FMC Technologies

Flowline Products and Services

World Proven Chiksan® and Weco® Equipment

Flowline Products and Services

FMC Technologies is the world's leading supplier of flowline products and services to the oilfield industry and is the standard against which all others are measured. From the original Chiksan® and Weco® products to the revolutionary equipment designs and integrated services of today, FMC's fluid control family of products and services enables customers to achieve maximum life and value from their flowline systems throughout a complete range of applications.

The success of FMC's fluid control technology stems from a strong tradition of anticipating and responding to customer needs in every way possible. By focusing on the delivery of top products and services, FMC Technologies is helping its customers face tomorrow's technical and economic challenges today.

Flowline Products and Services

Health, Safety & Environment

As a leading oilfield equipment and services provider, FMC Technologies stresses overall health, safety, and environment (HSE) in all of its operations and processes. With a proven record of outstanding HSE performance, FMC is a strong advocate of HSE training that goes beyond the basic legal requirements. The goal is to ensure that all field and office personnel are competent to carry out HSE critical duties, having received the appropriate training required by law, company policy, and clients. HSE policy covers all key elements of the business, including company safety policy statements, product safety, risk assessment, monitoring, auditing, and review.

Manufacturing Leader

FMC's fluid control manufacturing facility is located in Stephenville, Texas. The plant was constructed in 1980 and expanded in 1984, 1987, and 1996. The facility

occupies a 44-acre site and comprises 220,000 square feet of manufacturing capacity and 48,000 square feet of customer service, production support, and engineering offices. It utilizes the latest in computer numerical controlled (CNC) machining centers, production planning systems, computer aided design/computer aided manufacturing (CAD/CAM) systems, and the latest technology in order and distribution operating systems. The Stephenville facility produces a wide range of flowline equipment for distribution worldwide.

Experienced, Knowledgeable, Productive People

FMC's global fluid control team is structured around top flowline professionals – individuals who understand your business and are dedicated to meeting your needs. The management, engineering, and sales support staff are among the most experienced in the oil and gas industry. Their knowledge and industry expertise show up in the quality of products and services delivered to you.

CHIKSAN

WECO

Flowline Products and Services

Unsurpassed Quality

FMC's fluid control quality system has been surveyed and approved by DNV and meets ISO 9001 and European Pressure Equipment Directive 97/23/CE. Most products are supplied with the CE marking. Chiksan and Weco products also can be supplied with both type and case approval from DNV, Lloyds, ABS, GGTN, and others. Products for sour gas service meet NACE MR-01-75 and API RP-14-E. Complete material certification and traceability are also available.

Research and Development

To meet the evolving needs of its customers, FMC continually invests in flowline research and development. This industry-leading effort has resulted in a host of new products and refinements to existing products. All new products are subjected to exhaustive laboratory and field tests to ensure their reliability and integrity before they are released to the marketplace. Research and development capabilities include exhaustive laboratory and field testing, destructive and nondestructive testing, three-dimensional finite element analysis, computational fluid dynamics, and the flowline industry's only high-velocity flow loop.

Worldwide Distribution

Chiksan and Weco products are distributed from more than 60 locations worldwide. FMC fluid control facilities stock many flowline products in the specific sizes, pressures, and materials common in the various regions. From a replacement seal for a Chiksan swivel joint to a platform full of well servicing equipment, FMC Technologies delivers.

