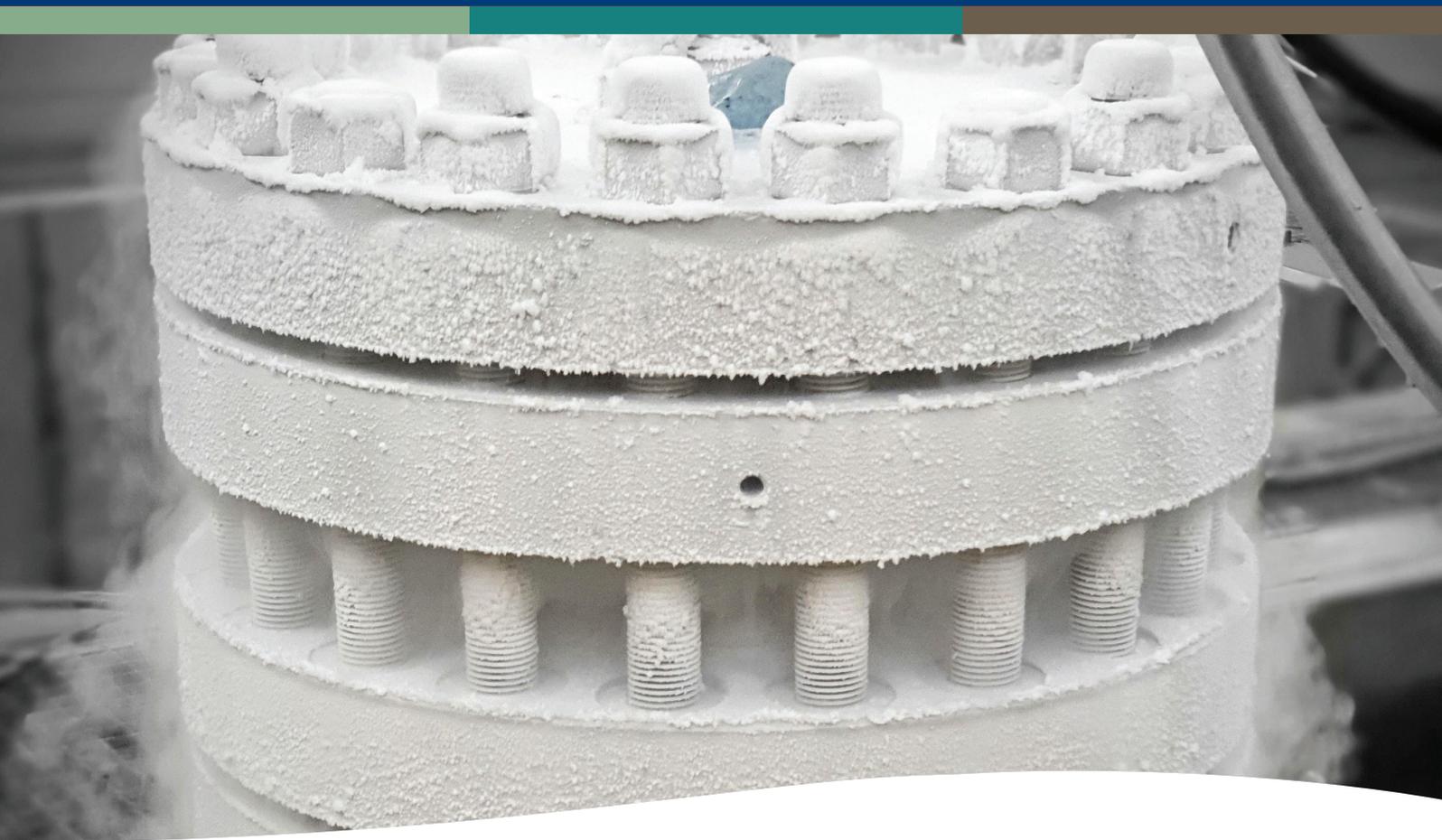


NOZ-CHEK[®]

brands you trust.



NOZ-CHEK[®] Cryogenic Valves



Crane ChemPharma & Energy

www.cranecpe.com

NOZ-CHEK® Cryogenic Valves

SCOPE OF LINE

- Sizes 1" – 48" (Test capability 1" to 72" and pressures of 22,500 PSI)
- ASME B16.34 & API 6D, pressure classes 150 – 4500
- API 6A pressure classes 2000 – 15,000
- Flanged, butt-weld ends, hubs ends and specials
- Standard and short pattern

STANDARD FEATURES

Extensive research and development, coupled with valid design procedures, have resulted in these unique NOZ-CHEK® features:

- **Few moving parts - Disc is the only moving part, minimizing wear.**
- **Axial movement of disc - Disc and seating configuration give streamlined flow path with venturi effect, resulting in low pressure drop.**
- **Short stroke of spring-assisted disc - Inlet flow velocity moves disc axially with short stroke. In response to flow velocity reduction, a compressed spring initiates valve closure and provides quick response.**
- **Spring options - Choice of spring affects critical velocity and valve response. Selection is made on engineering evaluation of specific applications. In absence of this data, a standard spring will be provided.**

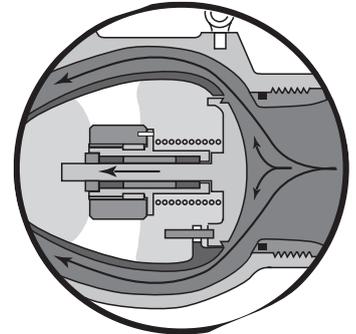
CHARACTERISTICS

NOZ-CHEK® valves deliver an effective dynamic response under various flow deceleration conditions. The dynamic performance characteristics of NOZ-CHEK® valves are compared to swing check and dual plate spring-assisted check valves in Figure 1.

