and performance across a broad range of cryogenic and industrial applications.

To guarantee traceability and maintain the highest product integrity, a range of validation techniques - including Positive Material Identification (PMI) – is applied to all incoming material. Strict control is maintained through segregation, storage, and quality assurance processes, preserving material integrity throughout the manufacturing cycle.

Body material options

Material Group	Material Designator	UNS No.	ASTM Material Grade
Austenitic Stainless Steel	Valves Flanged & Threaded	S31600	A479 Gr 316 Flanged
	Welded	S31603	A479 Gr 316L Welded

All materials will meet (as applicable) the requirements of NACE MR0103/MR0175 and ISO 15156 and are further supplied in accordance with NORSOK M-650/M-630, as required.

Connections

Threaded Connections

Thread Type	Material Designator
NPT/National Pipe Taper	ANSI B1.20.1

Flanged Connections

Parker Bestobell cryogenic flanged valves are designed in accordance with ASME B16.5 and carry the corresponding pressure-temperature ratings of their flange end interfaces. Flange dimensions and pressure classes fully comply with ASME B16.5 specifications.

Pressure-temperature ratings for flanges ASME/ANSI B16.5

		-29 °C	100 °C	150 °C	200 °C
		-20 °F	212 °F	302 °F	392 °F
Flange Material	Class	Working Pressure PSI (Bar)			
A351 Gr. CF8M	Class 150	275 (19.0)	235 (16.2)	215 (14.8)	199 (13.7)
	Class 300	719 (49.6)	612 (42.2)	558 (38.5)	518 (35.7)

Welded Connections

Butt Weld: DN15 to DN350 butt weld end connections are manufactured in accordance with ASME/ANSI B16.25. The standard weld preparation is Schedule 10, with other schedules available upon request.

GENERAL TECHNICAL INFORMATION

Features

Carbon/Graphite Stem Packing

Parker Bestobell marine valves utilise soft graphite stem packings located between carbon load-spreading rings. The gland rings are isolated from cryogenic exposure by a gas pocket formed within upper extension tube, enhancing packing longevity.

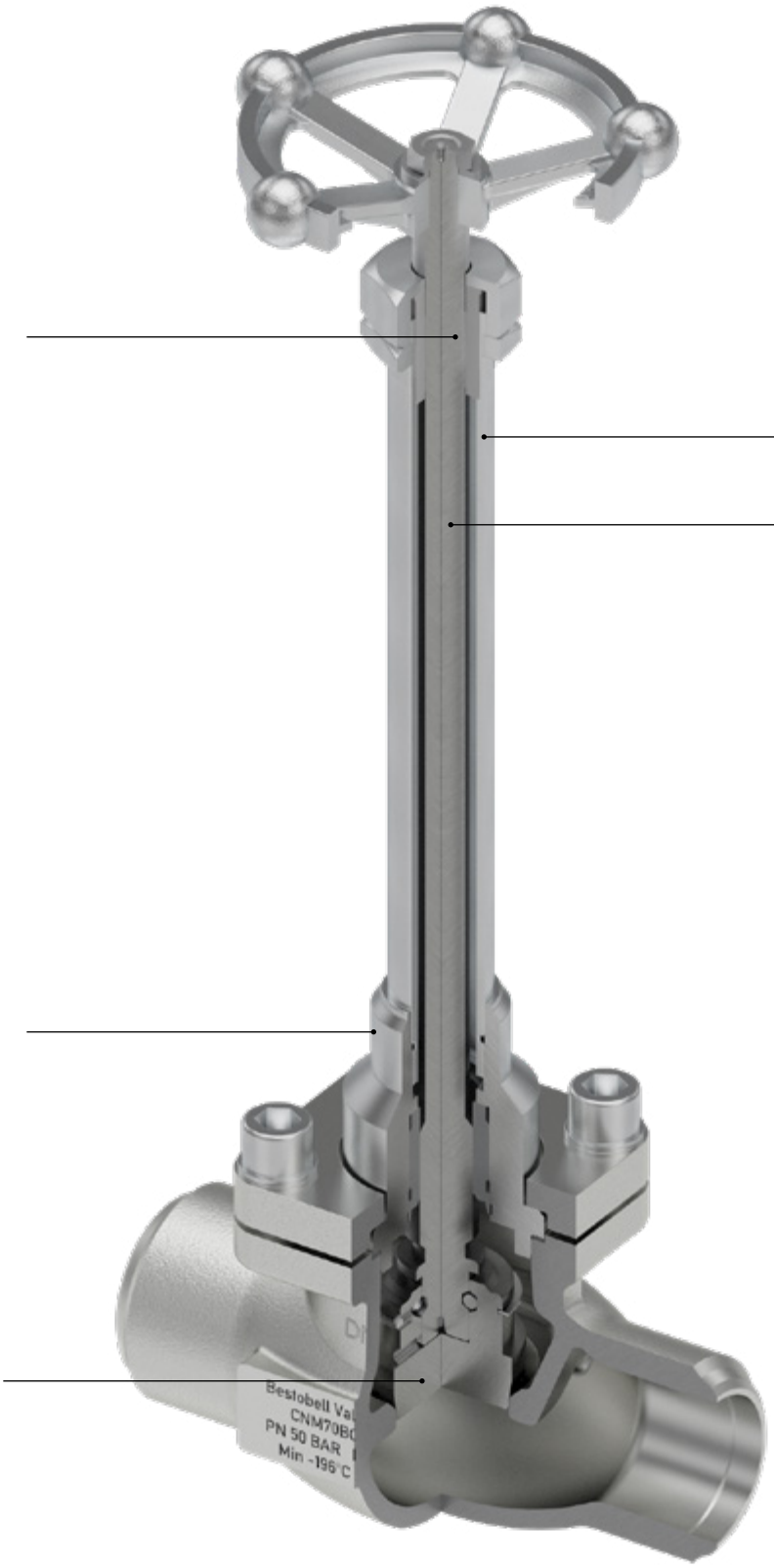
For optimal functionality, valves should be installed within +/- 45° of vertical. Any liquid ingress into the stem area is redirected into the process line, mitigating the risk of pressure build-up within the stem extension.

Independent Cover & Top Flange Assembly

Each valve incorporates a fully independent cover and top flange arrangement to ensure mechanical integrity and sealing reliability. The top flange is manufactured separately from the valve cover and assembled using preloaded securing bolts, which apply consistent compression to the sealing gasket. This configuration prevents gasket degradation and ensures long-term leak-tight performance in demanding service environments.

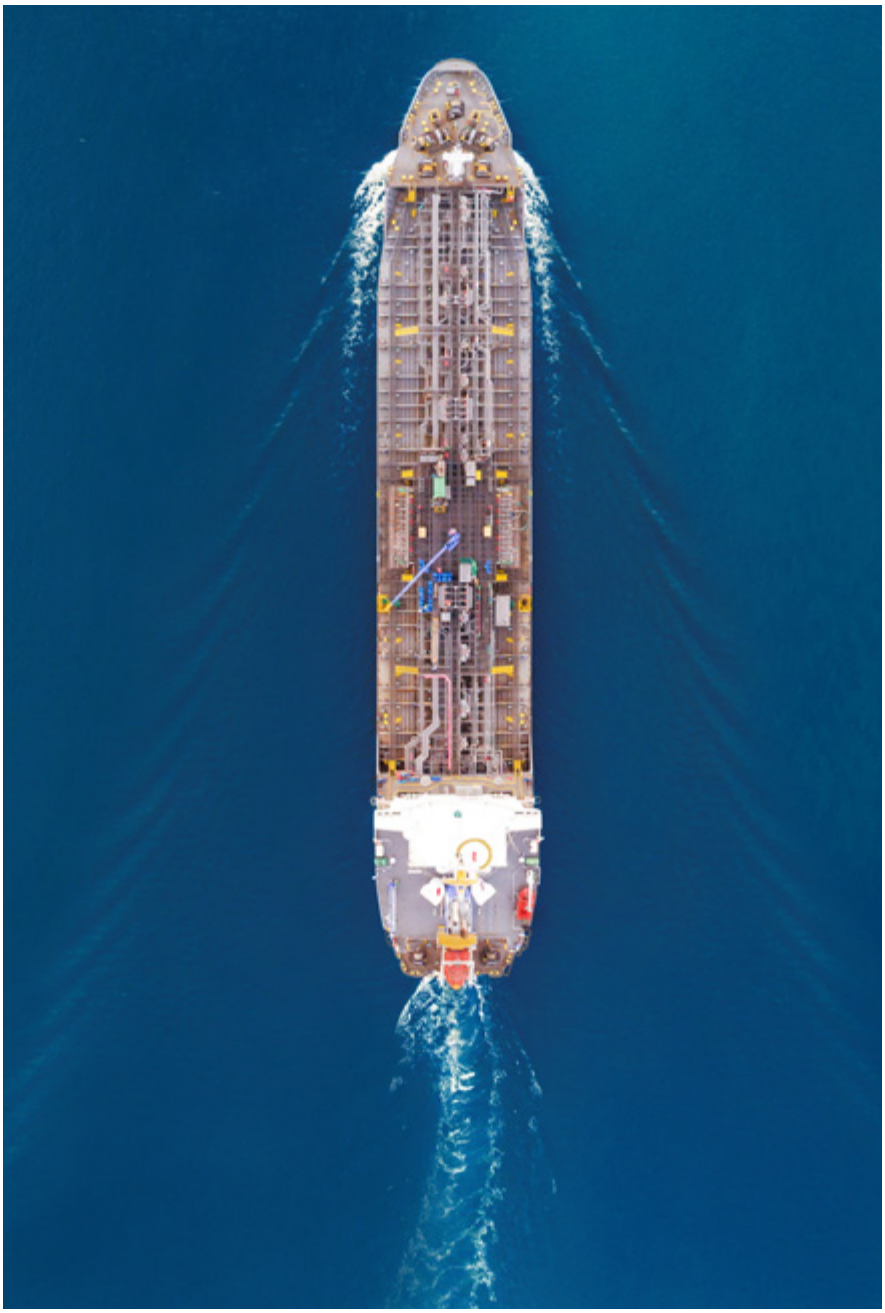
Floating Disc (Manual Valves)

Manual valves feature a free-rotating disc that maintains continuous contact with the sealing surface during operation. This design minimises wear and ensures a tight shut-off, supporting long-term, leak-tight service in LNG applications.



Robust Headworks Construction

- A stainless steel cover, threaded and welded to the stem extension, ensures precise alignment and structural integrity.
- A bearing insert between the stem and bush reduces friction and prevents galling, supporting smooth valve actuation and extended service life.
- The bolted bonnet design allows for efficient valve mounting and rapid disassembly when gas-free, streamlining installation and maintenance procedures.

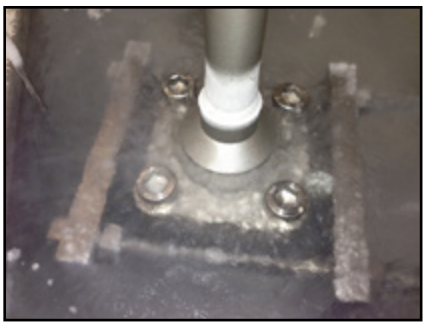


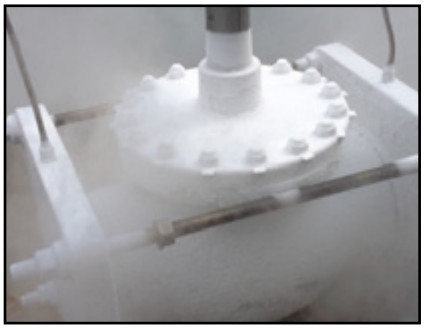
Anti-Blowout Stem Design

To prevent stem ejection under pressure during packing maintenance, the stem includes an integral blowout-prevention collar with a larger diameter than the stem shaft. This collar is retained by a machined shoulder in the valve cover. A precision-machined flat on the collar prevents cryogenic liquid entrapment, eliminating pressure spikes caused by thermal expansion.

Cryogenic Testing

Parker performs cryogenic testing by immersing valves in an insulated tank filled with liquid nitrogen at -196°C (-321°F). Shell leak and seat leakage tests are conducted using 100% helium as the tracer gas. All cryogenic testing is performed in accordance with the IGC Code and is witnessed by an authorised Class Society Surveyor. Upon successful completion, valves are issued an EN10204 3.2 certification, verifying compliance with the specified testing and inspection requirements.





GENERAL TECHNICAL INFORMATION

Cryogenic Product Range

Valve Type	Miniature Needle Globe Valve (MNGV)	Manual Globe Valve	Screw Down Non-Return Globe Valve (SDNR)	Pneumatically Actuated Globe Valve	Hydraulically Actuated Globe Valve
Series	CNM	CNM	CNM	CNM****M32	CNM****M39
Page Number	8	12	17	22	27
Size Range	DN15 & DN25	DN15-DN250	DN15-DN150	DN15 to DN200	DN25-DN350
Size Range (inch)	1/2" - 1"	1/2" - 10"	1/2" - 6"	1/2" - 8"	1" - 14"
Pressure Rating	Up to 50 bar (725 PSI)	Up to 50 bar (725 PSI)	Up to 50 bar (725 PSI)	Up to 50 bar (725 PSI)	Up to 50 bar (725 PSI)
End Connec-tions	NPT Butt Weld Flanged	Butt Weld Flanged	Butt Weld Flanged	Butt Weld Flanged	Butt Weld Flanged
Materials	Stainless Steel CF3M (Butt weld) Stainless Steel CF8M (Flanged)	Stainless Steel CF3M (Butt weld) Stainless Steel CF8M (Flanged)	Stainless Steel CF3M (Butt weld) Stainless Steel CF8M (Flanged)	Stainless Steel CF3M (Butt weld) Stainless Steel CF8M (Flanged)	Stainless Steel CF3M (Butt weld) Stainless Steel CF8M (Flanged)

Swing Check Valve	Lift Check Valve	Strainer	Float Level Isolation Valve (FLIV)
CHC	CGT	CS	CHF
32	37	42	46
DN25-DN350	DN15-DN200	DN15-DN100	DN150, DN200, DN300
1” - 14”	1/2” - 8”	1/2” - 4”	6” - 8”- 12”
Up to 50 bar (725 PSI)	Up to 50 bar (725 PSI)	Up to 50 bar (725 PSI)	1.5 bar
Butt Weld Flanged	Butt Weld Flanged	Butt Weld Flanged	Flanged
Stainless Steel CF3M (Butt weld) Stainless Steel CF8M (Flanged)	Stainless Steel CF3M (Butt weld) Stainless Steel CF8M (Flanged)	Stainless Steel CF3M (Butt weld) Stainless Steel CF8M (Flanged)	Stainless Steel CF8M (Flanged)

MINIATURE NEEDLE GLOBE VALVE (MNGV)

Overview

The Parker Bestobell Miniature Needle Globe Valve (MNGV) is a compact, stainless steel valve engineered for isolation and sampling in liquefied gas systems where extended stems are not required. Designed for both cryogenic and non-cryogenic service, the MNGV offers a tight shut-off via a conical metal seat and is ideal for space-constrained installations.

Its bolted bonnet design ensures ease of maintenance and reliable performance in demanding operating environments.