Integrated Services

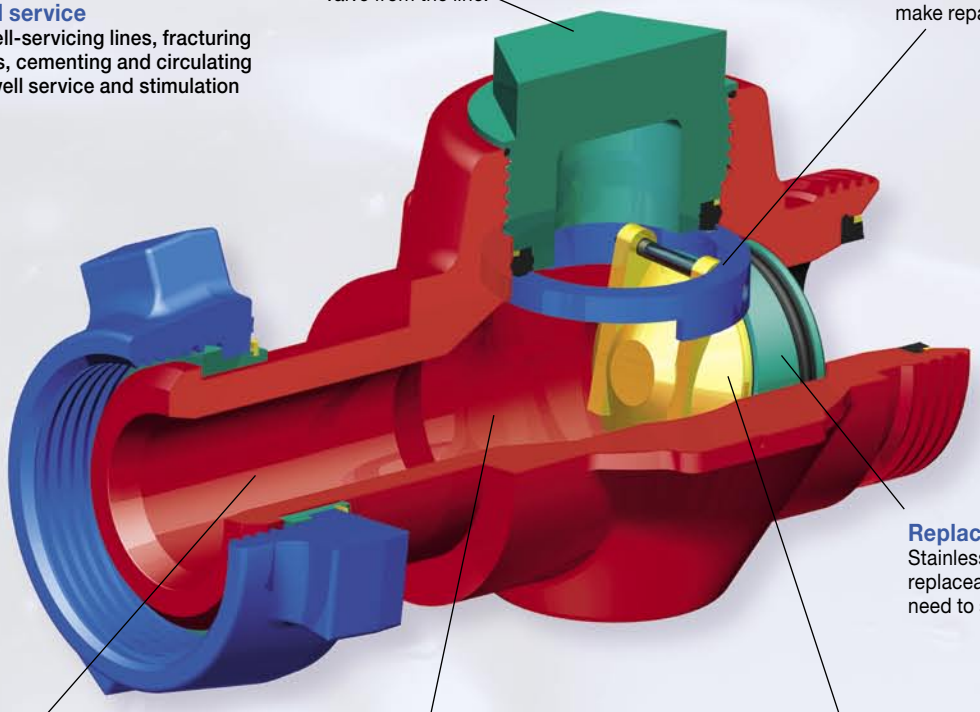
To satisfy the total flowline requirements of its customers, FMC Technologies has consolidated its industry-leading after-sales capabilities into a comprehensive Integrated Services program. Integrated Services is helping customers worldwide realize the maximum value from their flowline assets to guarantee that the right products are shipped to the job site in top working condition. This total solutions approach includes the InteServ tracking and management system, mobile inspection and repair, strategically located service centers, and genuine Chiksan and Weco spare parts.

Weco® Check Valves

Weco check valves are used to isolate well-servicing equipment from high-pressure treating fluids during fracturing applications. Offered in three primary models, these rugged valves seal against a complete range of well-servicing fluids at pressures to 20,000 psi. Valves are available in 1-1/2 to 4-inch bore sizes for standard and reverse flow. Sour gas models available. Consult factory for configurations. Like all pressure containing products, Weco check valves require special handling (see inside back cover for Warnings and Cautions).

Top-Entry Check Valves

Recommended service
High-pressure well-servicing lines, fracturing lines, testing lines, cementing and circulating lines, and other well service and stimulation applications



ACME thread cap
Coarse, ACME thread cap can be easily removed without having to remove the valve from the line.

Fast, easy service
Top-entry design and removable flapper assembly make repair fast and easy.

Replaceable seat
Stainless steel seat is replaceable, reducing the need to scrap body.

Abrasion resistant flapper
Carboxylated nitrile flapper face is abrasion resistant against a complete range of well fluids.

Forged design
Forged body, unique flow dynamics, advanced erosion characteristics, and abrasion-resistant components combine for long service life.

