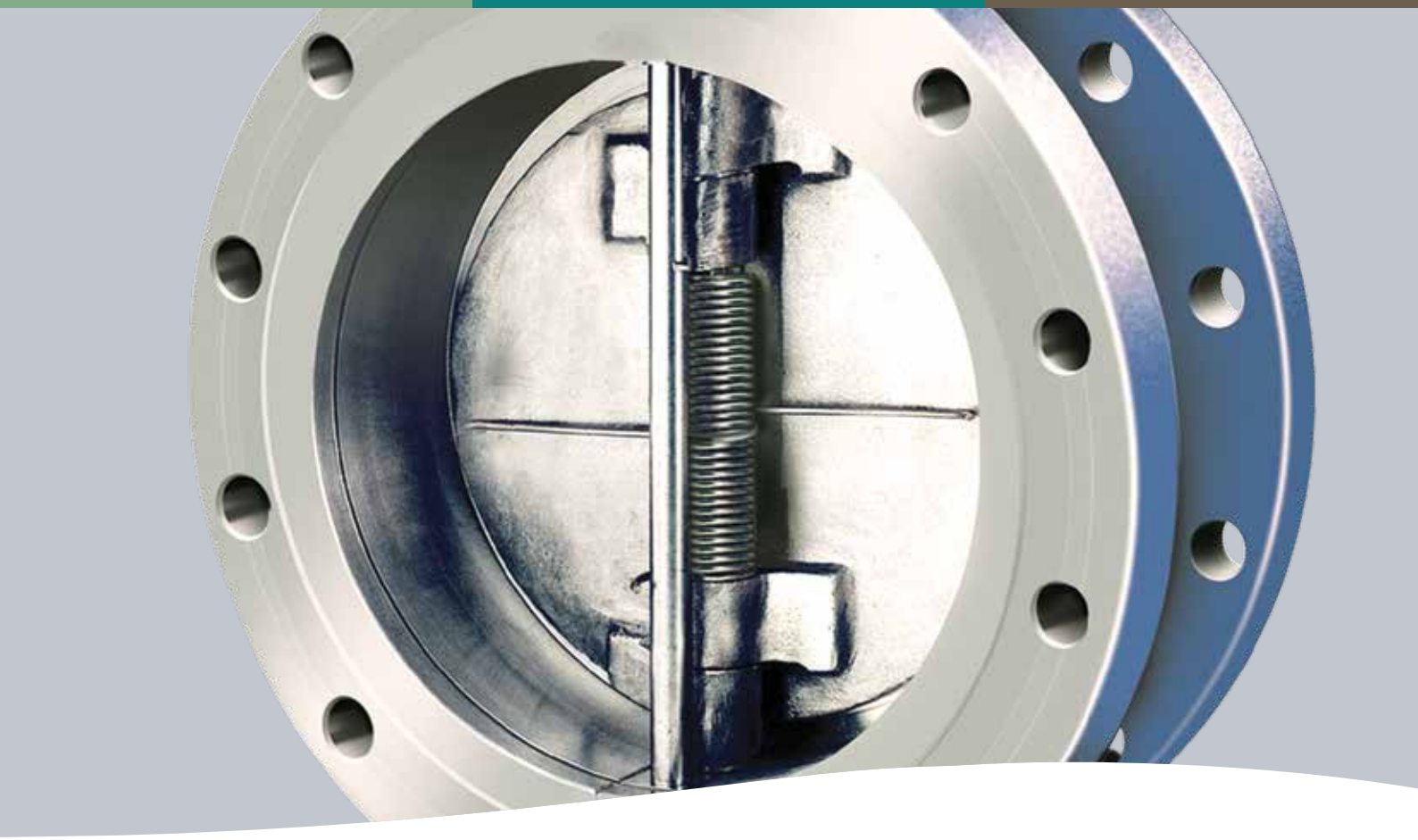
DUO-CHEK®

brands you trust.