Functions:

- Media isolation
- Media flow control

Typical Applications:

- Transportation of liquefied gases
- Storage of liquefied gases
- Gas processing systems
- Instrumentation isolation

Valve size	DN15 & DN25
Maximum Working Pressure (MWP)	50 bar (725 PSI) dependent on end connections
Working temperature	-196°C to +200°C (-319°F to +392°F)
End connections	Butt Weld, Flanged or NPT (F)
Body materials	Stainless Steel CF3M or CF8M
Suitable for media type	Group 1 gases/liquefied gases
Design and testing standards	ASTM B31.1, BS EN 1626, BS ISO 21011 Optional full material traceability backed by BS EN 10204 3.1/3.2 certification
Type approvals	DNV, LR, ABS, BV, ClassNK
Extension lengths	100mm (DN15) 150mm (DN25)

Features, Benefits and Values

Feature	Benefit	Value
Bolted bonnet	Simplified maintenance access. Allows for thermal expansion and contraction at cryogenic temperatures. Eliminates leakage at the bonnet gasket.	Safety Reliability Ease of Operation
Anti-blowout stem	Stem collar prevents ejection under internal pressure. Flat on the integral collar prevents cryogenic liquid entrapment and pressure build-up during warming cycles.	Safety Reliability
Bearing material insert	Eliminates thread galling between stem and cover. Reduces actuation torque and wear.	Performance Reliability
Disc retention	The absence of threaded components provides total reliability in systems with vibration.	Safety Reliability

MNGV in DN15 size with butt weld ends and 100mm extension.

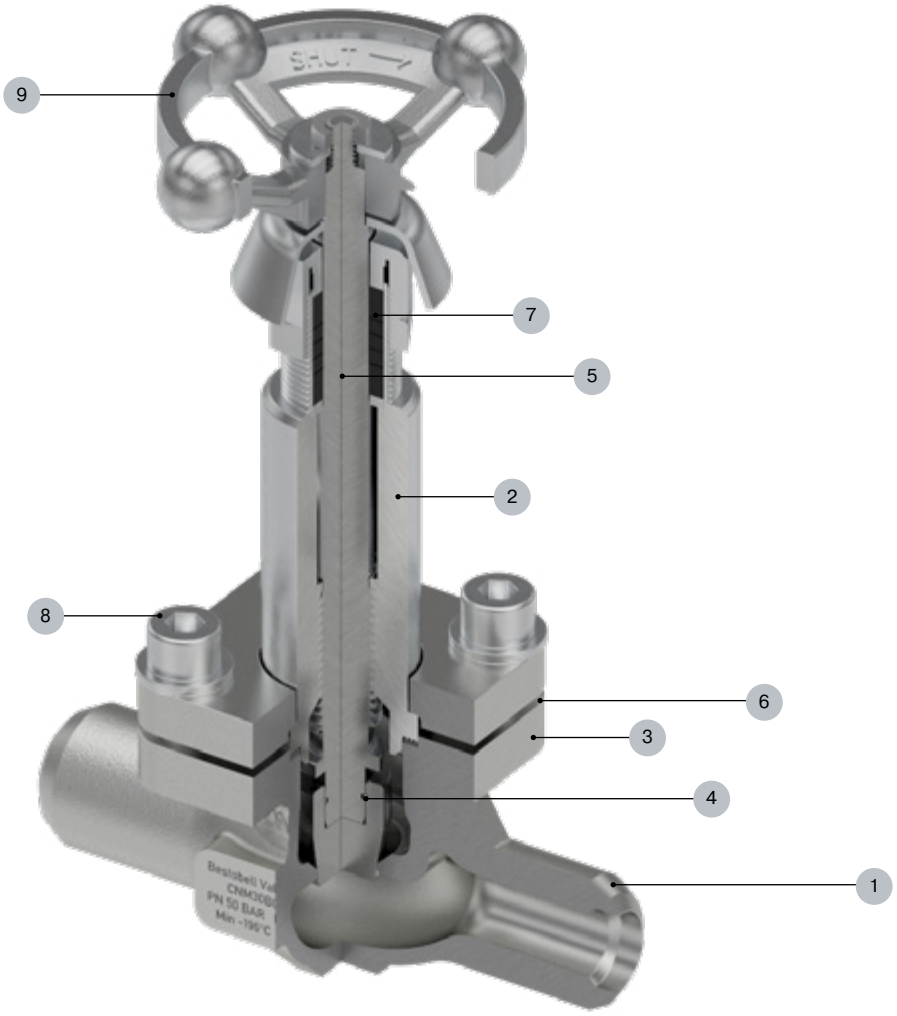
MNGV in DN25 size with flanged ends and 150mm extension.

MNGV in DN15 size with butt weld and flanged ends, and 100mm extension.

Technical Information

Bill of Materials

	Description	Material
1	Body	SS ASTM A351 CF3M / SS ASTM A351 CF8M
2	Cover	SS 316L BS EN 10088-3 1.4404 / SS ASTM A351 CF3M
3	Bonnet Flange	SS ASTM A351 CF8M
4	Disc	SS 316 BS EN 10088-3 1.4401 / SS ASTM A351 CF8M
5	Stem	SS 316 BS EN 10088-3 1.4401
6	Gasket	Reinforced Graphite
7	Gland Packing	Carbon / Graphite
8	Fasteners	SS A320 B8M / SS A194 8M
9	Handwheel	SS ASTM A351 CF8



Ordering Information

MNGV (DN15 & DN25)

CNM		30		BC		F2		D		1		M1		030	
Product		Valve Size		Inlet Connection		Outlet Connection		Bonnet Type		Extension Length		Seat Type		Working Pressure	
CNM	Cryogenic Globe Valve	**30**	DN15	**BB**	Butt Weld Schedule 10	**BB**	Butt Weld Schedule 10	**D**	Bolted	**1**	100mm (DN15)	**M1**	Metal/ Metal	**030**	19 bar
		50	DN25	**BC**	Butt Weld Schedule 40	**BC**	Butt Weld Schedule 40			**2**	150mm (DN25)			**070**	50 bar
				F2	ASME B16.5 Flanged Class 150	**F2**	ASME B16.5 Flanged Class 150								
				F4	ASME B16.5 Flanged Class 300	**F4**	ASME B16.5 Flanged Class 300								
				TE	NPTF	**TE**	NPTF								

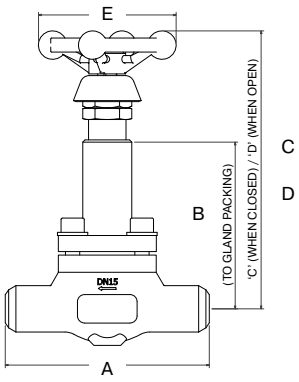
Notes:

1. If inlet and outlet connections are the same only enter inlet connection type.
2. Other end connections are available on request.

Specifications

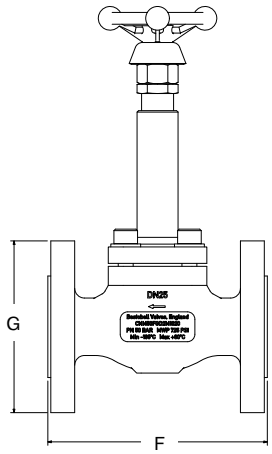
Butt Weld End Connections

		DN15	DN25
A	mm	114.5	140
B	mm	95	150
C	mm	156	215
D	mm	167	230
E	mm	77	80
Weight	kg	1.6	3.2



Flanged End Connections

			DN15	DN25
F	mm	Class 150	115	140
		Class 300	130	160
G	mm	Class 150	89	108
		Class 300	95	124
Flange Thickness	mm	Class 150	13	14.5
		Class 300	14	18
Weight	kg	Class 150	2.6	4.3
		Class 300	3	5



MANUAL GLOBE VALVE

Overview

The Parker Bestobell cryogenic stainless steel extended globe valves are engineered for zero-leakage performance, extended service life, and reduced maintenance cost in marine LNG applications. Designed in full compliance with IACS Class requirements, these valves provide secure media isolation and flow control in cryogenic environments.

Each valve features Parker Bestobell's unique independent bonnet and top flange arrangement, which eliminates the risk of leakage through the flange gasket and ensures consistent compression over long-term use. A three-stage stem packing system provides reliable atmospherics sealing, even under thermal cycling.

The floating disc design delivers tight shut-off across the seat, ensuring long-term sealing integrity and compliance with fire-safe standards. Nitronic® steel bushings are integrated into the headworks to deliver smooth stem actuation without galling.

The cone seat is engineered to deliver a drop-tight shut-off and is specifically designed to reduce the risk of ice build-up when moisture is present on the downstream side of the valve.

Parker Bestobell cryogenic globe valves are intended for vertical installation and should not be installed at an angle greater than 45° from the vertical position.

Functions:

- Media isolation
- Media flow control

Typical Applications:

- Cryogenic gas transportation systems
- LNG and liquefied gas storage
- Gas processing infrastructure

Valve size	DN15 - DN250
Maximum Working Pressure (MWP)	50 bar (725 PSI) dependent on end connections and size
Working temperature	-196°C to +200°C (-319°F to +392°F)
End connections	Butt Weld & Flanged
Body materials	Stainless Steel
Suitable for media type	Group 1 gases/liquefied gases
Design and testing standards	ASTM B31.1, BS EN 1626, BS ISO 21011 Optional full material traceability backed by BS EN 10204 3.1/3.2 certification
Approvals	DNV, LR, ABS, BV, ClassNK

Features, Benefits and Values

Feature	Benefit	Value
Bolted bonnet	Simplified maintenance access. Allows for thermal expansion and contraction at cryogenic temperatures. Eliminates leakage at the bonnet gasket.	Safety Reliability Ease of Operation
Anti-blowout stem	Stem collar prevents ejection under internal pressure. Flat on the integral collar prevents cryogenic liquid entrapment and pressure build-up during warming cycles.	Safety Reliability
Bearing material insert	Eliminates thread galling between stem and cover. Reduces actuation torque and wear.	Performance Reliability
Disc retention	The absence of threaded components provides total reliability in systems with vibration.	Safety Reliability
Extended stem design	Protects packings from cryogenic exposure. Supports easier access for operation and maintenance. Supports insulated and jacketed piping installations.	Performance Reliability Ease of Operation

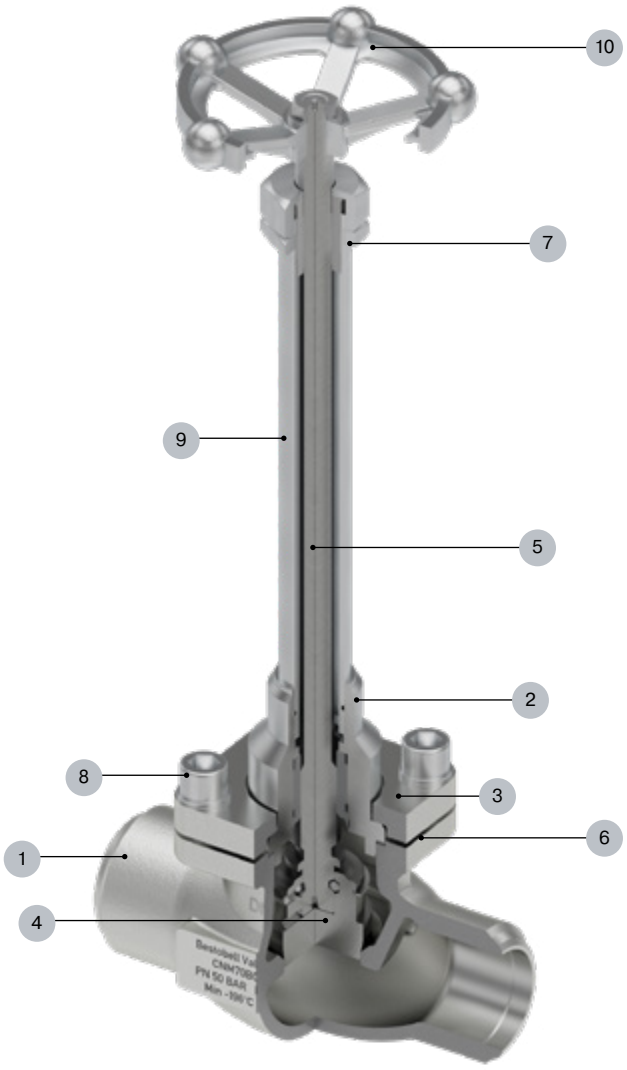
Cryogenic globe valve in DN200 size with flanged ends and 700mm extension.

Cryogenic globe valve in DN65 size with flanged ends and 300mm extension.

Technical Information

Bill of Materials

	Description	Material
1	Body	SS ASTM A351 CF3M / SS ASTM A351 CF8M
2	Cover	SS 316L BS EN 10088-3 1.4404 / SS ASTM A351 CF3M
3	Bonnet Flange	SS ASTM A351 CF8M
4	Disc	SS 316 BS EN 10088-3 1.4401 / SS ASTM A351 CF8M
5	Stem	SS 316 BS EN 10088-3 1.4401
6	Gasket	Reinforced Graphite
7	Gland Packing	Carbon / Graphite
8	Fasteners	SS A320 B8M / SS A194 8M
9	Extension Tube	SS ASTM A312 TP316L
10	Handwheel	SS ASTM A351 CF8



Ordering Information

Manual Globe Valves (DN15-DN80)

CNM		30		BB		D		6		M1		030	
Product		Valve Size		End Connection		Bonnet Type		Extension Length		Seat Type		Working Pressure	
CNM	Cryogenic Globe Valve	**30**	DN15	**BB**	Butt Weld Schedule 10	**D**	Bolted	**6**	300mm (DN15, DN50)	**M1**	Metal/ Metal	**030**	19 bar
		50	DN25	**BC**	Butt Weld Schedule 40			**4**	300mm (DN65, DN80)			**070**	50 bar
		70	DN40	**F2**	ASME B16.5 Flanged Class 150								
		80	DN50	**F4**	ASME B16.5 Flanged Class 300								
		90	DN65										
		A0	DN80										

Manual Globe Valves (DN100)

CNM		B0		B1		D		7		M1		030	
Product		Valve Size		End Connection		Bonnet Type		Extension Length		Seat Type		Working Pressure	
CNM	Cryogenic Globe Valve	**B0**	DN100	**B1**	Butt Weld Schedule 10	**D**	Bolted	**7**	400mm	**M1**	Metal/ Metal	**030**	19 bar
				B4	Butt Weld Schedule 40							**070**	50 bar
				F2	ANSI B16.5 Flanged Class 150								
				F4	ANSI B16.5 Flanged Class 300								

Manual Globe Valves (DN150-DN250)

CNM		D0		B1		D		9		M1		030	
Product		Valve Size		End Connection		Bonnet Type		Extension Length		Seat Type		Working Pressure	
CNM	Cryogenic Globe Valve	**D0**	DN150	**B1**	Butt Weld Schedule 10	**D**	Bolted	**9**	600mm (DN150)	**M1**	Metal/ Metal	**030**	19 bar
		E0	DN200	**B4**	Butt Weld Schedule 40			**D**	700mm (DN200)				
		F0	DN250	**FA**	ASME B16.5 Flanged Class 150			**D**	742mm (DN250)				

Notes:
Other end connections are available on request.

