FMC Technologies

Flowline Products and Services

World Proven Chiksan® and Weco® Equipment

http://www.fmctechnologies.com

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 Technologies' 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 Technologies' 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.

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.

Health, Safety And 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 Technologies 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.

Unsurpassed Quality

FMC Technologies 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.

Worldwide Distribution

Chiksan and Weco products are distributed from more than 60 locations worldwide. FMC Technologies 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.

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, computation fluid dynamics, and the flowline industry's only high-velocity flow loop.

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 Weco spare parts.

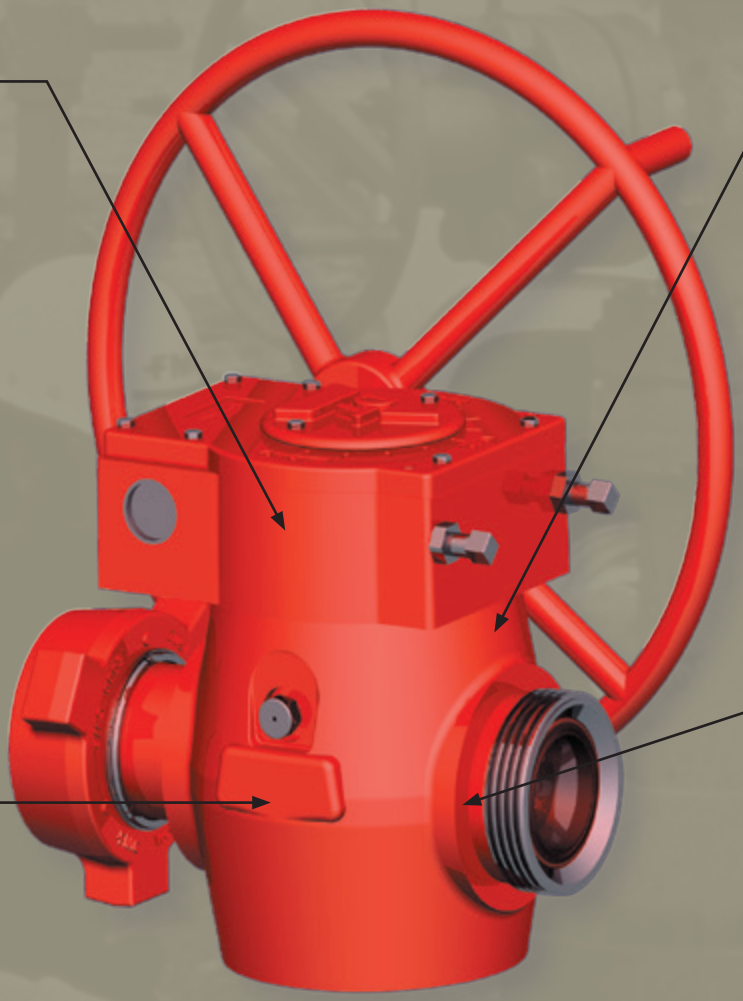
CHIKSAN WECO

Contents

Weco® Plug Valves premium,

Choice of operators, actuators
Gear operators, pneumatic actuators and hydraulic actuators are available.

Body erosion virtually eliminated
Fluid is forced between the plug/seal interface, limiting wear to replaceable parts.



Ultimate sealability, no adjustments required
Floating plug improves sealability and reduces plug wear.

Low torque operation at all pressures
Cylindrical plug fits between seal and side segments, reducing plug drag on the valve body.

Weco ULT and DR plug valves are premium, quarter-turn valves designed for a wide range of standard and sour gas drilling, production, and well-servicing applications. These rugged valves are offered in single and dual-body designs in pressures to 20,000 psi. They range in size from 1 to 4-inches and come with threaded, Weco wing union, flanged, and clamp hub ends. Consult factory for configurations. Like all pressure containing products, Weco plug valves require special handling

(see inside back cover for Warnings and Cautions).

quarter-turn valves

ULT Plug Valves

The benefits of FMC's ULT plug valves are a direct result of its unique design features. Combined, these features have redefined the standards for plug valve operating principles and performance.

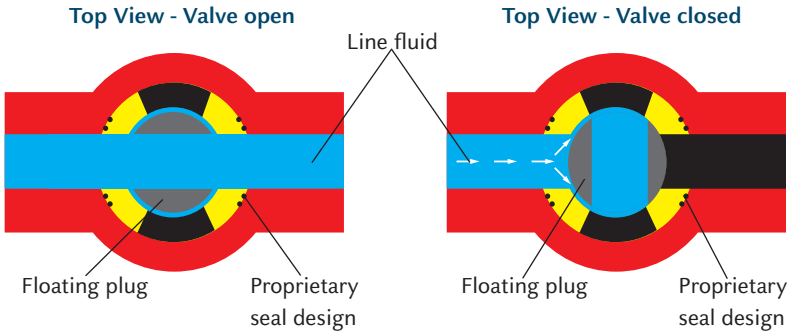
Ultimate Sealability

The key to the ULT plug valve's unprecedented seal integrity is its proprietary floating plug and dual-seal design. When the valve is closed, the dual segment seal provides a redundant seal on the downstream side of the valve. In 3-inch and larger sizes, the ULT plug valve also employs a two-piece plug and stem design. When these valves are closed, line fluid pressure in the body is equalized around the plug resulting in ultimate sealing and low operating torque.

Ultimate Valve Body Life

In addition to improved bidirectional seal performance, the ULT plug valve dramatically extends service life. When a traditional plug valve is closed, high-pressure fluids are forced between the upstream body and seal segment interface. This flow path can erode the valve body, potentially ruining the valve. When a ULT plug valve is closed, the only available flow path is between the seal segment and plug interface. This flow path eliminates body erosion and limits any potential wear to replaceable components.

OPERATING PRINCIPAL



Ultimate Seal Life

In addition to improved valve body life, two other frequent operating problems associated with high-pressure plug valves - both of which cause premature damage to seals and increased valve operating torque - are solved by the ULT plug valve. Traditional plug valve designs can sometimes seal on the upstream side of the valve, resulting in extrusion damage to the upstream segment seal. Traditional plug valves can also trap body pressure after line pressure is removed from the valve, resulting in extrusion damage to both upstream and downstream segment seals. The dual-seal design of the ULT plug valve, by forcing flow between the plug and segment interface, eliminates both of these problems.

Ultimate Life Cycle Cost Savings

Superior sealability, increased life of valve body and elimination of premature seal damage result in significant savings in life cycle costs of the ULT plug valve over traditional plug valves. Qualification tests have proven the the ULT plug valve extends service life 3 to 5 times over other plug valves while reducing maintenance costs. On 1 inch size, ULT parts kits may be used in existing DR plug valve bodies to extend the life of these valves.

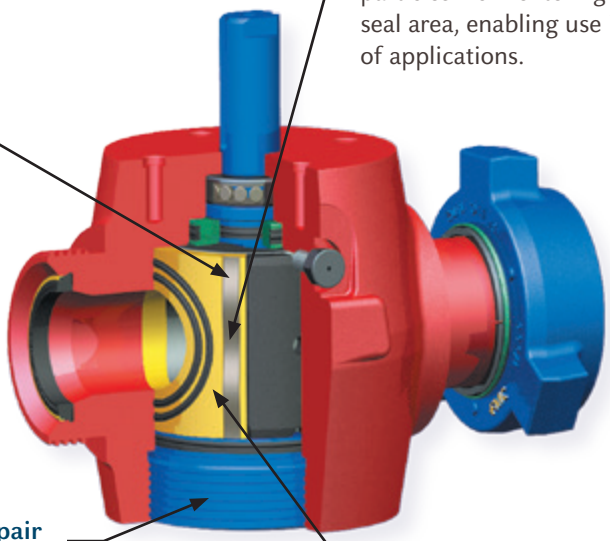
ULT Plug Valves
(3-inch and larger)

Up to 20,000 psi cold working pressure

Recommended service
Slick water, sand, proppant/gel, energized fluids, inhibited acids and cement

Two-piece floating plug/stem
Proprietary floating plug and stem uniformly distribute load against the downstream seat to improve sealability and reduce plug wear.

Handles sand, proppant, and cement
Linear wave springs prevent small particles from entering metal-to-metal seal area, enabling use in a broad range of applications.



Fast, simple field repair
Bottom entry design provides access to all valve internals without having to remove the operator or actuator.

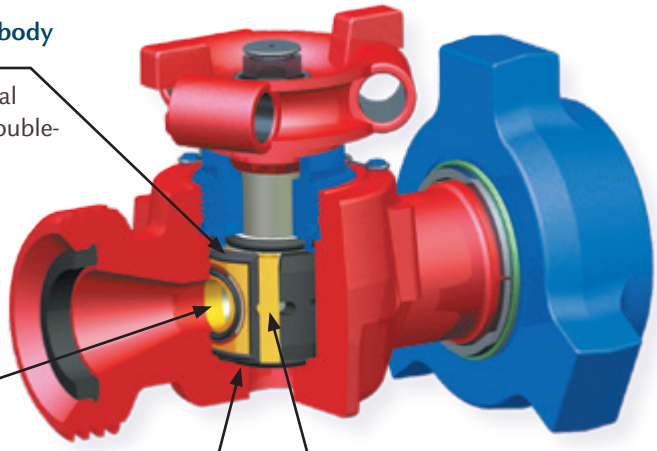
Eliminates body washout, extends body life
Dual seals direct flow between the seal segment and plug to provide long, trouble-free service life.

ULT Plug Valves
(below 3-inch)

Up to 20,000 psi cold working pressure

Recommended service
Slick water, sand, proppant/gel, energized fluids, inhibited acids and cement

Eliminates body washout, extends body life
Dual seals direct flow between the seal segment and plug to provide long, trouble-free service life.



Fast assembly
Integral stem and plug provide fast, sure assembly without adjustments.

Interchangeable design
Internal components of 1" size interchange with Weco DR valve components, potentially extending the life of those valve bodies.

Eliminates corrosion in segment sealing area
Dual segment seals greatly reduce erosive fluid flow between the seal segments and the plug valve body to improve sealing capabilities and extend service life.

See specifications tables (pg. 42 - 43) for sizes, dimensions, weights, materials, and part numbers.

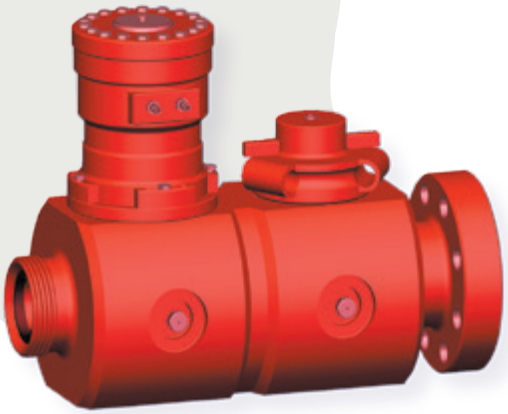
Specialty ULT Plug Valves

The ULT plug valve's proven, proprietary design technology enables customers to take advantage of a wide range of configurations for a host of specialty applications. Options include single and dual body designs; drill pipe, Weco union, or flanged end connections; and side outlets.

Consult factory for specific applications.

ULT Dual Body Plug Valves

(Weco Union x Flanged End Connections)



ULT Dual Body Plug Valves

(Drill Pipe Connections)

ULT Flanged Plug Valves

(Flanged End Connections)

See specifications tables (pg. 42 - 43) for sizes, dimensions, weights, materials, and part numbers.

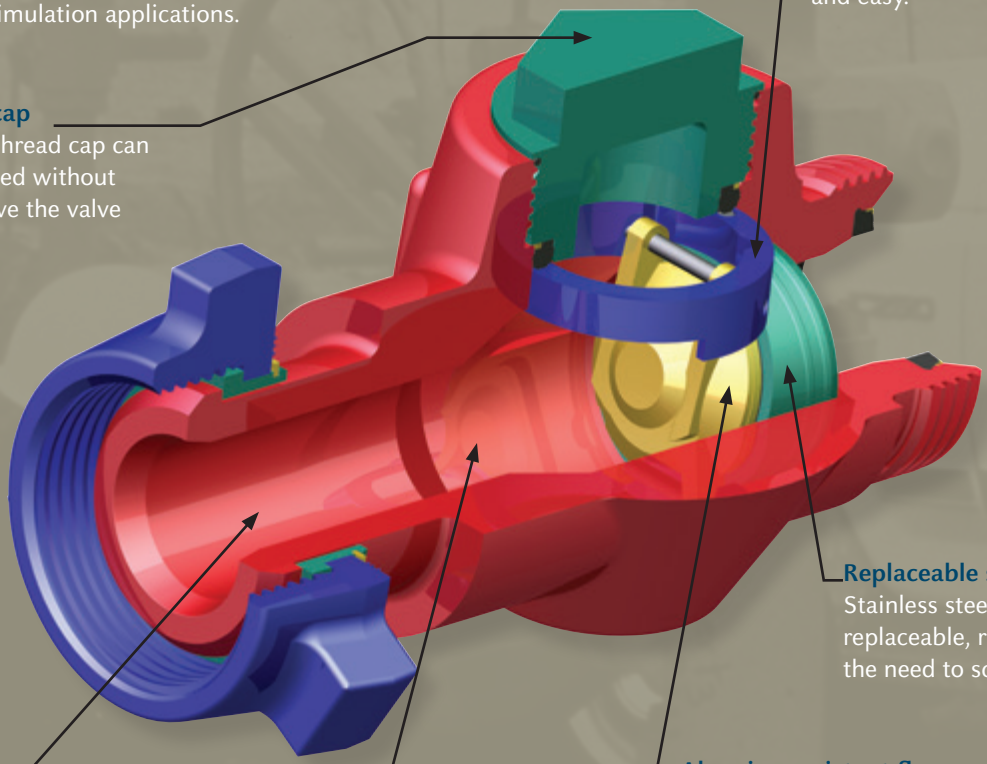
Weco® Check Valves

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.

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

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



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.

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

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

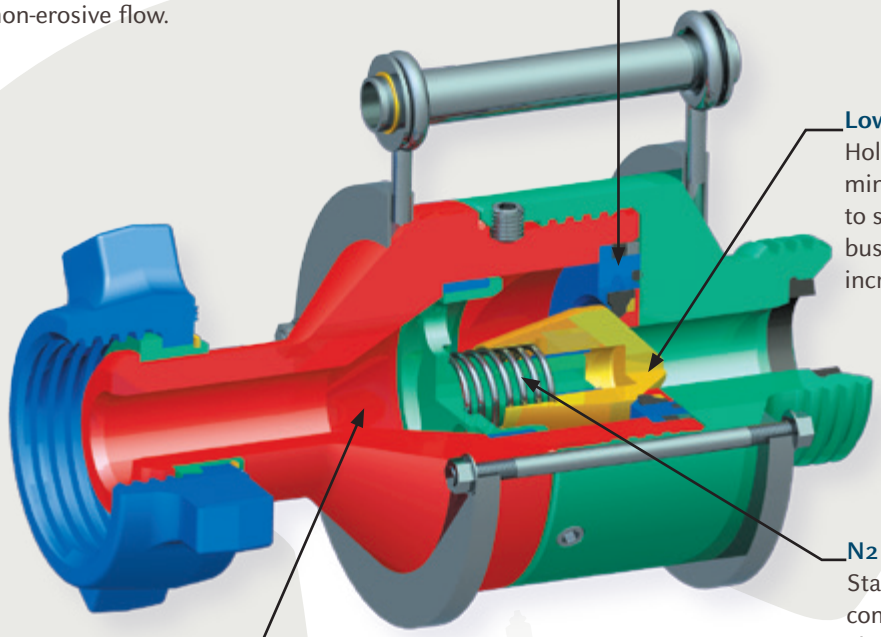
Weco check valves are used to isolate well-servicing equipment from high-pressure treating fluids during fracturing applications. Offered in three primary models, these rugged valves seal against a complete range of well-servicing fluids at pressures to 20,000 psi. Valves are available in 1-1/2 to 4-inch 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).

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.

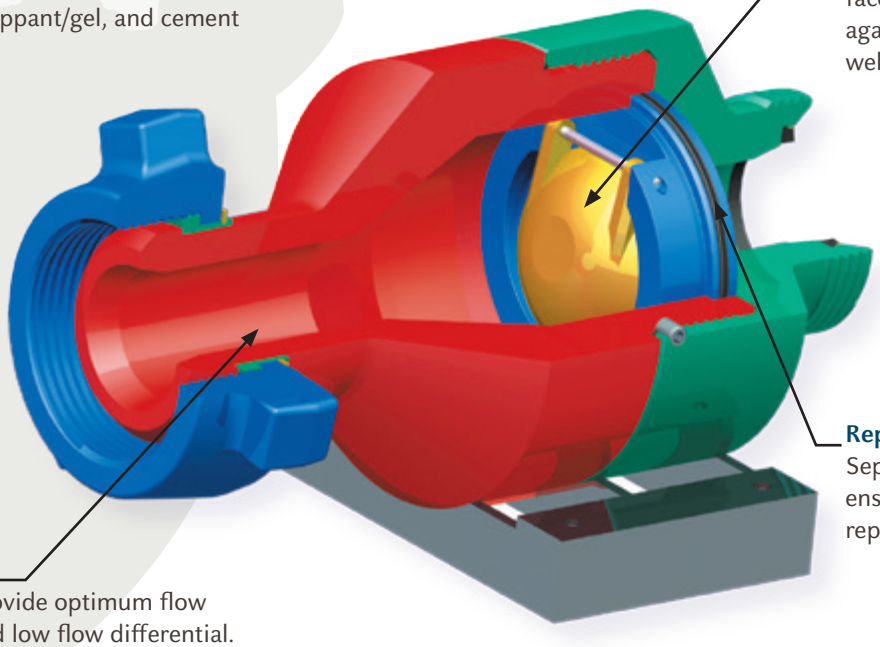
N_2 and CO_2 capability
Stainless steel internal components and special elastomer seal handle gas velocities in excess of 250 feet/second.

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

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.

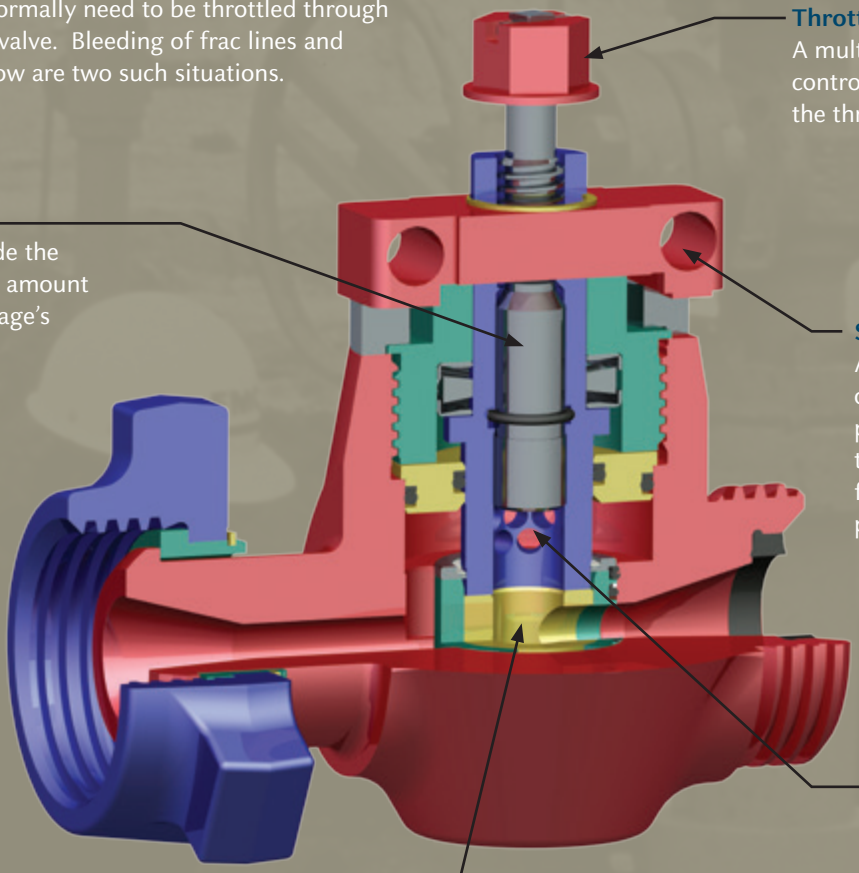
See specifications tables (pg. 44 - 45) for sizes, dimensions, weights, materials, and part numbers.

Choke Throttle Valve

Flowline Choke Valve

Recommended service

High pressure pumping applications where high velocity erosive fluid would normally need to be throttled through a partially open plug valve. Bleeding of frac lines and controlling cement flow are two such situations.



Throttle Control
A multi-turn nut is used to control the vertical travel of the throttle stem.

Throttle Stem
The stem travels inside the cage and controls the amount of flow through the cage's ports.

Shut-off Control
A quarter-turn control is operated with a standard plug valve bar to rotate the plug between the full open and full closed positions.

Ported Cage
Fluid flows radially leading to energy dissipation in the center of the ported choke cage.

Plug
The plug provides full shutoff capability. The plug is protected from throttling by being operated when the throttle stem is fully choked.

The best attributes of a ported cage choke and a plug valve are combined in FMC's flowline choke valve. The choke portion of the valve is used to throttle high velocity flows while the plug valve portion of the valve remains full open. The plug valve portion is protected by the choke from high velocity erosive flow. Because of the combined use of the two halves of the valve, high velocity erosive flows can be throttled without degrading the positive shutoff performance of the valve.

(see inside back cover for Warnings and Cautions).

Pressure Relief Valve

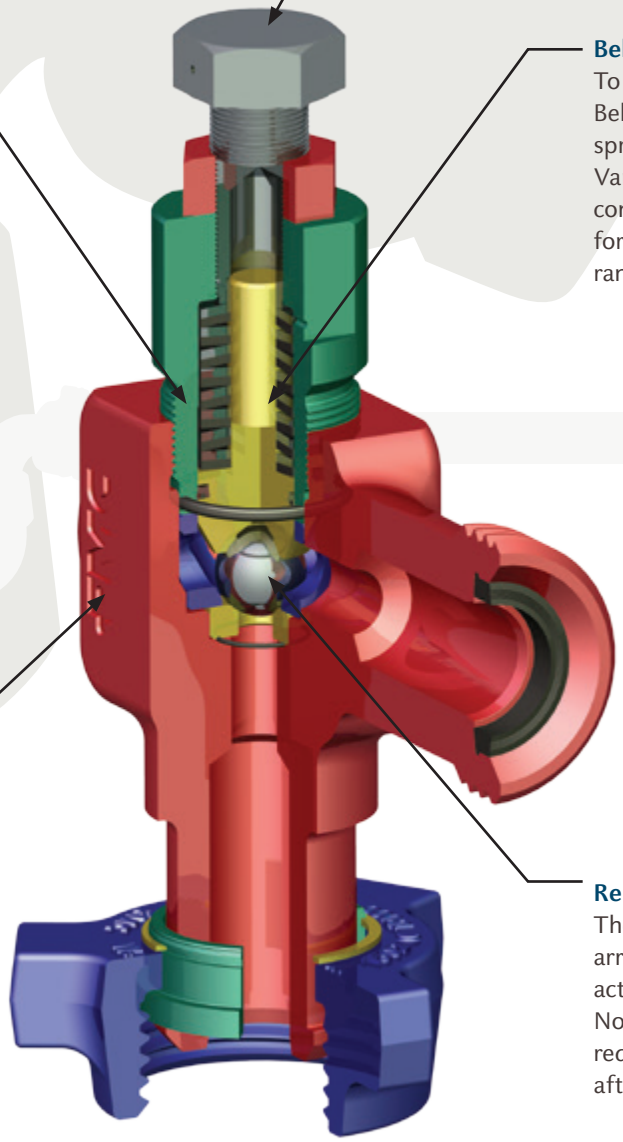
Recommended service

Over pressure protection for pumps, treating lines, and pressure vessels.
Note: The FMC Technologies valve is not considered a full flow relief valve; therefore, its main function is a tattletale which indicates the set pressure has been reached. To keep the pressure from continuing to increase, other measures must be taken.

Easily Adjusted
Adjustment screw allows the relief pressure to be easily adjusted in the field.

ACME Thread Body Cap
Full ACME thread engagement between body and body cap ensures 3:1, burst pressure:cold working pressure ratio.

Belleville Washers
To ensure reliable closure, Belleville washers act as a spring to resist fluid pressure. Various spring stack configurations are available for different relief pressure ranges.



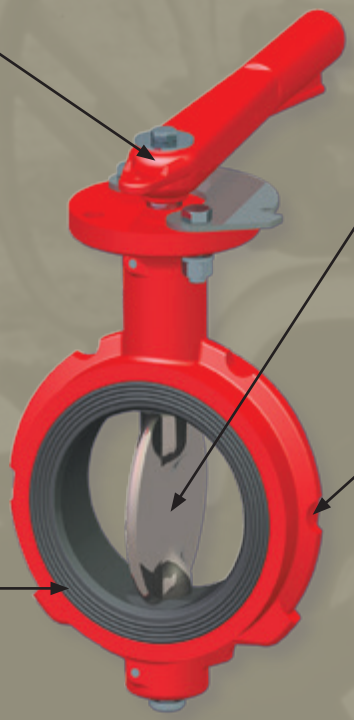
Field Repairable
If ball, seat, or seals need replacing, easy-to-use field repair kits are available.

Relief Mechanism
The spring, ball, and seat arrangement provide a direct acting, self reseating valve. No manual intervention is required to reseat the valve after pressure stabilization.