NOZ-CHEK®'s unique design features result in superior performance, fast response and lower pressure loss in piping systems.

OPENING

Reduced pressure, generated by increased velocity in the minimal flow area, results in additional force to assist the disc to open and allows for extra spring loading that facilitates a faster closing time.

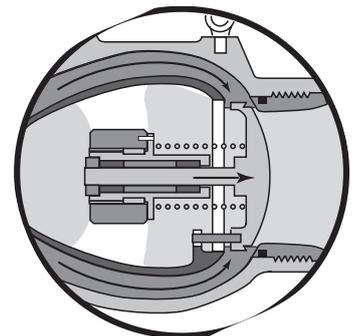


This spring force is balanced in the fully open position.

The NOZ-CHEK® geometry is established by considering the design velocity required to ensure that the disc is stabilized open against its stop even if moderate flow oscillation occurs.

CLOSING

When a noticeable reduction in flow occurs, the disc reacts immediately, limiting backflow and valve slamming.



The spring load, low mass disc, and short displacement ensures a rapid self-dampening response.

For certain applications, the internal geometry can be modified to suit the service conditions.

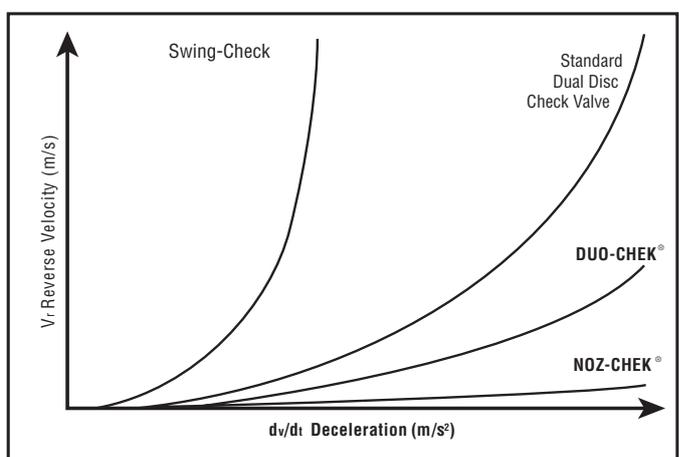


Figure 1

NOZ-CHEK® Cryogenic Capabilities, Features & Benefits

HIGH PERFORMANCE NON-SLAM CHECK VALVE

One of the most significant elements of piping system design is integrating the means to protect mechanical equipment and prevent damage caused by backflow.

NOZ-CHEK® valves are specifically designed for fast-reversing systems where backflow is a constant concern. In such critical service applications, NOZ-CHEK® Non-Slam Check Valves offer the following benefits.

- **Minimizes the damaging effects of water hammer in fluid systems**
- **Removal of chatter associated with conventional valves in reciprocating compressor service**
- **Protects rotating equipment from damage due to flow reversal**
- **Minimizes pressure loss in piping systems**
- **Provides quick dynamic response reducing reverse velocity**

NOZ-CHEK® is designed and manufactured to the highest quality standards including ISO-9001, Stoomwezen and TUV.

LOW CRYOGENIC LEAK RATE PER BS 6364 INDUSTRY STANDARD

NOZ-CHEK® Cryogenic Valves meet the requirements of Shell 77/200, MSS SP-134, ISO 28921-1 and BS 6364. Now, this product line can also be offered to meet the rigorous requirements of BS 6364 (300 CC/MIN at -196 °C/ -320°F) with tighter leak rates, as standard.

ZERO FUGITIVE EMISSIONS

NOZ-CHEK® products feature a single piece solid body (no penetrations or external leak paths), reflecting our commitment to environmental responsibility and critically ensuring zero fugitive emissions.

IN-HOUSE CRYOGENIC TESTING

The low temperature and Cryogenic High-Pressure gas testing is carried out on-site in our state of the art testing facilities. Test capability 1" to 72" and pressures of 22,500 PSI.

INNOVATION OF PROVEN TECHNOLOGY

Dedication to solving our Customers' challenges, longstanding commitment to safety and quality continue to drive our product innovation.

Industry Standards*	
API 598	Valve Pressure Testing and Inspection
ASME B16.34	Pressure/Temperature Ratings
API 6D	Pipeline Valves
API 6A	Production Valves
2014/68/EU	Pressure Equipment Directive
ISO 28921 – 1	International Standards Organisation Cryogenic testing
BS 6364	British Valve Standard Cryogenic testing
MSS SP-134	Manufacturing Standards Society

*Consult factory for other specification requirements.