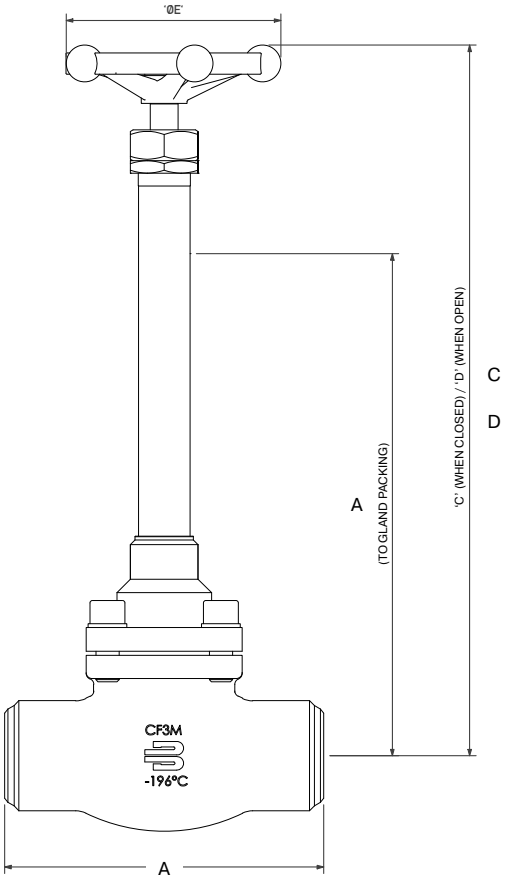
Specifications

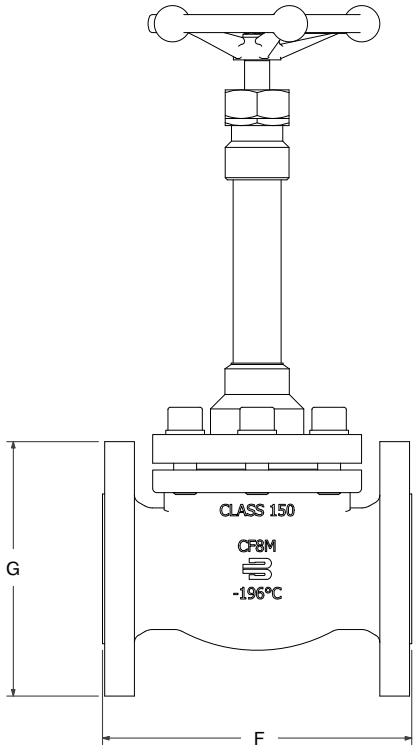
Butt Weld End Connections

		DN15	DN25	DN40	DN50	DN65	DN80	DN100	DN150	DN200
A	mm	114.5	140	165	203	216	241	292	406	495
B	mm	95	150	300	300	300	300	400	600	700
C	mm	156	215	367	376	395	407	577	931	1363
D	mm	167	230	386	401	420	439	614	1000	1363
E	mm	77	80	115	138	152	203	380	600	700
Weight	kg	1.6	3.2	5	8	12	16	54	135	230

Flanged End Connections

			DN15	DN25	DN40	DN50	DN65	DN80	DN100	DN150	DN200	DN250
F	mm	Class 150	115	140	165	203	216	243	350	406	495	622
		Class 300	130	160	200	230	290	310	350	N/A	N/A	N/A
G	mm	Class 150	89	108	127	152	177	190	229	280	343	406
		Class 300	95	124	155	165	191	210	254	N/A	N/A	N/A
Flange Thickness	mm	Class 150	13	14.5	17.5	19.05	22.3	24.8	24.8	25.4	28.4	30.2
		Class 300	14	18	20.5	22.35	25.4	28.4	31.75	N/A	N/A	N/A
Weight	kg	Class 150	2.6	4.3	5.5	12	16	22	50	150	230	310
		Class 300	3	5	8	14	18	25	55	N/A	N/A	N/A





SCREW DOWN NON-RETURN GLOBE VALVE (SDNR)

Overview

Parker Bestobell's stainless steel extended Screw Down Non-Return (SDNR) globe valves are designed to eliminate leakages, extend service life, and reduce spares and maintenance cost LNG operators. Fully compliant with classification society requirements, these valves deliver secure media control with reliable non-return functionality in demanding cryogenic conditions.

Available with flanged or butt weld ends, each valve incorporates Parker Bestobell's independent bonnet and flange assembly. This proven design removes the risk of flange gasket leakage. A triple-stage stem packing ensures zero atmospheric emissions.

The polished flat seat design features a PTFE-sealed disc that provides a secure, drop-tight non-return seal in the event of reverse flow. Manual actuation via a handwheel allows the valve to be locked in the closed position for positive isolation.

For optimal performance, SDNR globe valves are designed to be installed vertically and must not exceed 45° from vertical when mounted at an angle.

Functions:

- Media isolation
- Media control

Applications:

- Transportation of liquefied gases
- Storages of liquefied gases
- Gas processing

Valve size	DN15 - DN150
Maximum Working Pressure (MWP)	50 bar (725 PSI) dependent on end connections
Working temperature	-196°C to +200°C (-319°F to +392°F)
End connections	Butt Weld & Flanged
Body materials	Stainless Steel
Suitable for media type	Group 1 gases/liquefied gases
Design and testing standards	ASTM B31.1, BS EN 1626, BS ISO 21011 Optional full material traceability backed by BS EN 10204 3.1/3.2 certification
Approvals	DNV, LR, ABS, BV, ClassNK

Features, Benefits and Values

Feature	Benefit	Value
Bolted bonnet	Simplified maintenance access. Allows for thermal expansion and contraction at cryogenic temperatures. Eliminates leakage at the bonnet gasket.	Safety Reliability Ease of Operation
Anti-blowout stem	Stem collar prevents ejection under internal pressure. Flat on the integral collar prevents cryogenic liquid entrapment and pressure build-up during warming cycles.	Safety Reliability
Bearing material insert	Eliminates thread galling between stem and cover. Reduces actuation torque and wear.	Performance Reliability
Disc retention	The absence of threaded components provides total reliability in systems with vibration.	Safety Reliability
Extended stem design	Protects packings from cryogenic exposure. Supports easier access for operation and maintenance. Supports insulated and jacketed piping installations.	Performance Reliability Ease of Operation
Soft Seat	PTFE sealing ring ensures reliable non-return sealing.	Performance

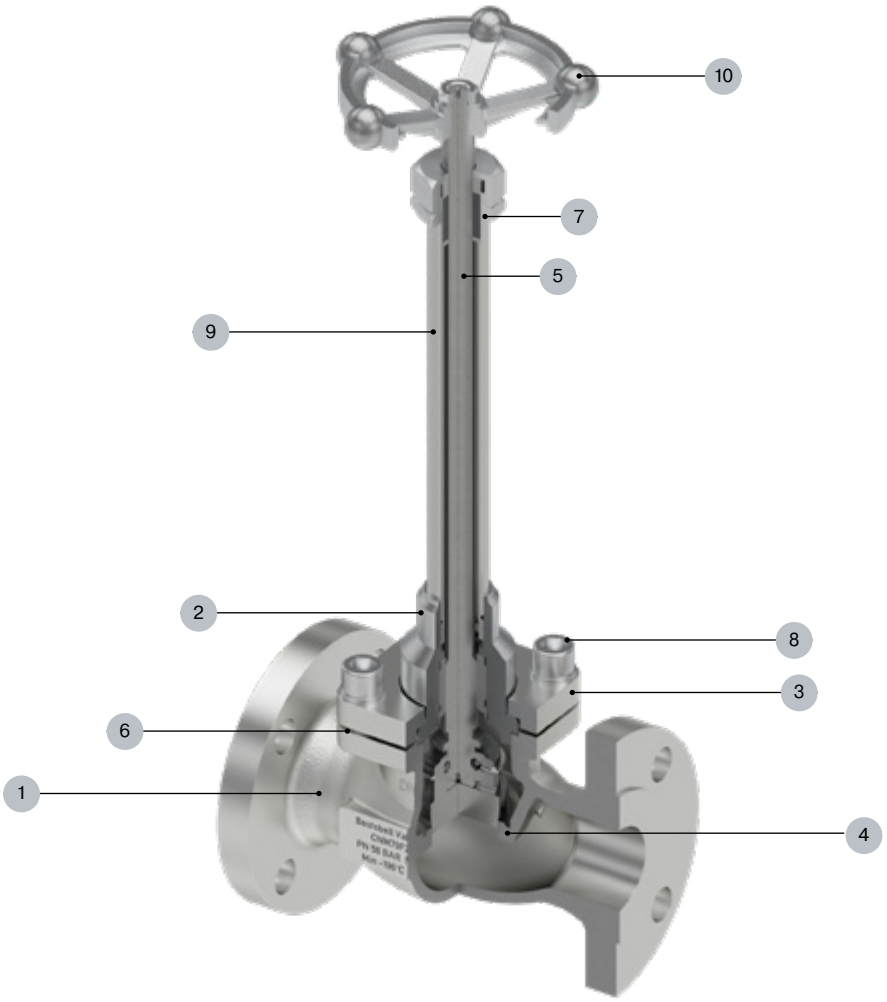
Cryogenic SDNR valve in DN25 size with flanged ends and 300mm extension.

Cryogenic SDNR valve in DN40 size with butt weld ends and 300mm extension.

Technical Information

Bill of Materials

	Description	Material
1	Body	SS ASTM A351 CF3M / SS ASTM A351 CF8M
2	Cover	SS 316L BS EN 10088-3 1.4404 / SS ASTM A351 CF3M
3	Bonnet Flange	SS ASTM A351 CF8M
4	Disc	SS 316 BS EN 10088-3 1.4401 / SS ASTM A351 CF8M
5	Stem	SS 316 BS EN 10088-3 1.4401
6	Gasket	Reinforced Graphite
7	Gland Packing	Carbon / Graphite
8	Fasteners	SS A320 B8M / SS A194 8M
9	Extension Tube	SS ASTM A312 TP316L
10	Handwheel	SS ASTM A351 CF8



Ordering Information

Screw Down Non-Return Valve (DN15-DN150)

CNM		30		BB		D		6		S2		030	
Product		Valve Size		End Connection		Bonnet Type		Extension Length		Seat Type		Working Pressure	
CNM	Cryogenic Globe Valve	**30**	DN15	**BB**	Butt Weld Schedule10	**D**	Bolted	**6**	300mm (DN15, DN50)	**S2**	PTFE Seal	**030**	19 bar
		50	DN25	**BC**	Butt Weld Schedule 40			**4**	300mm (DN65 DN80)			**070**	50 bar
		70	DN40	**F2**	ASME B16.5 Flanged Class 150			**7**	400mm (DN100)				
		80	DN50	**F4**	ASME B16.5 Flanged Class 300			**9**	600mm (DN150)				
		90	DN65										
		A0	DN80										
		B0	DN100										
		D0	DN150										

Notes:
Other end connections are available on request.

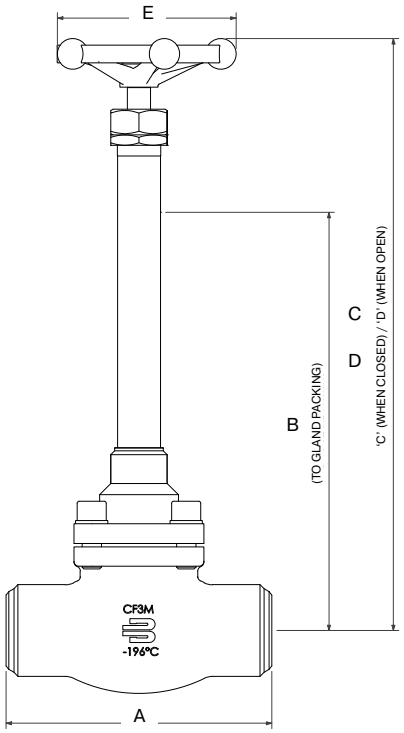
Specifications

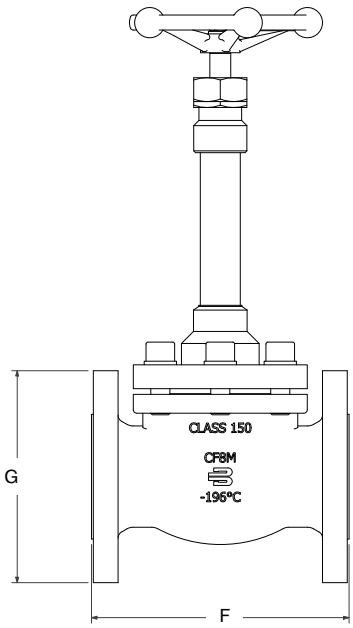
Butt Weld End Connections

		DN15	DN25	DN40	DN50	DN65	DN80	DN100	DN150
A	mm	114.5	140	165	203	216	241	292	406
B	mm	95	150	300	300	300	300	400	600
C	mm	156	215	367	376	395	407	577	931
D	mm	167	230	386	401	420	439	614	1000
E	mm	77	80	115	138	152	203	380	600
Weight	kg	1.6	3.2	5	8	12	16	54	135

Flanged End Connections

			DN15	DN25	DN40	DN50	DN65	DN80	DN100	DN150
F	mm	Class 150	115	140	165	203	216	243	350	406
		Class 300	130	160	200	230	290	310	350	N/A
G	mm	Class 150	89	108	127	152	177	190	229	280
		Class 300	95	124	155	165	191	210	254	N/A
Flange Thickness	mm	Class 150	13	14.5	17.5	19.05	22.3	24.8	24.8	25.4
		Class 300	14	18	20.5	22.35	25.4	28.4	31.75	N/A
Weight	kg	Class 150	2.6	4.3	5.5	12	16	22	50	150
		Class 300	3	5	8	14	18	25	55	N/A





PNEUMATICALLY ACTUATED GLOBE VALVE

Overview

Parker Bestobell's pneumatically actuated stainless steel extended globe valves are designed for automated control in marine LNG systems, offering high-integrity shut-off, long service life, and reduced operational costs. Fully complaint with classification society requirements, these vales are optimised for remote actuation and high cycle service in cryogenic environments where manual operation is impractical or restricted.

This range is supplied with pneumatic actuators, available in two configurations: corrosion-resistant stainless steel (fail-closed) or marine-grade pained (fail-open). Both variants are engineered for exposed deck conditions. A manual handwheel override is available on request.

Position control is managed via an integrated potentiometer, while open/close states are monitored using limit switches. Designed for both throttling and on/off duties.

All valves feature Parker Bestobell's proprietary independent bonnet and flange assembly, eliminating flange gasket leakage. A triple-stage stem packing ensures zero atmospheric emissions.

The valve's all-metal seat offers tight shut-off against the disc and complies with fire-safe standards for LNG applications. Nitronic® steel bushings deliver low-friction, galling-resistant performance.

These valves are designed for vertical installation and should not be mounted at angles less than 30° from horizontal.

Functions:

- Automated media isolation
- Automated throttling/flow regulation

Applications:

- Transportation of liquefied gases
- Storages of liquefied gases
- Gas processing

Valve size	DN15 to DN200
Maximum Working Pressure (MWP)	50 bar (725 PSI) dependent on end connections and DN size
Working temperature	-196°C to +200°C (-319°F to +392°F)
End connections	Butt Weld & Flanged
Suitable for media type	Group 1 gases/liquefied gases
Design and testing standards	ASTM B31.1, BS EN 1626, BS ISO 21011 Optional full material traceability backed by BS EN 10204 3.1/3.2 certification
Approvals	DNV, LR, ABS, BV, ClassNK

Features, Benefits and Values

Feature	Benefit	Value
Bolted bonnet	Simplified maintenance access. Allows for thermal expansion and contraction at cryogenic temperatures. Eliminates leakage at the bonnet gasket.	Safety Reliability Ease of Operation
Anti-blowout stem	Stem collar prevents ejection under internal pressure. Flat on the integral collar prevents cryogenic liquid entrapment and pressure build-up during warming cycles.	Safety Reliability
Bearing material insert	Eliminates thread galling between stem and cover. Reduces actuation torque and wear.	Performance Reliability
Disc retention	The absence of threaded components provides total reliability in systems with vibration.	Safety Reliability
Extended stem design	Protects packings from cryogenic exposure. Supports easier access for operation and maintenance. Supports insulated and jacketed piping installations.	Performance Reliability Ease of Operation
Stainless steel or marine painted actuator	Robust actuators for exposed ship deck conditions.	Performance

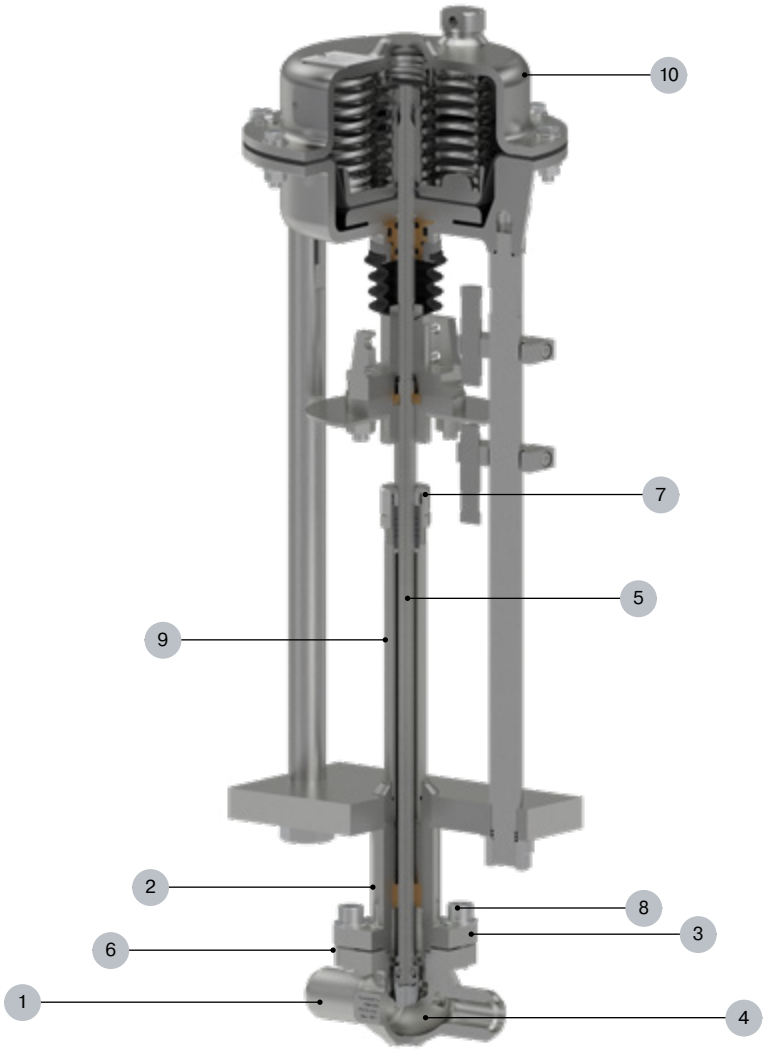
Cryogenic pneumatically actuated globe valve in DN40 size with flanged ends, 300mm extension, and 310mm actuator, fail-close.