Up to 20,000 psi cold working pressure; 2-inch size
Up to 15,000 psi cold working pressure; 3-inch size

Weco® Butterfly Valves and

Choice of operators, actuators
All Weco butterfly valve models can be equipped with a wide range of operators and actuators.



Outstanding flow efficiency
Streamlined disc design minimizes turbulence and pressure drop for greater flow efficiency.

Fast, simple field repair
If a valve should need repair, it can be completely reconditioned in the field using interchangeable stock parts.

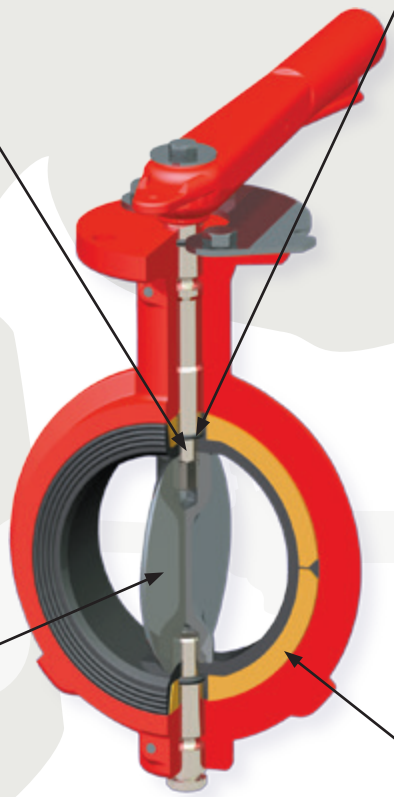
Leak-proof installation
Ribbed seat face eliminates the need for flange gaskets and ensures leak-proof installation.

Weco butterfly valves offer the ultimate in dependable, economical flow control. These field-proven valves are available from stock in 2 through 24-inch sizes and can handle working pressures up to 175 psi. For pressure ratings from 176 psi up to 285 psi, consult factory. Wafer, notched, and lug-type body styles meet requirements for new or existing flowline systems. Using a variety of materials, valve bodies, discs, stems, and seats can be individually matched to specific operating conditions, including temperature range, type and concentration of fluid, and various flow conditions. All materials meet ASTM and AISI standards.

Actuators

No in-line pins, screws or bolts
Hex drive provides positive disc movement without in-line pins, screws, or bolts.

Triple seal design
An O-ring, undersized stem holes in the seat, and corresponding flats on seat and disc hubs provide three completely independent seals. This unique feature isolates both the upper and lower stems from line fluid, allowing use of standard stem material.



Self-centering disc
Dual stem with upper and lower tangential pins allows a self-centering disc. This design provides equal sealing pressure 360° around the disc, ensuring positive shut off and extending service life.

Elastomer seat
An elastomer seat with two-piece, hard phenolic back-up eliminates seat walking and allows the seat to expand under pressure, making the valve body the pressure containing component.

Standard Materials of Construction

Valve Part	Standard Material	Optional Materials
Seat & O-ring	Nitrile (Buna N) (-20°F to 200°F)	Hypalon®, Polytetrafluoroethylene (PTFE), Viton®, EPDM, Red Natual Rubber
Body	Ductile Iron	Aluminum, Steel, Stainless Steel
Stem (upper & lower)	410 Stainless Steel	316 Stainless Steel
Disc	Ductile Iron	Aluminum, Bronze, 316 Stainless Steel, Ryton® , Kynar® , Halar, Polytetrafluoroethylene (PTFE) Coated, Nickle Plated, Hastelloy®
Spirol/Retainer Pins	302 Stainless Steel	

Other materials of construction available. Consult factory.

Model 12

Short neck, wafer body; 175 psi cold working pressure, 2 to 12-inch sizes; 150 psi cold working pressure, 14 and 16-inch sizes

Recommended service

General on/off and throttling services from 1mm Hg absolute vacuum to full working pressure

Features

- Valves are self-centering and mount between 125 or 150 lb ANSI flanges

Model 12N

Short neck, notched body; 175 psi cold working pressure, 2 to 6-inch sizes

Recommended service

General on/off and throttling services from 1mm Hg absolute vacuum to full working pressure

Features

- Valves are notched to fit between lightweight flanges

Model 22

Long neck, wafer body; 175 psi cold working pressure, 2 to 12-inch sizes.

Recommended service

General on/off and throttling services from 1mm Hg absolute vacuum to full working pressure

Features

- Valves are self-centering and mount between 125 or 150 lb ANSI flanges
- Long neck allows for pipe insulation

Model 22L

Long neck, lug body, 175 psi cold working pressure, 2 to 24-inch sizes

Recommended service

General on/off and throttling services from 1mm Hg absolute vacuum to full working pressure

Features

- Tapped lugs allow independent ustream or downstream bolting to 125 or 150 lb ANSI flanges
- Long neck allows for pipe insulation.

See specifications tables (pg. 46 - 51) for sizes, dimensions, weights, materials, and part numbers.

Operators & Actuators

All models and sizes of Weco butterfly valves can be equipped with Weco operators or actuators as well as other brands of actuators. Typical options include standard and throttling handles, gear operators, chain-wheel operators, vane actuators, pneumatic actuators, special controllers, and positioners.

Pneumatic Actuators

Double-acting or fail-safe spring return; 2 through 12-inch valves sizes

Recommended service

Pneumatic actuator for on/off valve operation

Features

- Mounts directly to Weco butterfly valves without special adapters or mounting hardware
- Full 90° operation with a minimum of 30 psi, air, no adjustments required

Standard Handle

2 through 12-inch valve sizes

Recommended service

Manual on/off service

Features

- Positive-stop gripper with integral locking lug ensures full open/full closed operation
- Model 12 and 12N valves have a detent plate which bolts on the valve body in each of four quadrants
- Model 22 and 22L valve have a pre-notched top flange with on/off detent positions

Vane Actuators

Quarter-turn, double acting actuator; 2 through 6-inch valve sizes

Recommended service

Compact, pneumatic actuator for on/off valve operation

Features

- The only moving part, the vane, is cast integral to the shaft for sturdiness; does not require field lubrication
- Fully repairable in-line
- Mounts directly to valve in any quadrant

Gear Operators

Weatherproof, worm gear operator; 2 through 24-inch valve sizes

Recommended service

Manual on/off or throttling services

Features

- Operator has 90° travel arc with internal travel stop screws for a plus or minus 20° adjustment at either end of the travel
- Mounts on the valve in any quadrant
- Chain wheel attachment available
- Hand-wheel shaft extensions available

Throttling Handle

2 through 12-inch valve sizes

Recommended service

Manual Throttling Service

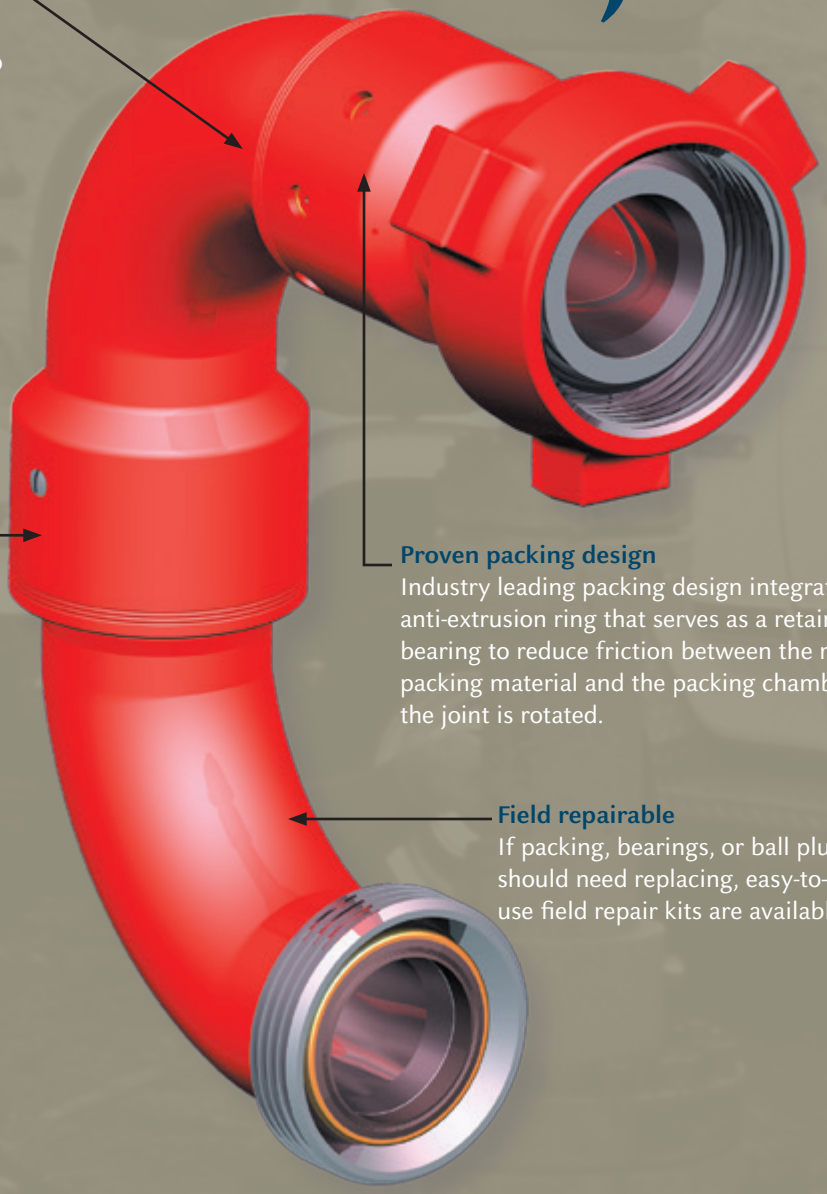
Features

- Notched detent plate and positive-stop gripper with integral locking lug ensures positive locking in any of 10 positions from full open or full closed operation
- Detent plate bolts on the valve body in each of the four quadrants.

See specifications tables (pg. 46 - 51) for sizes, dimensions, weights, materials, and part numbers.

Original Chiksan® Swivel Joints

Steamlined bore minimizes flow restrictions
Smooth, round bore design minimizes turbulence and pressure drop, Longsweep and TripleStep swivel joints have extra-long radius elbows that optimize flow characteristics and extend life in the ball race areas when handling abrasives at extremely high pressures.



Proven packing design
Industry leading packing design integrates an anti-extrusion ring that serves as a retainer and bearing to reduce friction between the resilient packing material and the packing chamber as the joint is rotated.

Bearings key to rotation, strength
To assure long, dependable service, Chiksan dual and tri-race ball bearing swivels are designed to meet or exceed load capacities and service conditions. All ball races are either flame hardened, carburized and hardened, or have "snap-in" stainless steel ball races.

Field repairable
If packing, bearings, or ball plugs should need replacing, easy-to-use field repair kits are available.

Chiksan swivel joints deliver significantly longer life, superior performance, and reduced maintenance. Designed for standards and sour gas services, these world proven fittings come in 3/8 to 12-inch sizes and can handle pressures from vacuum to 20,000 psi. Many different Chiksan assembly configurations are available. These styles can be combined in an unlimited variety of ways to suit practically any installation. Available end connections are threaded, integral Weco® wing union, beveled for welding, or flanged. Like all pressure containing products, Chiksan swivels require special handling

(see inside back cover for Warnings and Cautions).

Figure Number	Color Coding	Cold Working Pressure psi (bar)	Material	End Connections	Nominal Sizes, in.									Notes
					3/8	1/2	3/4	1	1 1/4	1 1/2	2	3	4	
Low-Pressure Swivel Joints	Dark Green	175 (12)	Ductile Iron	Flanged								✓	✓	1,2,3
	Blue	285 (20)	Carbon Steel	Flanged							✓	✓	✓	1,3,4
	Dark Green	600 (41)	Ductile Iron	NPT			✓	✓	✓	✓	✓	✓	✓	2,3
	Blue	1,000 (69)	Carbon Steel	NPT							✓	✓	✓	3
				Beveled for welding							✓	✓	✓	3,4
High-Pressure Swivel Joints	Silver	6,000 (414)	Carbon Steel	Female line pipe threads	✓	✓	✓	✓	✓	✓	✓	✓	✓	3,6,8
Extra High-Pressure Swivel Joints	Black	10,000 (690)	Carbon Steel	Female line pipe threads							✓			3,6
Longsweep® Swivel Joints	Olive Green (Sour Gas)	7,500 (517)	Alloy Steel	Weco figure 1002 union								✓		5
	Olive Green (Sour Gas)	10,000 (690)	Alloy Steel	Weco figure 1502 union				✓			✓	✓	✓	5
	Black	10,000 (690)	Alloy Steel	Female line pipe threads				✓		✓	✓			3,6,7
				Weco figure 1002 union										3
	Olive Green (Sour Gas)	15,000 (1034)	Alloy Steel	Weco figure 2202 union							✓	✓		6
	Red	15,000 (1034)	Alloy Steel	Weco figure 1502 union				✓		✓	✓			3
TripleStep Swivel Joints	Black	10,000 (690)	Alloy Steel	Weco figure 1002 union								✓	✓	3
	Red	15,000 (1034)	Alloy Steel	Weco figure 1502 union								✓	✓	3
	Brown	7,500 (517)	Alloy Steel	Female line pipe threads										3,6
	Light Blue	20,000 (1379)	Alloy Steel	Weco figure 2002 union								✓		3

Notes

- All body materials meet ASTM or AISI standards.
- Consult factory for special sizes, styles, end connections, or packing units.

1. Flanged ends faced and drilled to Class 150 flange specifications, unless otherwise specified.
2. Not available in Styles 80, 10, or other styles requiring more than two swivel connections.
3. 3/8 - to 4-inch sizes furnished with nitrile packing and brass or stainless steel anti-extrusion ring.
4. 6 - to 12-inch sizes furnished with nitrile packing and stainless steel anti-extrusion ring.
5. Furnished with Fluoroelestomer or HNBR packing and stainless steel anti-extrusion ring. FMC Technologies does not warrant the performance of any elastomer seal for sour gas service.
6. Power make-up must be used for line pipe threaded connections to achieve rated cold working pressure.
7. 3-inch size rated at 10,000 psi could working pressure with integral Weco 1002 union ends only.
8. 5-inch size available with threaded or beveled ends; limited to 3,000 psi could owrking pressure.

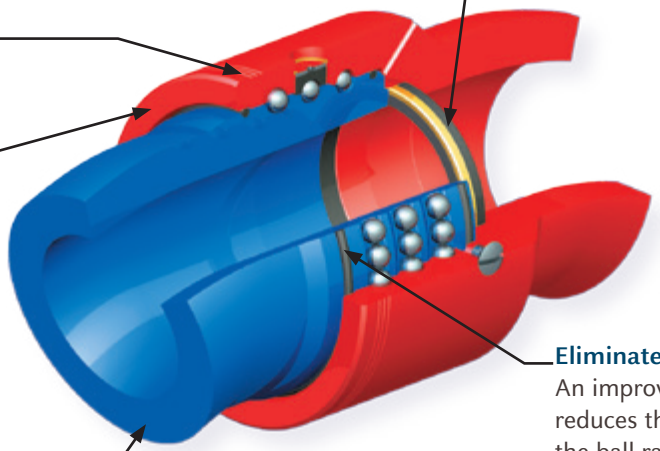
Sour gas service

FMC Technologies manufactures Chiksan sour gas swivel joints in accordance iwth the National Association of Corrosion Engineers (NACE) Standard MR-01-75 and the American Petroleum Institute's (API) Standard RP-14-E. These swivel joints are specially heat-treated and inspected for controlled hardness. Because the specially heat treated steel required for sour gas service does not provide a strong enough bearing surface, Chiksan sour gas swivel joints use patented snap-in ball races to assure extra strength and high load-bearing capacity. Fluoroelastomer or HNBR packing is used to isolate the races from the line fluid.

TripleStep Swivel Joints

Advanced material selection
The TripleStep swivel joint is manufactured from forged alloy steel with a closely controlled, proprietary chemical composition and heat treatment to ensure superior toughness, ductility, case depth, case hardness, and core strength.

Instream packing for long seal life
World proven instream packing technology provides unsurpassed sealability and reliability in the harshest oilfield conditions. An integral anti-extrusion ring serves as a retainer and bearing to reduce friction between the resilient packing material and the packing chamber as the joint is rotated.



Exclusive design delivers longer life, lower cost
TripleStep swivel joints deliver the highest bending and axial load capacities in the industry. They also eliminate rejections from excessive wear in the ball race areas as well as swivel seizures due to corrosion and brinnelling of the ball races.

Eliminates routine maintenance
An improved environmental seal reduces the potential for corrosion in the ball race area. The integrity of the seal and the use of a high-performance grease during initial assembly virtually eliminates the need for periodic greasing.

Unmatched erosion allowance
Patented three step design coupled and bearing race geometry adds significant wall thickness under the male races and bearing load capacity without increasing swivel joint size or weight.

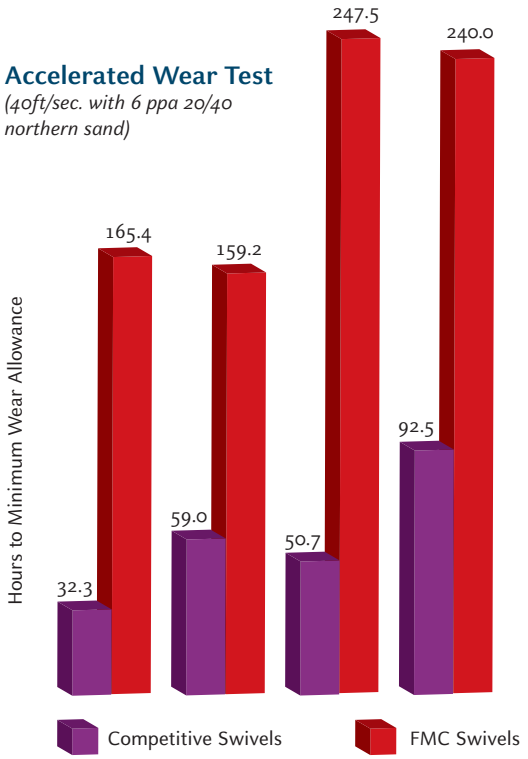
Competitive Hype VS. Proof Positive

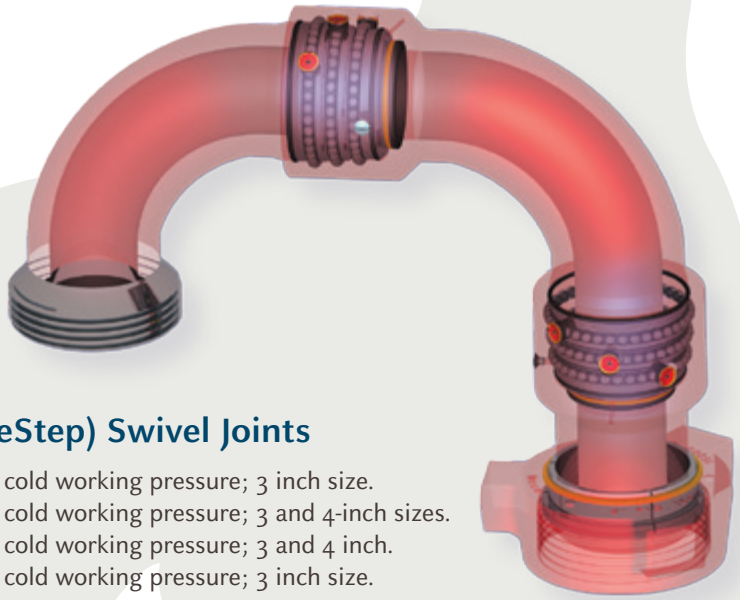
Designed especially for abrasive, high pressure well servicing applications, TripleStep swivel joints have been proven against competitive swivels in customer-witnessed flow loop tests and field applications. The patented three step ball race design provides significantly greater erosion allowance without increasing swivel joint size or weight. The result: TripleStep swivel joints deliver increased life, superior performance, and reduced maintenance...lasting 1.7 to 5 times longer than competitive swivels.

Thicker Where it Counts

Competitive swivels wear out first in the ball races, meaning they must be disassembled for inspection. TripleStep swivels wear in the elbows, meaning they can be inspected and returned to service without disassembly. The TripleStep design places more material under the male ball race - a location that computational flow dynamics analysis and field testing shows to be a high erosion area.

Accelerated Wear Test
(40ft/sec. with 6 ppa 20/40 northern sand)





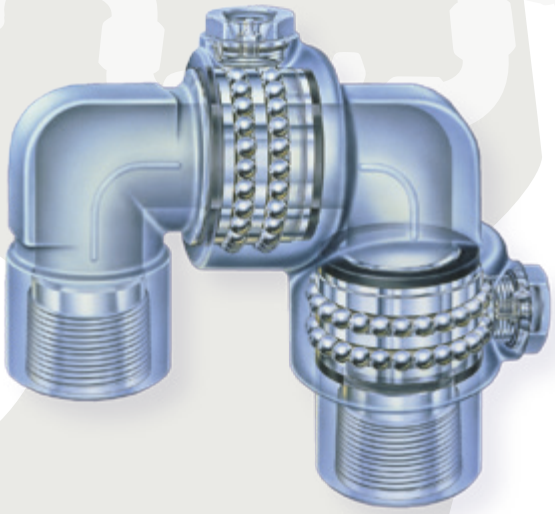
TSi (TripleStep) Swivel Joints

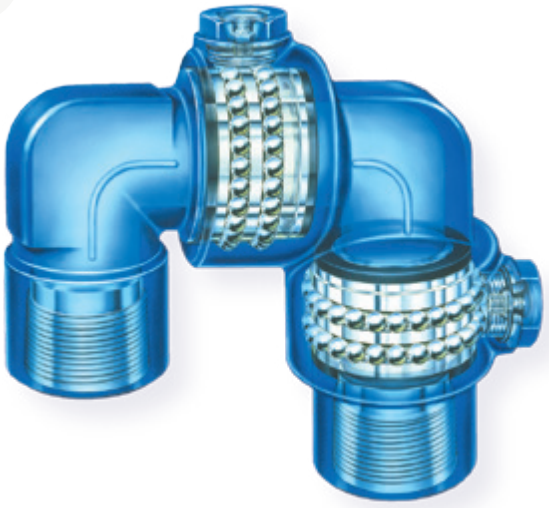
- 6,000 psi cold working pressure; 3 inch size.
- 10,000 psi cold working pressure; 3 and 4-inch sizes.
- 15,000 psi cold working pressure; 3 and 4 inch.
- 20,000 psi cold working pressure; 3 inch size.

For Longsweep swivels and sizes or pressures not shown, consult factory

Recommended service

Long-radius elbows designed especially for high-pressure abrasive applications such as fracturing, choke-and-kill lines, cementing and circulating hoses, acidizing, and test lines





HP (High-Pressure) Swivel Joints

6,000 psi cold working pressure; 3/8 to 4-inch sizes

Recommended service

Hydraulic control lines, mud lines, rotary line connections, BOP lines, test lines, offshore wellhead connections, cementing and circulating hoses, and choke-and-kill lines

Low-Pressure Swivel Joints

175 psi to 1,000 psi cold working pressure; 3/4 to 12-inch sizes.

Recommended service

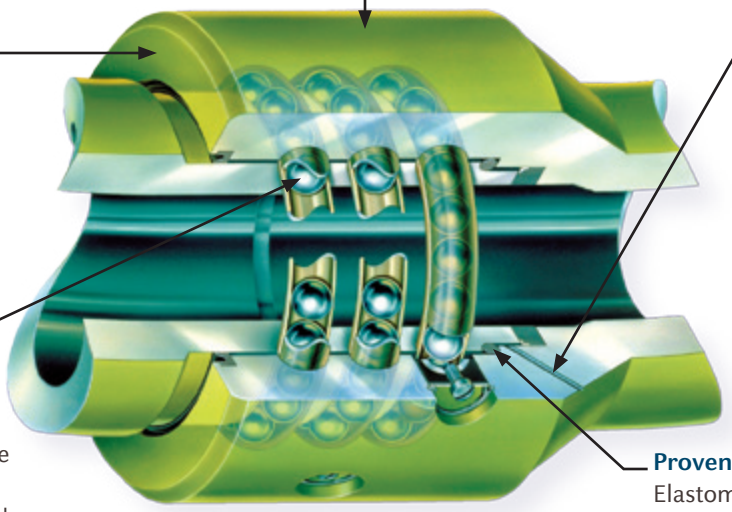
Transfer lines, temporary flow lines, discharge lines, auxiliary flow lines, water lines, and other general-service oilfield applications.

See specifications tables (pg. 58 - 64) for sizes, dimensions, weights, materials, and part numbers.

Chiksan Sour Gas Swivel Joint

Controlled hardness
Swivel components are specially heat-treated and 100% tested for controlled hardness.

Positive identification
Chiksan swivels for sour gas service are stamped "Sour Gas" and painted with an olive green, zinc-chromate primer to ensure quick, positive identification.



Leak detection
A leak detection port between the packing and O-ring seal signals the need for packing replacement.

Snap-in ball races
Snap-in ball races provide hard bearing surface to deliver extra strength and high load-bearing capacity when handling sour gas.

Proven packing design
Elastomeric packing with stainless steel anti-extrusion ring and secondary O-ring seal are used to isolate the races and bearings from line fluid.