NOZ-CHEK® Cryogenic Applications



Key processes within the LNG liquefaction plant with cryogenic requirements are within the Compression Trains, where treated natural gas is compressed over several reducing stages to a liquid state. In larger LNG plants, this process is furthered during Mixed Refrigerant Cycle which also requires gasses to be compressed and cooled to cryogenic temperatures. NOZ-CHEK® ideally suited to prevent backflow during this process.

NOZ-CHEK® Cryogenic Valves prevent cryogenic liquid from leaking back into parts of the system that are not made of cryogenic suitable material, minimizing the risk of material cracking and potential leakage to atmosphere.

TYPICAL CRYOGENIC APPLICATIONS

- LNG
- Liquefaction Compression Train
- Mixed Refrigerant
- Ethylene Production
- Ethylene Refrigeration
- Air Separation Units
- General Cryogenic compressor protection



NOZ-CHEK[®] Cryogenic Valves Design Features

1 DISC

Standard disc is high strength with minimized weight to provide fast dynamic response. Design minimizes bearing loads, thus lengthens life of bearings and shaft. Offered in a variety of trim materials, with metal or resilient seating.

2 FLOW OUTLET ZONE

Designed for pressure recovery to minimize pressure loss and fluid turbulence. Results in smooth flow.

3 SEAT

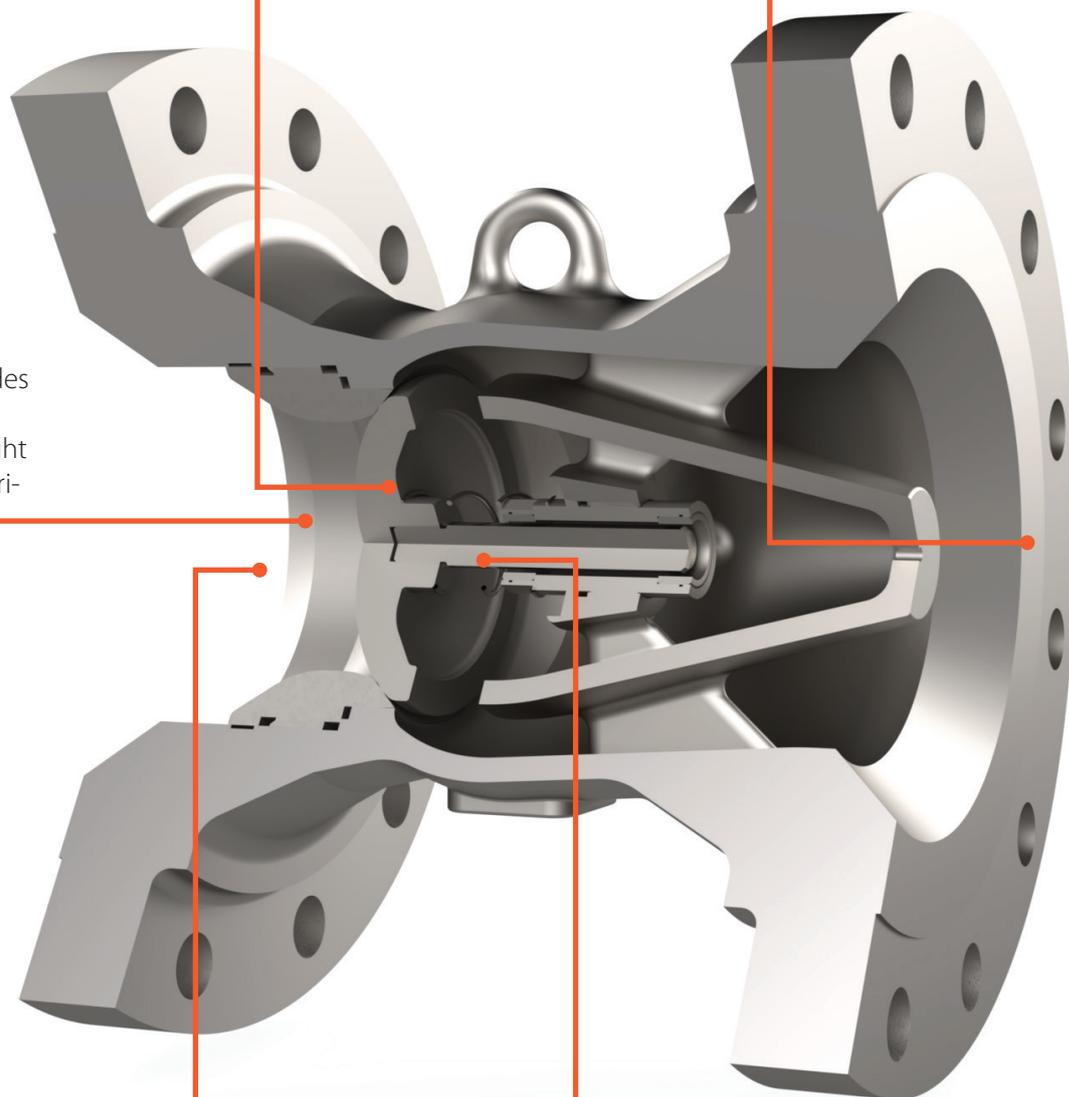
Assures venturi flow by its configuration. Provides seating surface for disc and enables bubble-tight seal with resilient materials.