Cryogenic pneumatically actuated globe valve in DN80 size with butt weld ends, 300mm extension, and 410mm actuator, fail-close.

Technical Information

Bill of Materials

	Description	Material
1	Body	SS ASTM A351 CF3M / SS ASTM A351 CF8M
2	Cover	SS 316L BS EN 10088-3 1.4404 / SS ASTM A351 CF3M
3	Bonnet Flange	SS ASTM A351 CF8M
4	Disc	SS 316 BS EN 10088-3 1.4401 / SS ASTM A351 CF8M
5	Stem	SS 316 BS EN 10088-3 1.4401
6	Gasket	Reinforced Graphite
7	Gland Packing	Carbon / Graphite
8	Fasteners	SS A320 B8M / SS A194 8M
9	Extension Tube	SS ASTM A312 TP316L
10	Actuator	Stainless Steel (fail-close) Marine painted carbon steel (fail-open)



Ordering Information

Pneumatically Actuated Globe Valve (DN15-DN80)

CNM		30		BB		D		6		M		322		10	
Product		Valve Size		End Connection		Bonnet Type		Extension Length		Seat Type		Actuation		Working Pressure	
CNM	Cryogenic Globe Valve	**30**	DN15	**BB**	Butt Weld Schedule 10	**D**	Bolted	**3**	230mm (DN15)	**M**	Metal/ Metal	**322**	Pneumatic Fail-Close	**10**	10 bar
		50	DN25	**BC**	Butt Weld Schedule 40			**6**	300mm (DN25-DN50)			**332**	Pneumatic Fail-Open	**30**	19 bar
		70	DN40	**F2**	ASME B16.5 Flanged Class 150			**4**	300mm (DN65, DN80)					**40**	21 bar
		80	DN50	**F4**	ASME B16.5 Flanged Class 300									**40**	25 bar
		90	DN65											**60**	40 bar
		A0	DN80											**70**	50 bar

Pneumatically Actuated Globe Valve (DN100-DN200)

CNM		D0		B1		D		7		M		322		10	
Product		Valve Size		End Connection		Bonnet Type		Extension Length		Seat Type		Actuation		Working Pressure	
CNM	Cryogenic Globe Valve	**B0**	DN100	**B1**	Butt Weld Schedule 10	**D**	Bolted	**7**	400mm (DN100)	**M**	Metal/ Metal	**322**	Pneumatic Fail-Close	**06**	6 bar
		D0	DN150	**B4**	Butt Weld Schedule 40			**D**	700mm (DN150)			**332**	Pneumatic Fail-Open	**10**	10 bar
		E0	DN200	**FA**	ASME Flanged CL150			**J**	700mm (DN200)					**19**	19 bar
				FC	ASME Flanged CL300										

Size	Butt weld	Max WP (Bar)	Class 150 FL	Class 300 FL	Class 150 Actuator	Class 300 Actuator	230mm ext	300mm ext	400mm ext	700mm ext	CV
DN15	✓	50	✓	✓	168mm	168mm	✓				3.5
DN25	✓	50	✓	✓	210mm	210mm		✓			13.4
DN40	✓	19	✓		310mm			✓			27
DN50	✓	19	✓		310mm			✓			49
DN65	✓	19	✓		310mm			✓			75
DN80	✓	10	✓		310mm			✓			108
DN80	✓	19	✓		410mm			✓			108
DN100	✓	25	✓	✓	410mm	TMA1.41			✓		198
DN150	✓	15	✓		TMA1.41					✓	385
DN200	✓	6	✓		TMA1.41					✓	715

Specifications

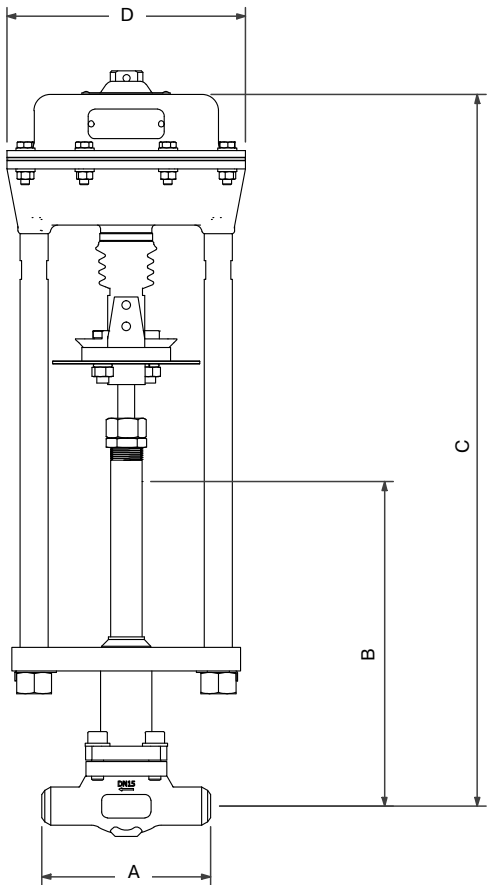
Butt Weld End Connections

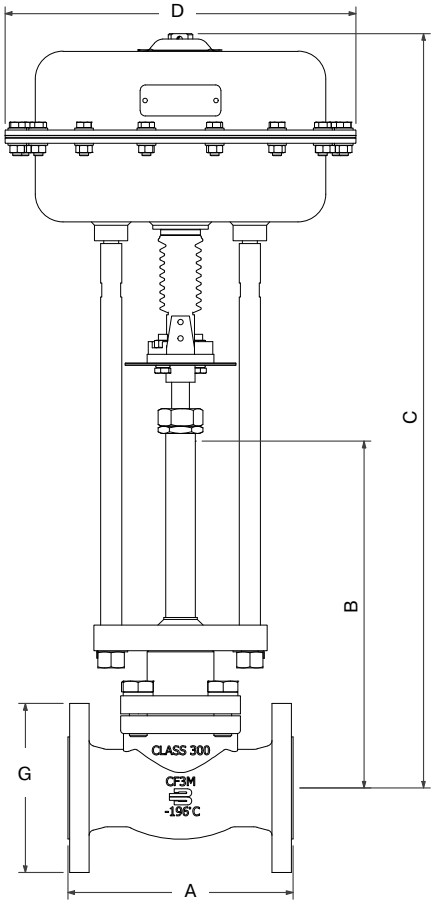
		DN15	DN25	DN40	DN50	DN65	DN80	DN100	DN150	DN200
A	mm	114.5	140	165	203	216	241	292	406	495
B	mm	230	300	300	300	300	300	400	700	700
C*	mm	500	639	630	678	662	703	870	1492	1751
D*	mm	162	212	316	316	316	316	420	415	415
Weight	kg	10	14	28	32	35	42	100	210	300

* Actuator may need to be upgraded when working at increased pressures.

Flanged End Connections – Class 150 and 300

			DN15	DN25	DN40	DN50	DN65	DN80	DN100	DN150	DN200
A	mm	Class 150	115	140	165	203	216	243	350	406	495
		Class 300	130	160	200	230	290	310	350	N/A	N/A
G	mm	Class 150	89	108	127	152	177	190	229	280	343
		Class 300	95	124	155	165	191	210	254	N/A	N/A
Flange Thickness	mm	Class 150	13	14.5	17.5	19.05	22.3	24.8	24.8	25.4	28.4
		Class 300	14	18	20.5	22.35	25.4	28.4	31.75	N/A	N/A
Weight	kg	Class 150	11	15	29	36	39	48	115	230	330
		Class 300	12.5	17	31	38	42	51	118	N/A	N/A





HYDRAULICALLY ACTUATED GLOBE VALVE

Overview

Parker Bestobell's hydraulically actuated stainless steel extended globe valves are engineered for high-integrity automated control in marine LNG systems, where precise flow regulation and dependable sealing are essential. These valves are designed to eliminate leakage, reduce maintenance intervals and ensure long service life under extreme cryogenic conditions - all in full compliance with classification society standards.

The valves are operated by a linear hydraulic actuator, suitable for both on/off and throttling applications. Position control is managed via an integrated potentiometer, with open/close signals provided via limit switches. Manual override is possible through dedicated hand pump ports.

All valves feature Parker Bestobell's proprietary independent bonnet and flange assembly, eliminating flange gasket leakage. A triple-stage stem packing ensures zero atmospheric emissions.

The valve's all-metal seat offers tight shut-off against the disc and complies with fire-safe standards for LNG applications. Nitronic® steel bushings deliver low-friction, galling-resistant performance.

These valves are designed for vertical installation and should not be mounted at angles less than 30° from horizontal.

Functions:

- Automated media isolation
- Hydraulic throttling/flow control

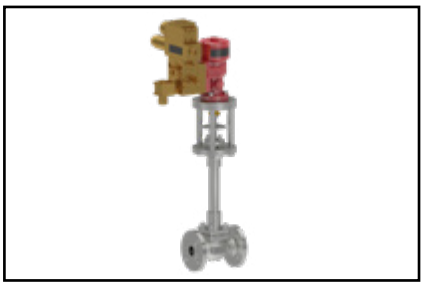
Applications:

- Transportation of liquefied gases
- Storages of liquefied gases
- Gas processing

Valve size	DN25 – DN350
Maximum Working Pressure (MWP)	50 bar (725 PSI) dependent on end connections
Working temperature	-196°C to +200°C (-319°F to +392°F)
End connections	Butt Weld & Flanged
Suitable for media type	Group 1 gases/liquefied gases
Design and testing standards	ASTM B31.1, BS EN 1626, BS ISO 21011 Optional full material traceability backed by BS EN 10204 3.1/3.2 certification
Approvals	DNV, LR, ABS, BV, ClassNK

Features, Benefits and Values

Feature	Benefit	Value
Bolted bonnet	Simplified maintenance access. Allows for thermal expansion and contraction at cryogenic temperatures. Eliminates leakage at the bonnet gasket.	Safety Reliability Ease of Operation
Anti-blowout stem	Stem collar prevents ejection under internal pressure. Flat on the integral collar prevents cryogenic liquid entrapment and pressure build-up during warming cycles.	Safety Reliability
Bearing material insert	Eliminates thread galling between stem and cover. Reduces actuation torque and wear.	Performance Reliability
Disc retention	Disc is threaded onto the stem and secured with a pin.	Safety Reliability
Extended stem design	Protects packings from cryogenic exposure. Supports easier access for operation and maintenance. Supports insulated and jacketed piping installations.	Performance Reliability Ease of Operation
Hydraulic actuation system	Lineal actuator for precision control. Internal non-return valve maintains actuator position under load. Adjustable actuation speed. Position indication via potentiometer; On/off status via limit switches. Manual hand pump ports allow local operation in case of hydraulic failure.	Performance Reliability



Cryogenic hydraulically actuated globe valve with flanged ends and 300mm extension.

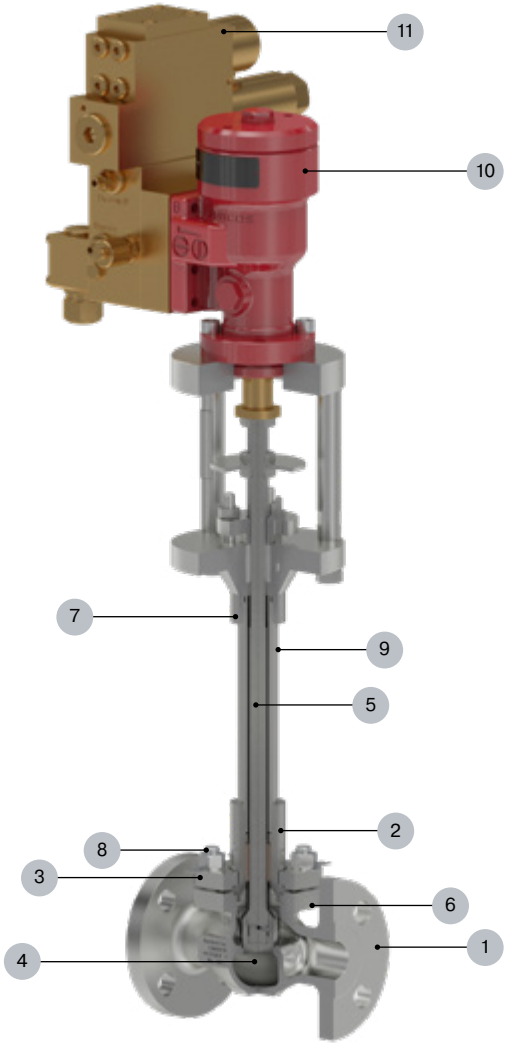
Cryogenic hydraulically actuated globe valve with butt weld ends and 300mm extension.

Cryogenic hydraulically actuated globe valve with flanged ends and 750mm extension.

