brands you trust.

DUO-CHEK® High Performance Non-Slam Check Valves

www.cranecpe.com
Key Features and Typical Applications

Key Features & Benefits

1. Dual-plate designs that are compact and lightweight for efficient seating, operation and lower installation cost
2. Independent springs with long legs to prevent seat scrubbing and provide non-slam performance
3. Retainerless valve design without body penetration for critical service applications

Typical Applications

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

Double Flanged (Retainerless)
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

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

### Industry Standards*

<table>
<thead>
<tr>
<th>Standard</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>API 594</td>
<td>Valve Design</td>
</tr>
<tr>
<td>API 598</td>
<td>Valve Pressure Testing and Inspection</td>
</tr>
<tr>
<td>ASME B16.5 &amp; B16.47</td>
<td>Flanges</td>
</tr>
<tr>
<td>ASME B16.34</td>
<td>Pressure/Temperature Ratings</td>
</tr>
<tr>
<td>API 6D</td>
<td>Pipeline Valves</td>
</tr>
<tr>
<td>API 6A</td>
<td>Production Valves</td>
</tr>
<tr>
<td>PED 2014/68/EU</td>
<td>Pressure Equipment Directive</td>
</tr>
</tbody>
</table>

*Consult factory for other specification requirements.

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

Dual plate lightweight design for efficient seating and operation.

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

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

Wafer Style H (Retainerless)
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.

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.

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.
<table>
<thead>
<tr>
<th>Features</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lightweight and Compact Wafer Design</td>
<td>Installs between mating flanges with 10 to 20% the weight of flanged swing checks in popular sizes - <strong>Saves money in initial valve cost and provides lower installation cost.</strong></td>
</tr>
<tr>
<td>Dual Plate, Flat Seat Design</td>
<td>Plate heel is lifted first by design to prevent seat wear. Employs two spring-loaded plates with flat seats - <strong>Gives superior performance and tight shutoff to meet industry standards.</strong></td>
</tr>
<tr>
<td>Independent Spring Action</td>
<td>Maximum deflection of 140°, provides improved valve response and longer life - <strong>Saves money with longer valve life and improved system performance by reducing water hammer.</strong></td>
</tr>
<tr>
<td>Independent Plate Suspension with Unique Hinge Design (larger sizes)</td>
<td>Improves valve response and reduces friction forces by 66% - <strong>Further assurances of non-slam performance with faster valve response.</strong></td>
</tr>
<tr>
<td>Simple, External Body Geometry</td>
<td>Configuration simplifies valve insulation - <strong>Saves money.</strong></td>
</tr>
<tr>
<td>Variety of Body Designs Available Lug and Double Flange</td>
<td>Provides options to suit application needs - <strong>Eases your selection process by utilizing the industry leader as your single source.</strong></td>
</tr>
<tr>
<td>Wide Variety of Materials</td>
<td>Versatility for many services - <strong>Satisfies more application needs.</strong></td>
</tr>
<tr>
<td>Flexibility in Installation Position</td>
<td>Provides more rigidity than pipe, eliminating concerns of pipe bending loads of flanged valves - <strong>Safety against thermal or seismic catastrophes.</strong></td>
</tr>
<tr>
<td>Body Strength and Rigidity</td>
<td>Some sizes suitable for horizontal or vertical up positions - <strong>Simplifies piping design, eliminates constraints that swing checks create.</strong></td>
</tr>
<tr>
<td>Retainerless Duo-Chek® Design Eliminates Body Penetrations</td>
<td>For critical service applications, prevents possible escape of unwanted and/or hazardous materials to atmosphere - <strong>Provides safety in critical services by eliminating environmental concerns. Standards in Lug and Double Flange Designs.</strong></td>
</tr>
<tr>
<td>Vertical Hinged Design</td>
<td>In horizontal position flow allows plates to function freely and full open under lower flow conditions as compared to swing check - <strong>Reduces pressure loss, improves dynamic response and eliminates valve chatter.</strong></td>
</tr>
<tr>
<td>Special Valves Meet Market Needs: • Special Lined • Hub Ends • Weld Ends • PED Certified (CE) • Low Temperature Applications - Cryogenic • ABS Certified • CRN Registration</td>
<td>Wide size range, pressure range and added options allow further market needs to be met - <strong>Reliance on world’s largest wafer check line to supply more needs.</strong></td>
</tr>
</tbody>
</table>
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 CO2 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
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
Other Specials
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.