4 FLOW INLET ZONE

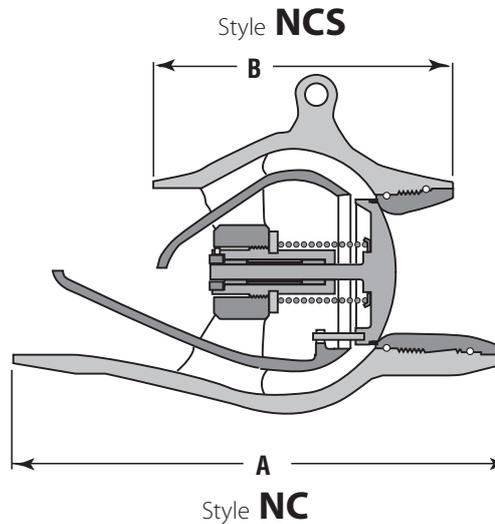
Venturi design maximizes flow impact on disc. Provides streamlined flow when valve is fully open to minimize pressure loss.

5 SPRING

As the most strategic component, the spring is designed to meet specific service conditions – a customized approach.



NOZ-CHEK® Cryogenic Valves Dimensional Data



NC: Integral Body, Standard Pattern
 NCS: Integral Body, Short Body Pattern

Class 150 RF

Nominal Size	Standard Pattern	Short Pattern	Weight	
	A in (mm)	B in (mm)	A lbs. (kg)	B lbs. (kg)
2	8.00 (203)	-	22 (10)	-
3	9.50 (241)	-	66 (30)	-
4	11.50 (292)	-	106 (48)	-
6	14.00 (356)	-	168 (76)	-
8	19.50 (495)	-	428 (194)	-
10	24.50 (622)	14.37 (365)	536 (243)	485 (220)
12	27.50 (699)	17.25 (438)	628 (285)	622 (282)
14	31.00 (787)	18.70 (475)	944 (428)	765 (347)
16	34.00 (864)	21.45 (545)	1,078 (489)	915 (415)
18	38.50 (978)	24.00 (610)	1,795 (814)	1,186 (538)
20	38.50 (978)	33.47 (850)	3,177 (1,441)	2,370 (1,075)
24	51.00 (1,295)	31.88 (810)	2,540 (1,152)	2,888 (1,310)
28	57.00 (1,448)	37.22 (945)	4,422 (2,006)	3,439 (1,560)
30	60.00 (1,524)	39.77 (1,010)	5,417 (2,457)	4,332 (1,965)
36	77.00 (1,956)	39.37 (1,000)	5,983 (2,714)	5,743 (2,605)
42	-	55.72 (1,415)	-	9,039 (4,100)
48	-	57.50 (1,461)	-	11,629 (5,275)

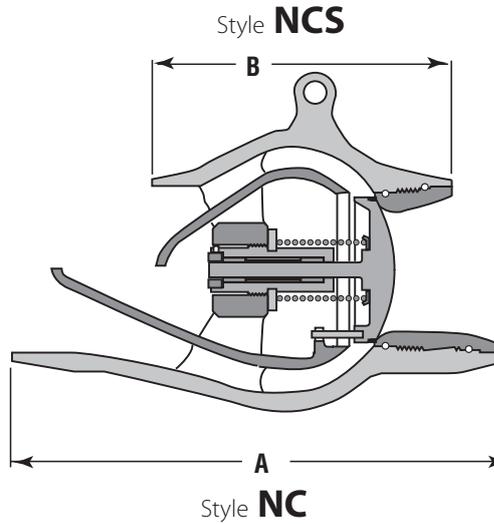
Class 300 RF

Nominal Size	Standard Pattern	Short Pattern	Weight	
	A in (mm)	B in (mm)	A lbs. (kg)	B lbs. (kg)
2	10.50 (267)	-	29 (13)	-
3	12.50 (318)	-	66 (30)	-
4	14.00 (356)	-	106 (48)	-
6	17.50 (445)	10.00 (254)	209 (95)	194 (88)
8	21.00 (533)	12.25 (311)	450 (204)	419 (190)
10	24.50 (622)	14.37 (365)	613 (278)	547 (248)
12	28.00 (711)	17.25 (438)	730 (331)	672 (305)
14	33.00 (838)	18.70 (475)	1,186 (538)	981 (445)
16	34.00 (864)	21.45 (545)	1,426 (647)	1,168 (530)
18	38.50 (978)	24.00 (610)	1,808 (820)	1,521 (690)
20	40.00 (1,016)	31.88 (810)	2,586 (1,173)	2,403 (1,090)
24	53.00 (1,346)	31.88 (810)	3,338 (1,514)	3,020 (1,370)
28	59.00 (1,499)	40.75 (1,035)	5,262 (2,387)	4,850 (2,200)
30	60.00 (1,524)	39.77 (1,010)	5,831 (2,645)	5,278 (2,394)
36	82.00 (2,083)	39.37 (1,000)	9,608 (4,358)	8,091 (3,670)
42	-	55.72 (1,415)	-	12,390 (5,620)
48	-	57.50 (1,461)	-	11,740 (5,325)