DUO-CHEK® High Performance Non-Slam Check Valves

CRANE

Crane ChemPharma & Energy

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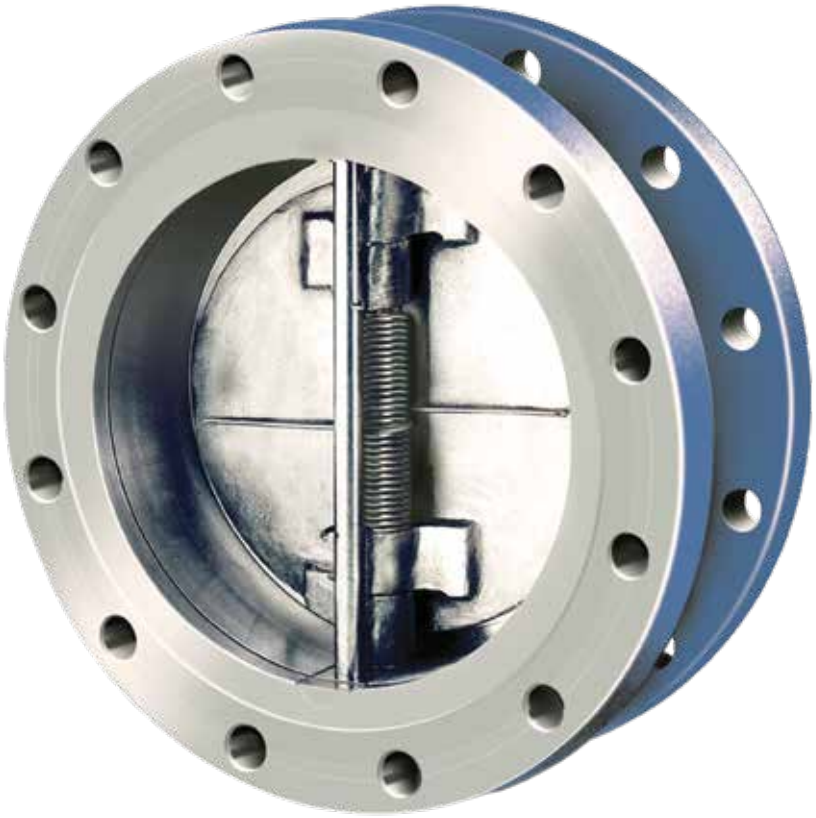
Key Features and Typical Applications

Key Features & Benefits

❶ Dual-plate designs that are compact and lightweight for efficient seating, operation and lower installation cost

❷ Independent springs with long legs to prevent seat scrubbing and provide non-slam performance

❸ Retainerless valve design without body penetration for critical service applications



Double Flanged (Retainerless)

Typical Applications

- Petroleum Refining
- Oil and Gas Production
- Chemicals and Petrochemicals
- Power Generation
- Steel/Primary Metals
- Marine
- Water and Wastewater
- Pulp and Paper

Duo-Chek® The High Performance Non-Slam Check Valve

Duo-Chek® high performance non-slam check valves are the original Mission Manufacturing Company wafer check valves introduced to the market in the late 50's. The valve is available in the sizes, pressure classes and configurations required to meet the most demanding of applications. Product range includes, but is not limited to:

- Sizes: 2" to 88"
- ASME Pressure Class 125 through 2500
- API 6A and 6D pressure classes
- DIN, JIS, BS, AS, and ISO standards are also available
- Wafer, lug, double flanged and extended body styles
- Wafer configurations available in retainered and retainerless style
- Body Materials:
  Cast Iron, Carbon Steel, Stainless Steels, Duplex Stainless Steel, Super Duplex
- Resilient Seat Materials:
  EPDM, Buna-N, Neoprene, and Viton-B®
- Integral and overlaid metal seats also available
- End Connections:
  Raised Face, Plain Face, Ring Joint, Weld-End, Hub-End