Sour Gas Service

FMC Technologies manufactures Chiksan sour gas swivel joints in accordance with the National Association of Corrosion Engineers (NACE) Standard MR-01-75 and the American Petroleum Institute's (API) Standard RP-14-E. These swivel joints are specially heat-treated and inspected for controlled hardness. Because the specially heat-treated steel required for sour gas does not provide a hard enough bearing surface, Chiksan sour gas swivel joints use snap-in ball races for extra strength and high load-bearing capacity. Sour gas swivel joints come standard with integral Weco wing union end connections. They also have a leak-detection port between the packing and the O-ring seal. If leakage past the packing should occur, it is forced through the port, signaling the need for packing replacement. For positive identification, all Chiksan sour gas swivel joints are stamped "Sour Gas" or "NACE MR-01-75" using low-stress dot stamping and painted with an olive green, zinc-chromate primer tthat is unique to sour gas equipment.

Chiksan Swivel Joints for Sour Gas Service:

High-Pressure Swivel Joints

6,000 psi cold working pressure, 2 and 3-inch sizes; Weco Figure 602 wing union end connections

Longsweep Swivel Joints

7,500 psi cold working pressure, 3-inch size; Weco Figure 1002 wing union end connections

10,000 psi could working pressure, 1,2,3 and 4-inch sizes; Weco Figure 1502 wing union end connections

15,000 psi cold working pressure, 2 and 3-inch sizes; Weco Figure 2202 wing union end connections

Chiksan Swivel Joint Styles

Chiksan swivel joints are available from stock in nine basic styles or configurations. These styles permit 360-degree rotation and movement in one, two, or three planes. They can be combined in an unlimited variety of ways to suit practically any installation. All Chiksan swivel joints are assembled using two or more standard pieces.

Warning

Although Chiksan swivel joints can be rotated while under fluid pressure, they are not recommended for service requiring continuous rotary motion. See inside back cover for additional Warnings and Cautions.

Style 20

Style 30

Style 40

Style 50

Style 60

Style 70

Style 80

Style 10

Style 100

See specifications tables (pg. 58 - 64) for sizes, dimensions, weights, materials, and part numbers.

Chiksan Cementing and Circulating Hoses

Chiksan cementing and circulating hoses can handle a complete range of standard and sour gas fluids at cold working pressures up to 15,000 psi. These rugged, all-steel hoses are available in 1 to 3-inch sizes and configurations to meet virtually any need. All materials meet ASTM or AISI standards.

Recommended service

High-pressure discharge lines, water lines, temporary flow lines, well testing lines, cementing and circulating lines, and other high-pressure applications

Features

- All designs feature Chiksan swivel joints which provide flexibility, absorb shock and vibration, and maximize flow characteristics
- Weco wing union connections ensure fast, pressure-tight make-up and break-out without threading, welding, or special connections
- Chiksan hoses fold up easily and quickly for transportation and storage
- Designs are available for sour gas services at cold working pressures up to 15,000 psi

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

Chiksan Coiled Tubing Reel Swivel

15,000 psi cold working pressure; 2 and 3-inch sizes

Recommended service

High-pressure coiled tubing applications

Converts for sour gas service

By changing out the Weco wing union subs, the assembly is converted to a sour gas swivel. This exclusive feature reduces inventory and lowers costs.

Reliable UV packing

With zero failures in thousands of high-pressure gate valve stem seal applications worldwide, proprietary UV packing provides greater sealability with lower torque than comparable seals.

Fast, easy field maintenance

The swivel internal components can be serviced from the front without removing the housing from the coiled tubing unit.

Stepped bearing races

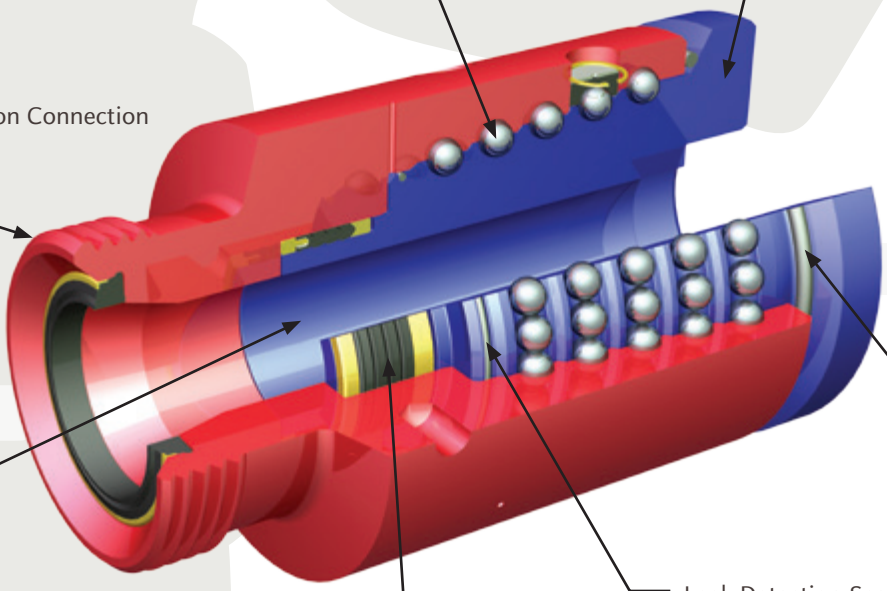
Exclusive stepped bearing race geometry enables easy centering of the mandrel relative to the packing. Stepped design also provides low bearing stresses and torque for longer bearing life.

Consult factory for special coiled tubing applications.

Coil Tubing

Recommended service

High Pressure Coiled Tubing Well Fracturing Application.



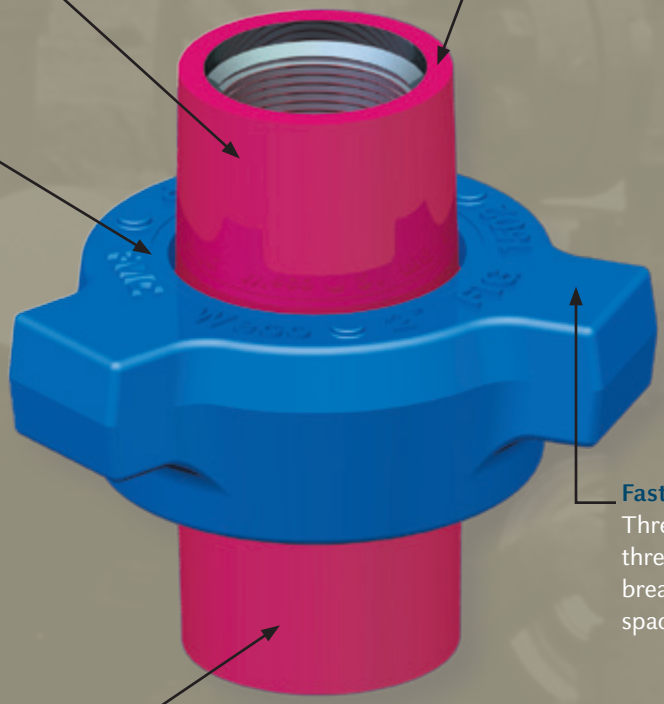
Available in 2-9/16 inch bore
10,000 psi cold working pressure
Temperature ratings from -20°F to 225°F
Maximum rotational speed of 10 rpm

Original Weco® Wing Unions

Simple identification
New, factory-shipped Weco wing unions are color coded for quick identification.

Choice of end connections
Weco wing unions are available with line pipe or tubing threads, butt weld, or non-pressure seal end connections.

Positive identification
For positive identification in the field, all Weco wing union nuts and subs include the Weco name union figure number, size, and pressure rating. Additionally, Weco wing unions for sour gas service are stamped "Sour Gas."



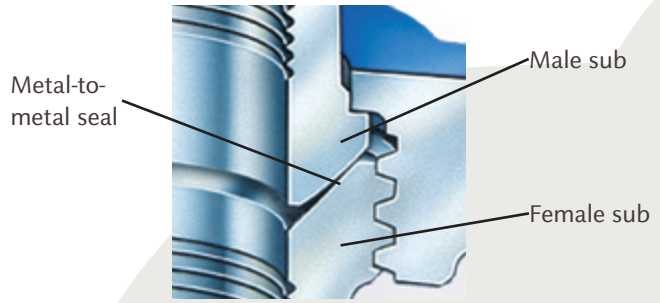
Fast make-up, break-out
Three lug nuts and self-locking ACME threads provide fast make-up and break-out regardless of position or space restrictions.

Interchangeable parts
All Weco wing union parts of the same figure number, size, and pressure rating are interchangeable. This feature makes it easy to mate male and female subs that are frequently made-up and broken-out.

Weco wing unions are the most complete line of standard and sour-gas service pipe connectors in the world. Available in 1 to 12-inch nominal pipe sizes with cold working pressures up to 20,000 psi, Weco wing unions are manufactured using the finest raw materials, tooling procedures, and heat-treating techniques available. Materials meet ASME and AISI standards. Each union is carefully inspected to ensure long, dependable service in the most extreme conditions. Like all pressure containing products, Weco wing unions require special handling

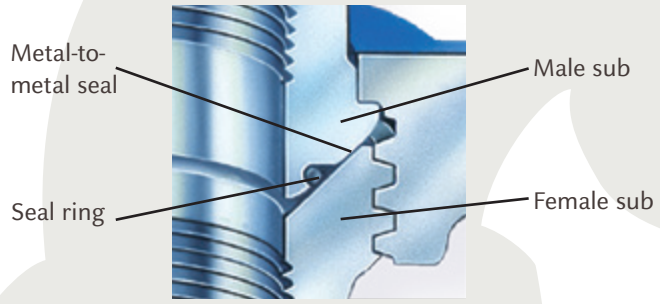
(see inside back cover for Warnings and Cautions).

Proven Seal Designs



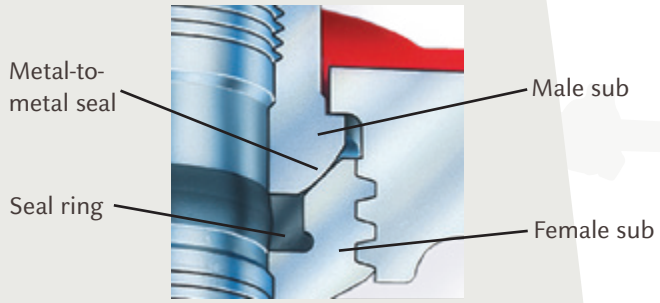
Low-Pressure Services (1,000 to 2,000 psi)

Weco wing unions for low-pressure services feature a primary metal-to-metal seal. The spherical surface of the male sub and conical surface of the female sub provide a large, ball-and-cone sealing surface. This metal-to-metal seal remains leak-proof even when one surface is slightly pitted or misaligned.



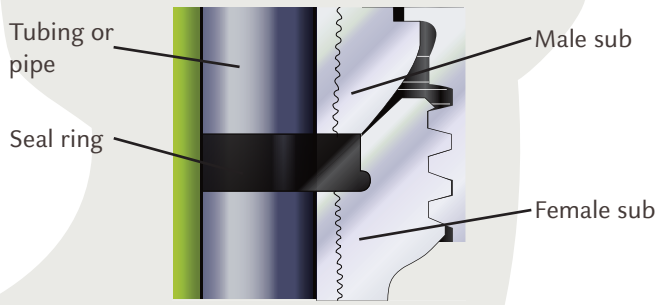
Medium-Pressure Services (2,000 to 4,000 psi)

Many Weco wing union designs supplement the metal-to-metal seal with a resilient O-ring in the male sub. The replaceable O-ring extends union life and protects the metal-to-metal seal against corrosion.



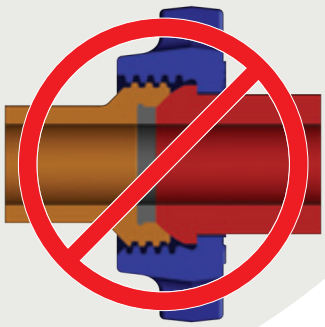
High-Pressure Services (6,000 to 20,000 psi)

Weco wing unions for high-pressure services feature a replaceable, lip-type seal ring in the female sub. This primary seal protects the secondary metal-to-metal seal from abrasion and corrosion while minimizing flow turbulence.



NPS (Non-Pressure Seal) Option Figures 602, 1002, and 1502)

The Weco non-pressure seal option is especially designed for abrasive, high-pressure wing union services where welded connections are undesirable. This design provides strong, permanent end connections without butt welding. The union ends are shop assembled to pipe or tubing. An epoxy thread compound is used to secure the connection.



Warning

Interchangeable parts

Weco wing union parts of the same figure number, size and pressure rating are interchangeable, making it easy to match male and female subs that are frequently made-up and broken-out. For positive identification in the field, all Weco wing union nuts and subs include the Weco name, figure number, size and pressure rating. It is vital that the user positively identify union connections and components to avoid mismatch conditions and potential union failure. See inside back cover for details.

Wing Unions

Figure Number	Assembly Color Key Standard Service	Pressure Rating, psi, bar							
		Standard		Sour Gas (see note 8)		1 25	1 ¼ 32	1 ½ 40	
		Cold Working	Test	Cold Working	Test				
100		1,000 69	1,500 103	NA	NA				
200		2,000 138	3,000 207	NA	NA	✓	✓	✓	
206		2,000 238	3,000 207	NA	NA	✓	✓	✓	
207		2,000 138	3,000 207	NA	NA				
211		2,000 138	3,000 207	NA	NA	✓			
400		2,500 172	3,750 259	2,500 172	3,750 259				
400		4,000 276	6,000 414	4,000 276	6,000 414				
602		6,000 414	9,000 621	6,000 414	9,000 621	✓	✓	✓	
1002		10,000 690	15,000 1034	7,500 517	11,250 776	✓	✓	✓	
1003		10,000 690	15,000 1034	7,500 517	11,250 776				
1502		15,000 1034	22,500 1551	10,000 690	15,000 1034	✓		✓	
2002		20,000 1379	30,000 2068	NA	NA				
2202		NA	NA	15,000 1034	22,500 1551				

NOTES

- NA - Not Available
- All end connections with line pipe threads unless otherwise noted.

1. Butt-weld available. Consult factory for wall thickness.
2. Non pressure seal configurations available.
3. Power make-up must be used for line pipe threaded connections to achieve rated cold working pressure.
4. Line pipe threads are not offered for sour gas service in this figure number.
5. Line pipe threads are not recommended for sour gas service above 4-inch nominal pipe size.
6. Figure 400 available in 5 ½ - and 7-inch OD with casing threads.
7. Available in butt-weld ends only.

Nominal Pipe Sizes, inches									Notes
2 50	2 ½ 65	3 80	4 100	5 125	6 150	8 200	10 250	12 300	
✓	✓	✓	✓		✓	✓			
✓	✓	✓	✓						1
✓	✓	✓	✓		✓	✓	✓		1
		✓	✓		✓	✓	✓		1
✓									
				✓	✓	✓		✓	1,5,6
✓	✓	✓	✓						1,4
✓	✓	✓	✓						1,2
✓	✓	✓	✓	✓	✓				1,2,3,9
✓		✓	✓	✓					1,3,10
✓	✓	✓	✓						1,2,3
✓		✓							7
✓		✓							7

8. All unions for sour gas service are painted olive green, stamped "SOUR GAS" or "NACE MR-01-75" and have specially modified material properties.
9. 5 and 6-inch sizes rated at 7,500 psi CWP and 11,250 test; 5 and 6-inch unions for sour gas service rated at 5,000 psi CWP and 7,500 psi test.
10. 4 and 5-inch sizes rated at 7,500 psi CWP and 11,250 test; 4 and 5-inch unions for sour gas service rated at 5,000 psi CWP and 7,500 psi test.

Sour gas service

FMC manufactures Weco sour gas unions in accordance with the National Association of Corrosion Engineers (NACE) Standard MR-01-75 and American Petroleum Institute's (API) Standard RP-I4-E.

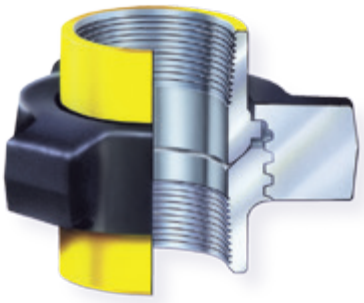


Figure 100
1,000 psi cold working pressure

Recommended service
Manifold and line connections

Features
- Pressure-tight make-up with hammer
- Economical low-pressure union

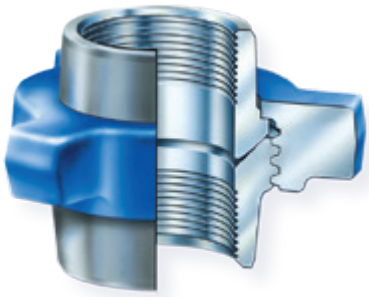


Figure 200
2,000 psi cold working pressure

Recommended service
General service manifolds and lines

Features
- Economical, general-purpose union
- 1 to 4-inch sizes

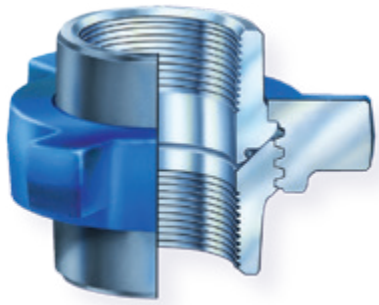


Figure 206
2,000 psi cold working pressure

Recommended service
Manifold line connections, suction service, and corrosion service

Features
- O-ring in male sub improves sealing and protects metal-to-metal seal against corrosion
- Replaceable O-ring extends union service life
- 1 to 10-inch sizes

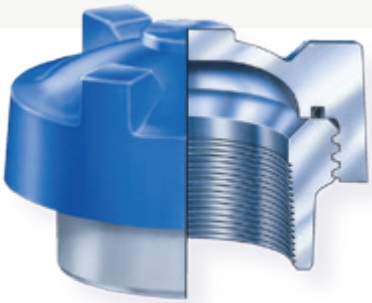


Figure 207
2,000 psi cold working pressure

Recommended service
Seals manifold connections and protects union threads

Features
- Parts interchangeable with Figures 200 and 206
- O-ring on blanking cap ensures a leak-free seal
- Cap can be tapped for pressure gauge
- Available in butt-weld

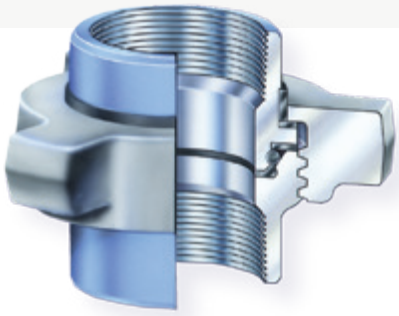


Figure 211
2,000 psi cold working pressure

Recommended service
Production systems with electrolytic corrosion problems

Features
- Laminated insulating rings provide 35 million ohms resistance across the union
- O-ring in male sub provides a positive primary seal
- Seal ring in female sub delvers a positive secondary seal

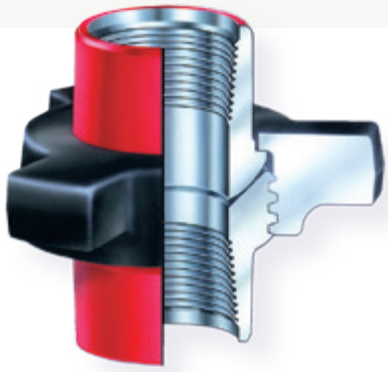


Figure 400
4,000 psi cold working pressure through 4-inch sizes; 2,500 psi cold working pressure, 5 through 12-inch sizes

Recommended service
Manifold line connections, pump suction, and mud services

Features
- 2-1/2 through 12-inch sizes have O-rings for primary seal
- Butt-weld available
- Available for sour gas service

See specifications tables (pg. 65 - 69) for sizes, dimensions, weights, materials, and part numbers.

Note

Note: To enhance safety, 2" Figure 602 and 1002 female subs have been modified so they cannot engage the 2" Figure 1502 nut. Also, a Go No-Go identification ring is available to determine whether the female sub is a 2" Figure 602/1002 or a 2" Figure 1502.

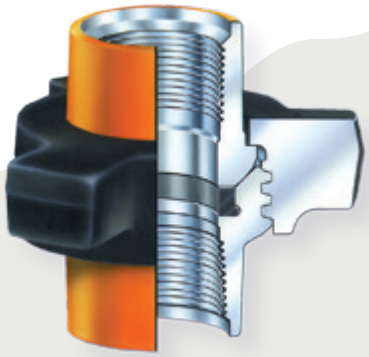


Figure 602

6,000 psi cold working pressure

Recommended service

Manifold line connections and mud service

Features

- Replaceable, lip-type seal provides primary seal, protects secondary metal-to-metal seal, and minimizes flow turbulence
- Butt-weld available
- Available for sour gas service at 6,000 psi cold working pressure

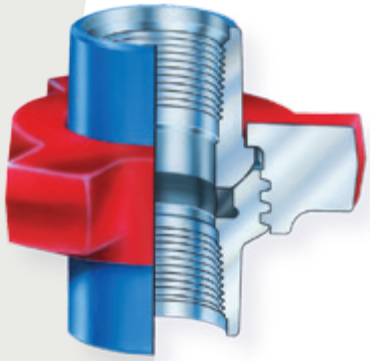


Figure 1002

10,000 psi cold working pressure through 4-inch sizes; 7,500 psi cold working pressure, 5 and 6-inch sizes

Recommended service

Cementing, fracturing, acidizing, testing, and choke-and-kill lines

Features

- O-ring in male sub improves sealing and protects metal-to-metal seal against corrosion
- Replaceable O-ring extends union service life
- 1 to 10-inch sizes

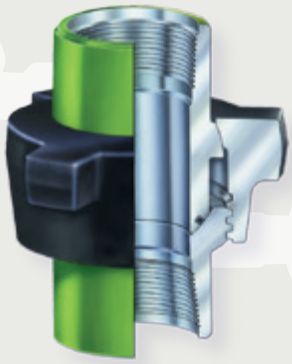


Figure 1003 Misaligning union

10,000 psi cold working pressure, 2 and 3-inch sizes; 7,500 psi cold working pressure, 4 and 5-inch sizes

Recommended service

For high-pressure connections where lines cannot be aligned

Features

- Ball seat provides positive seal with up to 7-1/2° misalignment; 2-inch model up to 4°
- Replaceable O-ring on male sub provides primary seal
- Available with threaded or butt-weld ends

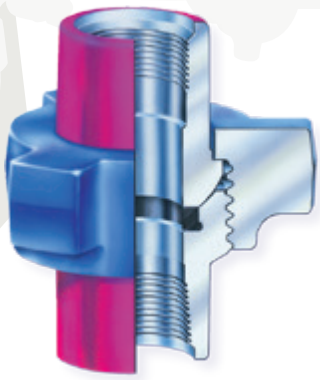


Figure 1502

15,000 psi cold working pressure

Recommended service

Cementing, fracturing, acidizing, testing, and choke-and-kill lines

Features

- Replaceable, lip-type seal
- Available for sour gas service: 10,000 psi cold working pressure; butt-weld or non-pressure seal configurations only
- Butt-weld available

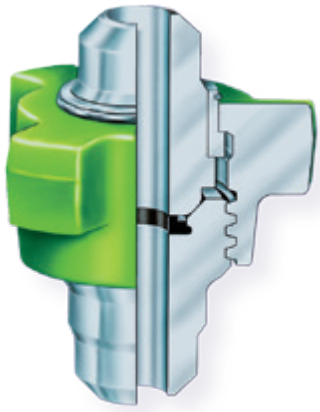


Figure 2002

20,000 psi cold working pressure

Recommended service

Cementing, fracturing, acidizing, testing, and choke-and-kill lines

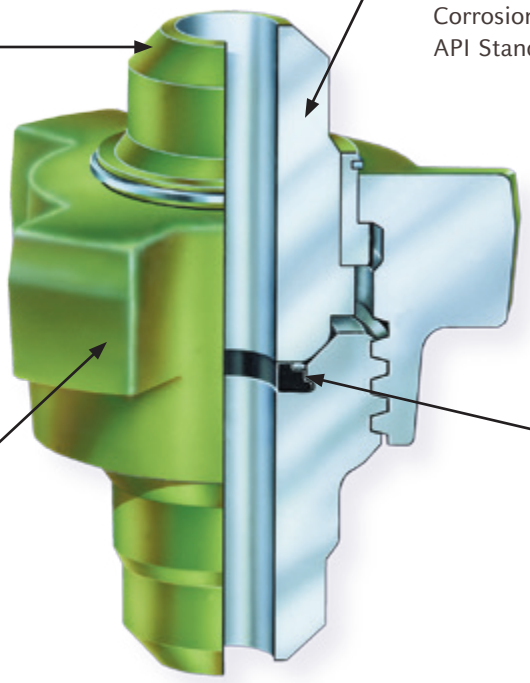
Features

- Replaceable, lip-type seal
- 2 and 3-inch line sizes
- Butt-weld configurations only

See specifications tables (pg. 65 - 69) for sizes, dimensions, weights, materials, and part numbers.

Quick, positive identification
Weco unions for sour gas service are stamped "Sour Gas" and painted with an olive green zinc-chromate primer to ensure quick, positive identification.

Meets industry standards
All Weco wing unions for sour gas service meet both the National Association of Corrosion Engineers Standard MR-01-75 and API Standard RP-14-E.



Controlled hardness
Weco union subs and nuts are specially heat-treated and 100% tested for controlled hardness.

Positive sealing
Primary fluoroelastomer seal and metal-to-metal seal combine to deliver positive sealing throughout the stated pressure range.

Sour Gas Service

FMC Technologies manufactures Weco sour gas wing unions in accordance with the National Association of Corrosion Engineers (NACE) Standard MR-01-75 and American Petroleum Institute (API) Standard RP-14-E. These outstanding, field-proven unions are specially heat treated for controlled hardness. For fast, sure identification, each Weco sour gas union is stamped "Sour Gas" or "NACE MR-01-75" using low stress dot stamping and painted with an olive green zinc-chromate primer that is unique to sour gas equipment. FMC Fluid Control uses fluoroelastomer seals or O-rings in all sour gas unions, but does not warrant the performance of any elastomer for sour gas service.