Class 600 RF

Nominal Size	Standard Pattern	Short Pattern	Weight	
	A in (mm)	B in (mm)	A lbs. (kg)	B lbs. (kg)
2	11.50 (292)	-	37 (17)	-
3	14.00 (356)	-	66 (30)	-
4	17.00 (432)	-	163 (74)	-
6	22.00 (559)	15.37 (390)	425 (193)	373 (169)
8	26.00 (660)	12.25 (311)	551 (250)	448 (203)
10	31.00 (787)	14.38 (365)	880 (399)	739 (335)
12	33.00 (838)	17.25 (438)	1,138 (516)	939 (426)
14	35.00 (889)	18.69 (475)	1,437 (652)	1,186 (538)
16	39.00 (991)	21.50 (546)	2,110 (957)	1,742 (790)
18	43.00 (1,092)	31.88 (810)	3,411 (1,547)	2,987 (1,355)
20	47.00 (1,194)	31.88 (810)	3,389 (1,537)	3,042 (1,380)
24	55.00 (1,397)	31.88 (810)	5,315 (2,411)	4,266 (1,935)
28	63.00 (1,600)	34.25 (870)	8,673 (3,934)	5,864 (2,660)
30	65.00 (1,651)	39.75 (1,010)	8,675 (3,935)	6,614 (3,000)
36	82.00 (2,083)	47.82 (1,215)	19,354 (8,779)	9,921 (4,500)
42	-	57.50 (1,461)	-	14,515 (6,584)
48	-	63.58 (1,615)	-	22,597 (10,250)

NOZ-CHEK® Cryogenic Valves Dimensional Data



NC: Integral Body, Standard Pattern
 NCS: Integral Body, Short Body Pattern

Class **900 RF**

Nominal Size	Standard Pattern	Short Pattern	Weight	
	A in (mm)	B in (mm)	A lbs. (kg)	B lbs. (kg)
2	14.50 (368)	-	79 (36)	-
3	15.00 (381)	-	121 (55)	-
4	18.00 (457)	-	220 (100)	-
6	24.00 (610)	15.38 (391)	567 (257)	425 (193)
8	29.00 (737)	13.63 (346)	739 (335)	639 (290)
10	33.00 (838)	15.50 (394)	1,508 (684)	1,065 (483)
12	38.00 (965)	18.00 (457)	1,951 (885)	1,488 (675)
14	40.50 (1,029)	18.62 (473)	2,928 (1,328)	1,532 (695)
16	44.50 (1,130)	29.51 (750)	3,225 (1,463)	2,690 (1,220)
18	48.00 (1,219)	30.50 (775)	4,456 (2,021)	3,175 (1,440)
20	52.00 (1,321)	34.22 (869)	6,484 (2,941)	4,674 (2,120)
24	61.00 (1,549)	40.00 (1,016)	8,126 (3,686)	7,015 (3,182)
28	-	40.00 (1,016)	-	10,251 (4,650)
30	-	40.41 (1,026)	-	10,472 (4,750)
36	-	46.84 (1,190)	-	15,984 (7,250)
42	-	60.00 (1,524)	-	21,870 (9,920)
48	-	64.00 (1,626)	-	31,747 (14,400)

Class **1500 RF**

Nominal Size	Standard Pattern	Short Pattern	Weight	
	A in (mm)	B in (mm)	A lbs. (kg)	B lbs. (kg)
2	14.50 (368)	-	79 (36)	-
3	18.50 (470)	-	172 (78)	-
4	21.50 (546)	-	271 (123)	-
6	27.75 (705)	15.88 (403)	805 (365)	595 (270)
8	32.75 (832)	13.63 (346)	1,008 (457)	805 (365)
10	39.00 (991)	15.50 (394)	1,978 (897)	1,385 (628)
12	44.50 (1,130)	18.00 (457)	2,650 (1,202)	1,984 (900)
14	49.50 (1,257)	25.53 (648)	4,932 (2,237)	3,527 (1,600)
16	54.50 (1,384)	29.53 (750)	5,485 (2,488)	4,057 (1,840)
18	60.50 (1,537)	32.00 (813)	8,106 (3,677)	5,952 (2,700)
20	65.50 (1,664)	34.22 (869)	9,207 (4,176)	6,504 (2,950)
24	76.50 (1,943)	34.22 (869)	13,329 (6,046)	11,442 (5,190)

Class **2500 RF**

Nominal Size	Standard Pattern	Short Pattern	Weight	
	A in (mm)	B in (mm)	A lbs. (kg)	B lbs. (kg)
2	17.75 (451)	-	115 (52)	-
3	22.75 (578)	-	262 (119)	-
4	26.50 (673)	-	370 (168)	-
6	36.00 (914)	15.88 (403)	1,307 (593)	1,069 (485)
8	40.25 (1,022)	17.69 (449)	1,925 (873)	1,543 (700)
10	50.00 (1,270)	22.13 (562)	3,638 (1,650)	2,705 (1,227)
12	56.00 (1,422)	36.00 (914)	5,604 (2,542)	4,570 (2,073)

High Pressure Gas and Cryogenic In-House Testing

Improved Leak Rates for Low Temperature Service

Crane's NOZ-CHEK® Cryogenic Valves can now be offered to meet industry standard leak rate specifications for low temperature and Cryogenic service down to -196°C.