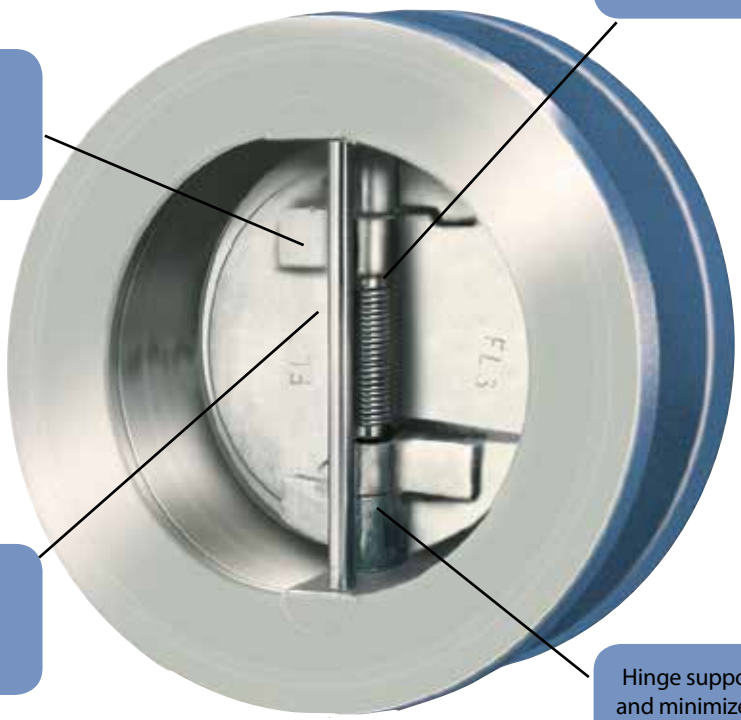
Industry Standards*	
API 594	Valve Design
API 598	Valve Pressure Testing and Inspection
ASME B16.5 & B16.47	Flanges
ASME B16.34	Pressure/Temperature Ratings
API 6D	Pipeline Valves
API 6A	Production Valves
PED 2014/68/EU	Pressure Equipment Directive

*Consult factory for other specification requirements.

Viton® is a registered trademark of DuPont Performance Elastomers L.L.C.

Spring action closes plates independently. (6" and larger)

Long-leg spring action allows plates to open and close without seat scrubbing.



Dual plate lightweight design for efficient seating and operation.

Hinge support sleeve reduces friction and minimizes water hammer through independent plate suspension (on larger sizes).

Wafer Style H (Retainerless)

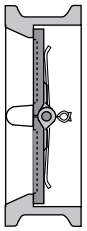
Specify Duo-Chek® ...to your Advantage

Leading engineers specify Duo-Chek® for check valve applications because it provides high performance. Extensive research and testing with demonstrated performance has earned worldwide recognition, unmatched in the industry.

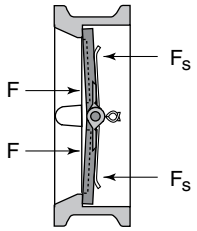


The Duo-Chek® wafer valve design is generally stronger, lighter, smaller, more efficient and less expensive than conventional swing check valves. Its design meets API 594 which is approximately one fourth the face to face dimension and 15% to 20% the weight, on most popular sizes, making them less expensive than a swing check valve. It is much easier to install between standard gaskets and line flanges. The savings compound during installation due to ease of handling and only one set of flange studs is required. Therefore, it is more cost effective to install, and also to maintain.

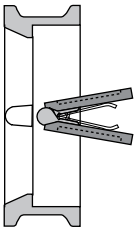
The Duo-Chek® also offers special design features that make it a high performance non-slam check valve. These include a scrub-free opening, and in most sizes a unique independent spring design as well as an independent plate support system. These features may not be found in other check valves. Other configurations offered include lug, double flange and extended body.



Plates in closed position. Top view.



Heel opens first as flow begins.



Plates fully opened (85°)

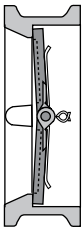
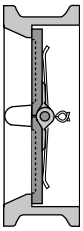


Plate toe closes first as flow decreases.

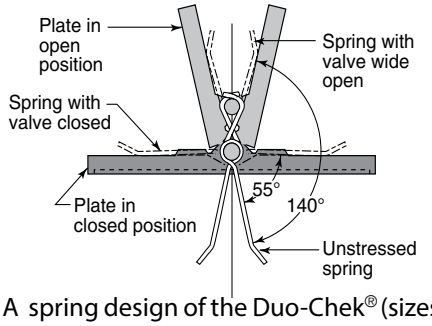


Plates fully seated for bubble-tight shutoff.