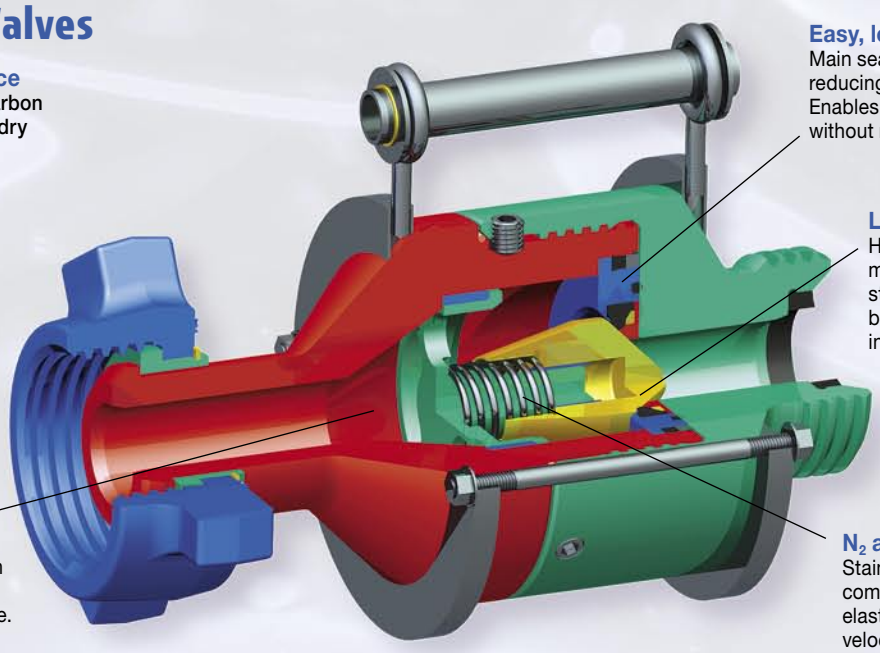
Open flow path
Flapper dynamics provide optimum flow through the valve and low flow differential.

See specifications tables (pages CV1A and CV2A) for sizes, dimensions, weights, materials, and part numbers.

Weco® Check Valves

Dart Check Valves

Recommended service
Extreme nitrogen and carbon dioxide services; wet or dry non-erosive flow



Easy, low-cost service
Main seal is located on seat, reducing exposure to flow. Enables seal to be replaced without replacing seat or dart.

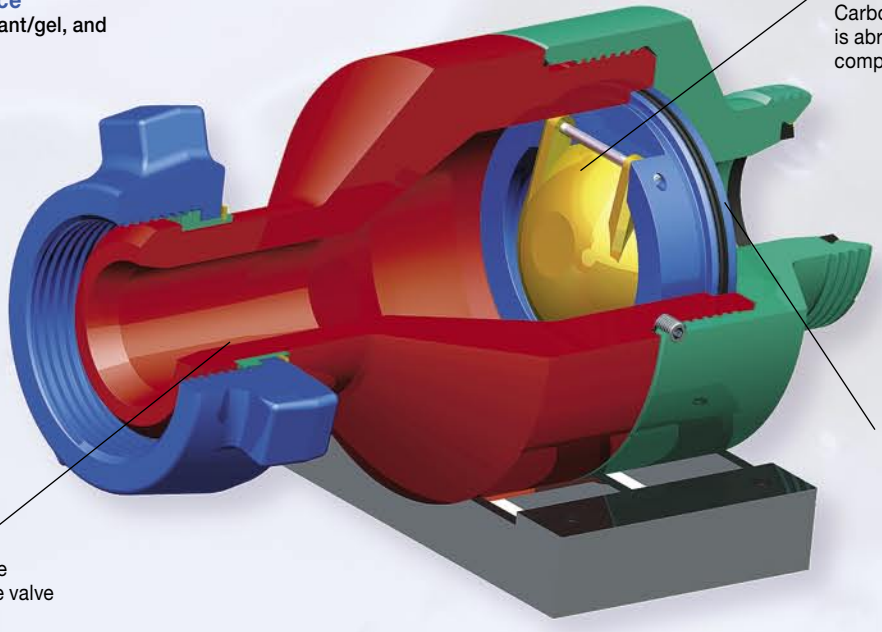
Low-inertia dart design
Hollow dart and fixed stem minimize pressure required to start flow. Non-metallic bushing reduces friction, increasing dart and stem life.

Minimizes explosive decompression
Explosive decompression resistant materials and design for long service life.

N_2 and CO_2 capability
Stainless steel internal components and special elastomer seal handle gas velocities in excess of 250 feet/second.