The extensive product line can now be offered to meet the stringent requirements of BS 6364, and other standards such as ISO 28921, MSS SP-134 and Shell 77/200.

The NOZ-CHEK® product is available in standard cryogenic materials such as 316SS, and in 1" - 48" sizes. Pressure classes are available per ASME standard.

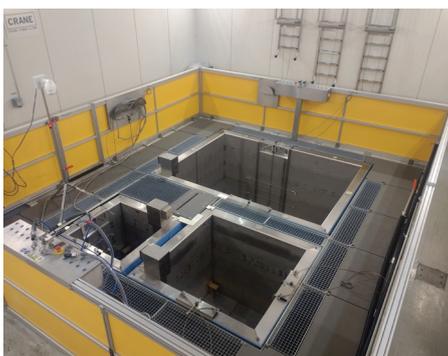
The low temperature and Cryogenic testing is carried out on site in our new state-of-the-art testing facility.

TESTING – Our testing facility is capable of testing multiple specifications for HPGT and Cryogenics due to its intelligent programming system. The programming software is run using a barcode system, removing all manual inputs and, therefore, the potential for human error. Multiple procedures are stored on the control system. These comply with industry standards, ensuring a lean and efficient testing process. The system also has the flexibility to be customized to specific customer needs. For example, specific temperature or pressure requirements. On completion of testing, a certificate of conformance is generated by the system detailing leak rates, pressures and temperatures, as well as a graphical representation of the testing cycle.

SAFETY is paramount. The test enclosure has been designed and implemented around this philosophy for all who interact with the facility. Key safety features include:

- Automatic interlock and lock-out personnel access door.
- Enclosure designed and tested to UL752 level 1 impact.
- 4 HD dome cameras with 10x optical zoom and 360° horizontal and 90° vertical rotation, coupled with remote monitoring via Internet access.
- Oxygen deficiency sensing connected directly to a high speed exhaust system for air quality

**The test enclosure is able to test valves up to 72" and to pressures of 22,500 PSI, ensuring extensive coverage of the Crane Engineered Check product range.*