The innovative dual-plate design of the Duo-Chek® employs two spring-loaded plates (disc halves) suspended on a central vertical hinge pin. As flow begins, the plates open in response to a resultant force (F) which acts as the center of the sealed surface area. The contact point of the reacting spring leg's force (Fs) acts beyond the center of the plate area, causing the heel to open first. This prevents rubbing of the seal surface prior to normal plate opening, eliminating wear.

As the velocity of flow decreases, torsion spring action reacts automatically. This moves the plates closer to the body seats, reducing the distance and time of travel for closure. By having the plates closer to the body seats at the time of flow reversal, the valve dynamic response is greatly accelerated. This dramatically reduces the water hammer effect for non-slam performance.
At closing, the point of spring force causes the toe of the plates to close first. This prevents dragging of the heels of the plates and maintains seal integrity for much longer periods.

Independent Spring Design



A spring design of the Duo-Chek® (sizes 6" and larger) allows higher torque to be exerted against each plate with independent closing in response to the process stream. Testing has proved this action provides up to 25% improvement in valve life and 50% reduction in water hammer.

Each of the dual plates has its own spring or springs, which provide independent closing action. These independent springs undergo less angular deflection, only 140° as compared to 350° for conventional springs with two legs.

Independent Plate Suspension Design

The Duo-Chek® unique hinge design reduces friction forces by 66%, which improves valve response significantly. Support sleeves are inserted through the outboard hinges so that the upper hinge is independently supported by the lower sleeve during valve operation. This allows both plates to close at the same time for quick response, and excellent dynamic performance.

Design Features

Features	Benefits
Lightweight and Compact Wafer Design	Installs between mating flanges with 10 to 20% the weight of flanged swing checks in popular sizes - **Saves money in initial valve cost and provides lower installation cost.**
Dual Plate, Flat Seat Design	Plate heel is lifted first by design to prevent seat wear. Employs two spring-loaded plates with flat seats - **Gives superior performance and tight shutoff to meet industry standards.**
Independent Spring Action	Maximum deflection of 140°, provides improved valve response and longer life - **Saves money with longer valve life and improved system performance by reducing water hammer.**
Independent Plate Suspension with Unique Hinge Design (larger sizes)	Improves valve response and reduces friction forces by 66% - **Further assurances of non-slam performance with faster valve response.**
Simple, External Body Geometry	Configuration simplifies valve insulation - **Saves money.**
Variety of Body Designs Available Lug and Double Flange	Provides options to suit application needs - **Eases your selection process by utilizing the industry leader as your single source.**
Wide Variety of Materials	Versatility for many services - **Satisfies more application needs.**
Flexibility in Installation Position	Provides more rigidity than pipe, eliminating concerns of pipe bending loads of flanged valves - **Safety against thermal or seismic catastrophes.**
Body Strength and Rigidity	Some sizes suitable for horizontal or vertical up positions - **Simplifies piping design, eliminates constraints that swing checks create.**
Retainerless Duo-Chek® Design Eliminates Body Penetrations	For critical service applications, prevents possible escape of unwanted and/or hazardous materials to atmosphere - **Provides safety in critical services by eliminating environmental concerns. Standards in Lug and Double Flange Designs.**
Vertical Hinged Design	In horizontal position flow allows plates to function freely and full open under lower flow conditions as compared to swing check - **Reduces pressure loss, improves dynamic response and eliminates valve chatter.**
Special Valves Meet Market Needs: • **Special Lined** • **Hub Ends** • **Weld Ends** • **PED Certified (CE)** • **Low Temperature Applications - Cryogenic** • **ABS Certified** • **CRN Registration**	Wide size range, pressure range and added options allow further market needs to be met - **Reliance on world's largest wafer check line to supply more needs.**

Applications







A wide variety of body designs, materials, and trim make Duo-Chek® valves exceptionally versatile and suitable for a multitude of liquid and gas fluid applications.

Some of the major markets and typical applications are depicted here.