Flapper Check Valves

Recommended service
Slick water, sand, proppant/gel, and cement services



Abrasion resistant flapper
Carboxylated nitrile flapper face is abrasion resistant against a complete range of well fluids.

Replaceable seat
Separate seat/body design ensures the seat can be replaced as needed.

Open flow path
Flapper dynamics provide optimum flow through the valve and low flow differential.

See specifications tables (pages CV1A and CV2A) for sizes, dimensions, weights, materials, and part numbers.

Weco® Check Valve Specifications

Top Entry Check Valves

Nominal Size, in.	Cold Working Pressure, psi (bar)	End Connections	Flow Orientation	Part Number	A in. (mm)	B in. (mm)	Weight lb (kg)
3	15,000 (1034)	1502 FxM	Standard	P521623	15.67 (398)	9.54 (242)	116 (53)
	15,000 (1034)	1502 MxF	Reverse	P524440	15.67 (398)	9.54 (242)	116 (53)
4	10,000 (690)	1002 FxM	Standard	P525809	19.75 (502)	11.88 (302)	239 (109)
	15,000 (1034)	1502 FxM	Standard	P524760	19.75 (502)	11.88 (302)	276 (126)

In-Line Flapper Check Valves

Nominal Size, in.	Cold Working Pressure, psi (bar)	End Connections	Flow Orientation	Part Number	A in. (mm)	B in. (mm)	Weight lb (kg)
1.5	15,000 (1034)	1502 MxF	Reverse	P519734	14.04 (357)	7 (178)	81 (37)
2	15,000 (1034)	1502 FxM	Standard	3269173	14.04 (357)	7 (178)	84 (38)
	15,000 (1034)	1502 MxF	Reverse	3269472	14.04 (357)	7 (178)	84 (38)
	20,000 (1379)	2002 FxM	Standard	3269158	16.91 (430)	8 (203)	123 (56)
3	6,000 (414)	602 FxM	Standard	P501959	15.67 (398)	8.12 (206)	121 (55)
	6,000 (414)	602 MxF	Reverse	P519978	15.67 (398)	8.12 (206)	124 (56)
	6,000 (414)	602 FxF	Standard	P502035	12.27 (312)	8.12 (206)	100 (45)
	15,000 (1034)	1502 FxM	Standard	3269052	15.67 (398)	8.12 (206)	122 (55)
	15,000 (1034)	1502 MxF	Reverse	P518432	15.67 (398)	8.12 (206)	126 (57)
	20,000 (1379)	2002 FxM	Standard	P520099	22.79 (579)	13 (330)	442 (201)
4	6,000 (414)	602 FxM	Standard	P513204	22.79 (579)	12.25 (311)	378 (171)
	10,000 (690)	1002 FxM	Standard	P517718	21.13 (537)	11.25 (286)	280 (127)
	15,000 (1034)	1502 FxM	Standard	P517894	22.79 (579)	12.25 (311)	385 (175)
	15,000 (1034)	1502 MxF	Reverse	P518468	22.79 (579)	12.25 (311)	385 (38)

Dart Check Valves

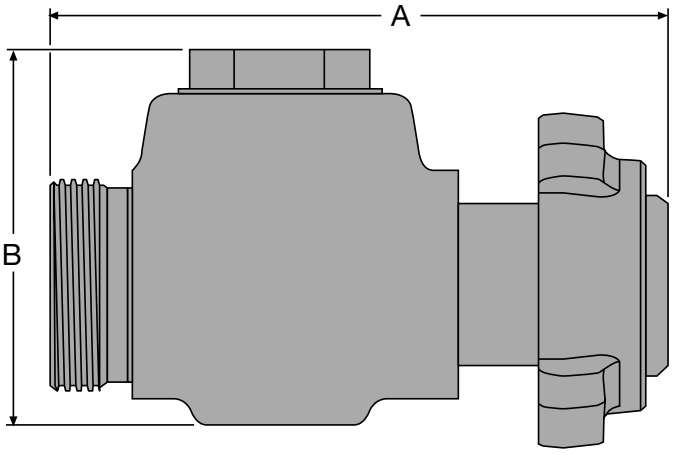
Nominal Size, in.	Cold Working Pressure, psi (bar)	End Connections	Flow Orientation	Part Number	A in. (mm)	B in. (mm)	Weight lb (kg)
1.5	15,000 (1034)	1502 FxM	Standard	P525269	14.04 (357)	10.31 (262)	86 (39)
	15,000 (1034)	1502 MxF	Reverse	P523811	14.04 (357)	10.31 (262)	86 (39)
2	15,000 (1034)	1502 FxM	Standard	P510771	14.04 (357)	10.31 (262)	87 (40)
3	15,000 (1034)	1502 FxM	Standard	P510773	15.67 (398)	11.43 (290)	130 (59)