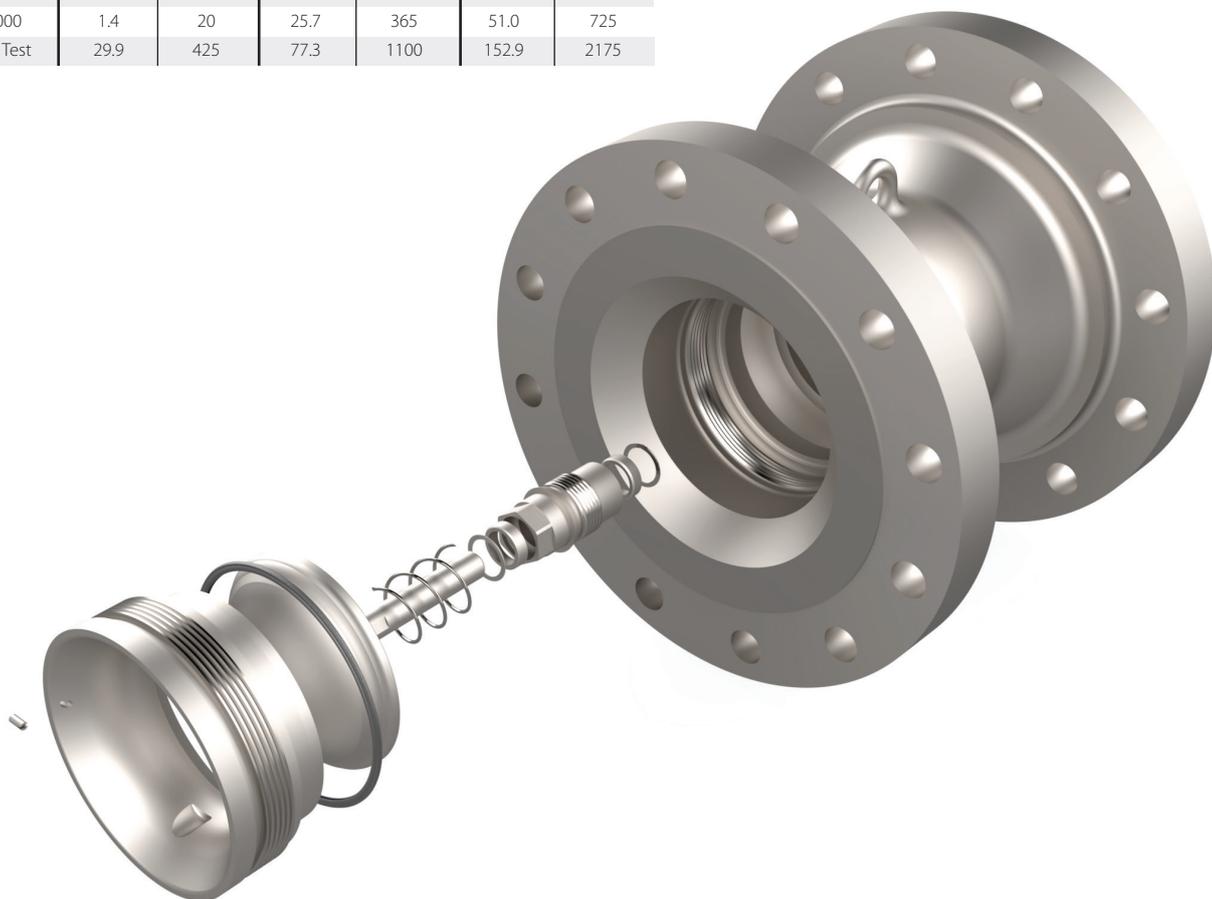


Pressure	Service Temperature	Test Temperature	End Connections	Typical Applications				
				LNG	Air Separation	Ethylene	Gas Compression	Gasoline
CLASS 150 – 4500 API 6A 2000 – 15,000	-321°F – 932°F -196°C – 500°C	-321°F – AMBIENT -196°C – AMBIENT	FLANGED, BUTT-WELD ENDS, HUBS ENDS AND SPECIALS	•	•	•	•	•

NOZ-CHEK® Cryogenic Pressure-Temperature Ratings

ASME B16.34 for Steel and 316 Stainless Steel Materials

Temperature		Maximum Non-Shock Service Pressure, psi and kg/cm ² (ASME B16.34)					
°C	°F	Series 150		Series 300		Series 600	
		316SS		316SS		316SS	
		kg/cm ²	psi	kg/cm ²	psi	kg/cm ²	psi
-29 to 38	-20 to 100	19.3	275	50.6	720	101.2	1440
66	150	17.9	255	47.1	670	94.2	1340
93	200	16.9	240	43.6	620	87.2	1240
121	250	15.8	225	41.5	590	83.0	1180
149	300	15.1	215	39.4	560	78.7	1120
177	350	14.4	205	37.6	535	75.6	1075
204	400	13.7	195	36.2	515	72.4	1030
232	450	12.7	180	34.8	495	69.6	990
260	500	12.0	170	33.7	480	67.1	955
288	550	10.9	155	32.7	465	65.4	930
316	600	9.8	140	31.6	450	63.6	905
343	650	8.8	125	31.3	445	62.6	890
371	700	7.7	110	30.2	430	60.8	865
399	750	6.7	95	29.9	425	59.4	845
427	800	5.6	80	29.2	415	58.3	830
454	850	4.6	65	28.5	405	56.9	810
468	875	3.9	55	28.1	400	56.2	800
482	900	3.5	50	27.8	395	55.5	790
496	925	2.8	40	27.4	390	54.8	780
510	950	2.5	35	27.1	385	54.5	775
524	975	1.8	25	26.4	375	52.7	750
538	1000	1.4	20	25.7	365	51.0	725
Hydrostatic Shell Test		29.9	425	77.3	1100	152.9	2175



NOZ-CHEK® Cryogenic Valves Ordering Information

24"

Valve Size

NC

Style

30

Pressure Class

C

Body & Trim

P

Seal

F

End Connection

Description: 24" Style NC, ASME Class 300, Stainless Steel Body, Metal to Metal Seal, Raised Face Flanges (No Modifications)

Valve Size

Nominal valve sizes are expressed in inches, for ASME, API and BS flange standards or millimeters for DIN, AS and JIS flange standards. (Size preceded by "M" for DIN, "A" for AS or "J" for JIS)

Seal

Operating temperature for general guidance only

Code Letter	Seal Material	Operating Temp. °C	Operating Temp. °F
P	Metal	-257 to 537	-450 to 1000

Body Seal

Operating temperature for general guidance only

Body Seal Type	Material	Temperature Range	
Spring Energised Cryogenic Seal	PTFE, spring energised Elgiloy	-196°C to 150°C	-320°F to 302°F
O-Ring	Various Materials	-60°C to 260°C	-76°F to 500°F
Metal C Seal	INC 718	-150°C to 550 °C	-238°F to 1022°F

Style

Ordering Letter	Body Style	Size Range
NC	Integral Body, Standard Pattern	2" through 84" (50 mm through 2134 mm)
NCS	Integral Body, Short Body Pattern	8" through 84" (200 mm through 2134 mm)

Flange Series

(ASME B16.42 Series "A" or "B" to be specified over 24")