Technical Information

Bill of Materials

	Description	Material
1	Body	SS ASTM A351 CF3M / SS ASTM A351 CF8M
2	Cover	SS 316L BS EN 10088-3 1.4404 / SS ASTM A351 CF3M
3	Bonnet Flange	SS ASTM A351 CF8M
4	Disc	SS 316 BS EN 10088-3 1.4401 / SS ASTM A351 CF8M
5	Stem	SS 316 BS EN 10088-3 1.4401
6	Gasket	Reinforced Graphite
7	Gland Packing	Carbon / Graphite
8	Fasteners	SS A320 B8M / SS A194 8M
9	Extension Tube	SS ASTM A312 TP316L
10	Actuator	Marine Painted Cast Iron
11	Hydraulic Block	Naval Brass



Ordering Information

Hydraulically Actuated Globe Valve (DN25-DN80)

CNM		50		BB		D		6		M		39		10	
Product		Valve Size		End Connection		Bonnet Type		Extension Length		Seat Type		Actuation		Working Pressure (Throttling Valves)	
CNM	Cryogenic Globe Valve	**50**	DN25	**BB**	Butt Weld Schedule 10	**D**	Bolted	**3**	230mm (DN15)	**M**	Metal/ Metal	**39**	Hydraulic	**10**	10 bar
		70	DN40	**BC**	Butt Weld Schedule 40			**6**	300mm (DN25, DN50)					**30**	19 bar
		80	DN50	**F2**	ASME B16.5 Flanged Class 150			**4**	300mm (DN65, DN80)					**70**	25 bar
		90	DN65	**F4**	ASME B16.5 Flanged Class 300									Working Pressure (On/Off valves)	
		A0	DN80											**11**	10 bar
														31	19 bar
														71	25 bar

Hydraulically Actuated Globe Valve (DN100-DN350)

CNM		D0		B1		D		D		M		39		10	
Product		Valve Size		End Connection		Bonnet Type		Extension Length		Seat Type		Actuation		Working Pressure (Throttling valves)	
CNM	Cryogenic Globe Valve	**B0**	DN100	**B1**	Butt Weld Schedule 10	**D**	Bolted	**7**	400mm (DN100)	**M**	Metal/ Metal	**39**	Hydraulic	**10**	10 bar
		D0	DN150	**B4**	Butt Weld Schedule 40			**D**	700mm (DN150)					**30**	19 bar
		E0	DN200	**FA**	ASME B16.5 Flanged Class 150			**J**	650mm (DN200)					Working Pressure (On/Off valves)	
		F0	DN250					**K**	750mm (DN250)					**11**	10 bar
		G0	DN300					**K**	750mm (DN300)					**31**	19 bar
		H0	DN350					**D**	710mm (DN350)					**71**	25 bar

Size	Butt weld	Class 150 FL	Class 300 FL	Emerson Actuator	Stroke (mm)	MWP Bar
DN25	✓	✓		KC65	15	19
DN40	✓	✓	✓	KC65	17	25
DN50	✓	✓	✓	KC65	17	25
DN65	✓	✓		KC125	24	19
DN80	✓	✓	✓	KC125	30	25
DN100	✓	✓		KC125	33	19
DN100	✓		✓	KC250	33	25
DN150	✓	✓		KC250	45	19
DN200	✓	✓		KC325	71	19
DN250	✓	✓		KC325	81	10
DN300	✓	✓		KC400	104	10
DN350	✓	✓		KC600	141	10

Specifications

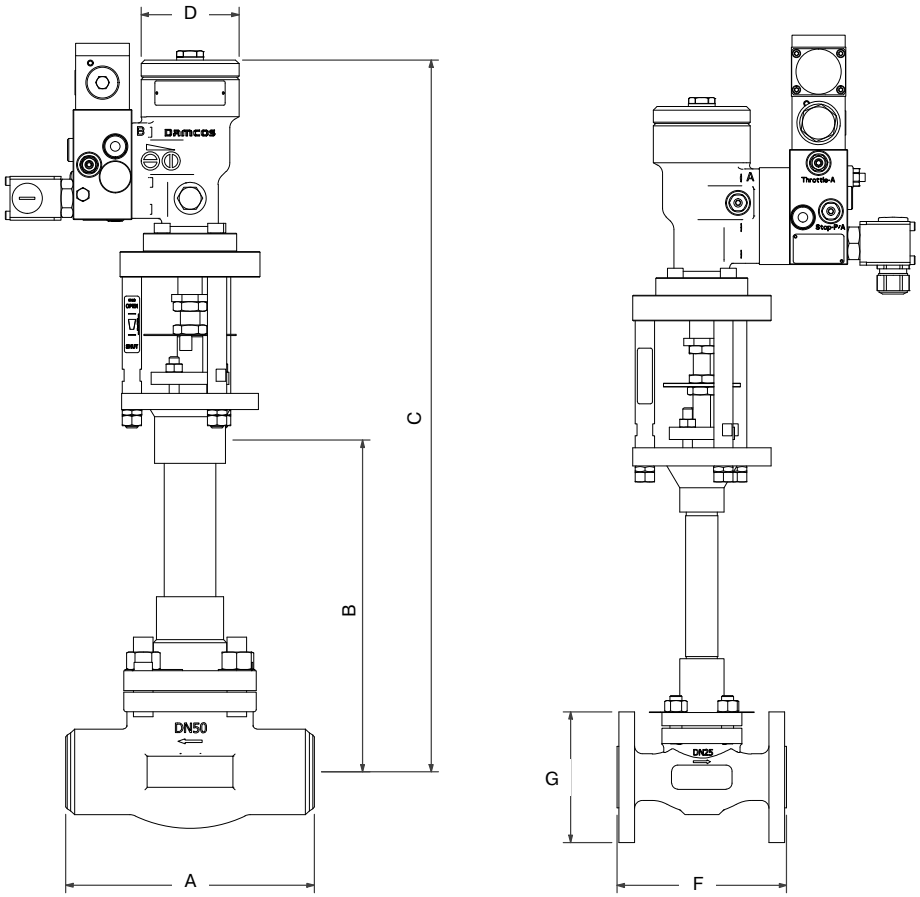
Butt Weld End Connections

		DN25	DN40	DN50	DN65	DN80	DN100	DN150	DN200	DN300
A	mm	140	165	203	216	241	292	406	495	698
B	mm	300	300	300	300	300	400	700	650	750
C*	mm	627	654	669	743	750	975	1288	1434	1600
D*	mm	80	80	80	98	98	150	150	175	240
Weight	kg	12	14	27	28	30	100	160	236	405

* Actuator may need to be upgraded when working at increased pressures.

Flanged End Connections – Class 150 and 300

			DN25	DN40	DN50	DN65	DN80	DN100	DN150	DN200	DN300
F	mm	Class 150	140	165	203	216	243	350	406	495	698
		Class 300	160	200	230	290	310	350	N/A	N/A	N/A
G	mm	Class 150	108	127	152	177	190	229	280	343	483
		Class 300	124	155	165	191	210	254	N/A	N/A	N/A
Flange Thickness	mm	Class 150	14.5	17.5	19.05	22.3	24.8	24.8	25.4	28.4	31.9
		Class 300	18	20.5	22.35	25.4	28.4	31.75	N/A	N/A	N/A
Weight	kg	Class 150	13	15	29	30	40	66	175	266	422
		Class 300	17	19	33	35	50	100	N/A	N/A	N/A



SWING CHECK VALVE

Overview

Parker Bestobell cryogenic swing check valves are engineered for backflow prevention in high-pressure LNG and cryogenic gas pipelines. Designed for high flow efficiency and operational reliability, these valves feature a full-bore design that minimises pressure drop while allowing maximum flow throughput.

The swing check mechanism provides automatic closure as forward pressure decreases, eliminating reverse flow without external actuation.

These valves are suitable for installation in both horizontal and vertical (upward flow) orientations. However, they are not recommended for use in systems with pulsating flow, as continuous disc oscillation can compromise seat integrity over time.

Functions:

- Non-return valve
- Backflow prevention

Applications:

- Transportation of liquefied gases
- Storages of liquefied gases
- Gas processing

Valve size	DN25 – DN350
Maximum Working Pressure (MWP)	50 bar (725 PSI) dependent on end connections
Working temperature	-196°C to +200°C (-319°F to +392°F)
End connections	Butt Weld & Flanged
Body materials	Stainless Steel
Suitable for media type	Group 1 gases/liquefied gases
Design and testing standards	ASTM B31.1, BS EN 1626, BS ISO 21011 Optional full material traceability backed by BS EN 10204 3.1/3.2 certification
Approvals	DNV, LR, ABS, BV, ClassNK

Features, Benefits and Values

Feature	Benefit	Value
Bolted bonnet	Simplified maintenance. Allows for thermal expansion and contraction at cryogenic temperatures. Eliminates leakage at the bonnet gasket.	Safety Reliability Ease of Operation
Internal swing mech-anism	Fully integrated hinge design within the valve body minimises potential leak paths.	Safety Reliability
PTFE sealing ring (DN25-DN300)	Fitted within a stainless steel disc delivers a secure seal with minimal pressure loss.	Reliability
Through-hole in a disc (DN350; on request)	Prevents pump dry-out in submerged LNG tank. (Valve design excludes PTFE seal).	Reliability
Offset disc centre of gravity	Ensures the valve closes fully when forward flow ceases.	Reliability
Unique cover design	Poka-yoke (error-proof) features prevent incorrect assembly. Flow direction arrow supports correct installation in the field.	Safety Ease to Operation

Cryogenic swing check valve in DN40 size with butt weld ends.

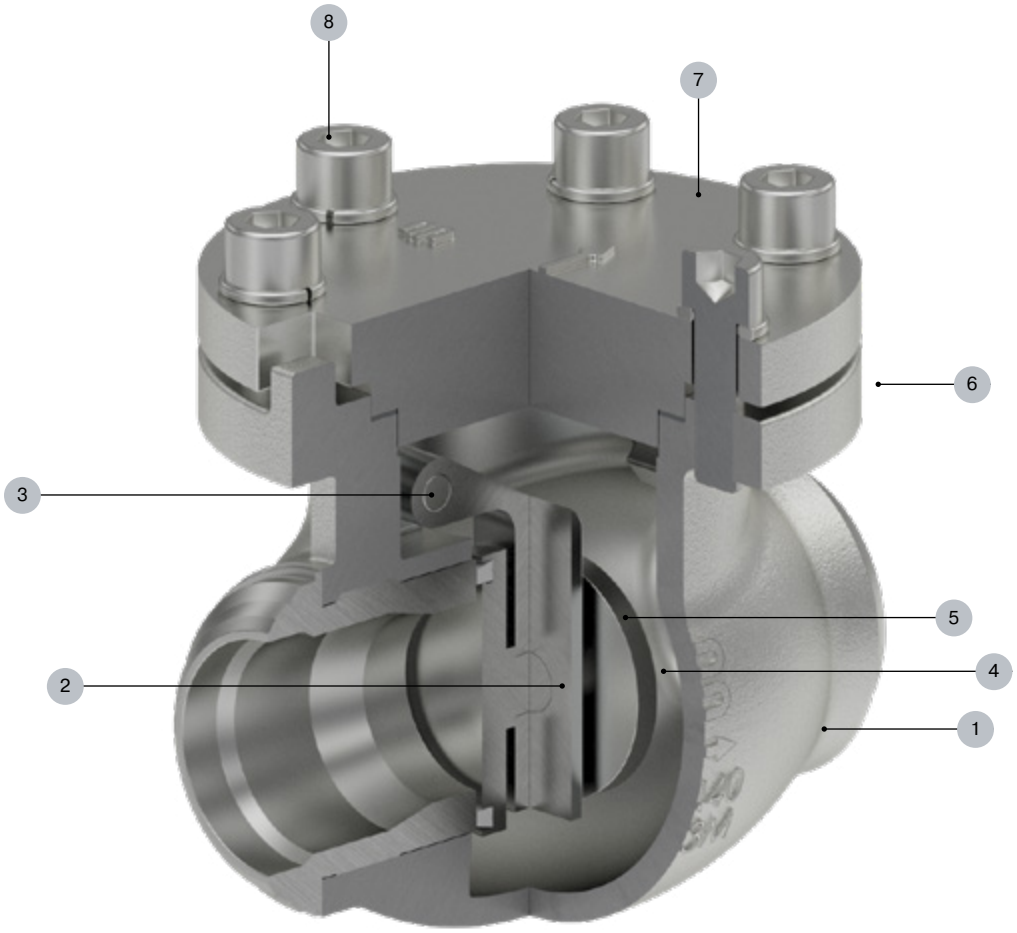
Cryogenic swing check valve in DN50 size with flanged ends.

Cryogenic swing check valve in DN300 size with butt weld ends.

Technical Information

Bill of Materials

	Description	Material
1	Body	SS ASTM A351 CF3M / SS ASTM A351 CF8M
2	Counter balance	SS 316 BS EN 10088-3 1.4401 / SS ASTM A351 CF8M
3	Hinge	SS 316 BS EN 10088-3 1.4401 / SS ASTM A351 CF8M
4	Disc	SS 316 BS EN 10088-3 1.4401 / SS ASTM A351 CF8M with PTFE Sealing ring
5	Seat	SS 316 BS EN 10088-3 1.4401 / SS ASTM A351 CF8M
6	Gasket	Reinforced Graphite
7	Cover	SS 316 BS EN 10088-3 1.4401 / SS ASTM A351 CF8M
8	Bolts /Fasteners	SS A320 B8M / SS A194 8M



Ordering Information

Swing Check Valve (DN25-DN100)

CHC		50		B1		30	
Product		Valve Size		End Connection		Working Pressure	
CHC	Cryogenic Swing Check Valve	**50**	DN25	**B1**	Butt Weld Schedule 10	**30**	19 bar
		70	DN40	**B4**	Butt Weld Schedule 40	**70**	50 bar
		80	DN50	**F2**	ASME B16.5 Flanged Class 150		
		90	DN65	**F4**	ASME B16.5 Flanged Class 300		
		A0	DN80				
		B0	DN100				

Swing Check Valve (DN150-DN350)

CHC		50		B1		30	
Product		Valve Size		End Connection		Working Pressure	
CHC	Cryogenic Swing Check Valve	**D0**	DN150	**B1**	Butt Weld Schedule 10	**30**	19 bar
		E0	DN200	**B4**	Butt Weld Schedule 40		
		F0	DN250	**FL**	ANSI B16.5 Class 150 Flanged		
		G0	DN300				
		H0	DN350				

Size	BW	Flange Class 150	Flange Class 300	MWP Bar	Cv US Galls/Min
DN25	✓	✓	✓	50	20.4
DN40	✓	✓	✓	50	48
DN50	✓	✓	✓	50	90
DN65		✓		19	147
DN80	✓	✓		19	283
DN100		✓		19	380
DN150	✓	✓		19	810
DN200	✓	✓	✓	25	2282
DN250		✓		19	3500
DN300	✓	✓		19	3755
DN350		✓		19	4422

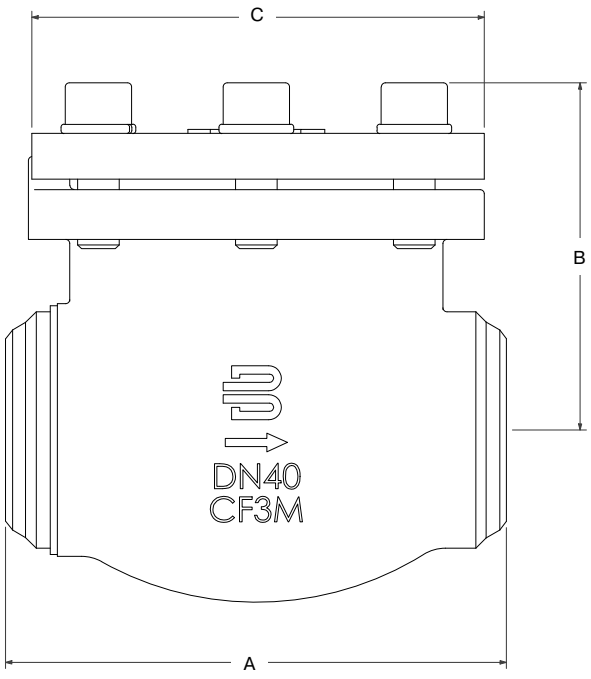
Specifications

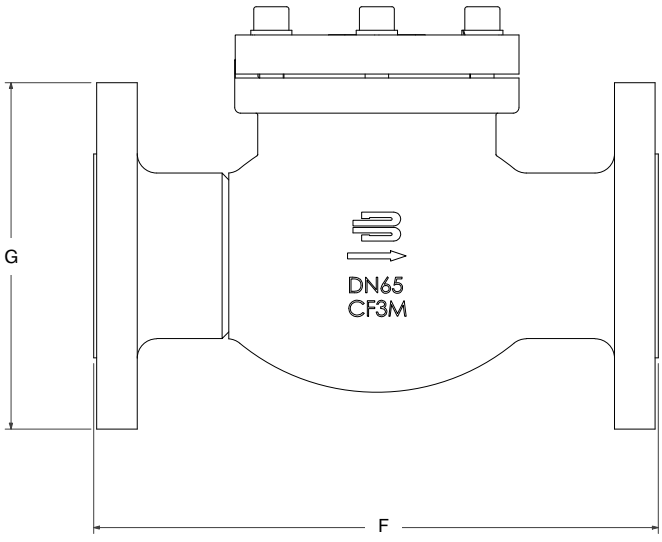
Butt Weld End Connections

		DN25	DN40	DN50	DN65	DN80	DN100	DN150	DN200	DN250	DN300	DN350
A	mm	92	121	146	N/A	260	N/A	406	N/A	N/A	N/A	N/A
B	mm	76	84	106	128	130	200	217	258	295	337	391
C	mm	74	110	125	146	155	255	285	366	440	505	575
Weight	kg	2	4	6	N/A	18	N/A	64	N/A	N/A	N/A	N/A

Flanged End Connections

			DN25	DN40	DN50	DN65	DN80	DN100	DN150	DN200	DN250	DN300	DN350
F	mm	Class 150	127	200	203	290	241	356	406	495	622	698	787
		Class 300	208	241	267	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
G	mm	Class 150	108	127	152	178	190	228	279	343	406	483	533
		Class 300	123	155	165	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Flange Thickness	mm	Class 150	11	19.1	19.1	22.4	23.8	23.8	25.4	28.4	30.2	31.8	35
		Class 300	17.5	21	22.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Weight	kg	Class 150	2.5	7.2	8	20	22	60	64	120	186	255	345
		Class 300	4	8.5	9.5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A





LIFT CHECK VALVE

Overview

Parker Bestobell cryogenic lift check valves are designed for backflow prevention in high-pressure LNG and cryogenic gas pipelines.