Oil and Gas Production
Centrifugal Compressor Discharge
Fire Water Lines
Oil/Steam Separation
Steam and CO_2 Injection
Gas/Oil Gathering Systems
Flowlines
Wellheads
Regasification
Liquidfaction

Power Generation
Steam
Condensate
Boiler Feed Pumps
Cooling Towers
Service Water Recirculators
River Water Intake

Petroleum Refining
Hydrogen
Cracking
Steam
Crude Oil
Gasoline
Visbreakers
Naphtha
Sulfur

Petrochemicals
Ethylene
Propylene
Steam
Reboilers
Gases

Chemicals
Chlorine
Phosgene
Aromatics
Polymers
Acids
Air Separation
Caustics

Water and Wastewater
Distribution Lines
Pumping Stations
Sewage Plant Blower Discharge
Chemical Treatment
Fire Protection Systems
HVAC Systems
Desalination

Steel/Primary Metals
Quench Lines
De-Scaling
Continuous Casters
Steam
Condensate
Strippers
Electro-Galvanizing

Pulp and Paper
Bleaching Lines
Black Liquor
Green Liquor
White Water
Steam
Chemical Recovery

Marine
Oil Tankers
Tanker Loading Terminals
Offshore Platforms
Sub-Sea Manifolds
Terminal Transfer Lines
Barge Unloading Lines
Shipboard Services

Valve Configurations



Style G
Retainered Wafer
Sizes 2" – 88"
- ASME Classes 125 – 2500
- Retainered Wafer Design
- Dimensions pages 13–14



Style H
Retainerless Wafer
Sizes 2" – 88"
- ASME Classes 150 – 2500
- Dimensions pages 13–14



Retainerless Wafer Double Flange Valves
Sizes 8" – 88"
- ASME Classes 150 – 900
- Sizes & Dimensions page 15

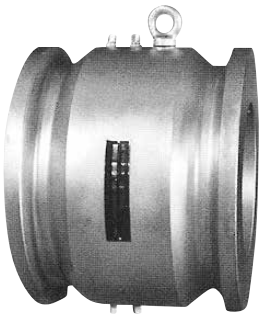


Retainerless Wafer Lug Valves
Sizes 2" – 24"
- ASME Classes 150 – 2500
- Sizes & Dimensions page 16



Style X
Extended Body Wafer
Sizes 10" – 54"
- ASME Classes 150 – 2500
- Designed for extremely fast opening conditions
- Sizes & Dimensions page 17

Specials



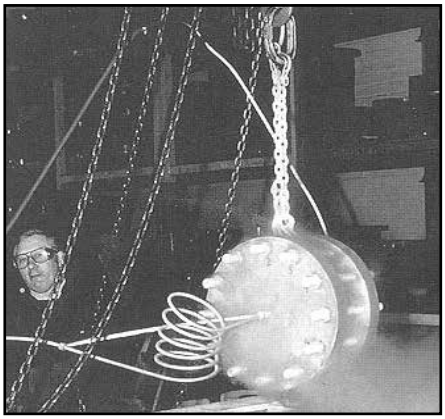
Hub End Valves

Valves with Hub ends may be furnished for use with hub end, clamp-style connections. These end connections simplify installation procedures in systems that utilize them. Please contact your sales office for information regarding sizes and pressure ratings available, and other hub end connections such as Spolock, Seaboard Lloyd, etc.



Butt Weld Valves

Valves with butt weld ends may be furnished for piping systems designed for welded system components to eliminate potential joint leak paths. See Ordering Information for proper figure number designation, so that weld-end preparations match the mating pipe schedules.



Cryogenic Valves

Duo-Chek® valves may be furnished for subatmospheric to cryogenic temperatures -58°F through -321°F(-50°C through -196°C). Special materials of construction such as low temperature alloy steels, austenitic stainless steel, aluminum bronze or Monel® are generally required.

Monel® is a registered trademark of Special Metals Corporation.



Coated & Lined Valves

Duo-Chek® valves may be furnished with linings, when specified, for abrasion or corrosion resistance. Linings include Natural Rubber, Neoprene, and others. All body surfaces of lined valves are covered with the specified material, eliminating the need for gaskets. Hinge and stop pin holes are encapsulated to seal them against line fluids.

Solid alloy valves are recommended for extremely corrosive applications. A variety of coatings may be provided on request to resist corrosion or abrasion. Some of the commonly specified coatings include epoxies, coal tar derivatives and sacrificial zinc primers. Please discuss your requirements with your sales office.