Caution:

It is possible to interchange sour gas parts with standard service products. Users must adopt safe practices for identification, installation, use, maintenance, and storage of sour gas equipment. (See inside back cover for additional Warnings and Cautions.)

Weco® Wing Unions for Sour Gas Service

Figure 400
4,000 psi cold working pressure, 1 through 4-inch sizes; 2,500 psi cold working pressure, 5 through 12-inch; butt-weld only above 4-inch sizes

Figure 602
6,000 psi cold working pressure, 1 through 4-inch sizes

Figure 1002
7,500 psi cold working pressure, 1 through 4-inch sizes; 5,000 psi cold working pressure, 5 and 6-inch sizes

Figure 1003
7,500 psi cold working pressure, 2 and 3-inch sizes; 5,000 psi cold working pressure, 4 and 5-inch sizes

Figure 1502
10,000 psi cold working pressure, 1 through 4-inch sizes; butt-weld or non-pressure seal configurations only

Figure 2202
15,000 psi cold working pressure, 2, and 3-inch sizes; butt-weld only

See specifications tables (pg. 65 - 69) for sizes, dimensions, weights, materials, and part numbers.

Other Weco® Unions

Tank Unions

500 psi maximum line pressure, 6, 8, 10 and 12-inch sizes

Recommended service

Mud tanks, mud tank connecting lines, and pump suction flanges

Features

- Molded nitrile seal provides a compression seal
- Makes up with hammer
- Elongated cross-section of seal ring ensures greater sealing surface when in contact with the pipe
- Accepts up to 7° pipe misalignment
- 6, 8 and 10-inch sizes may be socket welded to pipe or butt welded to tubing; 12-inch sizes require butt-weld

Air-O-Unions

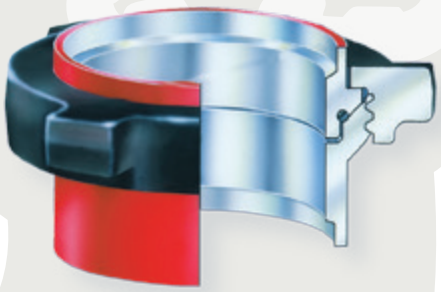
150 psi maximum line pressure, 4, 6, 8, 10, 13-3/8, and 16-inch sizes

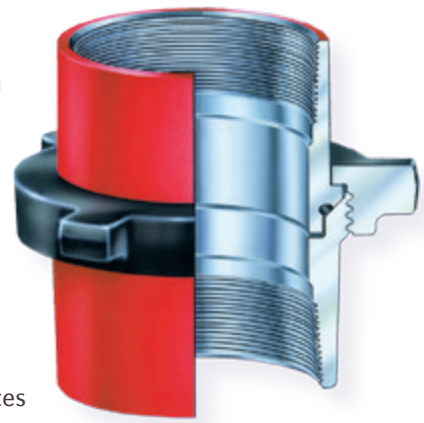
Recommended service

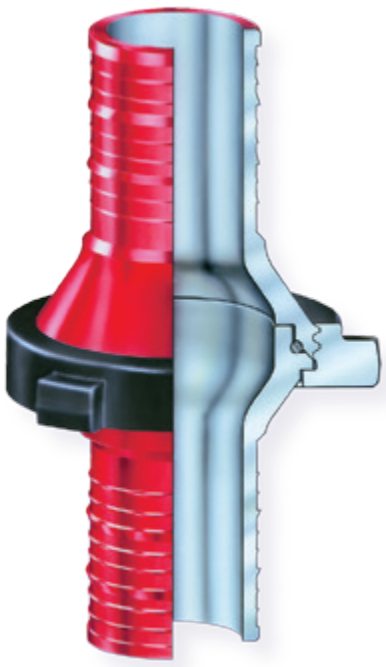
Mud suction and return lines and low-pressure fluid lines

Features

- Shot of rig air inflates tube to seal around pipe
- Fast, easy make-up without close alignment
- Allows pipe expansion or misalignment without breaking the seal
- No nuts, bolts, or wrenches required







Suction-Hose Unions

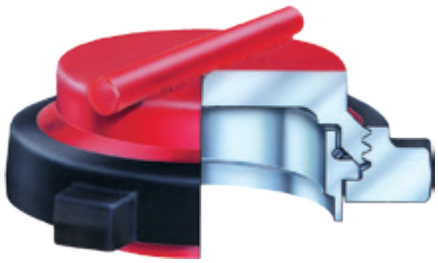
500 psi maximum line pressure, 4, 5, and 6-inch sizes

Recommended service

Mud system suction lines

Features

- Replaceable O-ring seal
- Choice of end fittings
- Secondary metal-to-metal seal
- Socket welded, threaded, or hose nipple

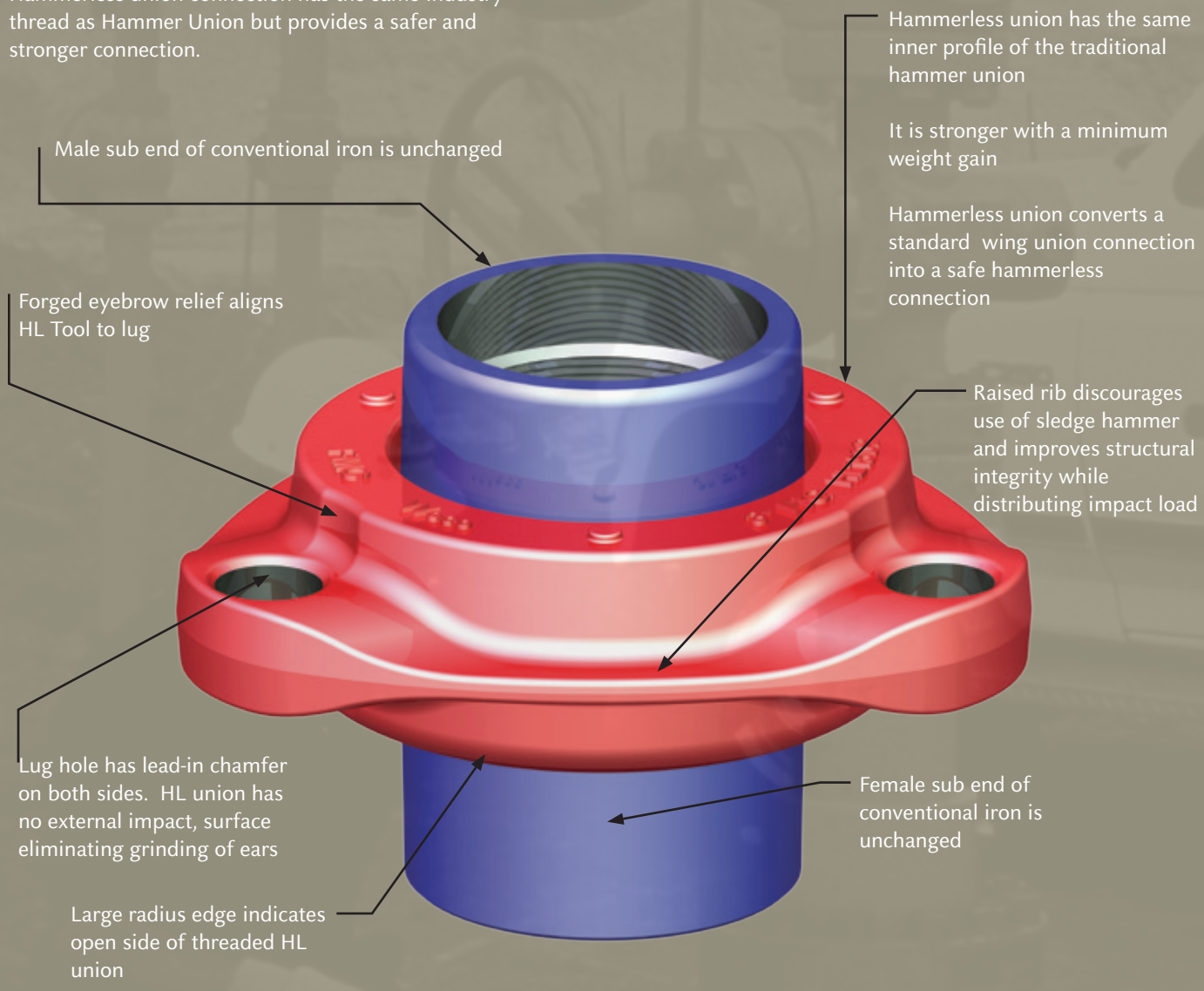


See specifications tables (pg. 65 - 69) for sizes, dimensions, weights, materials, and part numbers.

Hammerless Union (HL)

Recommended service

Hammerless union connection has the same industry thread as Hammer Union but provides a safer and stronger connection.



The Hammerless union is the next generation of union products targeted at eliminating the use of sledge hammer in making up high pressure temporary flowline connections in the field. This product was inspired by the desire for improved safety through the elimination of hammer related injuries.

Anticipated applications for the Hammerless union is well service temporary flow lines, with particular attention toward applications in fracturing, stimulation, cementing, and pipelines operations. However, any area in which space is constrained or swinging a hammer is dangerous, this product is a probable fit.

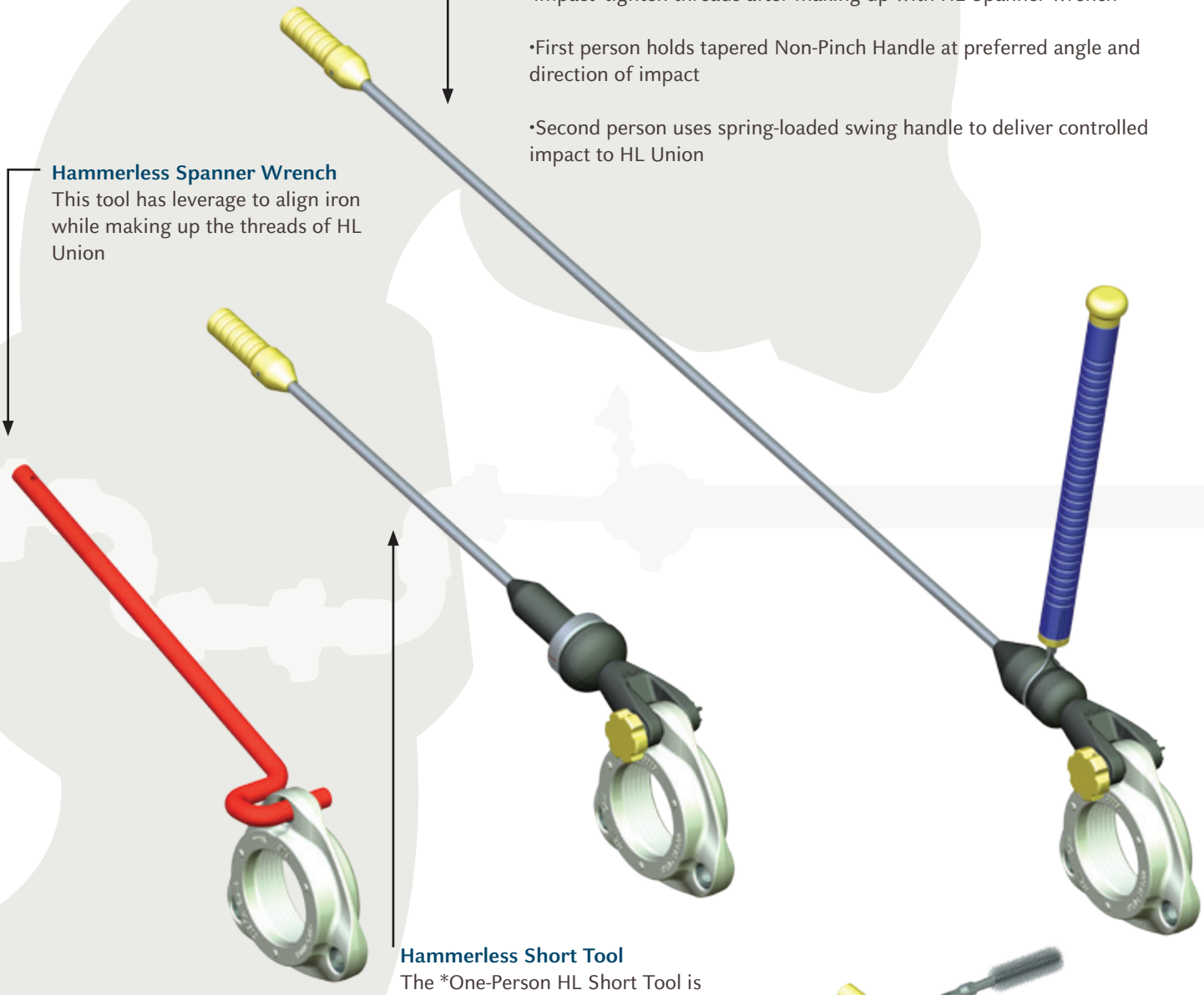
Hammerless Union Tools

Hammerless Long Tool
The Two-Person HL Long Tool is connected to HL union lug to safely 'impact' tighten threads after making up with HL Spanner wrench

•First person holds tapered Non-Pinch Handle at preferred angle and direction of impact

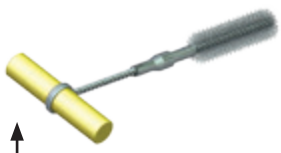
•Second person uses spring-loaded swing handle to deliver controlled impact to HL Union

Hammerless Spanner Wrench
This tool has leverage to align iron while making up the threads of HL Union



Hammerless Short Tool
The *One-Person HL Short Tool is connected to HL union lug to safely impact tighten threads after making up with HL Spanner Wrench. Operator uses this tool at elevated wellhead connections to tighten HL Union using one hand while tool remains safely attached

One Tool fits all HL sizes.



Round Wire Brush
Use to clean Iron threads and HL union threads

Use to clean HL union lug hole before attaching HL Tools

Weco® Fittings and Pup Joints

Weco Fittings

Up to 20,000 psi cold working pressure; 1 to 4-inch bore sizes

Recommended service

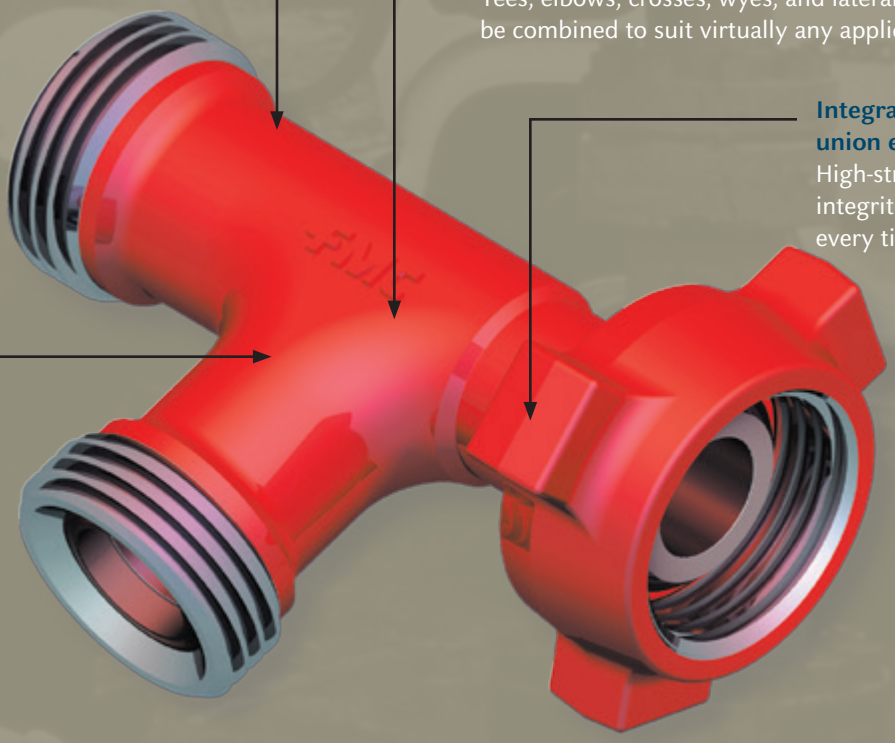
High-pressure well servicing lines, fracturing lines, testing lines, cementing and circulating lines, and other well service and stimulation applications

Optimized, lightweight designs
Save valuable weight and space.

Complete range of configurations
Tees, elbows, crosses, wyes, and laterals can be combined to suit virtually any application.

Integral Weco wing union end connections
High-strength, high integrity connections every time.

Forged construction with full traceability



Weco fittings and pup joints have been optimized for minimum weight and size. These rugged products are ideal for handling a complete range of standard and sour gas well servicing fluids at pressures up to 20,000 psi. Available in 1 to 4-inch sizes, both fittings are pups feature forged construction with integral Weco wing union ends for a high-strength, high-integrity connection every time. Weco pups and fittings come with full material traceability and can be supplied with Charpy impact values. Like all pressure containing products, Weco pups and fittings require special handling

(see inside back cover for Warnings and Cautions).

Weco Pup Joints

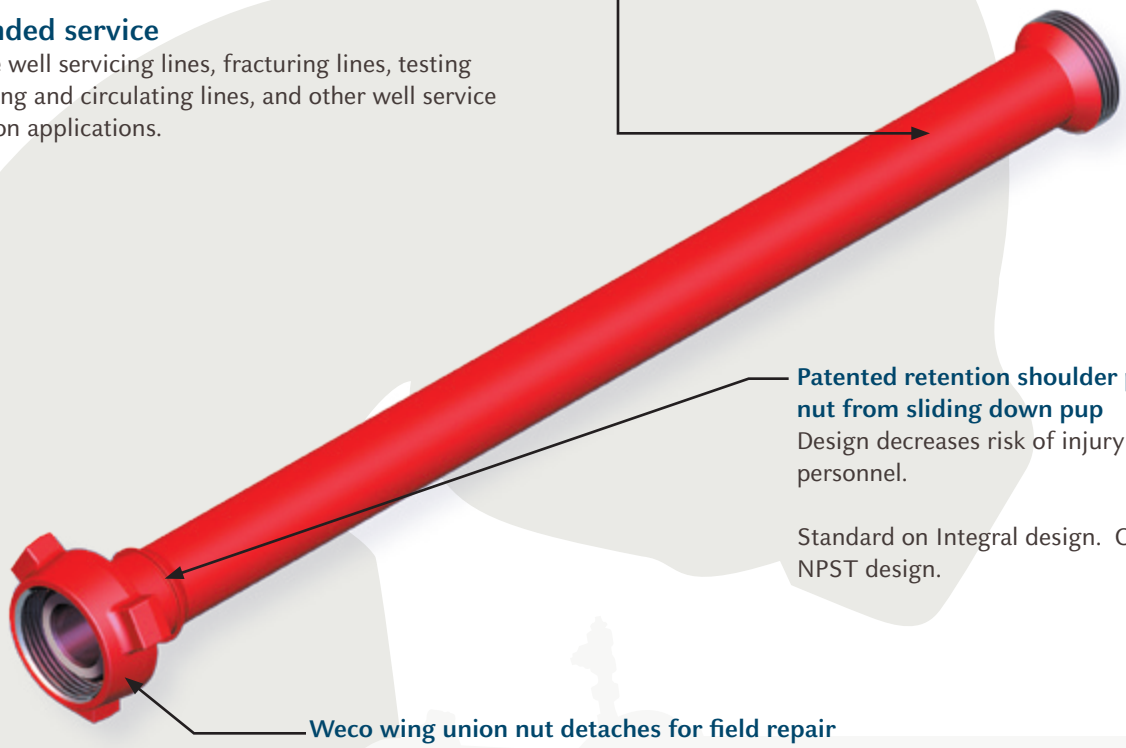
Up to 20,000 psi cold working pressure; 1, 1½, 2, 3, and 4-inch bore sizes, lengths to 20 feet

Recommended service

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

Integral and NPST designs

Available in integral and non pressure seal designs to suit virtually all oilfield applications.



Patented retention shoulder prevents nut from sliding down pup

Design decreases risk of injury to personnel.

Standard on Integral design. Optional on NPST design.

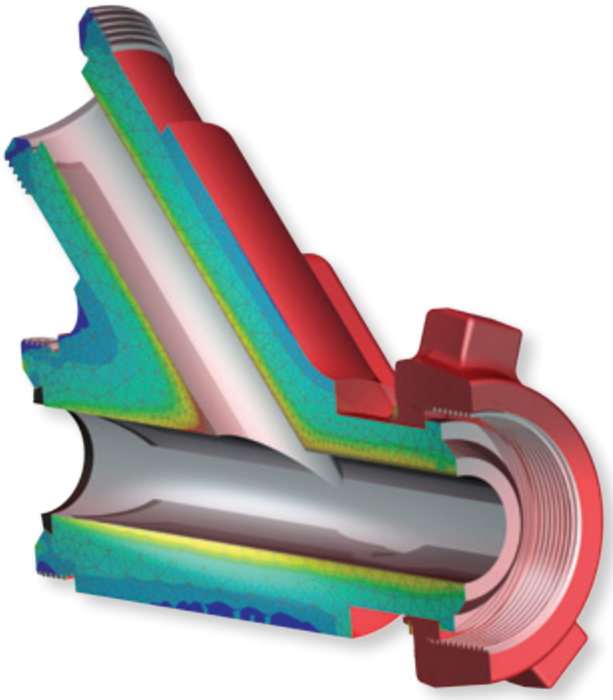
Weco wing union nut detaches for field repair

Permits fast, easy service at the job site.

Standard on Integral design. Optional on NPST design.

Optimized Forged Fittings

FMC Technologies offers the smallest, lightest integral forged fittings on the market. To minimize the size and weight of each fitting, engineers performed a finite element stress analysis on each fitting body design. From these results, the geometry was optimized for weight, and forgings were developed for each size and type of fitting. The fittings were then subjected to laboratory and field testing. The result: You save weight and space without sacrificing service life or safety.



Chiksan® and Weco® flowline products have set global industry standards for quality, reliability, and service life for almost 75 years. However, superior products alone are not enough to meet the divers challenges that operators and well-servicing companies face today. FMC's Integrated Services business pledges to meet or exceed customer expectations by providing value through services, technology, and competencies, and by safely following established standards without compromise. This total solutions approach to managing fluid control equipment is helping flowline customers worldwide realize the maximum value and service life from their fluid control assets.

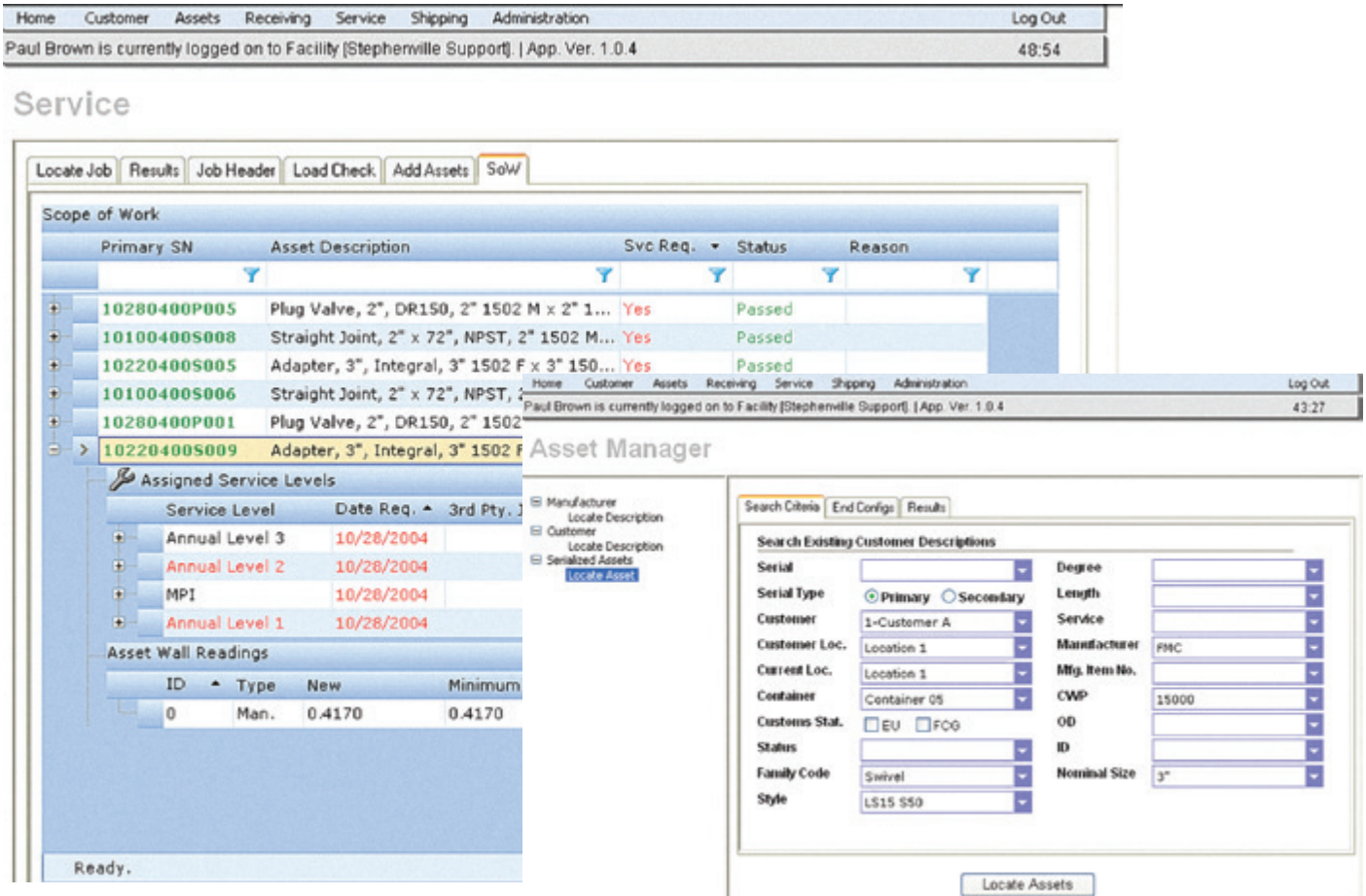
World's Leading Flowline Service Solution

InteServ Database

FMC's proprietary web-based database delivers unmatched standards for flowline data collection, documentation, and certifications. Built-in planning and tracking tools identify equipment usage patterns, inspection, and repair intervals to ensure the right products are shipped to the right job in top working condition. The bottom line: Customers improve safety, maximize equipment utilization, and minimize equipment maintenance costs.