These valves operate by allowing media to enter below the seat, lifting the disc upward under pressure. Once the inlet pressure drops or flow reverses, the disc reseats automatically, sealing the valve and preventing reverse flow.

Each valve features a flat seat with a PTFE-sealed disc, delivering reliable sealing performance with minimal pressure loss.

These lift check valves are suited to horizontal pipe runs with upward flow. For vertical installations, a spring-assisted design is required to ensure reliable disc lift against gravity. The internal guideway ensures that the disc travels in a strictly vertical path, allowing precise reseating and tight shut-off.

Functions:

- Non-return valve
- Backflow prevention

Applications:

- Transportation of liquefied gases
- Storages of liquefied gases
- Gas processing

Valve size	DN15 – DN200
Maximum Working Pressure (MWP)	50 bar (725 PSI) dependent on end connections
Working temperature	-196°C to +200°C (-319°F to +392°F)
End connections	Butt Weld, Flanged
Body materials	Stainless Steel
Suitable for media type	Group 1 gases/liquefied gases
Design and testing standards	ASTM B31.1, BS EN 1626, BS ISO 21011 Optional full material traceability backed by BS EN 10204 3.1/3.2 certification
Approvals	DNV, LR, ABS, BV, ClassNK

Features, Benefits and Values

Feature	Benefit	Value
Bolted bonnet	Simplified maintenance. Allows for thermal expansion and contraction at cryogenic temperatures. Eliminates leakage at the bonnet gasket	Safety Reliability Ease to Operation
Replaceable disc and seal	Reduced lifecycle cost. Ease of maintenance.	Performance
Flat seat with PTFE-sealed disc	Ensures tight shut-off under backflow conditions. PTFE seal delivers reliable sealing	Safety Performance
Full bore design	Supports high flow rates with minimal pressure drop. Increases media velocity.	Reliability

Cryogenic lift check valve in DN40 size with flanged ends.

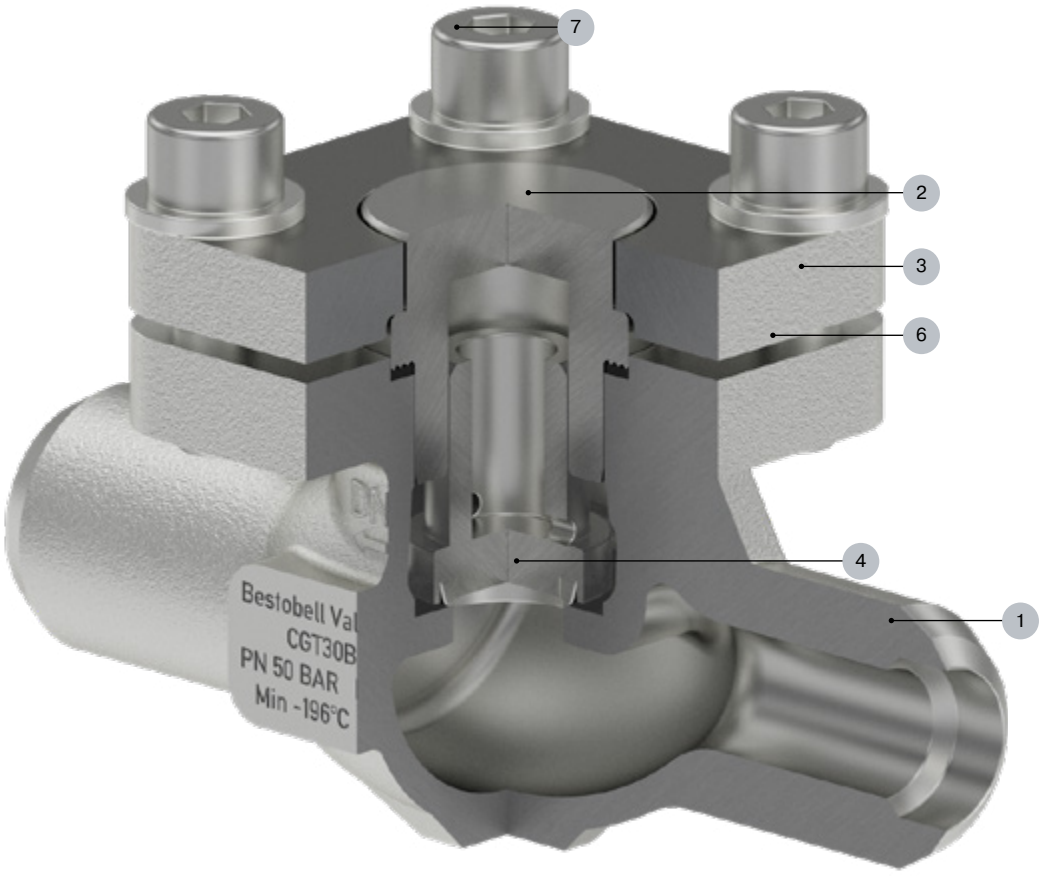
Cryogenic swing check valve in DN50 size with butt weld ends.

Cryogenic swing check valve in DN150 size with butt weld ends.

Technical Information

Bill of Materials

	Description	Material
1	Body	SS ASTM A351 CF3M / SS ASTM A351 CF8M
2	Cover	SS 316L BS EN 10088-3 1.4404 / SS ASTM A351 CF3M
3	Bonnet Flange	SS ASTM A351 CF8M
4	Disc	SS 316 BS EN 10088-3 1.4401 / SS ASTM A351 CF8M with PTFE Seal
5	Gasket	Reinforced Graphite
6	Fasteners	SS A320 B8M / SS A194 8M



Ordering Information

Lift Check Valve (DN15-DN150)

CGT		50		BB		R		SS		70	
Product		Valve Size		End Connection		Seat		Seal		Working Pressure	
CGT	Cryogenic Lift Check Valve	**30**	DN15	**BB**	Butt Weld Schedule 10	**R**	Raised	**SS**	PTFE		19 bar
		50	DN25	**BC**	Butt Weld Schedule 40					**70**	50 bar
		70	DN40	**F2**	ANSI B16.5 Flanged Class 150						
		80	DN50	**F4**	ANSI B16.5 Flanged Class 300						
		90	DN65								
		A0	DN80								
		B0	DN100								
		D0	DN150								

Lift Check Valve (DN200)

CGT		E0		B1		CS		30	
Product		Valve Size		End Connection		Seat		Working Pressure	
CGT	Cryogenic Lift Check Valve	**E0**	DN200	**B1**	Butt Weld Schedule 10	**CS**	Cone	**30**	19 bar
				B4	Butt Weld Schedule 40				
				FL	ASME B16.5 Flanged Class 150				

Notes:
1. Standard working pressure = 19 bar. If 50 bar is required add “70” at the end of the part number.
2. Inlet and outlet connections must be of the same type.
3. Other end connections are available on request.

Size	BW	Flange Class 150	Flange Class 300	MWP Bar	Cv US Galls/Min
DN15	✓	✓	✓	50	3.4
DN25	✓	✓	✓	50	13.2
DN40	✓	✓	✓	50	26.5
DN50	✓	✓	✓	50	47
DN65	✓	✓		19	75
DN80	✓	✓	✓	50	108
DN100	✓	✓		19	198
DN150	✓	✓	✓	25	415
DN200	✓	✓		19	715

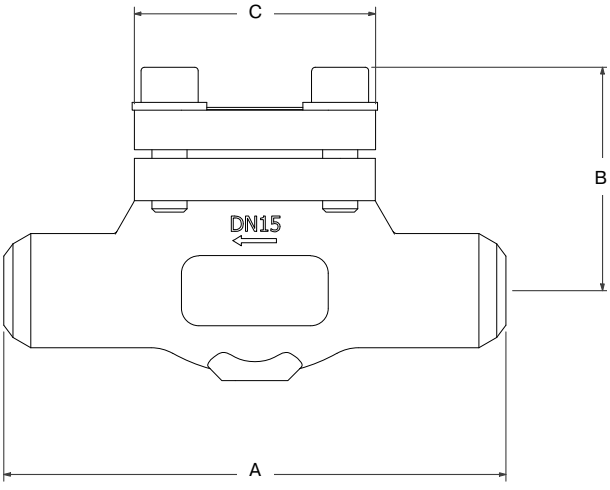
Specifications

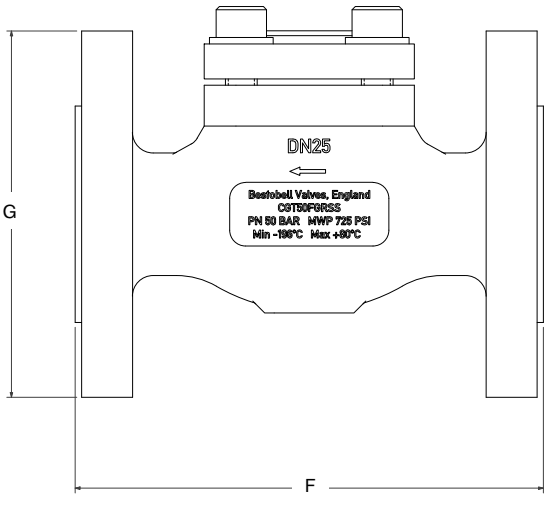
Butt Weld End Connections

		DN15	DN25	DN40	DN50	DN65	DN80	DN100	DN150	DN200
A	mm	114.5	140	165	203	216	241	292	406	495
B	mm	51	66	87	109	113	122	177	230	406
C	mm	55	66	81	108	146	160	230	280	365
Weight	kg	1	2	4	6.5	9	12	35	82	140

Flanged End Connections

			DN15	DN25	DN40	DN50	DN65	DN80	DN100	DN150	DN200
F	mm	Class 150	115	140	165	203	216	243	350	406	495
		Class 300	130	160	200	230	290	310	350	N/A	N/A
G	mm	Class 150	89	108	127	152	177	190	229	280	343
		Class 300	95	124	155	165	191	210	254	N/A	N/A
Flange Thickness	mm	Class 150	13	14.5	17.5	19.05	22.3	24.8	24.8	25.4	28.4
		Class 300	14	18	20.5	22.35	25.4	28.4	31.75	N/A	N/A
Weight	kg	Class 150	1.2	3	6	8	11	14	40	90	158
		Class 300	1.5	5	8	10	13	18	45	N/A	N/A





STRAINER

Overview

Parker Bestobell cryogenic T-type strainers are designed to protect downstream equipment in cryogenic pipelines by effectively removing particulate contaminants from liquefied gases.

They feature a full-bore body and large internal clearance around the entire strainer circumference, maximising flow capacity while maintaining low pressure drop and high media velocity.

The mesh strainer element is compatible with all common cryogenic liquids and gases and is supported by a metal cylinder for additional strength.

These cryogenic strainers must be installed horizontally with the cover positioned at the bottom to enable efficient drainage, optimal filtration performance, and easy maintenance access.

Functions:

- Particulate filtration
- Contaminant prevention

Applications:

- Transportation of liquefied gases
- Storages of liquefied gases
- Industrial gas processing

Valve size	DN15 - DN100
Maximum Working Pressure (MWP)	50 bar (725 PSI) dependent on end connections
Working temperature	-196°C to +200°C (-319°F to +392°F)
End connections	Butt Weld, Flanged
Body materials	Stainless Steel
Suitable for media type	Group 1 gases/liquefied gases
Design and testing standards	ASTM B31.1, BS EN 1626, BS ISO 21011 Optional full material traceability backed by BS EN 10204 3.1/3.2 certification
Approvals	DNV, LR, ABS, BV, ClassNK

Features, Benefits and Values

Feature	Benefit	Value
Bolted bonnet	Simplified maintenance. Allows for thermal expansion and contraction at cryogenic temperatures. Prevents leakage at the bonnet gasket.	Safety Reliability Ease of Operation
Large strainer area	Ensures consistent flow of fluid through the unit.	Performance
Full bore design	Enables high flow rates and low pressure drop. Maintains media velocity.	Reliability Performance
Reinforced mesh strainer element	Compatible with all common cryogenic gases and liquids. Metal support cylinder ensures strength and dimensional stability at low temperatures.	Performance

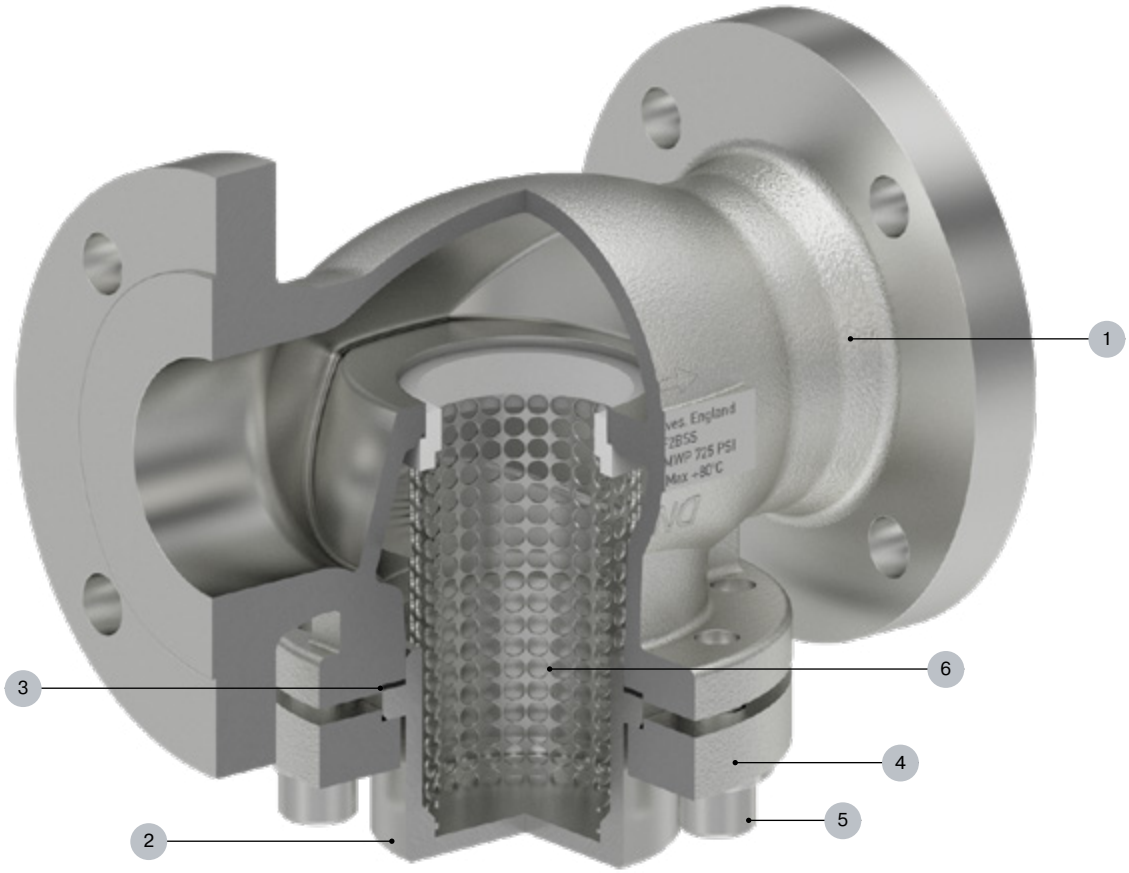
Cryogenic strainer with butt weld ends.