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.
**Figure Number System**

<table>
<thead>
<tr>
<th>Size</th>
<th>Style</th>
<th>Pressure Class</th>
<th>Body &amp; Plate</th>
<th>Seal</th>
<th>End Connection</th>
<th>Body Configuration</th>
<th>Modification Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>24&quot;</td>
<td>H</td>
<td>15</td>
<td>S</td>
<td>P</td>
<td>F</td>
<td>3</td>
<td>- 9</td>
</tr>
</tbody>
</table>

**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).

**Pressure Classes**

<table>
<thead>
<tr>
<th>ASME</th>
<th>APIA</th>
<th>DIN / JIS1</th>
<th>BS / AS2</th>
</tr>
</thead>
<tbody>
<tr>
<td>No.</td>
<td>Class</td>
<td>No.</td>
<td>PN Rating</td>
</tr>
<tr>
<td>12</td>
<td>125</td>
<td>21</td>
<td>2000</td>
</tr>
<tr>
<td>15</td>
<td>150</td>
<td>31</td>
<td>3000</td>
</tr>
<tr>
<td>30</td>
<td>300</td>
<td>51</td>
<td>5000</td>
</tr>
<tr>
<td>40</td>
<td>400</td>
<td>101</td>
<td>10000</td>
</tr>
<tr>
<td>60</td>
<td>600</td>
<td>151</td>
<td>15000</td>
</tr>
<tr>
<td>90</td>
<td>900</td>
<td>250</td>
<td>2500</td>
</tr>
<tr>
<td>150</td>
<td>1500</td>
<td>4500</td>
<td>4500</td>
</tr>
</tbody>
</table>

**Ordering Information**

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 seal, raised face end connections and Inconel® X spring.

**Example:**

M 100 (4") G16 SPF -9

Flange Standard (M - DIN) 100mm Size

Pressure Rating, PN for DIN or JIS (in bars)

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.

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

Flange Standard B - British Std. 10 A - Std. 2129

ASME Class is made from Table in corresponding Standard

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.
**Body and Plates**

<table>
<thead>
<tr>
<th>Ordering Letter</th>
<th>Material Description</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>BA</td>
<td>Ni-Aluminum Bronze</td>
<td>ASTM B148, Alloy 958</td>
</tr>
<tr>
<td>C</td>
<td>316 Stainless Steel</td>
<td>ASTM A351, Gr. CF-8M</td>
</tr>
<tr>
<td>F</td>
<td>Alloy 20</td>
<td>ASTM A351, Gr. CN7M</td>
</tr>
<tr>
<td>H</td>
<td>Cast Iron with</td>
<td>ASTM A126, class 40</td>
</tr>
<tr>
<td>K</td>
<td>Hastelloy® C</td>
<td>A494, Gr. CW12MW</td>
</tr>
<tr>
<td>L</td>
<td>C12 Alloy Steel</td>
<td>ASTM A217, Gr. C12 (9% Cr)</td>
</tr>
<tr>
<td>M</td>
<td>Monel®</td>
<td>ASTM A494, Gr. M30C</td>
</tr>
<tr>
<td>S</td>
<td>Carbon Steel</td>
<td>ASTM A216, Gr. WCB</td>
</tr>
<tr>
<td>T</td>
<td>317 S.S.</td>
<td>ASTM A351, Gr. CG-8M</td>
</tr>
<tr>
<td>U</td>
<td>WC6 Alloy Steel</td>
<td>ASTM A217, Gr. W6 (1 1/4% Cr)</td>
</tr>
<tr>
<td>V</td>
<td>347 S.S.</td>
<td>ASTM A351, Gr. CF-8C</td>
</tr>
<tr>
<td>Y</td>
<td>CS Alloy Steel</td>
<td>ASTM A217, Gr. C5 (5% Cr)</td>
</tr>
<tr>
<td>DZ</td>
<td>22% Duplex</td>
<td>ASTM A995, Gr. 4A</td>
</tr>
<tr>
<td>EA</td>
<td>254 SMO Stainless</td>
<td>UNS S31254, (ASTM CK3MCuN)</td>
</tr>
<tr>
<td>GC</td>
<td>LCC Low Temp. Steel</td>
<td>ASTM A352, Gr. LCC</td>
</tr>
<tr>
<td>TT</td>
<td>Titanium</td>
<td>ASTM B367, Gr. C2</td>
</tr>
<tr>
<td>EB</td>
<td>25% Super Duplex</td>
<td>ASTM A995, Gr. 6A</td>
</tr>
</tbody>
</table>