Putting Technology Into Service

- Fully integrated global database
- Internet-based asset tracking and reporting system
- Flexible data extraction tools for detailed asset analysis



Asset Management

Tracking and maintaining the volume of flowline equipment used in high-pressure pumping services is a major undertaking. Asset management is a cooperative program where specially trained FMC personnel inventory, track, and maintain a customer's flowline assets at their facility or in a designated FMC facility. Asset management is helping customers world-wide significantly increase equipment utilization rates and service life while reducing total costs and safety concerns.

Mobile Inspection and Repair

FMC introduced its mobile inspection and repair service in 1996. Today, the industry's largest fleet of mobile units performs complete inspection and repair services at customer locations throughout the world. The mobile package includes inspection, testing, repair, documentation, and certification with the goal of extending product life and reducing operator costs.

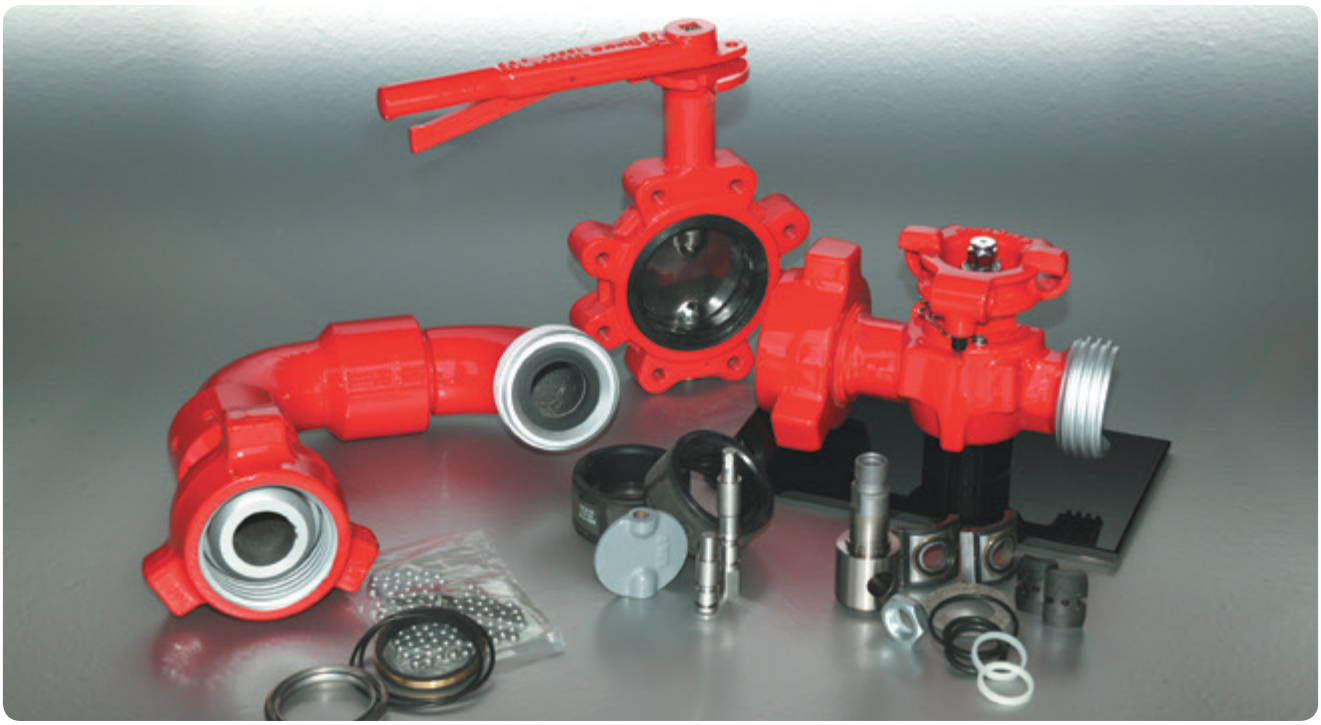
Service Centers

To keep Chiksan and Weco products in top working condition, FMC offers factory rebuild services from strategic locations worldwide. FMC is aggressively working to expand its in-house refurbishment services to meet growing demand, including butterfly valve and cement head inspection and repair.

Putting Technology Into Service

Spare Parts Management

Chiksan and Weco products are manufactured to precise dimensional tolerances using specialized materials of construction, unique machining processes, and strict quality control measures. The service life of these products can be extended with routine maintenance and periodic repair using genuine FMC spare parts.



Weco® and Chiksan® Specifications

Weco® Plug Valve Specifications

Weco® and Chiksan® Low Temperature Ranges (LT)

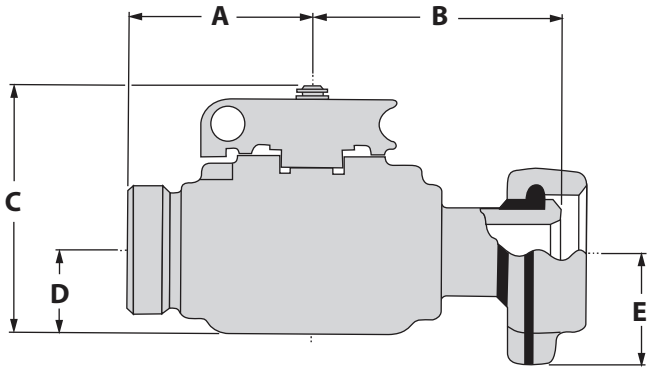
FMC leads the way with our new line of low temperature (-40°C) equipment. Please consult an FMC representative for more information on our standard service flowline low temperature products.

Plug Valves

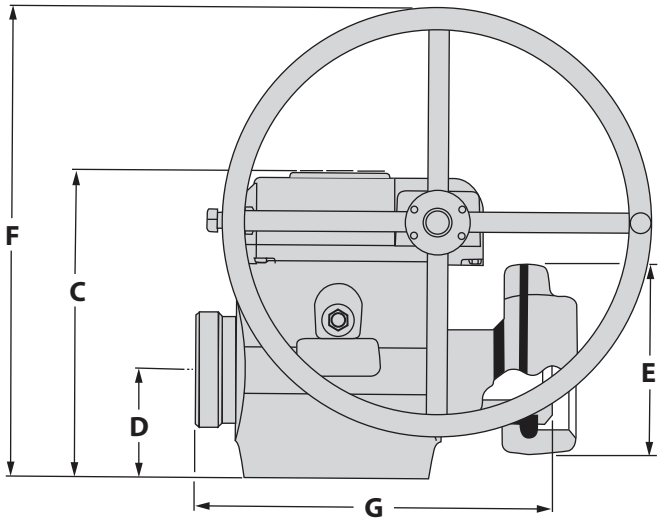
Model	Nominal Size, in.	Part No.	Part No.-LT	Weco End Connection *	Service	CWP psi (bar)	Weight lb (kg)
ULT 150	1	P516114	P516114-LT	1502	Standard	15,000 (1034)	37 (16.8)
ULT 100	1	P524578		1502	Sour	10,000 (690)	37 (16.8)
ULT 150	1x2	P516108	P516108-LT	1502	Standard	15,000 (1034)	43 (19.5)
	1x2 (.38 bore)	P516146	P516146-LT	1502	Standard	15,000 (1034)	58 (26.3)
ULT 100	1x2	P516208		1502	Sour	10,000 (690)	37 (16.8)
DR 150	2	3247527		1502	Standard	15,000 (1034)	93 (42.2)
ULT 150	2	P537789		1502	Standard	15,000 (1034)	84 (38)
ULT 100	2	3248705		1502	Sour	10,000 (690)	93 (42.2)
DR 200	2	3223008		2002	Standard	20,000 (1380)	83 (37.6)
	2	3234183		2202	Sour	15,000 (1034)	83 (37.6)
ULT 150 (Manual)	3	3265904	3265904-LT	1502	Standard	15,000 (1034)	238 (108)
ULT 100 (Manual)	3	P501010		1502	Sour	10,000 (690)	241 (109)
ULT 150 (Hydraulic)	3	3265123	3265123-LT	1502	Standard	15,000 (1034)	337 (153)
ULT 100 (Hydraulic)	3	3267427		1502	Sour	10,000 (690)	340 (154)
ULT 150 (Handwheel)	3	3265122	3265122-LT	1502	Standard	15,000 (1034)	288 (131)
ULT 100 (Handwheel)	3	3265257		1502	Sour	10,000 (690)	288 (131)
ULT 200 (Hydraulic)	3	P519087	P519087-LT	2002	Standard	20,000 (1380)	754 (342)
ULT 200 (Handwheel)	3	P519453	P519453-LT	2002	Standard	20,000 (1380)	634 (288)
ULT 150 (Handwheel)	3	P522233		2202	Sour	15,000 (1034)	640 (290)
ULT 100 (Hydraulic)	4	P518352	P518352-LT	1002	Standard	10,000 (690)	738 (335)
ULT 100 (Handwheel)	4	P518356	P518356-LT	1002	Standard	10,000 (690)	660 (299)
ULT 150 (Hydraulic)	4	P516015	P516015-LT	1502	Standard	15,000 (1034)	774 (351)
ULT 150 (Handwheel)	4	P518749	P518749-LT	1502	Standard	15,000 (1034)	660 (299)

Note: 1" , 1x2" ULT 150, DR150 and DR200 plug valves can be furnished with hydraulic actuators.

* Other end connections are available. Consult factory.



DR 150 with Manual Operator

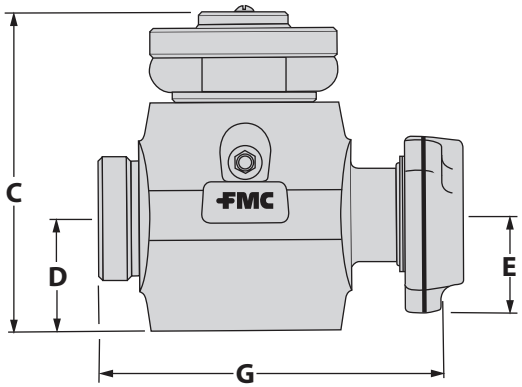


ULT 150 with Handwheel Operator

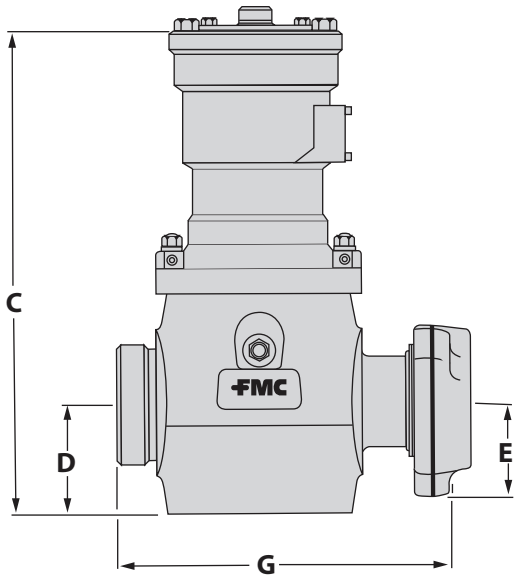
Weco® Plug Valve Specifications

Plug Valves

Model	Nominal Size, in.	A in. (mm)	B in. (mm)	C in. (mm)	D in. (mm)	E in. (mm)	F in. (mm)	G in. (mm)
ULT 150	1	4.69 (119)	5.88 (149)	6.59 (167)	1.75 (45)	2.88 (73)	—	—
ULT 100	1	4.69 (119)	5.88 (149)	6.59 (167)	1.75 (45)	2.88 (73)	—	—
ULT 150	1x2	4.69 (119)	5.88 (149)	6.59 (167)	1.75 (45)	3.93 (100)	—	—
	1x2 (.38 bore)	4.69 (119)	5.88 (149)	6.59 (167)	1.75 (45)	3.93 (100)	—	—
ULT 100	1x2	4.69 (119)	5.88 (149)	6.59 (167)	1.75 (45)	3.93 (100)	—	—
DR 150	2	6 (152)	7.88 (200)	8.05 (205)	2.62 (67)	3.93 (100)	—	—
	2	6 (152)	7.88 (200)	8.05 (205)	2.62 (67)	3.93 (100)	—	—
DR 200	2	6.06 (154)	9.19 (233)	8.05 (205)	2.62 (67)	3.76 (96)	—	—
	2	6.06 (154)	9.19 (233)	8.05 (205)	2.62 (67)	3.76 (96)	—	—
ULT 150 (Manual)	3	—	—	14.27 (363)	5 (127)	4.55 (116)	—	15.69 (399)
ULT 100 (Manual)	3	—	—	14.27 (363)	5 (127)	4.55 (116)	—	15.69 (399)
ULT 150 (Hydraulic)	3	—	—	21.81 (554)	5 (127)	4.55 (116)	—	15.69 (399)
ULT 100 (Hydraulic)	3	—	—	21.81 (554)	5 (127)	4.55 (116)	—	15.69 (399)
ULT 150 (Handwheel)	3	—	—	14.47 (368)	5 (127)	4.55 (116)	22.12 (562)	15.69 (399)
ULT 100 (Handwheel)	3	—	—	14.47 (368)	5 (127)	4.55 (116)	22.12 (562)	15.69 (399)
ULT 200 (Hydraulic)	3	—	—	29.63 (753)	6.26 (159)	6 (152)	—	22.08 (561)
ULT 200 (Handwheel)	3	—	—	17.62 (448)	6.26 (159)	6 (152)	36.88 (937)	22.08 (561)
ULT 150 (Handwheel)	3	—	—	17.62 (448)	6.26 (159)	6 (152)	36.88 (937)	22.08 (561)
ULT 100 (Hydraulic)	4	—	—	28.49 (724)	7.00 (118)	4.94 (126)	—	22.85 (580)
ULT 100 (Handwheel)	4	—	—	19.1 (485)	7.00 (118)	4.94 (126)	38.36 (974)	22.85 (580)
ULT 150 (Hydraulic)	4	—	—	28.49 (724)	7.00 (118)	4.94 (126)	—	22.85 (580)
ULT 150 (Handwheel)	4	—	—	19.1 (485)	7.00 (118)	4.94 (126)	38.29 (973)	22.85 (580)



DR 150 with Manual Operator



ULT 150 with Hydraulic Actuator

Weco® Check Valve Specifications

Top Entry Check Valves

Nominal Size	CWP	Service	End Connections	Flow Orientation	Part Number	P/N - LT	A	B	Weight	Repair Kit	Elastomer Set
2″	15,000	Standard	1502 MXF	Standard	P530589	P530589-LT	13.12	8.27	70	P528681	P528686
	15,000	Standard	1502 FXM	Reverse	P537198	P537198-LT	13.12	8.27	70	P528681	P528686
	15,000	Standard	1502 MXF	Standard	•P537131	•P537131-LT	13.12	8.27	69	P528681	P528686
	10,000	Sour Gas	1502 MXF	Standard	P537196	P537196-LT	13.12	8.27	70	P537904	P537905
3″	15,000	Standard	1502 MXF	Standard	P521623	P521623-LT	15.67	9.54	117	P522215	P523359
	15,000	Standard	1502 FXM	Reverse	P524440	P524440-LT	15.67	9.54	117	P522215	P523359
	15,000	Standard	1502 MXF	Standard	•P537132	•P537132-LT	15.67	9.54	116	P522215	P523359
	10,000	Sour Gas	1502 MXF	Standard	P537225	P537225-LT	15.67	9.54	117	P508059	P508060
	6,000	Standard	602 MXF	Standard	P537202	P537202-LT	15.67	9.54	100	P522215	P523359
	6,000	Standard	602 FXM	Reverse	P527120	P527120-LT	15.67	9.54	100	P522215	P523359
4″	15,000	Standard	1502 MXF	Standard	P524760	P524760-LT	19.75	11.88	276	P525441	P525505
	15,000	Standard	1502 FXM	Reverse	P527699	P527699-LT	19.75	11.88	276	P525441	P525505
	10,000	Standard	1002 MXF	Standard	P525809	P525809-LT	19.75	11.88	240	P525441	P525505
	10,000	Standard	1002 FXM	Reverse	P527018	P527018-LT	19.75	11.88	240	P525441	P525505
	6,000	Standard	602 MXF	Standard	P527592	P527592-LT	19.75	11.88	239	P525441	P525505

* Vent Cap

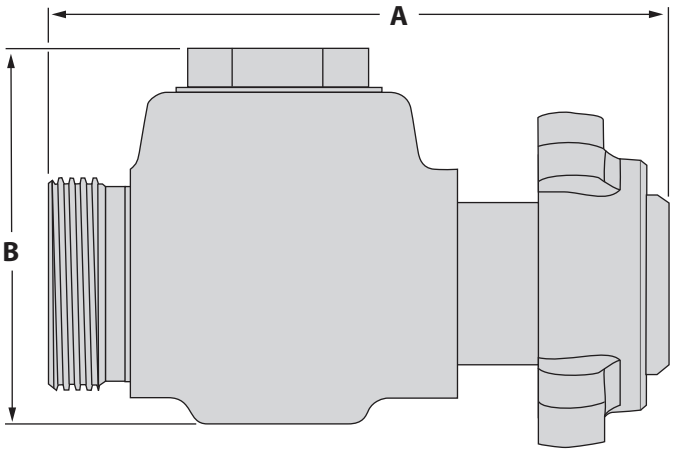
In-Line Flapper Check Valves

Nominal Size	CWP	Service	End Connections	Flow Orientation	Part Number	P/N - LT	A	B	Weight	Repair Kit	Elastomer Set
1"	15,000	Standard	1502 MXF	Standard	P524738	P524738-LT	14.04	7.00	84	3269517	3269518
1-1/2"	15,000	Standard	1502 FXM	Reverse	P519734	P519734-LT	14.04	7.00	81	3269517	3269518
2"	20,000	Standard	2002 MXF	Standard	3269158	3269158-LT	16.91	8.00	123	P519720	P535387
3"	20,000	Standard	2002 MXF	Standard	P520099	P520099-LT	22.79	13.00	441	P520232	P535388

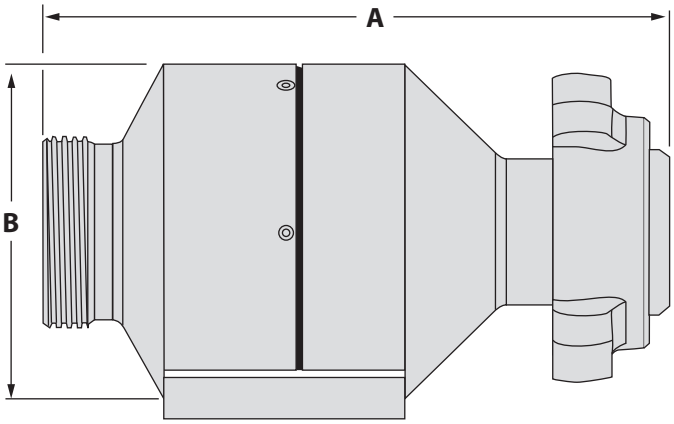
Dart Check Valves

Nominal Size	CWP	Service	End Connections	Flow Orientation	Part Number	P/N - LT	A	B	Weight	Repair Kit	Elastomer Set
1"	15,000	Standard	1502 MXF	Standard	P536118	P536118-LT	14.04	10.31	76	P518835	P518834
11/2″	15,000	Standard	1502 FXM	Reverse	P523811	P523811-LT	14.04	10.31	86	P518835	P518834
	15,000	Standard	1502 MXF	Standard	P525269	P525269-LT	14.04	10.31	86	P518835	P518834
2"	15,000	Standard	1502 MXF	Standard	P510771	P510771-LT	14.04	10.31	87	P518835	P518834
3"	15,000	Standard	1502 MXF	Standard	P510773	P510773-LT	15.67	11.43	130	P519874	P519873

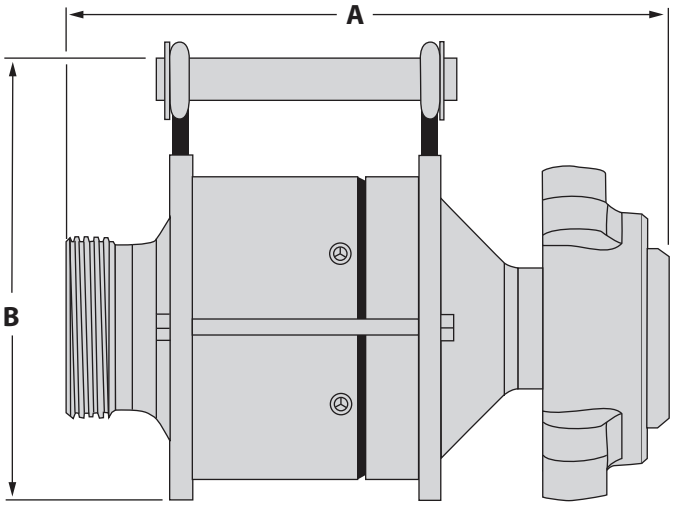
Weco® Check Valve Specifications



Top Entry Check Valves



In-Line Flapper Check Valves



Dart Check Valves

Weco® Butterfly Valve Specifications

Model 12

Sizes in.		2	2 ½	3	4	6	8	10	12	14	16
Part No.		3227485	3227486	3227487	3245819	3227493	3232417	3227495	3227496	3255865	3255869
P/N - LT		3227485-LT	3227486-LT	3227487-LT	3245819-LT	3227493-LT	3232417-LT	3227495-LT	3227496-LT	3255865-LT	3255869-LT
Dimensions, in., mm	A	4 31/32 126	5 5/8 150	5 29/32 150	7 9/32 185	7 25/32 198	9 13/32 239	10 21/32 271	12 5/32 309	14 31/32 380	17 7/16 443
	B	3 76.2	3 11/32 84.9	3 5/8 92.1	4 1/4 108	5 5/16 135	7 178	8 1/4 210	9 3/4 248	10 3/8 264	11 15/16 303
	C	4 1/8 105	4 7/8 124	5 3/8 137	6 7/8 175	8 3/4 222	11 279	13 3/8 340	16 1/8 410	17 11/16 449	20 1/8 511
	D	2 1/16 52.4	2 1/2 63.5	3 1/16 77.8	4 1/16 103	6 1/16 154	8 1/16 205	10 254	12 305	13 1/4 337	15 1/4 387
	E	5/8 Sq. 15.9	5/8 Sq. 15.9	5/8 Sq. 15.9	5/8 Sq. 15.9	5/8 Sq. 15.9	7/8 Sq. 22.2	7/8 Sq. 22.2	1 1/8 Sq. 28.6	1 1/8 Sq. 28.6	2* 50.8
	F	4 102	4 102	4 102	4 102	4 102	6 152	6 152	6 152	6 152	8 203
	G	1 1/32 26.2	1 1/32 26.2	1 1/32 26.2	1 9/32 32.5	1 9/32 32.5	1 9/32 32.5	1 9/32 32.5	1 9/32 32.5	1 9/32 32.5	3 3/16 81
	H	1 5/8 41	1 3/4 45	1 3/4 45	2 51	2 1/8 54	2 1/2 64	2 1/2 64	3 76	3 76	4 102
	I	7/16 11.1	7/16 11.1	7/16 11.1	7/16 11.1	7/16 11.1	9/16 14.3	9/16 14.3	9/16 14.3	9/16 14.3	17/32 13.5
	J	3 1/4 82.6	3 1/4 82.6	3 1/4 82.6	3 1/4 82.6	3 1/4 82.6	5 127	5 127	5 127	5 127	6 1/2 165