Cryogenic strainer with flanged ends.

Technical Information

Bill of Materials

	Description	Material
1	Body	SS ASTM A351 CF3M / SS ASTM A351 CF8M
2	Cover	SS ASTM A351 CF8M
3	Gasket	Reinforced Graphite
4	Loose Flange	SS ASTM A351 CF8M
5	Fasteners	SS A320 B8M / SS A194 8M
6	Filter	SS 316 BS EN 10088-3 1.4401



Ordering Information

Strainers

CS		70		BB		A		SS	
Series		Valve Size		Inlet Connection		Filter Size		Filter Material	
CS	Cryogenic Strainers - Full Stainless Steel	**30**	DN15	**BB**	Butt Weld Schedule 10	**F**	100 Mesh	**SS**	Stainless Steel
		50	DN25	**BC**	Butt Weld Schedule 40	**B**	40 Mesh		
		70	DN40	**F2**	ASME B16.5 Flanged Class 150	**A**	20 Mesh		
		80	DN50	**F4**	ASME B16.5 Flanged Class 300				
		90	DN65						
		A0	DN80						
		B0	DN100						

Note:
DIN Flanges available on request.

Specifications

Butt Weld End Connections

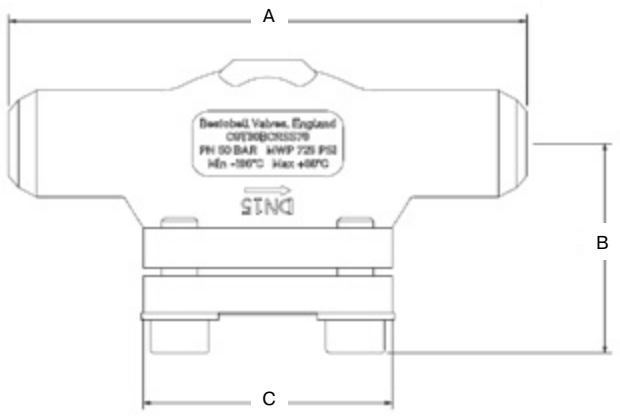
		DN15	DN25	DN40	DN50	DN65	DN80	DN100
A	mm	114.5	140	165	203	216	241	292
B	mm	51	66	87	109	113	122	177
C	mm	55	66	81	108	146	160	230
Weight	kg	1	2	4	6.5	9	12	35

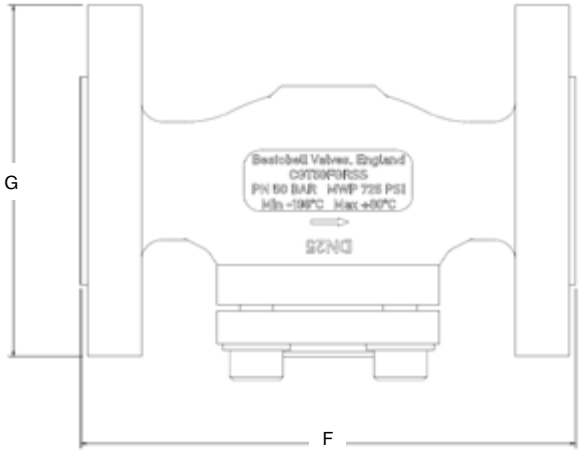
Flanged End Connections

			DN15	DN25	DN40	DN50	DN65	DN80	DN100
F	mm	Class 150	115	140	165	203	216	243	350
		Class 300	130	160	200	230	290	310	350
G	mm	Class 150	89	108	127	152	177	190	229
		Class 300	95	124	155	165	191	210	254
Flange Thickness	mm	Class 150	13	14.5	17.5	19.05	22.3	24.8	24.8
		Class 300	14	18	20.5	22.35	25.4	28.4	31.75
Weight	kg	Class 150	1.2	3	6	8	11	14	40
		Class 300	1.5	5	8	10	15	18	45

Dimension B and Cv values are the same as for Butt Weld/Socket Weld ends.

Size	Butt Weld Schedule 10	Butt Weld Schedule 40	Flange Class 150	Flange Class 300	20 mesh	40 mesh	10 mesh
DN15	✓	✓	✓	✓	✓	✓	✓
DN25	✓	✓	✓	✓	✓	✓	✓
DN40	✓	✓	✓	✓	✓	✓	✓
DN50	✓	✓	✓	✓	✓	✓	✓
DN65	✓	✓			✓	✓	✓
DN80	✓	✓			✓	✓	✓





FLOAT LEVEL ISOLATION VALVE

DN150, DN200 & DN300

Overview

The Parker Bestobell Float Level Isolation (FLIV) valve is specifically engineered for use with Wärtsilä (Whessoe) and Henri secondary float level measurement systems, providing secure isolation of the float from the cargo tank. It eliminates the issues commonly associated with gate valves, such as accidental cutting of the float tape, which can cause both the tape and float to fall back into the cargo tank. If closed while the float is still engaged, the design safely retains the tape along the valve disk, preventing damage and preserving system functionality.

The valve is operated via a robust quarter-turn gearbox featuring a clearly visible open/closed position indicator. Integrated padlock flanges allow secure locking of the valve to prevent unauthorized actuation during maintenance or operation.

Compact and ergonomically designed, the FLIV enables a single operator to handle both the valve and the associated level gauge with ease. An integrated inspection chamber provides direct access to the float assembly, streamlining inspection and replacement without the need for external fabrication or additional components.

The FLIV is fire-safe by design, incorporating graphite gaskets on all external joints, and PTFE/metal-to-metal backup seal on the valve disc.

Functions:

- Isolation of float level measurement systems
- In-situ float inspection and replacement

Applications:

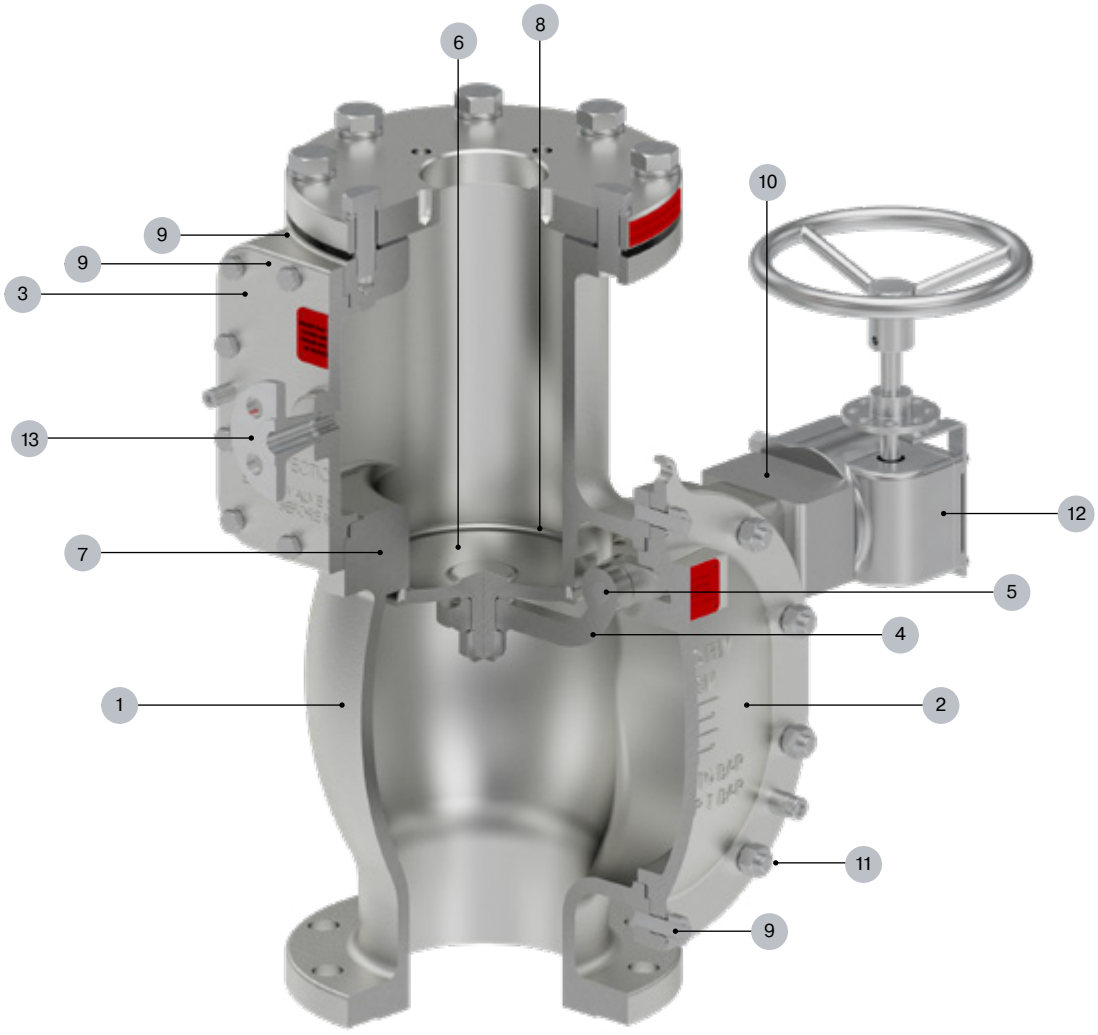
- LNG and liquefied gas storage systems aboard marine cargo vessels

Valve size	DN150, DN200, DN300
Maximum Working Pressure (MWP)	1.5 bar
Working temperature	Ambient
End connections	Flanged
Suitable for media type	Gaseous Methane
Approvals	DNV, LR, ABS, BV, ClassNK

Technical Information

Bill of Materials

	Description	Material
1	Body	ASTM A351 CF8M
2	Bonnet	ASTM A351 CF8M
3	Inspection Cover	ASTM A351 CF8M
4	Hinge	ASTM A351 CF8M
5	Drive Pin	Super Duplex Zeron 100
6	Disc	ASTM A351 CF8M
7	Seat	ASTM A351 CF8M
8	Sealing Ring	PTFE
9	Gasket	Graphite (316 St. St. Reinforced)
10	Gland Packing	Graphite
11	Fasteners	ASTM A320 B8M / ASTM A194 8M
12	Gearbox	Stainless Steel
13	½" Purge Flange	Stainless Steel



Ordering Information

Float Level Isolation Valves - DN150

CHF		D0		FA		FLIV02		-M	
Series		Valve Size		End Connection		Mounting Plate		Class Society	
CHF	Float level isolation valve	**D0**	DN150	**FA**	ASME B16.5 Flanged Class 150	**FLIV02**	Wartsila mounting plate with DN15 flange purge connection	**-M**	DNV, LR, BV, NK
						FLIV04	Topped with blind flange with DN15 flange purge connection	**A**	ABS

Float Level Isolation Valves - DN200

L06		20				A001-2		-M	
Series		Valve Size		End Connection		Mounting Plate		Class Society	
L06	Float level isolation valve	**20**	DN200		ASME B16.5 Flanged Class 150	**A001-2**	Henri mounting plate with DN15 flange purge connection	**-M**	DNV, LR, BV, NK
						A002-2	Wartsila mounting plate with DN15 flange purge connection	**A**	ABS

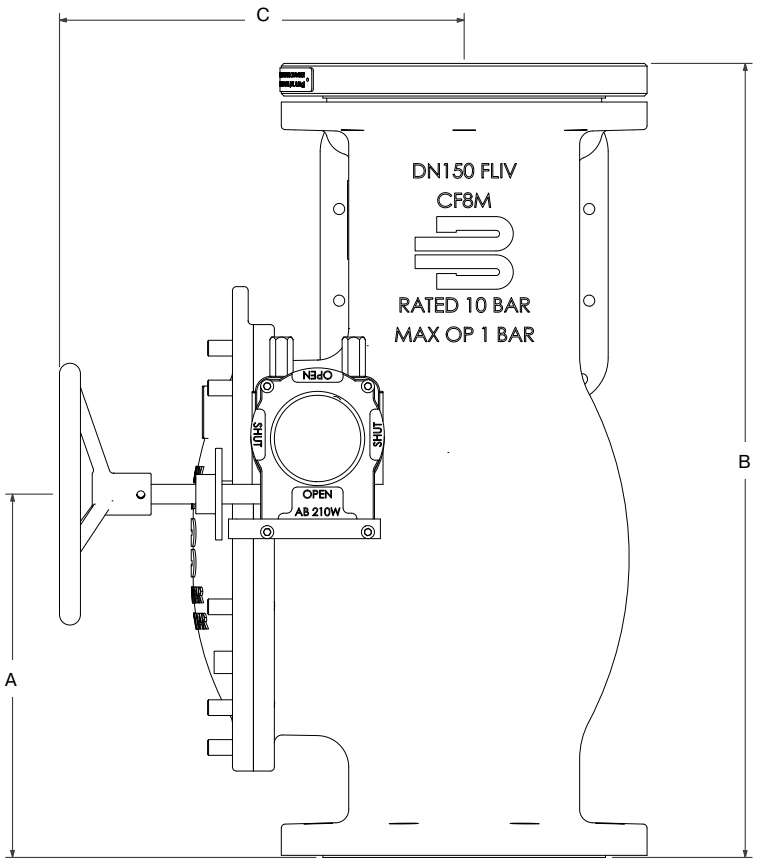
Float Level Isolation Valves - DN300

CHF		G0		FA		FLIV02		A	
Series		Valve Size		End Connection		Mounting Plate		Class Society	
CHF	Float level isolation valve	**G0**	DN300	**FA**	ASME B16.5 Flanged Class 150	**FLIV02**	Wartsila mounting plate with DN15 flange purge connection	**-M**	DNV, LR, BV, NK
								A	ABS

Specifications

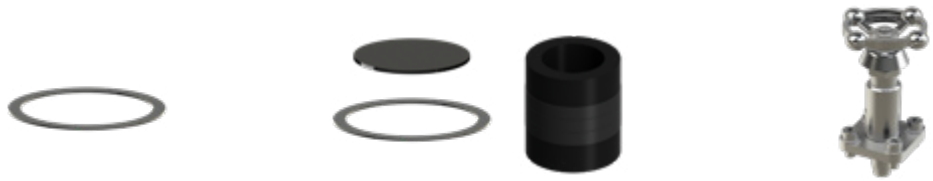
Butt Weld End Connections

		DN150	DN200	DN300
A	mm	278	330	460
B	mm	622	734	920
C	mm	319	401	518
Weight	kg	110	200	400



SPARES KITS

Miniature Needle Globe Valve - MNGV



	Bonnet Gasket	Gasket/Packings/AF Disc	Complete Headworks*
DN15	CNMGRDN15	CNMPRDN15	CNM1HRDN15-M
DN25	CNMGRDN25	CNMPRDN25	CNM1HRDN25-M

* Complete headworks include gasket, packings, AF disc and handwheel.