ASME		API		DIN/JIS		BS/AS	
Ordering No.	Pressure Class	Ordering No.	Rating	Ordering No.	PN Rating	Ordering No.	Table
15	150	21	2000	Flange Standard: M-DIN J-JIS	6 thru 320	B-BS A-AS	A thru T
30	300	31	3000				
60	600	51	5000				
90	900	101	10,000				
150	1500	151	15,000				
250	2500						
450	4500						

NOZ-CHEK[®] Cryogenic Valves Ordering Information

24"

Valve Size

NC

Style

30

Pressure Class

C

Body & Trim

P

Seal

F

End Connection

Description: 24" Style NC, ASME Class 300, Stainless Steel Body, Metal to Metal Seal, Raised Face Flanges (No Modifications)

Standard Body & Disc Materials

Code	Body	Disc
C	ASTM A 351 GR CF8M 316 stainless steel	stainless steel

Spring Material

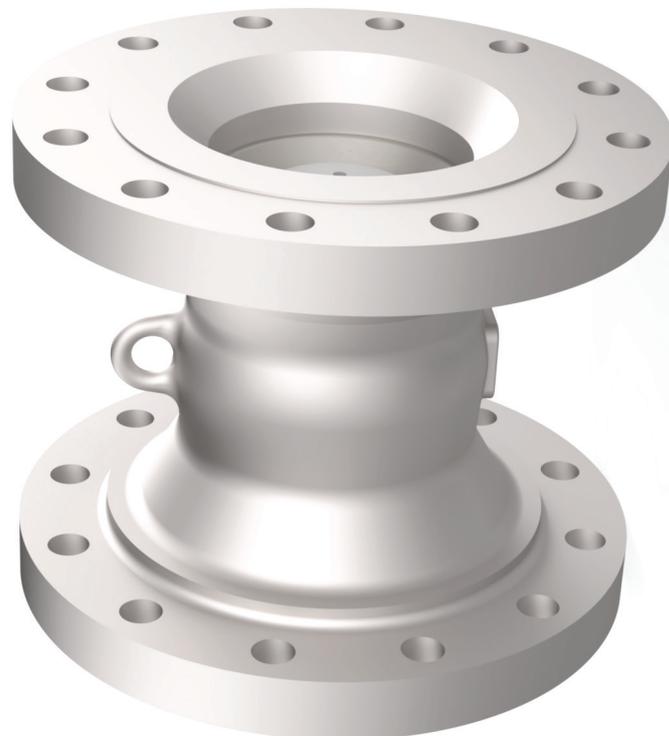
Spring Material	Maximum Recommended Operating Temperatures	
	°C	°F
316 Stainless Steel	-200 to 300	-328 to 572
Inconel [®] X-750	-200 to 537	-328 to 1000

Inconel[®] is a registered trademark of Special Metals Corporation. For temperatures up to 600°F (315°C), Inconel will be furnished as standard. Other alloy spring materials are available to meet specific service requirements.

End Connections

Ordering Letter	Connections
F	Flanged-Raised Faced
X	Flanged Flat Faced
G	Grayloc [®] End
P	Flanged Smooth Finish
R	Flanged Ring Joint
W	Butt Weld

Grayloc[®] is a registered trademark of Oceaengineering International, Inc.



Modifications

A modification number is assigned when non-standard features, material mixes or documentation are ordered.

NOZ-CHEK®

Crane ChemPharma & Energy

Crane Energy Global Headquarters
4526 Research Forest Drive, Suite 400
The Woodlands, Texas 77381 U.S.A.
Tel: +1 936 271 6500
Fax: +1 936 271 6510

Crane Stockham Valve Ltd.
6 Alexander Road
Cregagh, Belfast BT6 9HJ, Northern Ireland
Tel: +44 2 890 704222
Fax: +44 2 890 401582

www.cranecpe.com

CRANE

Sydney, Australia Operations
146-154 Dunheved Circuit
St. Marys, NSW 2760 Australia
Tel: +61 2 9623 0234
Fax: +61 2 9673 3870

Xomox Chihuahua, S.A.
Juan Ruiz de Alarcón 313,
Complejo Industrial Chihuahua,
31136 Chihuahua, Mexico
Tel: +52 614 442 9860

Crane Process Flow Technologies (India) Ltd
E7 / E8 -2 Old MIDC
Satara - 415 004 India
Tel: +91 21 62244417
Fax: +91 21 62245126

brands you trust.



Crane Co. and its subsidiaries cannot accept responsibility for possible errors in catalogues, brochures, other printed materials, and website information. Crane Co. reserves the right to alter its products without notice, including products already on order provided that such alteration can be made without changes being necessary in specifications already agreed. All trademarks in this material are property of the Crane Co. or its subsidiaries. The Crane and Crane brands logotype, in alphabetical order, (ALOYCO®, CENTER LINE®, COMPAC-NOZ®, CRANE®, DEPA®, DUO-CHEK®, ELRO®, FLOWSEAL®, JENKINS®, KROMBACH®, NOZ-CHEK®, PACIFIC VALVES®, RESISTOFLEX®, REVO®, SAUNDERS®, STOCKHAM®, TRIANGLE®, UNI-CHEK®, WTA®, and XOMOX®) are registered trademarks of Crane Co. All rights reserved.