Body: Ductile Iron Disc: Ductile Iron Stems Stainless Steel Seat: Nitrile

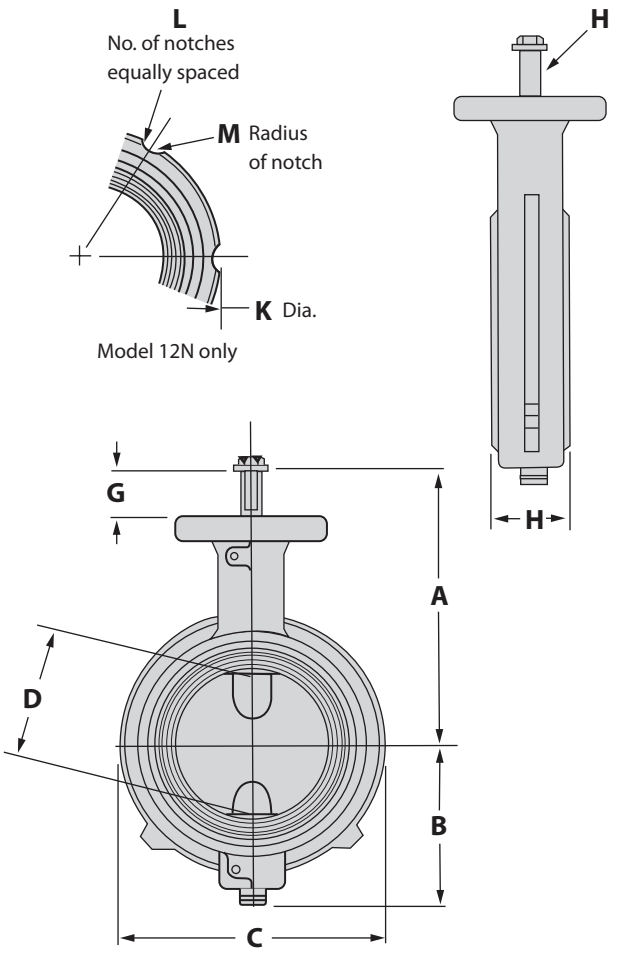
* 2 inch diameter with 1/2 inch keyway

Model 12N *(For use with lightweight industrial flanges.)*

Sizes in.		2	3	4	5	6
Part No.		3229885	3230052	3229886	3229887	3229888
		3229885-LT	3230052-LT	3229886-LT	3229887-LT	3229888-LT
Dimensions, in., mm	A	4 31/32 126	5 29/32 150	7 9/32 185	7 9/32 185	7 25/32 198
	B	3 76.2	3 5/8 92.1	4 1/4 108	4 13/16 122	5 5/16 135
	C	4 1/8 105	5 3/8 137	6 7/8 175	7 3/4 197	8 3/4 222
	D	2 1/16 52.4	3 1/16 77.8	4 1/16 103	5 1/16 129	6 1/16 154
	E	5/8 Sq. 15.9	5/8 Sq. 15.9	5/8 Sq. 15.9	5/8 Sq. 15.9	5/8 Sq. 15.9
	F	4 101.6	4 101.6	4 101.6	4 101.6	4 101.6
	G	1 1/32 26.2	1 1/32 26.2	1 9/32 32.5	1 9/32 32.5	1 9/32 32.5
	H	1 5/8 41.3	1 3/4 44.5	2 50.8	2 1/8 54	2 1/8 54
	I	7/16 11.1	7/16 11.1	7/16 11.1	7/16 11.1	7/16 11.1
	J	3 1/4 82.6	3 1/4 82.6	3 1/4 82.6	3 1/4 82.6	3 1/4 82.6
	K	3 3/4 82.6	4 3/8 111	6 3/8 162	6 29/32 175	8 1/2 216
	L	4 102	6 152	6 152	6 152	8 203
	M	5/16 7.9	5/16 7.9	3/8 9.5	3/8 9.5	3/8 9.5

Body: Ductile Iron Disc: Ductile Iron

Stems: 416 Stainless Steel Seat: Nitrile

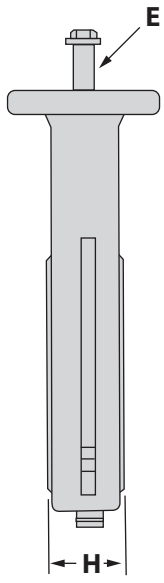


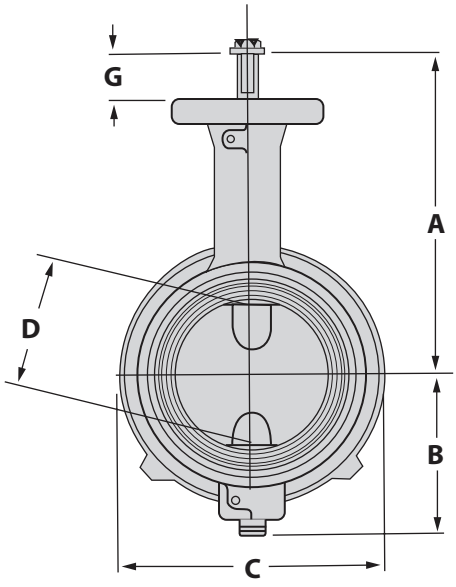
Weco® Butterfly Valve Specifications

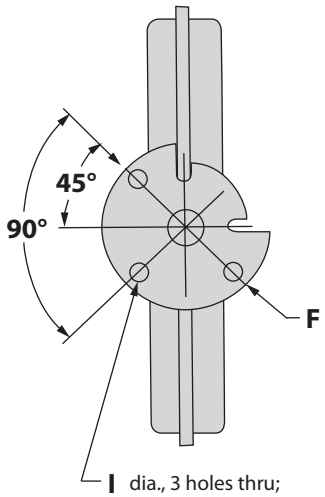
Model 22

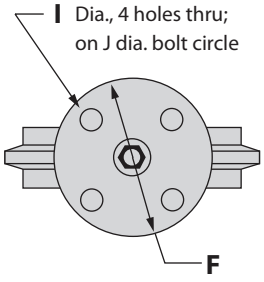
Sizes in.		2	2 ½	3	4	5	6	8	10	12
Part No.		3225730	3225731	3225732	3225733	3225734	3225735	3225736	3225737	3225738
P/N - LT		3225730-LT	3225731-LT	3225732-LT	3225733-LT	3225734-LT	3225735-LT	3225736-LT	3225737-LT	3225738-LT
Dimensions, in., mm	A	7 9/32 185	7 25/32 198	8 1/16 205	9 5/32 233	9 21/32 245	10 5/32 258	11 19/32 294.5	12 27/32 326	14 11/32 364
	B	3 76.2	3 11/32 84.9	3 5/8 92.1	4 1/4 108	4 13/16 122	5 5/16 135	7 178	8 1/4 210	9 3/4 248
	C	4 1/8 105	4 7/8 124	5 3/8 131	6 7/8 175	7 3/4 197	8 3/4 222	11 279	13 3/8 340	16 1/16 408
	D	2 1/16 52.4	2 1/2 63.5	3 1/16 77.8	4 1/16 103	5 1/16 129	6 1/16 154	8 1/16 205	10 254	12 305
	E	5/8 Sq. 15.9	5/8 Sq. 15.9	5/8 Sq. 15.9	5/8 Sq. 15.9	5/8 Sq. 15.9	5/8 Sq. 15.9	7/8 Sq. 22.2	7/8 Sq. 22.2	1 1/8 Sq. 28.6
	F	4 101.6	4 101.6	4 101.6	4 101.6	4 101.6	4 101.6	6 152.4	6 152.4	6 152.4
	G	1 1/32 26.2	1 1/32 26.2	1 1/32 26.2	1 9/32 23.5	1 9/32 32.5	1 9/32 32.5	1 9/32 32.5	1 9/32 32.5	1 9/32 32.5
	H	1 5/8 41.3	1 3/4 44.5	1 3/4 44.5	2 50.8	2 1/4 54	2 1/4 54	2 1/2 63.5	2 1/2 63.5	3 76.2
	I	7/16 11.1	7/16 11.1	7/16 11.1	7/16 11.1	7/16 11.1	7/16 11.1	9/16 14.3	9/16 14.3	9/16 14.3
	J	3 1/4 82.6	3 1/4 82.6	3 1/4 82.6	3 1/4 82.6	3 1/4 82.6	3 1/4 82.6	5 127	5 127	5 127

Body: Ductile Iron Disc: Ductile Iron Stems 416 Stainless Steel Seat: Nitrile









Weco® Butterfly Valve Specifications

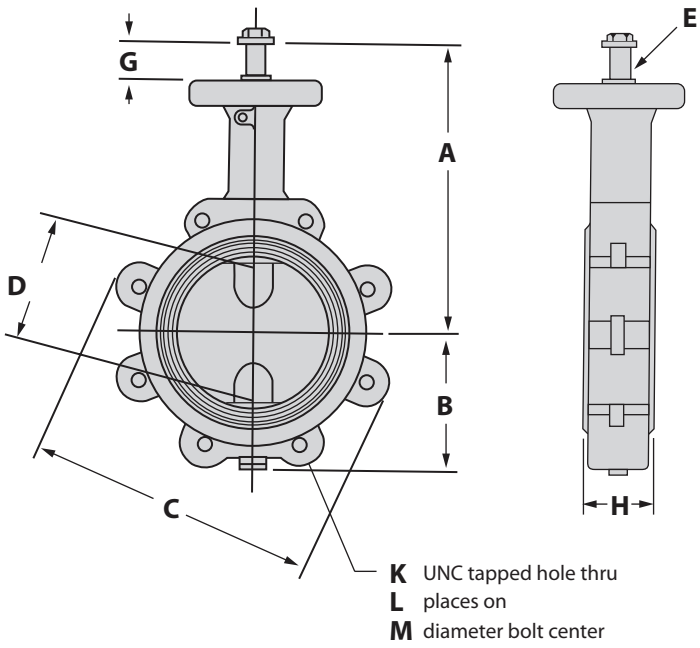
Model 22L

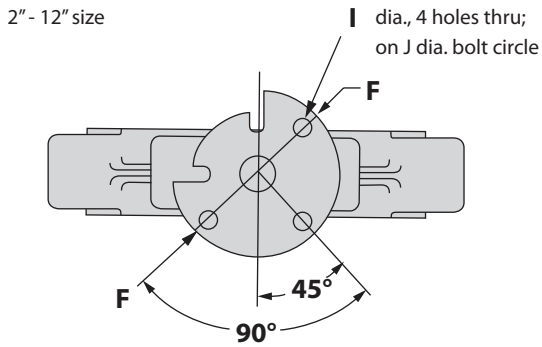
Sizes in.		2	2 ½	3	4	5	6	8	10	12	14	16	18	20	24
Part No.		3225748	3225749	3225750	3222751	3225752	3225753	3225754	3225755	3225756	3255867	3255870	3255871	3255872	3255873
P/N - LT		3225748-LT	3225749-LT	3225750-LT	3222751-LT	3225752-LT	3225753-LT	3225754-LT	3225755-LT	3225756-LT	3255867-LT	3255870-LT	3255871-LT	3255872-LT	3255873-LT
Dimensions, in., mm	A	7 9/32 185	7 25/32 198	8 1/16 205	9 5/32 233	9 21/32 245	10 5/32 258	11 19/32 295	12 27/32 326	14 11/32 364	14 31/32 380	17 7/16 443	18 7/16 468	19 7/16 494	23 3/4 603
	B	3 76.2	3 11/32 84.9	3 5/8 92.1	4 1/4 108	4 13/16 122	5 5/16 135	7 178	8 1/4 210	9 3/4 248	10 3/8 264	11 15/16 303	12 15/16 329	13 15/16 354	17 1/8 435
	C	6 152	7 178	7 1/2 191	9 229	10 254	11 279	13 1/2 343	16 406	19 483	20 3/4 527	23 1/4 591	25 635	27 1/4 692	32 813
	D	2 1/16 52.4	2 1/2 63.5	3 1/16 77.8	4 1/16 103	5 1/16 129	6 1/16 154	8 1/16 205	10 254	12 305	13 1/4 337	15 9/32 388	17 9/32 439	19 1/4 489	23 584
	E	5/8 Sq. 15.9	5/8 Sq. 15.9	5/8 Sq. 15.9	5/8 Sq. 15.9	5/8 Sq. 15.9	5/8 Sq. 15.9	7/8 Sq. 22.2	7/8 Sq. 22.2	1 1/8 Sq. 28.6	1 1/8 Sq. 28.6	2* 50.8	2* 50.8	2* 50.8	2.5** 63.5
	F	4 101.6	4 101.6	4 101.6	4 101.6	4 101.6	4 101.6	6 152.4	6 152.4	6 152.4	6 152.4	8 203.2	8 203.2	8 203.2	8 203.2
	G	1 1/32 26.2	1 1/32 26.2	1 1/32 26.2	1 9/32 32.5	1 9/32 32.5	1 9/32 32.5	1 9/32 32.5	1 9/32 32.5	1 9/32 32.5	1 9/32 32.5	3 3/16 81	3 3/16 81	3 3/16 81	4 3/8 111
	H	1 5/8 41.3	1 3/4 44.5	1 3/4 44.5	2 50.8	2 1/8 54	2 1/8 54	2 1/2 63.5	2 1/2 63.5	3 76.2	3 76.2	4 101.6	4 1/2 114.3	5 127	6 1/16 154
	I	7/16 11.1	7/16 11.1	7/16 11.1	7/16 11.1	7/16 11.1	7/16 11.1	9/16 14.3	9/16 14.3	9/16 14.3	9/16 14.3	17/32 13.5	17/32 13.5	17/32 13.5	21/32 16.7
	J	3 1/4 82.6	3 1/4 82.6	3 1/4 82.6	3 1/4 82.6	3 1/4 82.6	3 1/4 82.6	5 127	5 127	5 127	5 127	6 1/2 165.1	6 1/2 165.1	6 1/2 165.1	6 1/2 165.1
	K	5/8-11	5/8-11	5/8-11	5/8-11	3/4-10	3/4-10	3/4-10	7/8-9	7/8-9	1-8	1-8	1 1/8-7	1 1/8-7	1 1/4-7
	L	4 102	4 102	4 102	8 204	8 204	8 204	8 204	12 305	12 305	12 305	16 406	16 406	20 508	20 508
	M	4 3/4 121	5 1/2 140	6 152	7 1/2 191	8 1/2 216	9 1/2 241	11 3/4 299	14 1/4 362	17 432	18 3/4 476	21 1/4 540	22 3/4 578	25 635	29 1/2 750

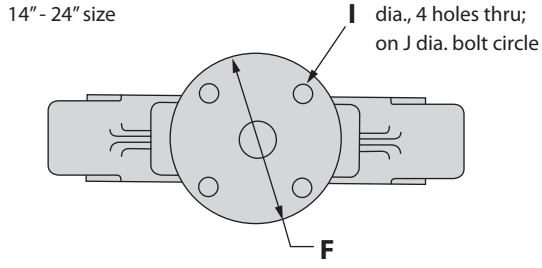
Body: Ductile Iron Disc: Ductile Iron Stems 416 Stainless Steel Seat: Nitrile

* 2 inch diameter with 1/2 inch keyway

* 2.5 inch diameter with 5/8 inch keyway





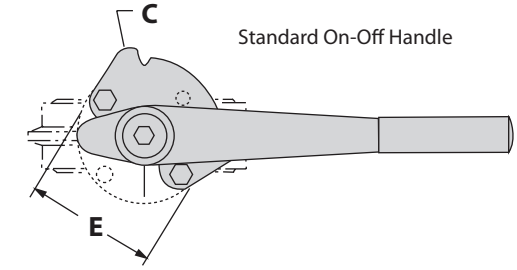


Weco® Butterfly Valve Specifications

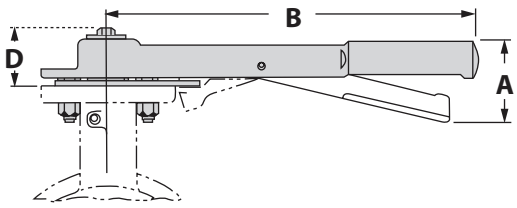
Standard and Throttle Handles

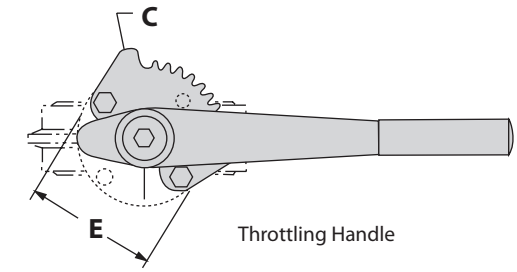
		Valve Size, in.			
		2 - 3	4 & 6	8 & 10	12
Standard for Models 12, 12N		3234078	3231336	3227946	3227947
Standard for Models 22, 22L		3234092	3231337	3216208	3216224
Throttling for all Models		3235577	3235578	3228018	3228019
Dimensions, in., mm	A	2 3/8 60.3	2 1/2 63.5	3 76.2	2 3/4 69.9
	B	9 1/2 241	10 7/8 276	15 381	19 483
	C	2 3/4 69.9	2 3/4 69.9	4 102	4 102
	D	1 7/16 36.5	1 11/16 42.9	1 11/16 42.9	1 11/16 42.9
	E	4 102	4 102	6 152	6 152

Note: Butterfly valve assemblies include a standard detent plate for on-off operations. Handle assemblies for throttling service include a throttling detent plate to replace the standard detent plate on the valve.



Standard On-Off Handle

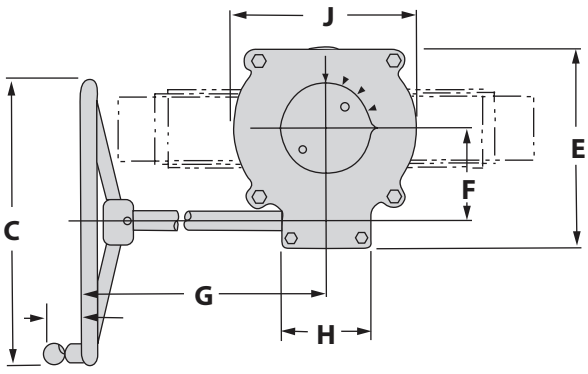


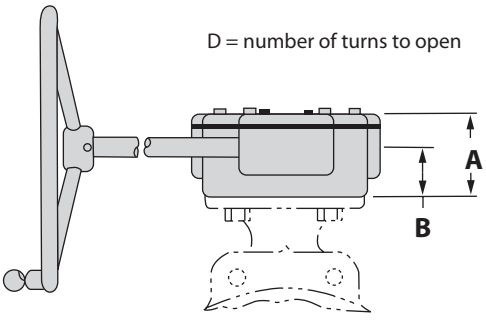


Throttling Handle

Gear Operators

		Valve Size, in.					
		2 - 6	8 & 10	12	14	16 - 20	24
Standard Handwheel		3217838	3217839	3217840	3256506	3256507	3256508
Chain-wheel Attachment		3223689	3223690	3223691	3256839	3256840	CF
Dimensions, in., mm	A	2 1/8 54	2 1/2 63.5	2 1/2 63.5	3 76.2	3 5/8 92.1	5 127
	B	1 1/16 27	1 1/4 31.8	1 1/4 31.8	1 1/2 38.1	2 3/8 60.3	2 1/2 63.5
	C	6 1/2 165	10 254	10 254	14 356	14 356	14 356
	D	5 127	7 1/2 191	7 1/2 191	15 381	15 381	15 381
	E	4 3/4 121	7 178	7 178	7 3/4 197	9 5/8 245	11 5/8 295
	F	1 5/8 41.3	2 9/16 65.1	2 9/16 65.1	3 1/8 79.4	4 1/2 1114	4 5/8 118
	G	6 5/16 160	9 1/8 232	11 5/8 295	15 1/4 387	15 1/4 387	17 1/4 438
	H	3 1/2 88.9	4 3/4 121	4 3/4 121	5 5/8 143	5 3/4 146	9 1/2 241
	I	3 76.2	3 1/2 88.9	3 1/2 88.9	3 1/2 88.9	3 1/2 88.9	3 1/2 88.9
	J	4 102	6 1/4 159	6 1/4 159	6 1/2 165	9 229	10 1/4 260





Weco® Butterfly Valve Sizing Information

Non-Compressible Fluids

Use the following equations for sizing valves handling liquids

(A) $C_v = Q\sqrt{\frac{G}{\Delta P}}$

(B) $Q = C_v\sqrt{\frac{\Delta P}{G}}$

(C) $\Delta P = \left[\frac{Q}{C_v}\right]^2 G$

Where:
- Q = Flow in gallons per minute (gpm)
- ΔP = (P_1-P_2) Pressure Drop (psi)
- P_1 = Inlet Pressure (psia)
- P_2 = Outlet Pressure (psia)
- G = Specific Gravity of Liquid (Water = 1.0)
- C_V = Valve Coefficient (Refer To Appropriate Table)

The equations listed above are the basis for the WECO sizing nomogram. The nomogram is a method of solving the equations above quickly and simply when the service fluid is water.

EXAMPLE

Given: A 6" WECO Butterfly Valve is to be installed in a line handling 500 gpm of water.

Find: Maximum pressure drop across the valve when in the full opena nd 60° open positions.

Solution: This problem may be solved using the nomogram or equation (C).

First Using the Nomogram: Enter nomogram on right side for a flow rate of 500 gpm. Draw horizontal line until it intersects the 6" valve line. From this point draw a vertical line until it intersects the 90° open line. Project line horizontally to the left and read ΔP^{of} .061 psi. Now, using same procedure as above, extend vertical line to 60° open line and project horizontally to the left to read ΔP^{of} .67 psi for 60° open.

Using Equation (C): Pressure Drop = $\Delta P = \left[\frac{Q}{C_V}\right]^2 G$

Where:
- C_v = 2020 @ 90° open (from tables)
- G = 1.0 (Water)
- Q = 500 gpm
- ΔP = $1.0\left[\frac{500}{2020}\right]^2 = .0613$

Now: C_v = 610 gpm @ 60° open, and

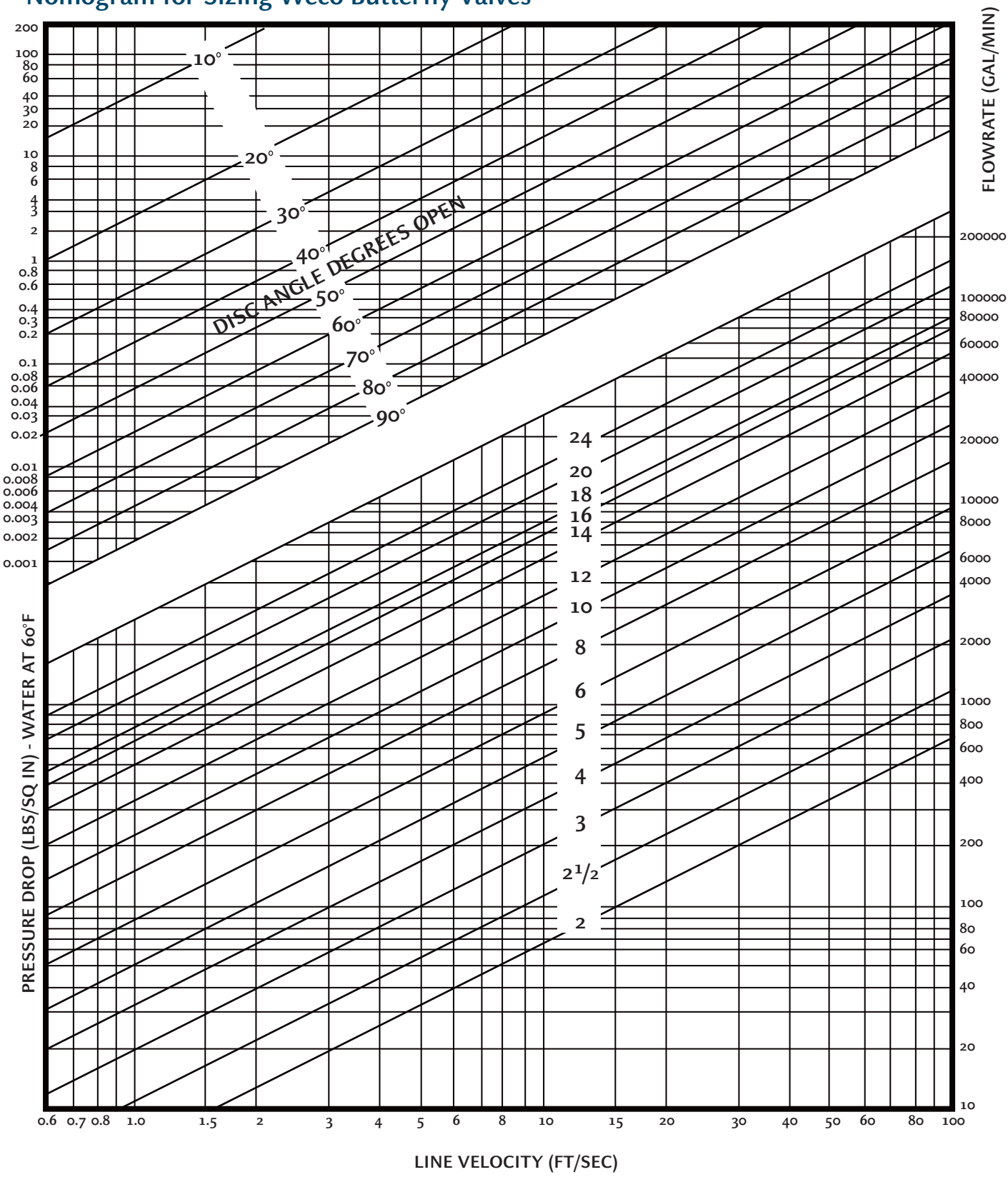
$\Delta P = 1.0\left[\frac{500}{610}\right]^2 = .672$

Cv Values
Resilient Seated BFV'S – All Models

Valve Size, in.	GPM @ PSI @ Various Disc Angles								
	10°	20°	30°	40°	50°	60°	70°	80°	90°
2	1.59	6.17	14.2	26.3	44.5	70.6	105	135	159
2 ½	2.33	9.06	20.9	38.6	65.3	104	156	215	266
3	3.50	13.6	31.4	57.9	98.0	156	240	342	457
4	6.16	23.9	55.1	102	173	274	423	625	860
5	9.56	37.2	85.6	158	268	426	656	970	1,320
6	13.7	53.3	123	227	384	610	941	1,420	2,020
8	24.2	94.3	217	401	679	1,080	1,660	2,500	3,540
10	37.3	145	334	617	1,040	1,660	2,560	3,830	5,580
12	53.7	209	481	888	1,500	2,390	3,690	5,620	8,080
14	61	166	650	1,300	2,100	3,500	5,220	8,000	13,000
16	81	477	960	1,700	2,900	4,920	7,000	11,000	17,000
18	125	535	1,120	1,960	3,500	5,800	8,000	15,000	19,000
20	161	723	1,500	2,700	4,800	7,900	12,500	18,500	27,000
24	305	921	2,000	3,640	6,175	10,350	17,500	24,000	35,000