Other Specials

Other Duo-Chek® specials furnished include:

- Valves to comply with NACE MR0103
- Valves cleaned for liquid oxygen (LOX) service
- Valves prepared for Food Service (austenitic stainless steel)
- Special testing for valves, including radiography, magnetic particle, dye penetrant, ultrasonic, helium leak, etc.

Ordering Information

Figure Number System

Size	Style	Pressure Class	Body & Plate	Seal	End Connection	Body Configuration		Modification Number
24"	H	15	S	P	F	3	-	9

DESCRIPTION: 24" Style H, ASME Class 150, Carbon Steel Body, Metal Seal, raised face flanges, with double flange body, (modification number indicates Inconel® X spring)

Valve Size

Nominal valve sizes are expressed in inches or millimeters.

In Inches:
For use with ASME, API and B and A Flange Standards.

In Millimeters:
For use with DIN, or JIS rated valves (size preceded by "M" for DIN, or "J" for JIS).

Style

Ordering Letter	Body Type	Size Range
H	Retainerless Duo-Chek® Design Wafer, Lug or Double Flange	2" through 88" (50mm through 2200mm)
G	Wafer, Retainered	2" through 88" (50mm through 2200mm)
X	Extended Body Design	10" through 54" (150mm through 1350mm)
W*	Bodies with Integral Weld-Ends	2" through 72" (50mm through 1800mm)

*Weld-end valves also require the additional designation of the pipe schedule they are designed to fit.

Pressure Classes

ASME		API[Δ]		DIN / JIS[1]		BS / AS[2]	
Ordering No.	Class	Ordering No.	Class	Ordering No.	PN Rating	Ordering No.	Table
12	125	21	2000	Flange Standard:	6		
15	150				10	B - BS	A
25	250	31	3000	M - DIN	16		thru
30	300				25	A - AS	T
40	400	51	5000	J - JIS	40		
60	600				64		
90	900	101	10000		100		
150	1500				160		
250	2500	151	15000		250		
450	4500				320		

Δ API Class is shown in psig, cold working pressure.

1 Metric valves with DIN or JIS standard flanges are designated by having the nominal size expressed in millimeters, preceded by "M" or "J". Flange ratings in PN numbers are then listed after the valve style, as in ASME or API Valves.

Example: M 100 (4") G16 SPF -9

- M: Flange Standard (M - DIN) (J - JIS)
- 100: 100mm Size
- G16: Pressure Rating, PN for DIN or JIS (in bars)

This specifies a metric valve, designed to fit between DIN flanges. Nominal size is 100 millimeters (corresponding to 4"), Style G Duo-Chek® with a pressure rating of 16 bars, carbon steel body and plate, metal seat, raised face end connections and Inconel® X spring.

2 Valves designed for use with British Standard 10 or Australian Standard 2129 are defined by adding two letters between the style of construction and pressure rating. First letter designates the standard, and the second letter denotes the table in that standard.

Example: 6" G B E 15 BNF

- B: Flange Standard B - British Std. 10 A - Std. 2129
- E: Table in corresponding Standard
- 15: ASME Class
- BNF: is made from

Figure number lists a 6" Style G Duo-Chek®, designed to fit between British Standard 10, Table E Flanges, using a Class 150 Valve, having an aluminum bronze body and plates, Neoprene seal and raised face end connections.

Ordering Information

Body and Plates

Ordering Letter	Material	Specification
BA	Ni-Aluminum Bronze	ASTM B148, Alloy 958
C	316 Stainless Steel	ASTM A351, Gr. CF-8M
F	Alloy 20	ASTM A351, Gr. CN7M
H	Cast Iron with Al. Br. Plates	ASTM A126, class 40 ASTM B148, (952)
K	Hastelloy® C	A494, Gr. CW12MW
L	C12 Alloy Steel	ASTM A217, Gr. C12 (9% Cr)
M	Monel®	ASTM A494, Gr. M30C
S	Carbon Steel	ASTM A216, Gr. WCB

Ordering Letter	Material	Specification
T	317 S.S.	ASTM A351, Gr. CG-8M
U	WC6 Alloy Steel	ASTM A217, Gr. WC6 (1¼% Cr)
V	347 S.S.	ASTM A351, Gr. CF-8C
Y	C5 Alloy Steel	ASTM A217, Gr. C5 (5% Cr)
DZ	22% Duplex	ASTM A995, Gr. 4A
EA	254 SMO Stainless	UNS S31254, (ASTM CK3MCuN)
GC	LCC Low Temp. Steel	ASTM A352, Gr. LCC
TT	Titanium	ASTM B367, Gr. C2
EB	25% Super Duplex	ASTM A995, Gr 6A

Hastelloy® C is a registered trademark of Haynes International, Inc.