Note: Some sizes and models are available with a vent cap connection for relief of trapped pressure on downstream side which can occur in flowlines when valve is checked closed. Consult factory for more information.

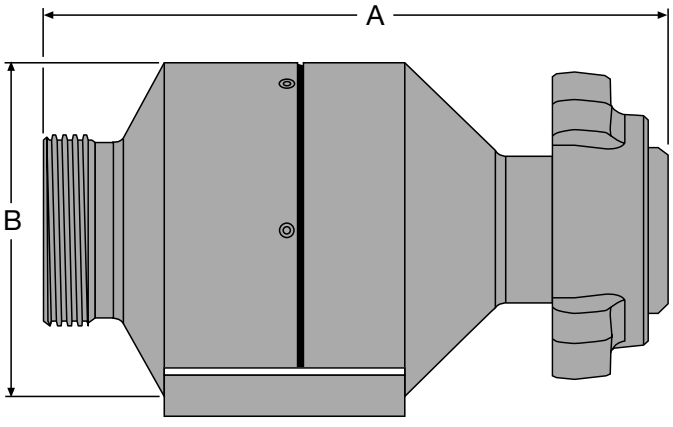
Consult factory for configurations available for models not shown above as well as installation instructions.

Weco® Check Valve Specifications

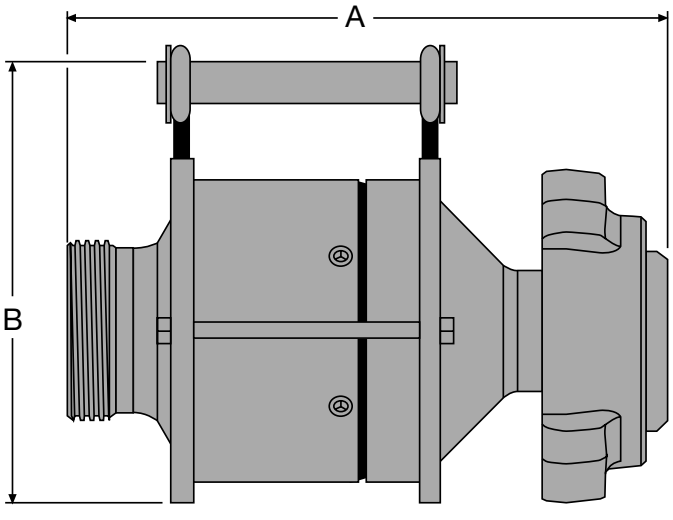
Top Entry Check Valves



In-Line Flapper Check Valves



Dart Check Valves



Typical Weco® and Chiksan® Equipment Recommended Temperature Ranges

(Consult factory for specific values)