Weco® Butterfly Valve Sizing Information

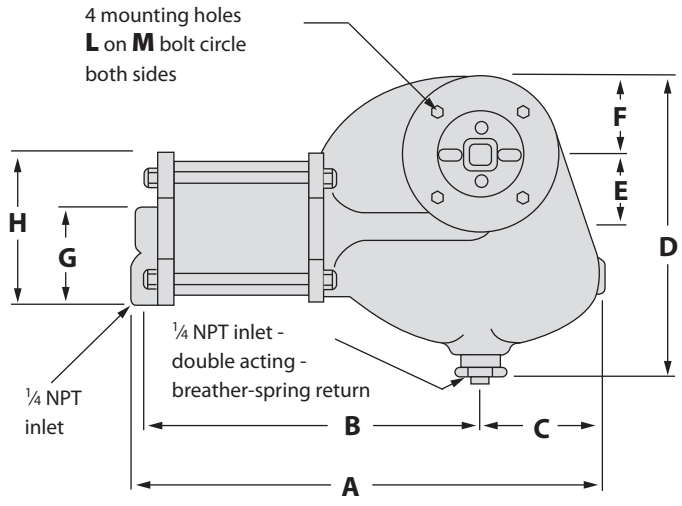
Nomogram for Sizing Weco Butterfly Valves

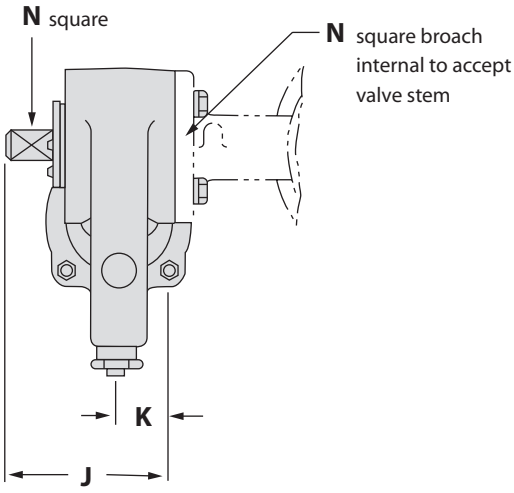


Weco® Pneumatic Actuator Specifications

Pneumatic Actuators - Double Acting

Model		330	350	550	550A	590	590A
Sizes, in.		2 - 6	5 - 6	8 - 10	12	10	12
Part #		3235438	3237369	3236771	3237183	3237886	3237887
Weight	lb kg	8 ½ 3.9	18 8.2	35 15.9	35 15.9	55 25	55 25
A	in. mm	12 9/16 319	16 1/8 511	19 3/8 492	19 3/8 492	22 559	22 559
B	in. mm	8 ¾ 222	12 5/16 313	13 11/16 348	13 11/16 348	15 7/8 403	15 7/8 403
C	in. mm	3 5/16 84.1	3 5/16 84.1	5 3/16 133	5 3/16 132	5 3/16 132	5 3/16 139
D	in. mm	7 13/16 198	7 13/16 198	12 1/16 308	12 1/16 308	12 1/16 308	12 1/16 308
E	in. mm	1 15/16 49.2	1 15/16 49.2	3 3/16 90.5	3 3/16 90.5	3 3/16 81	3 3/16 81
F	in. mm	2 1/16 52.4	2 1/16 52.4	3 1/16 77.8	3 1/16 77.8	3 1/16 77.8	3 1/16 77.8
G	in. mm	2 50.8	3 5/16 84.1	3 5/16 84.1	3 5/16 84.1	5 5/16 135	5 5/16 135
H	in. mm	3 7/8 98.4	6 ½ 165.1	6 ½ 165	6 ½ 165	10 9/16 268	10 9/16 268
J	in. mm	4 5/16 110	4 5/16 110	5 5/16 135	5 5/16 135	5 5/16 135	5 5/16 135
K	in. mm	1 7/16 36.5	1 7/16 36.5	1 7/8 47.6	1 7/8 47.6	1 7/8 47.6	1 7/8 47.6
L	in.	3/8 16 UNC	3/8 16 UNC	½ 13 UNC	½ 13 UNC	½ 13 UNC	½ 13 UNC
M	in. mm	3 ¼ 82.6	3 ¼ 82.6	5 127	5 127	5 127	5 127
N	in. mm	5/8 15.9	5/8 15.9	7/8 22.2	1 1/8 28.6	7/8 22.2	1 1/8 28.6

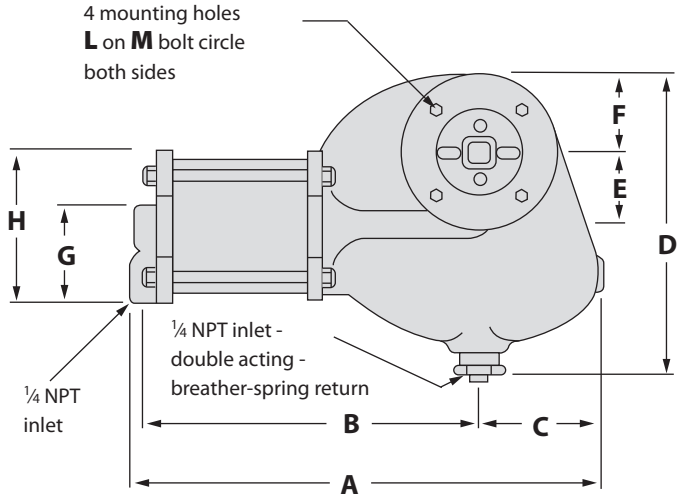


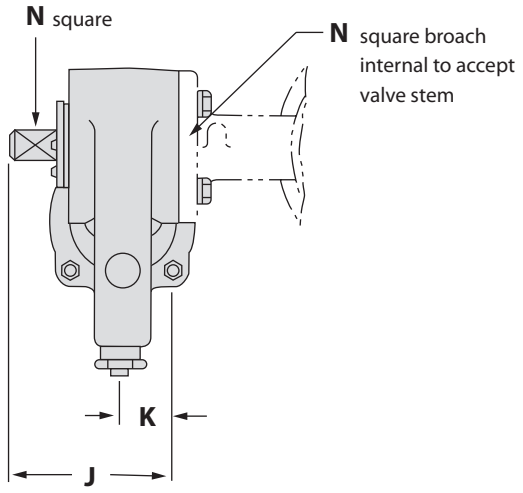


Weco® Pneumatic Actuator Specifications

Pneumatic Actuators - Spring Acting

Model		332	333	354	355	596	597A
Sizes, in.		2 - 3	3 - 4	4	5 - 6	8 - 10	12
Part #		3237525	3237368	3237373	3237515	3237865	3237866
Weight	lb kg	13 5.9	15 6.8	25 11.3	31 14.1	93 42.2	106 48.1
A	in. mm	19 9/16 497	19 9/16 497	20 1/4 514	20 1/4 514	30 1/8 765	30 1/8 765.2
B	in. mm	15 3/4 400	15 3/4 400	16 7/16 418	16 7/16 418	24 610	24 610
C	in. mm	3 5/16 84.1	3 5/16 84.1	3 5/16 84.1	3 5/16 84.1	5 1/16 129	5 3/16 132
D	in. mm	8 5/8 219	8 5/8 219	8 5/8 219	8 5/8 219	13 1/8 333	13 1/8 333
E	in. mm	1 15/16 49.2	1 15/16 49.2	1 15/16 49.2	1 15/16 49.2	3 3/16 81	3 3/16 81
F	in. mm	2 1/16 52.4	2 1/16 52.4	2 1/16 52.4	2 1/16 52.4	3 1/16 77.8	3 1/16 77.8
G	in. mm	2 50.8	2 50.8	3 5/16 84.1	3 5/16 84.1	5 5/16 135	5 5/16 135
H	in. mm	3 7/8 98.4	3 7/8 98.4	6 1/2 165	6 1/2 165	10 9/16 268	10 9/16 268
J	in. mm	4 5/16 110	4 5/16 110	4 5/16 110	4 5/16 110	5 5/16 135	5 5/16 135
K	in. mm	1 7/16 36.5	1 7/16 36.5	1 7/16 36.5	1 7/16 36.5	1 7/8 47.6	1 7/8 47.6
L	in.	3/8 16 UNC	3/8 16 UNC	3/8 16 UNC	3/8 16 UNC	1/2 13 UNC	1/2 13 UNC
M	in. mm	3 1/4 82.6	3 1/4 82.6	3 1/4 82.6	3 1/4 82.6	5 127	5 127
N	in. mm	5/8 15.9	5/8 15.9	5/8 15.9	5/8 15.9	7/8 22.2	1 1/8 28.6



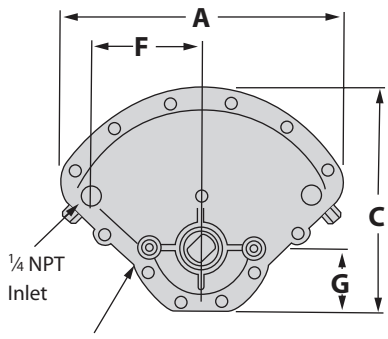


Weco® Pneumatic Actuator Specifications

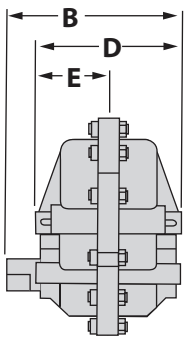
Pneumatic Vane Actuators

Fits 2" - 6" butterfly valves

Fits 2" - 6" butterfly valves		
Model		200
Part #		3258068
Weight	lb kg	10 4.54
A	in. mm	8.66 220
B	in. mm	5.56 141
C	in. mm	7.00 178
D	in. mm	4.62 117
E	in. mm	2.31 58.7
F	in. mm	3.41 86.6
G	in. mm	2.00 50.8



⅜ - 16 tapped hole x .56 deep
3 places on 3.25 dia. bolt circle
both sides



Weco® Actuator Sizing Specifications

Required Operating Torques:

There are three torques to be considered when selecting the proper actuator for a butterfly valve:

(1) Seating Torque - The torque required to displace a resilient seat and effect shutoff

(2) Bearing Torque - The torque required to overcome friction forces on the valve shaft bearing surfaces

(3) Dynamic Torque - Torque due to fluid forces which tend to close the valve.

The torques for resilient seated valves tabulated in this section are the sum of (1) and (2) above for various shutoff pressures. These tabulated values include a safety factor large enough to insure proper valve operation in most general butterfly valve applications. Where unusual service conditions exist (such as likelihood of seat swelling, or low and high temperature seat hardening), an additional safety factor may be applicable.

Dynamic Torque

Dynamic torque is torque on the valve shaft due to the fluid forces on the valve disc. This torque is a function of valve diameter, pressure drop, and a torque coefficient (Ct) which varies with angle opening. Torque is calculated by the equation:

$T = C_t D^3 \Delta P$ Where: T = Dynamic torque (in-lb)

D = Valve Dia (in.)

C_t = Dynamic torque coefficient (see table below)

C_t vs. Angle Open										
Angle Open	0	10	20	30	40	50	60	70	80	90
Ct	0	.007	.014	.022	.033	.050	.087	.143	.215	0

Weco® Actuator Sizing Information

Dynamic torque is not usually of major concern in resilient seated butterfly valves unless the line velocity exceeds 20 fps. If line velocity exceeds this, a check should be made to insure that actuator output exceeds the calculated dynamic torque. Dynamic torque should be checked at 80° open for on-off applications.

Dynamic torque is of prime consideration in situations where line velocity is not recovered downstream of the valve. This situation exists on installations where' there is an unlimited source and less than 6 diameters of pipe downstream of the valve. If a valve discharges to the atmosphere, the pressure drop across the valve will be equal to the height of water above the valve for all angles of valve opening. This pressure drop must not exceed the pressure drop tabulated in Maximum ΔP vs. Angle Opening Tables for any angle. If it does, provisions must be made for velocity recovery by adding downstream piping.

Actuator Sizing For Tee Linkages:

For standard tee linkage applications where one actuator operates two butterfly valves of the same size with one valve opening as the other valve closes, the actuator sizing will be the same as for a single butterfly valve application. For the actuator sizing for other tandem linkage applications, consult the factory.

Low-Torque Valves:

Undercut discs are available for butterfly valve applications that require lower seating torques. For complete information, consult factory.

Actuators Sizing Torque for Weco® Butterfly Valves

Valve Size, in.	Seating Torque In Inch-lb (N*m), @ Various Line Pressures						
	0 psi 0 kPa	50 psi 345 kPa	75 psi 517 kPa	100 psi 690 kPa	125 psi 862 kPa	150 psi 1034 kPa	175 psi 1207 kPa
2	90 10	90 10	92 10	94 11	96 11	98 11	100 11
21/2	130 15	130 15	134 15	138 15	142 16	146 17	150 17
3	200 23	200 23	206 23	212 24	218 25	224 25	230 26
4	350 23	350 40	366 41	382 43	398 45	414 47	430 49
5	535 60	535 60	566 64	597 67	628 71	659 74	690 78
6	770 87	770 87	823 93	876 99	929 105	982 111	1,035 117
8	1,350 153	1,350 153	1,475 167	1,600 181	1,725 195	1,850 209	1,975 223
10	2,100 237	2,100 237	2,340 264	2,580 292	2,820 319	3,060 346	3,300 373
12	3,000 339	3,000 339	3,400 384	3,800 429	4,200 475	4,600 520	5,000 565
14	3,680 416	4,240 479	4,790 541	5,350 605	5,900 667	6,480 732	
16	4,880 551	5,730 647	6,580 744	7,430 840	8,280 936	9,140 1030	
18	6,230 704	7,460 843	8,690 982	9,920 1121	11,150 1260	12,390 1400	
20	7,770 878	9,380 1060	11,000 1243	12,610 1425	14,230 1610	15,840 1790	
24	11,100 1250	14,010 1580	16,920 1910	19,830 2240	22,740 2570	25,650 2900	

NOTE: For valves using Polytetrafluoroethylene (PTFE) seats, use torque value at highest standard value rating even for lower pressure applications.
Above figures are for values used in wet service, for dry service valves contact factory.

Weco® Actuator Sizing Information

Minimum Air Pressure for Weco® Pneumatic Actuators Operating Weco® Valves at 175 psi Rated Pressure

Double Acting Models	Actuator air pressure: psi, kPa		
	30 207	50 345	75 517
	Valve Sizes		
330	2″ - 4″	2″ - 5″	2″ - 6″
350	2″ - 6″	2″ - 6″	2″ - 6″
550	8″	8″ - 10″	8″ - 10″
550A	—	—	12″
590	8″ - 10″	8″ - 10″	8″ - 10″
590A	12″	12″	12″

Spring Return Models	Actuator air pressure: psi (kPa) (Note 1)			
	30 (207) 40 (276)	40 (276) 50 (345)	60 (414) 70 (483)	70 (483) 80 (552)
	Valve Sizes			
332	2″ - 21/2″	2 - 21/2″	2 - 21/2″	2 - 21/2″
333	—	—	—	2″ - 4″
354	2″ - 4″	2″ - 4″	2″ - 4″	2″ - 4″
355	—	—	2″ - 6″	2″ - 6″
596	—	8″ - 10″	8″ - 10″	8″ - 10″
597A	—	—	12″	12″

NOTES:

1. Pressure above line for air to open, spring to close. Below line for air to close, spring to open.
2. All of the above ratings are conservative for normal installations. Abnormally high torque conditions may necessitate increased actuator capability.
3. Maximum actuator air pressure 120 psi, except 80 psi maximum pressure on Models 350, 590 and 590A.

Weco® Pneumatic Actuator Torque Ratings (note air pressure)

Double Acting Models	Displacement cu. in. cu. cm	Rated torque in. lb N*m	Pressure to achieve rated torque psi kPa
330	25 410	1,150 130	80 552
350	72 1180	1,150 130	30 207
550	120 1970	5,500 622	80 552
550A	120 1970	5,500 622	80 552
590	355 5820	5,500 622	30 207
590A	355 5820	5,500 622	30 207

Spring Return Models	Displace-ment cu. in. cu. cm	Spring closing torque in. lb N*m	Spring opening torque in. lb N*m	Air opening torque @ 80 psi in. lb N*m	Air Closing torque @ 80 psi in. lb N*m
332	25 410	150 17	300 34	1,000 113	850 96
333	25 40	425 48	850 96	725 82	300 34
354	72 1180	425 48	850 96	2,641 298	2,216 250
355	72 1180	1,050 119	2,100 237	2,016 228	966 109
596	355 5820	3,300 373	6,600 746	11,366 1280	8,066 911
597A	355 5820	5,000 565	10,000 1130	9,666 1100	4,666 527

NOTES: All of the above ratings are for normal installations. Abnormally high torque conditions may necessitate increased actuator air pressure.

Weco Model 200 Vane-Type Pneumatic Actuator

Operating Conditions	
Maximum Operating Pressure	120 psi (8.27 bar)
Maximum Housing Pressure	180 psi (12.41 bar)
Displacement	41 cu. in. (672 cu. cm.)/90° Stroke

Torque Data

Pressure	psi kPa	40 276	60 414	80 552	100 690	120 827
Torque Output	in. lb mm kg	800 90	1,200 136	1,600 181	2,000 226	2,400 271

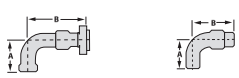
Minimum Actuator Pressure for Weco Valves at 175 psi line pressure

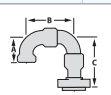
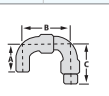
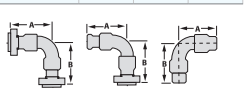
Valve Size		2″ - 4″	5″	6″
Pressure	psi kPa	30 207	45 310	60 414

NOTES: All of the above ratings are for normal installations. Abnormally high torque conditions may necessitate increased actuator air pressure.

Chiksan® Swivel Joint Specifications

Size/ Model Bore in. (mm)	CWP psi (bar)	End Con-nec-tions	Style 20			Style 30				Style 40				Style 50					Style 60			
			Part No.	A	Wt lb kg	Part No.	A	B	Wt lb kg	Part No.	A	B	Wt lb kg	P/N P/N-LT	A	B	C	Wt lb kg	Part No.	A	B	Wt lb kg
1″ LS10 .88 (22)	10,000 (690)	Threaded	CF			6101537 6101537-LT	4.38 111	7.14 181	8 3.6	N/A				3139546 3139546-LT	4.38 111	7.28 185	7.02 178	16 7.2	CF			
1″ LS15 .88 (22)	15,000 (1034)	1502 (MxF)	CF			3259291 3259291-LT	4.06 103	8.4 213	12 5.5	N/A				3139547 3139547-LT	4.06 103	7.35 187	8.4 213	22 10.2	CF			
		1502 (MxM)	CF			N/A				N/A				N/A					CF			
1.5″ LS10 1.3 (33)	10,000 (690)	Threaded	CF			CF				N/A				3139777 3139779-LT	7.96	9.37	7.96	26	CF			
1.5″ LS15 1.3 (33)	15,000 (1034)	1502 (MxF)	CF			CF				N/A				3139778 3139778-LT	5 127	9.4 239	10.1 257	34 15.5	CF			
		1502 (MxM)	CF			N/A				N/A				N/A					CF			
2″ LS10 1.88 (48)	10,000 (690)	Threaded	313988B	7.2	14	3139889	6.38	9.01	21	3139890 3139890-LT	6.36 162	10.73 273	30 13.6	3139904 3139904-LT	6.4 163	10.74 273	9 229	37 16.8	CF			
2″ LS15 1.88 (48)	15,000 (1034)	1502 (MxF)	3144126	11.15 283	37 16.8	3144125	5.5	10.91	36	N/A				3139475 3139475-LT	5.5 140	10.74 273	10.92 277	56 25.5	3144630 3144630-LT	11 279	11 279	48 22
		1502 (MxM)	CF			N/A				N/A				3267203 3267203-LT	7.28 185	10.74 273	10.92 277	60 27.2	6101559 6101559-LT	11 279	11 279	62 28.1
		1502 (FxF)	CF			N/A				N/A				P509888	5.5 140	10.74 273	8.79 223	42 18.9	P504952 P504952-LT	8.79 223	8.79 223	37 16.9
2″ LS20 1.88 (48)	20,000 1379)	2002 (MxF)	CF			CF				N/A				3144569 3144569-LT	5.12 130	10.9 277	12.42 315	62 28.3	CF			
		2002 (MxM)	P524579 P524579-LT			CF				N/A				N/A					CF			
3″ TSi15 2.75 (70)	7,500 (517)	Threaded	CF			N/A				N/A				N/A					CF			
3″ TSi15 2.75 (70)	15,000 (1034)	1502 (MxF)	P505417 P505417-LT	12.6 320	52 23.8	P505416 P505416-LT	7.9 201	14.4 366	68 31	N/A				P505327 P505327-LT	7.9 201	16.4 417	14.4 366	107 48.4	P505420 P505420-LT	14.5 368	14.5 368	91 41.3
		1502 (MxM)	CF			N/A				N/A				N/A					CF			
3″ TSi20 3 (76)	20,000 (1379)	2002 (MxF)	CF			CF				N/A				P527340 P527340-LT	9.69 246	21.2 538	20.4 518	288 131	CF			
4″ TSi10 3.88 (98)	10,000 (690)	1002 (MxF)	P516092 P516092-LT	14.5 359	74 33.6	P517487 P517487-LT	8.3 211	16.2 411	99 45	N/A				P516091 P516091-LT	8.3 211	18.1 460	16.2 411	161 73.3	CF			
		1002 (MxM)	CF			N/A				N/A				N/A					CF			
4″ TSi15 3.5 (89)	15,000 (690)	1502 (MxF)	CF			CF				N/A				P527331 P527331-LT	9.69 246	21.2 538	20.4 518	255 116	CF			

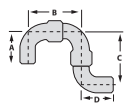
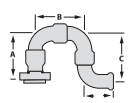
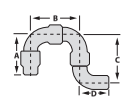
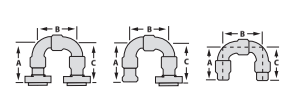
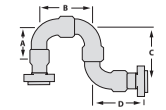
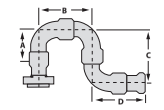



Chiksan® Swivel Joint Specifications

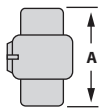
TripleStep and Longsweep® Swivel Joints

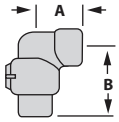
Size/ Model Bore in. (mm)	CWP psi (bar)	End Connec-tions	Style 70						Style 80						Style 10					Style 100						
			Part No.	A	B	C	D	Wt lb kg	Part No.	A	B	C	D	Wt lb kg	P/N P/N-LT	A	B	C	Wt lb kg	Part No.	A	B	C	D	Wt lb kg
1″ LS10 .88 (22)	10,000 (690)	Threaded	N/A						CF						3141454 3141454-LT	7.14 181	7.46 189	7.14 181	24 10.9	N/A					
1″ LS15 .88 (22)	15,000 (1034)	1502 (MxF)	N/A						P516135 P516135-LT	8.4 181	7.47 190	7.47 190	4.06 103	28 12.9	3139550 3139550-LT	8.4 213	7.4 188	8.4 213	27 12.1	CF					
		1502 (MxM)	N/A						N/A						3145886 3145886-LT	8.4 213	7.4 188	8.4 213	27 12.1	CF					
1.5″ LS10 1.3 (33)	10,000 (690)	Threaded	N/A						CF						P501542 P501542-LT	7.96 202	9.37 238	7.96 202	26 11.8	N/A					
1.5″ LS15 1.3 (33)	15,000 (1034)	1502 (MxF)	N/A						P502504 P502504-LT	10.12 257	9.37 238	9.37 238	5 127	47 21.1	3139781 3139781-LT	10.12 257	9.37 238	10.12 257	44 20	CF					
		1502 (MxM)	N/A						N/A						3139780 3139780-LT	10.12 257	9.37 238	10.12 257	52 23.5	CF					
2″ LS10 1.88 (48)	10,000 (690)	Threaded	3139891 3139891-LT	6.38 162	10.73 273	10.73 273	6.38 162	47 21.2	3139892 3139892-LT	8.91 226	10.73 273	10.73 273	6.38 162	56 25.6	3139476 3139476-LT	9 229	10.7 272	9 229	45 20.5	N/A					
2″ LS15 1.88 (48)	15,000 (1034)	1502 (MxF)	P505482 P505482-LT	5.5 140	10.73 273	10.73 273	5.5 140	60 27.2	3139901 3139901-LT	10.9 277	10.73 256	10.73 256	5.5 140	80 36.5	3139905 3139905-LT	10.9 277	10.7 272	10.9 277	61 27.7	3144094 3144094-LT	10.97 279	10.73 273	10.73 273	10.91 277	82 37.5
		1502 (MxM)	N/A						P527697 P527697-LT						3139477 3139477-LT	10.9 277	10.7 272	10.9 277	70 31.8	3139903 3139903-LT	10.97 279	10.73 273	10.73 273	10.91 277	90 40.7
		1502 (FxF)	N/A						N/A						P518960 P518960-LT	8.8 224	10.7 272	10.9 277	50 22.7	CF					
2″ LS20 1.88 (48)	20,000 1379)	2002 (MxF)	N/A						CF						3144570 3144570-LT	10.9 277	10.81 275	12.42 315	78 35.2	CF					
		2002 (MxM)	N/A						N/A						3144571 3144571-LT	12.51 318	10.91 277	12.52 318	87 39.5	3144572 3144572-LT	12.5 318	10.9 277	10.9 277	12.5 318	108 49.1
3″ TSi15 2.75 (70)	7,500 (517)	Threaded	N/A						N/A						P524218 P524218-LT	12.88 327	16.42 417	12.88 327	102 46.4	CF					
3″ TSi15 2.75 (70)	15,000 (1034)	1502 (MxF)	N/A						P505409 P505409-LT	14.4 366	16.4 417	16.4 417	7.9 201	145 65.9	P505325 P505325-LT	14.5 368	16.4 417	14.4 366	129 58.7	P505410 P505410-LT	14.4 366	16.4 417	16.4 417	14.6 371	168 76.1
		1502 (MxM)	N/A						N/A						P505326 P505326-LT	14.4 366	16.4 417	14.4 366	143 64.8	P505411 P505411-LT	14.4 366	16.4 417	16.4 417	14.6 371	181 82.2
3″ TSi20 3 (76)	20,000 (1379)	2002 (MxF)	N/A						CF						P527399	20.4 518	21.2 538	20.4 518	360 164	CF					
4″ TSi10 3.88 (98)	10,000 (690)	1002 (MxF)	N/A						CF						P516094 P516094-LT	16.1 409	18.1 460	16.2 411	198 89.8	CF					
		1002 (MxM)	N/A						N/A						P516093 P516093-LT	15.9 404	18.1 460	16.2 411	209 95	CF					
4″ XHTL 3.5 (89)	10,000 (690)	1502 (MxF)	N/A						CF						3130501	20.4 518	21.2 538	20.4 518	338 154	CF					