Manual Globe Valve

	Bonnet Gasket	Gasket/Packings/AF Disc	Complete Headworks*
DN15	CNMGRDN15	CNMPRDN15	CNMHRDN15-M
DN25	CNMGRDN25	CNMPRDN25	CNMHRDN25-M
DN40	CNMGRDN40	CNMPRDN40	CNMHRDN40-M
DN50	CNMGRDN50	CNMPRDN50	CNMHRDN50-M
DN65	CNMGRDN65	CNMPRDN65	CNMHRDN65-M
DN80	CNMGRDN80	CNMPRDN80	CNMHRDN80-M
DN100	CNMGRDN100	CNMPRDN100	CNMHRDN100-M
DN150	CNMGRDN150	CNMPRDN150	N/A
DN200	CNMGRDN200	CNMPRDN200	N/A
DN250	CNMGRDN250	CNMPRDN250	N/A

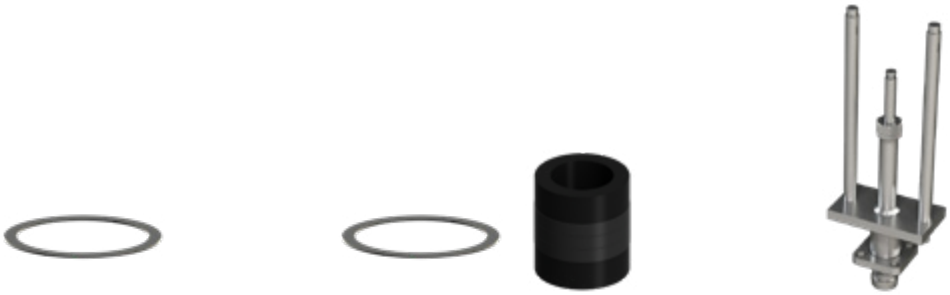
* Complete headworks include gasket, packings, AF disc and handwheel.

Screw Down Non-Return Globe Valve - SDNR

	Bonnet Gasket	Gasket/Packings/AF Disc	Disc/Seal	Complete Headworks*
DN15	CNMGRDN15	CNMPRDN15	CNMDRDN15	S-CNPM30BBD6CIN-M
DN25	CNMGRDN25	CNMPRDN25	CNMDRDN25	S-CNPM50BBD6CIN-M
DN40	CNMGRDN40	CNMPRDN40	CNMDRDN40	S-CNPM70BBD6CIN-M
DN50	CNMGRDN50	CNMPRDN50	CNMDRDN50	S-CNPM80BBD6CIN-M
DN65	CNMGRDN65	CNMPRDN65	CNMDRDN65	S-CNPM90BBD4CIN-M
DN80	CNMGRDN80	CNMPRDN80	CNMDRDN80	S-CNPMA0BBD4CIN-M
DN100	CNMGRDN100	CNMPRDN100	CNMDRDN100	N/A
DN150	CNMGRDN150	CNMPRDN150	CNMDRDN150	N/A

* Complete headworks include gasket, packings, AF disc, disc/seal and handwheel.

Pneumatically Actuated Globe Valve



	Bonnet Gasket	Gasket & Packings	Complete Headworks*
DN15	CNMGRDN15	CNMPRDN15	CNMPHRDN15-M
DN25	CNMGRDN25	CNMPRDN25	CNMPHRDN25-M
DN40	CNMGRDN40	CNMPRDN40-PA	CNMPHRDN40-M
DN50	CNMGRDN50	CNMPRDN50	CNMPHRDN50-M
DN65	CNMGRDN65	CNMPRDN65-PA	CNMPHRDN65-M
DN80	CNMGRDN80	CNMPRDN80	CNMPHRDN80-M
DN80	CNMGRDN80	CNMPRDN80	CNMPHRDN80-3-M
DN100	CNMGRDN100	CNMPRDN100	CNMPHRDN100-M
DN150	CNMGRDN150	CNMPRDN150	N/A
DN200	CNMGRDN200	CNMPRDN200	N/A

* Complete headworks include gasket and packings.

Hydraulically Actuated Globe Valve

	Bonnet Gasket	Gasket and Packings	Stem/Disc Subassembly (Hydraulic Actuator)	Stem/Disc Subassembly (Electric Actuator)
DN25	CNMGRDN25	CNMHPRDN25	S-SUBCNM5001006-M	
DN40	CNMGRDN40	CNMHPRDN40	S-SUBL0104S008-M	S-L0104F006-M
DN50	CNMGRDN50	CNMHPRDN50	S-SUBL0105S007-M	
DN65	CNMGRDN65	CNMHPRDN65	S-SUBL0106S007-M	S-SUBL0106S005-M
DN80	CNMGRDN80	CNMHPRDN80	S-SUBL0108S009-M	
DN100	CNMGRDN100	CNMHPRDN100	S-SUBCNMB02000-M	
DN150	CNMGRDN150	CNMHPRDN150	S-L0215F006A (Disc only)	
DN200	CNMGRDN200	CNMHPRDN200	S-L0120F007-M (Disc only)	
DN250	CNMGRDN250	CNMHPRDN250	S-MCN04AG2F000-M (Disc only)	
DN300	CNMGRDN300	CNMHPRDN300	S-L0130F005-M (Disc only)	
DN350	CNMGRDN350	CNMHPRDN350	S-L0135F004-M (Disc only)	SUBCNMH001002-M (Headworks without actuator)

For actuators, contact Parker.

Lift Check Valve

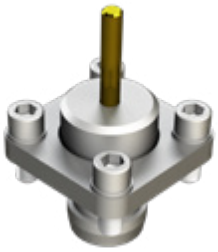

	Bonnet Gasket	Disc Seal
DN15	CNMGRDN15	CGTDRDN15
DN25	CNMGRDN25	CGTDRDN25
DN40	CNMGRDN40	CGTDRDN40
DN50	CNMGRDN50	CGTDRDN50
DN65	CNMGRDN65	CGTDRDN65
DN80	CNMGRDN80	CGTDRDN80
DN100	CNMGRDN100	CGTDRDN100
DN150	CNMGRDN150	CGTDRDN150
DN200	CNMGRDN200	CGTDRDN250

Swing Check Valve


	Bonnet Gasket	Gasket & Disc/Seal
DN25	CHCGRDN25	CHCDRDN15
DN40	CHCGRDN40	CHCDRDN25
DN50	CHCGRDN50	CHCDRDN40
DN65	CHCGRDN65	CHCDRDN50
DN80	CHCGRDN80	CHCDRDN65
DN100	CHCGRDN100	CHCDRDN80
DN150	CHCGRDN150	CHCDRDN100
DN200	CHCGRDN200	CHCDRDN150
DN250	CHCGRDN250	CHCDRDN250
DN300	CHCGRDN300	CHCDRDN300
DN350	CHCGRDN350	N/A

Regrinding Kit

	Regrinding Kit
DN15	CNMGDN15
DN25	CNMGDN25
DN40	CNMGDN40
DN50	CNMGDN50
DN65	CNMGDN65
DN80	CNMGADN80
DN100	CNMGBDN100



Float level Isolation Valve - FLIV

	Gasket Kit, Bonnet Gasket, Inspection Gasket and Mounting Plate Gasket	Gasket Kit, Bonnet Gasket, Inspection Gasket, Mounting Plate Gasket and Packings Kit
DN150	CHFGRDN150	CHFPRDN150
DN200	CHFGRDN200	CHFPRDN200
DN300	CHFGRDN300	CHFPRDN300

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specifically. Unless otherwise specified by Seller, all prices are

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4. Warranty. Seller warrants that the Products sold here- under shall be free from defects in material or workmanship for a period of twelve months from the date of delivery to Buyer or 2,000 hours of normal use, whichever occurs first. This warranty is made only to Buyer and does not extend to anyone to whom Products are sold after purchased from Seller. The prices charged for Seller's products are based upon the exclusive limited warranty stated above, and upon the following disclaimer: DISCLAIMER OF WARRANTY: THIS WARRANTY COMPRISES THE SOLE AND ENTIRE WARRANTY PERTAINING TO PRODUCTS PROVIDED HEREUNDER. SELLER DISCLAIMS ALL OTHER WARRANTIES, EXPRESS AND IMPLIED, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

5. Claims; Commencement of Actions. Buyer shall promptly inspect all Products upon delivery. No claims for shortages will be allowed unless reported to the Seller within 10 days of delivery. No other claims against Seller will be allowed unless asserted in writing within 60 days after delivery or, in the case of an alleged breach of warranty, within 30 days after the date within the warranty period on which the defect is or should have been discovered by Buyer. Any action based upon breach of this agreement or upon any other claim arising out of this sale (other than an action by Seller for any amount due to Seller from Buyer) must be commenced within thirteen months from the date of tender of delivery by Seller or, for a cause of action based upon an alleged breach of warranty, within thirteen months from the date within the warranty period on which the defect is or should have been discovered by Buyer.

6. LIMITATION OF LIABILITY. UPON NOTIFICATION, SELLER WILL, AT ITS OPTION, REPAIR OR REPLACE A DEFECTIVE PRODUCT, OR REFUND THE PURCHASE PRICE. IN NO EVENT SHALL SELLER BE LIABLE TO BUYER FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF, OR AS THE RESULT OF, THE SALE, DELIVERY, NON-DELIVERY, SERVICING, USE OR LOSS OF USE OF THE PRODUCTS OR ANY PART THEREOF, OR FOR ANY CHARGES OR EXPENSES OF ANY NATURE INCURRED WITHOUT SELLER'S WRITTEN CONSENT, EVEN IF SELLER HAS BEEN NEGLIGENT, WHETHER IN CONTRACT, TORT OR OTHER LEGAL THEORY. IN NO EVENT SHALL SELLER'S LIABILITY UNDER ANY CLAIM MADE BY BUYER EXCEED THE PURCHASE PRICE OF THE PRODUCTS.

7. Contingencies. Seller shall not be liable for any default or delay in performance if caused by circumstances beyond the reasonable control of Seller.

8. User Responsibility. The user, through its own analysis and testing, is solely responsible for making the final selection of the system and Product and assuring that all performance, endurance, maintenance, safety and warning requirements of the application are met. The user must analyze all aspects of the application and follow applicable industry standards and Product information. If Seller provides Product or system options, the user is responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the Products or systems.

9. Loss to Buyer's Property. Any designs, tools, patterns, materials, drawings, confidential information or equipment furnished by Buyer or any other items which become Buyer's property, may be considered obsolete and may be destroyed by Seller after two consecutive years have elapsed without Buyer placing an order for the items which are manufactured using such property. Seller shall not be responsible for any loss or damage to such property while it is in Seller's possession or control.

10. Special Tooling. A tooling charge may be imposed for any special tooling, including without limitation, dies, fixtures, molds and patterns, acquired to manufacture Products. Such special tooling shall be and remain Seller's property notwithstanding payment of any charges by Buyer. In no event will Buyer acquire any interest in apparatus belonging to Seller which is utilized in the manufacture of the Products, even if such apparatus has been specially converted or adapted for such manufacture and notwithstanding any

charges paid by Buyer. Unless otherwise agreed, Seller shall have the right to alter, discard or otherwise dispose of any special tooling or other property in its sole discretion at any time.

11. Buyer's Obligation; Rights of Seller. To secure payment of all sums due or otherwise, Seller shall retain a security interest in the goods delivered and this agreement shall be deemed a Security Agreement under the Uniform Commercial Code. Buyer authorizes Seller as its attorney to execute and file on Buyer's behalf all documents Seller deems necessary to perfect its security interest. Seller shall have a security interest in, and lien upon, any property of Buyer in Seller's possession as security for the payment of any amounts owed to Seller by Buyer.

12. Improper use and Indemnity. Buyer shall indemnify, defend, and hold Seller harmless from any claim, liability, damages, lawsuits, and costs (including attorney fees), whether for personal injury, property damage, patent, trademark or copyright infringement or any other claim, brought by or incurred by Buyer, Buyer's employees, or any other person, arising out of: (a) improper selection, improper application or other misuse of Products purchased by Buyer from Seller; (b) any act or omission, negligent or otherwise, of Buyer; (c) Seller's use of patterns, plans, drawings, or specifications furnished by Buyer to manufacture Product; or (d) Buyer's failure to comply with these terms and conditions. Seller shall not indemnify Buyer under any circumstance except as otherwise provided.

13. Cancellations and Changes. Orders shall not be subject to cancellation or change by Buyer for any reason, except with Seller's written consent and upon terms that will indemnify, defend and hold Seller harmless against all direct, incidental and consequential loss or damage. Seller may change product features, specifications, designs and availability with notice to Buyer.

14. Limitation on Assignment. Buyer may not assign its rights or obligations under this agreement without the prior written consent of Seller.

15. Entire Agreement. This agreement contains the entire agreement between the Buyer and Seller and constitutes the final, complete and exclusive expression of the terms of the agreement. All prior or contemporaneous written or oral agreements or negotiations with respect to the subject matter are herein merged.

16. Waiver and Severability. Failure to enforce any provision of this agreement will not waive that provision nor will any such failure prejudice Seller's right to enforce that provision in the future. Invalidation of any provision of this agreement by legislation or other rule of law shall not invalidate any other provision herein. The remaining provisions of this agreement will remain in full force and effect.

17. Termination. This agreement may be terminated by Seller for any reason and at any time by giving Buyer thirty (30) days written notice of termination. In addition, Seller may by written notice immediately terminate this agreement for the following: (a) Buyer commits a breach of any provision of this agreement (b) the appointment of a trustee, receiver or custodian for all or any part of Buyer's property (c) the filing of a petition for relief in bankruptcy of the other Party on its own behalf, or by a third party (d) an assignment for the benefit of creditors, or (e) the dissolution or liquidation of the Buyer.

18. Governing Law. This agreement and the sale and delivery of all Products hereunder shall be deemed to have taken place in and shall be governed and construed in accordance with the laws of the State of Ohio, as applicable to contracts executed and wholly performed therein and without regard to conflicts of laws principles. Buyer irrevocably agrees and consents to the exclusive jurisdiction and venue of the courts of Cuyahoga County, Ohio with respect to any dispute, controversy or claim arising out of or relating to this agreement. Disputes between the parties shall not be settled by arbitration unless, after a dispute has arisen, both parties expressly agree in writing to arbitrate the dispute.

19. Indemnity for Infringement of Intellectual Property Rights. Seller shall have no liability for infringement of any patents, trademarks, copyrights, trade dress, trade secrets or similar rights except as provided in this Section. Seller will defend and indemnify Buyer against allegations of infringement of U.S. patents, U.S. trademarks, copyrights, trade dress and trade secrets ("Intellectual Property Rights"). Seller will defend at its expense and will pay the cost of any settlement or damages awarded in an action brought against Buyer based on an allegation that a Product sold pursuant to this Agreement infringes the Intellectual Property Rights of a third party. Seller's obligation to defend and indemnify Buyer is contingent on Buyer notifying Seller within ten (10) days after Buyer becomes aware of such allegations of infringement, and Seller having sole control over the defense of any allegations or actions including all negotiations for settlement or compromise. If a Product is subject to a claim that it infringes the Intellectual Property Rights of a third party, Seller may, at its sole expense and option, procure for Buyer the right to continue using the Product, replace or modify the Product so as to make it noninfringing, or offer to accept return of the Product and return the purchase price less a reasonable allowance for depreciation. Notwithstanding the foregoing, Seller shall have no liability for claims of infringement based on information provided by Buyer, or directed to Products delivered hereunder for which the designs are specified in whole or part by Buyer, or infringements resulting from the modification, combination or use in a system of any Product sold hereunder. The foregoing provisions of this Section shall constitute Seller's sole and exclusive liability and Buyer's sole and exclusive remedy for infringement of Intellectual Property Rights.

20. Taxes. Unless otherwise indicated, all prices and charges are exclusive of excise, sales, use, property, occupational or like taxes which may be imposed by any taxing authority upon the manufacture, sale or delivery of Products.

21. Equal Opportunity Clause. For the performance of government contracts and where dollar value of the Products exceed $10,000, the equal employment opportunity clauses in Executive Order 11246, VEVRAA, and 41 C.F.R. §§ 60-1.4(a), 60-741.5(a), and 60-250.4, are hereby incorporated.

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