Elastomer Selection	Product Line and Materials of Construction					Temperature Ranges
	Wing Unions, Swivel Joints		Wing Unions, Swivel Joints, Plug Valves, Check Valves, Fittings, Pup Joints, Adapters		Butterfly Valves	
	Ductile Iron	Carbon Steel	Alloy Steel Standard Service	Alloy Steel Sour Gas Service		
No Seal (Wing Union)	X					20°F (-7°C) to 300°F (149°C)
No Seal (Wing Union)		X				0°F (-18°C) to 300°F (149°C)
Nitrile	X					20°F (-7°C) to 240°F (116°C)
Nitrile		X				0°F (-18°C) to 240°F (116°C)
Nitrile			X			-20°F (-29°C) to 240°F (116°C)
Winterized Nitrile				X		-50°F (-46°C) to 240°F (116°C)
HNBR	X					20°F (-7°C) to 300°F (149°C)
HNBR		X	X	X		10°F (-12°C) to 300°F (149°C)
Viton®	X	X	X	X		20°F (-7°C) to 300°F (149°C)
Natural Rubber Seat					X	-20°F (-29°C) to 150°F(66°C)
Nitrile Seat					X	-20°F (-29°C) to 200°F (93°C)
EPDM, Hypalon, or PTFE Seat					X	-20°F (-29°C) to 250°F (121°C)
Silicone Rubber Seat					X	-20°F (-29°C) to 300°F (149°C)
Fluoroelestomer Seat					X	-10°F (-23°C) to 300°F (149°C)
Neoprene Seat					X	0°F (-18°C) to 200°F (93°C)

Warnings and Cautions

FMC Technologies cannot anticipate all of the situations a user may encounter while installing and using FMC products. Therefore, the user of FMC products MUST know and follow all applicable industry specifications and practices on the safe installation and use of these products. For additional safety information, refer to FMC Technologies product catalogs, product brochures, and installation, operating, and maintenance manuals, which can be accessed at www.fmctechnologies/fluidcontrol.com, or contact FMC Technologies at 800-772-8582.

⚠ WARNING

Failure to follow these safety warnings could result in death, serious personal injury, and/or severe property damage.

- Never mix or assemble components, parts, or end connections with different pressure ratings. Mismatched conditions, including but not limited to that of a 2” Figure 1502 male sub end connected to a 2” Figure 602 female sub, may fail under pressure resulting in death, serious personal injury, or severe property damage.
- Never use or substitute non FMC components or parts in FMC products or assemblies.
- Never modify or repair FMC products in a manner not specifically directed in instructions published by FMC Technologies.
- Never strike, tighten, loosen, or attempt repairs on pressurized components or connections.
- Never exceed the rated working pressure of the product.
- Complete and proper make-up of components and connections is required to attain rated working pressure. Always apply essential care, attention, handling, and inspection to threaded components before, during and after make-up.
- Never use severely worn, eroded, or corroded products. Contact FMC Technologies for more information on how to identify the limits of erosion and corrosion.
- Never strike wing union nuts having severely flattened and extruded ears. This condition can result in flying debris leading to serious personal injury and must immediately be addressed by either grinding off extruded material or removing the nut from service.
- Always follow safe practices when using products in overhead applications. Products not properly secured could fall.
  - Never exceed the load rating of lifting devices on products or lifting equipment.
  - Use of FMC products in suspension applications can result in over-stress conditions leading to catastrophic failure.
  - If externally applied loads are anticipated, consult factory.
- Always follow safe practices when manually lifting and carrying products.
- Always select only appropriate product and materials for the intended service:
  - Never expose standard service products to sour gas fluids (Refer to NACE MR-01-75). Do not interchange sour gas with standard service components.
  - Always use appropriate safety precautions when working with ferrous products in below freezing temperatures. Freezing temperatures lower the impact strength of ferrous materials.
- Always follow manufacturer’s instructions and Material Safety Data Sheet directions when using solvents.
- Always make certain that personnel and facilities are protected from residual hazardous fluids before disassembly of any product.
- Whenever leakage is detected from FMC Technologies products, remove them from service immediately to prevent death, serious personal injury, and/or property damage.

SAFETY INSTRUCTIONS: The applications of FMC products are in working environments and systems which must be properly designed and controlled. Safety procedures and policies MUST be clearly established by the user and followed. Always use appropriate protective equipment.

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www.fmctechnologies.com/fluidcontrol