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

**End Connections**

<table>
<thead>
<tr>
<th>Ordering Letter</th>
<th>Connections Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>Serrated face</td>
</tr>
<tr>
<td>G</td>
<td>Hub End</td>
</tr>
<tr>
<td>P</td>
<td>Plain Face</td>
</tr>
<tr>
<td>R</td>
<td>Ring Joint (non serrated, Class 125)</td>
</tr>
<tr>
<td>W</td>
<td>Weld-End</td>
</tr>
</tbody>
</table>

**Spring Selection Guide**

<table>
<thead>
<tr>
<th>Spring Material</th>
<th>Operating Temperature °C</th>
<th>°F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 316 S.S.</td>
<td>-200 to 300</td>
<td>-325 to 570</td>
</tr>
<tr>
<td>Inconel® X-750 (standard)</td>
<td>-200 to 370</td>
<td>-325 to 700</td>
</tr>
<tr>
<td>Inconel® X-750 (heat treated)*</td>
<td>-200 up to 550</td>
<td>-325 to 1000</td>
</tr>
</tbody>
</table>

*Available upon request

**Common Modifications**

<table>
<thead>
<tr>
<th>Mod No.</th>
<th>Material Description</th>
<th>API Trim No.*</th>
<th>Trim Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-9</td>
<td>Inconel® X-750 Springs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-14</td>
<td>316 S.S. Plate, Pins</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-39</td>
<td>410 S.S. Plate, Pins &amp; Inconel® X-750 Springs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-169</td>
<td>410 S.S. Plate, Pins, Inconel® X-750 Springs and 410 S.S. Overlay Seat</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-201</td>
<td>316 S.S. Plate, Pins, Inconel® X-750 Springs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-233</td>
<td>316 S.S. Plate, Pins, Inconel® X-750 Springs and 316 S.S. Overlay Seat</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-491</td>
<td>Hard Face Plate, 316 SS, Pins, Inconel® X-750 Springs and Hard Face Seat</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-559</td>
<td>Inconel® X-750 Spring and conformance to NACE MR0103</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-772</td>
<td>Monel® Plate, Pins, Springs, Bearings and Monel® Overlay Seat</td>
<td></td>
<td></td>
</tr>
<tr>
<td>131E</td>
<td>410 S.S. Plate, pins, Inconel® X-750 Springs and Hard Face Seat</td>
<td></td>
<td></td>
</tr>
<tr>
<td>388E</td>
<td>316 S.S. Plate, Pins, Inconel® X-750 Springs and Hard Face Seat</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Steel and steel alloy based metals.
NACE MR0103 compliance offered on metal seated valves only.
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
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

Belfast, Northern Ireland Operations
6 Alexander Road
Cregagh, Belfast BT6 9HJ Ireland
Tel.: (442) 890-704222
Fax.: (442) 890-401582

Regional Manufacturing Service & Distribution Centers

INDIA
Solitaire 6th Floor, Survey No. 131/1+2
ITI Road, Opp. Reliance Footprint
Aundh, Pune 411007, India
Tel: 91 21 62244417
Fax: 91 21 62245126

AUSTRALIA
146-154 Dunheved Circuit
St. Mary's NSW 2760
Tel: (61) 2-8889-0100
Fax: (61) 2-9673-3870

MIDDLE EAST
Jebel Ali Free Zone South
2 PO Box 17415 - Dubai, UAE
Tel: 971-4-880-9989
Fax: 971-4-880-9185

EUROPE
6 Alexander Road
Cregagh, Belfast BT6 9HJ
Tel: 44 (28) 9070 4222
Fax: 44 (28) 9040 1582

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