Seal[1]

Ordering Letter	Material	Operating Temperature °C	Operating Temperature °F
A	EPDM	-18 to 121	0 to 250
M	Buna-N	-30 to 121	-22 to 250
N	Neoprene	-40 to 121	-40 to 250
P	As Body	-196 to 538	-321 to 1000
V	Viton-B®	-20 to 204	-4 to 400

Spring Selection Guide[2]

Spring Material	Operating Temperature °C	Operating Temperature °F
Type 316 S.S.	-200 to 300	-325 to 570
Inconel® X-750 (standard)	-200 to 370	-325 to 700
Inconel® X-750 (heat treated)*	-200 up to 550	-325 to 1000

End Connections

Ordering Letter	Connections
F	Serrated face
G	Hub End
P	Plain Face (non serrated, Class 125)
R	Ring Joint
W	Weld-End

Special Body Configurations

Designation No.	Configuration
None (Blank)	Wafer Style, inserted between mating flanges with studs spanning entire length
1	Lug design w/threaded holes bolted from each end
2	Lug design with through-bolt holes to protect studs
3	Double flanged design with valve flanges bolted to individual line flanges

* Available upon request

1 This range of operating temperatures is for general guidance. The range varies with application, body and plate material.

2 For unique service conditions other spring materials are available. Please consult factory.

Common Modifications

Mod No.	Material Description	API Trim No.*	Trim Description
-9	Inconel® X-750 Springs		
-14	316 S.S. Plate, Pins		
-39	410 S.S. Plate, Pins & Inconel® X-750 Springs		
-169	410 S.S. Plate, Pins, Inconel® X-750 Springs and 410 S.S. Overlay Seat	1	Type 410 S.S.
-201	316 S.S. Plate, Pins, Inconel® X-750 Springs		
-233	316 S.S. Plate, Pins, Inconel® X-750 Springs and 316 S.S. Overlay Seat	10	Type 316 S.S.
-491	Hard Face Plate, 316 SS, Pins, Inconel® X-750 Springs and Hard Face Seat	5	Hard Faced Seats
-559	Inconel® X-750 Spring and conformance to NACE MR0103		
-772	Monel® Plate, Pins, Springs, Bearings and Monel® Overlay Seat	9	Monel®
131E	410 S. S. Plate, pins, Inconel X-750 Springs and Hard Face Seat	8	F6 and Hard Faced
385E	316 S.S. Plate, Pins, Inconel X-750 Springs and Hard Face Seat	12	316 and Hard Faced

*Steel and steel alloy based metals.

NACE MR0103 compliance offered on metal seated valves only.

Additional Engineered Check Products



Noz-Chek®

Full Body Nozzle Check Valves

- Sizes 2" – 84"
- ASME Classes 150 – 4500
- Flanged, Hub-End, Weld-End
- Iron, Steel, and Stainless Steel
- ASME, DIN, JIS Standards



Uni-Chek®

Single-Disc Check Valves

- Sizes 2" – 36"
- ASME Classes 125 – 300
- Flanged, Plain, or Serrated Ends
- Cast Iron, Carbon Steel, and Stainless Steel
- Variety of external shaft options available



Compac-Noz®

Compact Body Nozzle Check Valves

- Sizes 12" – 60"
- ASME Classes 150 – 4500
- Flanged, Hub-End, Weld-End
- Iron, Steel, and Stainless Steel
- ASME, DIN, JIS Standards



Krombach®

Steam Extraction Check Valves

- Sizes 6" – 72"
- ASME Classes 150 – 300
- Double Flanged & Butt Weld Ends
- Steel, Stainless Steel and Welded Design

DUO-CHEK®

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