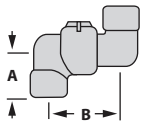







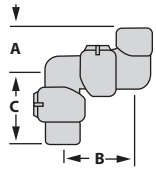
Chiksan® Swivel Joint Specifications

High-Pressure Swivel Joints





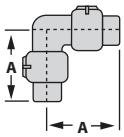


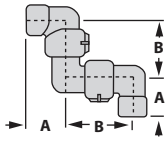


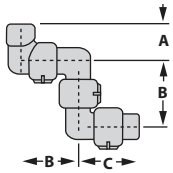
Nom. Sizes in.	CWP psi (bar)	End Connections	Style 20			Style 30				Style 40				Style 50				
			Part No.	A	Wt lb kg	Part No.	A	B	Wt lb kg	Part No.	A	B	Wt lb kg	Part No.	A	B	C	Wt lb kg
.38	6,000 (414)	Threaded	3111290	3.31 84	1.5 0.7	3111291	1.94 49	2.81 71	1.8 0.8	3111292	1.94 49	2.13 54	2.5 1.1	3111293	1.94 49	2.88 73	2.81 71	3.3 1.5
.5	6,000 (414)	Threaded	3111314	3.31 84	1.5 0.7	3111315	1.94 49	2.81 71	1.8 0.8	3111316	1.94 49	2.13 54	2.5 1.1	3111317	1.94 49	2.88 73	2.81 71	3.3 1.5
.75	6,000 (414)	Threaded	3220946	5.31 135	2.8 1.3	3220947	2.72 69	4.62 117	3.8 1.7	3220948	2.62 67	4.22 107	4.5 2	3220883	2.72 69	4.22 107	4.62 117	6.8 3.1
1	6,000 (414)	Threaded	3207727	5.31 135	2.8 1.3	3207728	2.72 69	4.62 117	3.6 1.6	3207729	2.62 67	4.22 107	4.5 2	3205399	2.72 69	4.22 107	4.62 117	6.8 3.1
1.25	6,000 (414)	Threaded	3207734	5.47 139	4 1.8	3207735	3.19 81	4.72 120	5 2.3	3207736	3.19 81	4.28 109	6.3 2.8	3207737	3.19 81	4.28 109	4.72 120	8 3.6
1.5	6,000 (414)	Threaded	3207741	5.47 139	4 1.8	3207743	3.19 81	4.72 120	5 2.3	3207744	3.19 81	4.28 109	6.3 2.8	3205400	3.19 81	4.28 109	4.72 120	10 4.5
2	6,000 (414)	Threaded	3207749	6.66 169	12 5.5	3207750	4.03 102	5.84 148	15 6.8	3207751	4.03 102	5.88 149	19.5 8.9	3205637	5.84 148	5.88 149	4.03 102	27 12.3
2.5	6,000 (414)	Threaded	cf	8.25 210	18 8.2	3220167	4.88 124	7.12 181	22 10	3221068	4.88 124	7.68 195	29 13.2	3219959	7.12 181	7.68 195	4.88 124	37 16.8
3	6,000 (414)	Threaded	3207756	9.12 232	25 11.4	3207757	4.62 117	9.44 240	37 16.8	3207758	4.62 117	8.75 222	38 17.3	3207759	4.62 117	7.94 202	8.62 219	53 24.1
4	6,000 (414)	Threaded	3207764	9.62 244	38 17.3	3207765	5.56 141	10.81 275	51 23.2	3207766	5.56 141	10.56 268	64 29.1	3207767	5.56 141	9.83 250	9.88 251	86 39.1

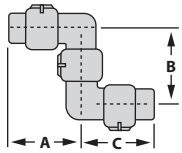
Chiksan® Swivel Joint Specifications

High-Pressure Swivel Joints









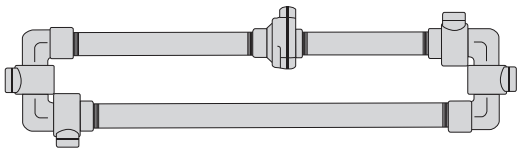
Nom. Sizes in.	CWP psi (bar)	End Connections	Style 60			Style 70				Style 80					Style 10				
			Part No.	A	Wt lb kg	Part No.	A	B	Wt lb kg	Part No.	A	B	C	Wt lb kg	Part No.	A	B	C	Wt lb kg
.38	6,000 (414)	Threaded	3111294	2.81 71	2.8 1.3	cf				N/A					N/A				
.5	6,000 (414)	Threaded	3111318	2.81 71	2.8 1.3	CF				3111320	1.94 49	2.88 73	2.81 71	4.8 2.2	3111313	3.12 79	2.88 73	3.12 79	4 1.8
.75	6,000 (414)	Threaded	3220949	4.62 117	5.8 2.6	CF				3220952	2.72 69	4.22 107	4.62 117	10 4.5	3220951	4.62 117	4.22 107	4.62 117	9 4.1
1	6,000 (414)	Threaded	3207730	4.62 117	8.8 4	3207731	2.72 69	4.22 107	8 3.6	3207732	2.72 69	4.22 107	4.62 117	10 4.5	3207726	4.62 117	4.22 107	4.62 117	9 4.1
1.25	6,000 (414)	Threaded	3207738	4.72 120	7 3.2	3207739	3.19 81	4.28 109	9.4 4.3	3207740	3.19 81	4.28 109	4.72 120	12 5.2	3207733	4.72 120	4.28 109	4.72 120	10 4.5
1.5	6,000 (414)	Threaded	3207745	4.72 120	7 3.2	3207746	3.19 81	4.28 109	9.4 4.3	3207747	3.19 81	4.28 109	4.72 120	14 6.4	3207741	4.72 120	4.28 109	4.72 120	10 4.5
2	6,000 (414)	Threaded	3207752	5.84 148	20 9.1	3207753	4.03 102	5.88 149	31 14.1	3207754	4.03 102	5.88 149	5.84 148	38 17.3	3207748	5.84 148	5.88 149	5.84 148	33 15
2.5	6,000 (414)	Threaded	N/A			N/A				N/A					N/A				
3	6,000 (414)	Threaded	3207760	8.62 219	48 21.8	3207761	4.62 117	7.94 202	57 25.9	3207762	4.62 117	7.94 202	9.44 240	77 35	3207762	8.62 219	7.94 202	9.44 240	71 32.3
4	6,000 (414)	Threaded	3207768	9.88 251	73 33.2	3207769	5.56 141	9.62 244	101 45.9	3207763	5.56 141	9.62 244	10.81 275	123 55.9	3207763	9.88 251	10.31 262	10.81 275	111 50.2

Chiksan® Swivel Joint Specifications

TripleStep and Longsweep® Swivel Joints

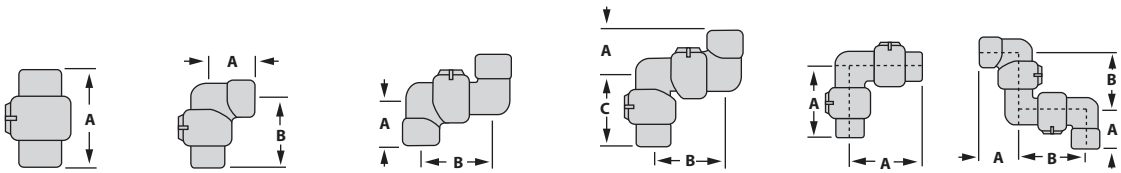
Nominal Size/ Model	Color Code	Cold Working Pressure psi (bar)	Weco Fig. No.	Swivel Joint Styles #1 / #2	Method of Construction Length in Extended Condition, Weight					
					Threaded 10 ft		Threaded 12 ft		Integral 9.5 ft*	
					P/N P/N-LT	lb (kg)	P/N P/N-LT	lb (kg)	P/N P/N-LT	lb (kg)
1″ HP	Silver	6,000 (414)	602	50 / 50	3211995	37 (17)	3207644	41 (19)	N/A	—
1 - ½″ HP	Silver	6,000 (414)	602	50 / 50	3206211	86 (39)	3205870	100 (45)	N/A	—
1 - ½″ LS	Black	10,000 (690)	1502	50 / 50	3264538 3264538-LT	106 (48)	3254780 3254780-LT	—	N/A	—
	Red	15,000 (1034)	1502	50 / 10	N/A	—	N/A	—	3267266	132 (60)
2″ HP	Silver	6,000 (414)	602	50 / 50	3206495	114 (52)	3205876	180 (820)	N/A	—
2″ LS	Black	10,000 (690)	1502	50 / 50	3144394 3144394-LT	136 (62)	3144001 3144001-LT	148 (67)	N/A	—
	Red	15,000 (1034)	1502	50 / 10	N/A	—	N/A	—	6102805 6102805-LT	159 (72)
2″ LSG	Olive Green (Sour Gas)	10,000 (690)	1502	50 / 10	N/A	—	N/A	—	6102809	159 (72)
3″ HP	Silver	6,000 (414)	602	50 / 50	3247975	213 (97)	3231262	234 (106)	N/A	—

Typical Integral Construction



Typical Threaded Construction

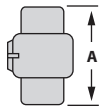
Low-Pressure Swivel Joints - Ductile Iron

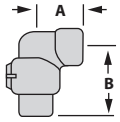


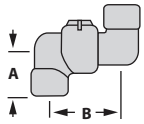
Nom. Sizes in.	CWP psi (bar)	End Connections	Style 20			Style 30				Style 40				Style 50					Style 60			Style 70			
			Part No.	A	Wt lb kg	Part No.	A	B	Wt lb kg	Part No.	A	B	Wt lb kg	Part No.	A	B	C	Wt lb kg	Part No.	A	Wt lb kg	Part No.	A	B	Wt lb kg
.75	600 (41)	Threaded	3131926	4.5 114	2 1	3131927	2.5 64	3.88 99	3 1.2	3131886	2.5 64	3.6 91	3 1.4	3132053	2.5 64	3.6 91	3.9 99	4 2	3131928	3.88 99	4 1.7	3131929	3.64 92	2.4 61	6 2.5
1	600 (41)	Threaded	3131930	4.5 114	2 1	3131931	2.5 64	3.88 99	3 1.3	3131932	2.5 64	3.6 91	3 1.4	3132054	2.5 64	3.6 91	3.9 99	4 2	3131933	3.88 99	4 1.7	3131934	3.63 92	2.5 64	5 2.3
1.25	600 (41)	Threaded	3131935	5 127	3 1.5	3131936	3 76	4.5 114	6 2.5	3131937	3 76	4.2 107	5 2.3	3131937	3 76	4.2 107	4.5 114	7 3.1	3131938	4.5 114	6 2.5	CF			
1.5	600 (41)	Threaded	3131940	5 127	3 1.5	3131941	3 76	4.5 114	5 2.2	3131942	3 76	4.2 107	5 2.3	3132056	3 76	4.2 107	4.5 114	7 3.1	3131943	4.5 114	6 2.5	3131944	4.25 108	3 76	8 3.6
2	600 (41)	Threaded	3131945	5.75 146	8 3.5	3131946	3.5 89	5.75 146	10 4.5	3131947	3.5 89	6.1 155	13 5.9	3132011	3.5 89	6.1 155	5.8 147	17 7.9	3131951	5.75 146	15 6.8	3131952	6.13 156	3.5 89	22 9.8
2.5	600 (41)	Threaded	3131954	6.63 168	17 7.5	3131955	4.63 118	6.88 175	19 8.6	3131957	4.6 117	7.63 194	23 10.5	3131959	4.6 117	7.6 193	6.9 175	28 12.7	3131962	6.88 175	23 10.2	3131963	7.63 194	4.63 118	35 15.9
3	600 (41)	Threaded	3131965	6.63 168	13 5.7	3131966	4.63 118	6.88 175	16 5.7	3131968	4.6 117	7.63 194	16 7.3	3131970	4.6 117	7.6 193	6.9 175	21 9.5	3131973	6.88 175	23 10.2	3131974	7.63 194	4.63 118	8 3.5
	175 (12)	Flanged	3132204	6.63 168	27 12.3	3131976	5.5 140	6.88 175	33 14.8	3131979	5.5 140	7.63 194	39 17.7	CF					CF			CF			
4	600 (41)	Threaded	3131987	7.25 184	18 8	3131988	5 127	7.75 197	24 8	3131990	5 127	9.2 234	31 14.1	3131992	5 127	9.1 231	7.6 193	42 19.1	3131996	7.63 194	35 15.9	3131996	9.13 231.9	5 127	50 22.7
	175 (12)	Flanged	3131356	7.5 191	39 17.7	3131998	6.13 156	8.13 207	47 21.4	3132001	6.13 156	9.5 241	56 25.5	CF					CF	8 203	58 26.4	CF			

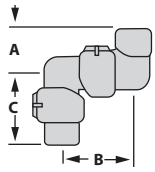
Chiksan® Swivel Joint Specifications

Low-Pressure Swivel Joints - Carbon Steel





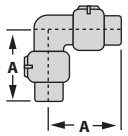


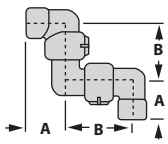


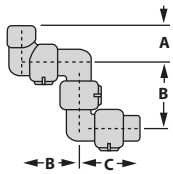
Nom. Sizes in.	CWP psi (bar)	End Connections	Style 20			Style 30				Style 40				Style 50				
			Part No.	A	Wt lb kg	Part No.	A	B	Wt lb kg	Part No.	A	B	Wt lb kg	Part No.	A	B	C	Wt lb kg
2	1,000 (69)	Threaded	313048	5.75 146	8 3.4	3131049	3.5 89	5.75 146	10 4.5	3131050	3.5 89	6.1 155	13 5.8	3131052	3.5 89	6.13 156	5.8 147	18 8
	275 (19)	Flanged	CF			3131218	4.25 108	6.29 160	20 8.9	3131220	5.94 151	6.1 155	22 10	CF				
	1,000 (69)	Beveled	3131225	5.75 146	8 3.6	3131226	3.5 89	5.75 146	13 5.8	3131229	3.5 89	6.1 155	13 5.8	3131231	3.5 89	6.13 156	5.75 146	18 8
3	1,000 (69)	Threaded	3131272	6.63 168	12 5.2	3131273	4.62 117	6.88 175	16 7	3131276	4.76 121	7.6 193	21 9.3	3131278	4.6 117	7.6 193	6.9 175	33 15
	275 (19)	Flanged	3131635	6.63 168	29 13.2	3131286	5.5 140	6.88 175	34 15.5	3131289	5.5 140	7.63 194	40 18.2	3131291	5.5 140	7.63 194	6.88 175	46 20.9
	1,000 (69)	Beveled	3131299	6.63 168	12 5.2	3131300	4.63 118	6.88 175	16 7	3131303	4.6 117	7.6 193	21 9.3	3131305	4.63 118	7.63 194	6.88 175	28 12.7
4	1,000 (69)	Threaded	3131316	7.25 184	18 8	3131317	5.00 127	7.75 197	24 10.7	3131320	5 127	9.2 234	31 14.1	3131322	5 127	9.1 231	7.6 193	40 18.2
	275 (19)	Flanged	3134977	7.5 191	43 19.5	3131330	6.13 156	8.13 207	50 22.7	3131333	6.13 156	9.5 241	57 25.9	3131335	6.13 156	9.13 232	8 203	66 30
	1,000 (69)	Beveled	3131343	7.25 184	18 8	3131344	5 127	7.75 197	24 10.7	3131347	5 127	9.2 234	31 14.1	3131349	5 127	9.13 232	7.63 194	40 18.2
6	1,000 (69)	Threaded	3131069	13.94 354	66 30	3131070	9.75 248	16.19 411	76 34.5	3131071	9.75 248	18.48 469	73 33.3	CF				
	275 (19)	Flanged	3131077	13.44 341.4	96 43.6	3131078	9.5 241	15.94 405	112 50.9	3131079	9.5 241	18.5 470	127 57.7	CF				
	1,000 (69)	Beveled	3131088	6.44 164	42 19.2	3131089	2.44 62	6 152	59 27	3131090	6 152	18.5 470	97 44.2	3131091	6 152	18.48 469	12.48 317	123 55.9
8	1,000 (69)	Threaded	3131096	16.25 413	106 48.4	3131097	12.5 318	19.75 502	137 62.4	P523643	12.5 318	23.2 589	167 75.9	CF				
	275 (19)	Flanged	3131104	15.25 387	138 62.9	3131105	12 305	19.25 489	169 77	3131106	12 305	23.2 589	200 91	3131107	12.03 306	23.28 591	19.35 491	261 119
	1,000 (69)	Beveled	3131114	7.25 184	62 28	3131115	8 203	15.25 387	91 41.5	3131116	8 203	23.2 589	121 54.8	CF				

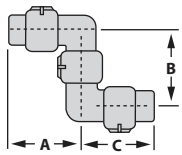
Chiksan® Swivel Joint Specifications

Low-Pressure Swivel Joints - Carbon Steel









Nom. Sizes in.	CWP psi (bar)	End Connections	Style 60			Style 70				Style 80					Style 10				
			Part No.	A	Wt lb kg	Part No.	A	B	Wt lb kg	Part No.	A	B	C	Wt lb kg	Part No.	A	B	C	Wt lb kg
2	1,000 (69)	Threaded	3131053	5.75 146	15 6.7	3131054	2.4 61	3.64 92	21 9.3	3131055	3.5 89	6.13 156	5.75 146	25 11.5	3131047	5.73 146	6.13 156	6.13 156	22 10.2
	275 (19)	Flanged	3134978	6.2 157	30 13.6	CF				CF					CF				
	1,000 (69)	Beveled	CF			CF				CF					P511523	5.73 146	6.07 154	5.73 146	24 10.8
3	1,000 (69)	Threaded	3131281	6.88 175	23 10.5	3131282	4.63 118	7.63 194	33 15	3131284	4.63 118	7.63 194	6.88 175	46 20.9	3131271	6.88 175	7.63 194	6.88 175	35 15.9
	275 (19)	Flanged	3131294	6.88 175	40 18.2	CF				CF					CF				
	1,000 (69)	Beveled	3131308	6.88 175	24 10.9	P505098	4.63 118	7.63 194	32 14.7	CF					CF				
4	1,000 (69)	Threaded	3131325	7.63 194	24 10.7	3131327	5 127	9.13 232	47 21.4	3131328	5 127	9.13 232	7.63 194	58 26.4	3131315	7.63 194	9.13 232	7.63 194	53 24.1
	275 (19)	Flanged	3131338	8 203	59 26.8	CF				CF					CF				
	1,000 (69)	Beveled	3131352	7.63 194	24 10.7	3134423	5 127	9.13 232	47 21.4	CF					3265987	7.62 194	9.12 232	7.62 194	53 24.1
6	1,000 (69)	Threaded	CF			CF				CF					CF				
	275 (19)	Flanged	3131081	15.94 194	154 70	3131082	6 152	18.6 472	185 84	CF					CF				
	1,000 (69)	Beveled	CF			3131093	9.5 241	18.44 468	130 59	3267081	6 152	18.6 472	12.54 319	171 77.7	CF				
8	1,000 (69)	Threaded	CF			CF				CF					CF				
	275 (19)	Flanged	3131108	19.41 493	230 104	CF				CF					CF				
	1,000 (69)	Beveled	CF			CF				CF					CF				

Weco® Wing Union Specifications

Figure 100 - 1,000 psi (69 bar) cold working pressure

Nominal Pipe Size		in.	2	2 ½	3	4	6	8
Union Part No. Qty/Carton			3200609 16	3200610 10	3200611 6	3200612 4	3200795 1	3200796 1
A	Clearance Radius	in. mm	3 3/16	3 15/16 100	4 ½ 114	5 5/16 135	6 15/16 176	8 7/32 209
B	Outside Diameter	in. mm	2 ¾	3 ¼ 83	4 102	5 3/16 132	7 5/16 186	9 15/32 241
C	End-to-end Threaded	in. mm	3 5/8	4 9/32 109	4 7/8 124	5 ¾ 146	6 23/32 171	7 3/16 183
D	Inside Diameter	in. mm	2 5/32	2 9/16 65	3 3/16 81	4 3/16 106	6 9/32 160	8 ¼ 209
Weight		lb kg	6 2.7	10 4.5	14 6.4	22 10	45 20.4	66 30
Material, Sub Material, Nut			DI DI	DI DI	DI DI	DI DI	DI DI	DI DI

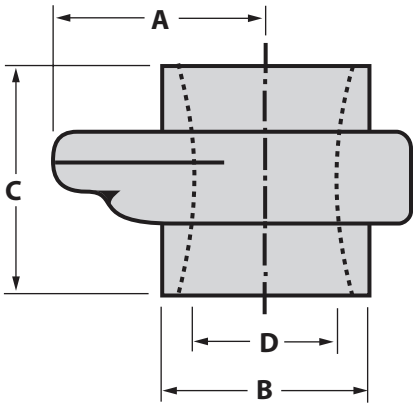


Figure 200 - 2,000 psi (138 bar) cold working pressure

Nominal Pipe Size		in.	1	1 ¼	1 ½	2	2 ½	3	4
Union Part No. Qty/Carton			3200829 40	3200960 28	3200773 28	3200778 16	3200899 10	3200782 6	3200912 4
A	Clearance Radius	in. mm	1 31/32 50	2 ¼ 57	2 ½ 64	3 76	3 9/16 90	4 102	4 11/16 119
B	Outside Diameter	in. mm	1 19/32 40	2 51	2 ¼ 57	2 29/32 74	3 13/32 84	4 3/32 104	5 1/8 130
C	End-to-end Threaded	in. mm	2 19/32 66	2 25/32 71	2 25/32 71	3 9/16 90	4 1/8 105	4 17/32 115	4 15/16 125
D	Inside Diameter	in. mm	1 1/8 28	1 15/32 37	1 22/32 43	2 5/32 55	2 9/16 65	3 3/16 81	4 3/16 106
Weight		lb kg	2 0.9	2 0.9	3 1.4	5 2.3	9 4.1	13 5.9	18 8.2
Material, Sub Material, Nut			CS DI	CS DI	CS DI	DI DI	CS DI	SF SF	SF SF

Figure 206 - 2,000 psi (138 bar) cold working pressure

Nominal Pipe Size		in.	1	1 ¼	1 ½	2	2 ½	3	4	6	8	10
Union Part No. Qty/Carton			3207627 40	3207633 28	3207636 28	3207281 16	3207278 10	3203048 6	3205449 4	3202521 1	3202552 1	3202566 1
A	Clearance Radius	in. mm	2 51	2 ¼ 57	2 ½ 64	3 76	3 9/16 90	4 102	4 11/16 119	6 ¼ 159	7 7/16 189	9 229
B	Outside Diameter	in. mm	1 19/32 40	1 31/32 50	2 ¼ 57	2 13/16 71	3 11/32 85	4 3/32 104	5 1/8 130	7 ½ 191	9 9/16 243	11 ½ 292
C	End-to-end Threaded	in. mm	2 21/32 67	2 25/32 71	2 25/32 71	3 ¼ 83	4 1/8 105	4 17/32 115	5 127	6 21/32 169	7 3/16 183	9 3/32 231
D	Inside Diameter	in. mm	1 1/8 28	1 15/32 37	1 22/32 43	2 5/32 55	2 9/16 65	3 3/16 81	4 3/16 106	6 9/32 160	8 ¼ 209	10 5/16 262
Weight		lb kg	2 0.9	2 0.9	3 1.4	5 2.3	8 3.6	13 5.9	18 8.2	42 19.1	65 29.5	90 40.8
Material, Sub Material, Nut			CS DI	CS DI	CS DI	SF DI	CS DI	SF SF	SF SF	SF SF	SF SC	SF SC

Materials: AS - Alloy Steel, CS - Carbon Steel, DI - Ductile Iron Casting, SC - Steel Casing, SF - Steel Forging

Weco® Wing Union Specifications

Figure 207 - 2,000 psi (138 bar) cold working pressure

Nominal Pipe Size		in.	3	4	6	8	10
Union Part No. Qty/Carton			3207906 8	3207907 4	3207908 1	3207981 1	3207982 1
A	Clearance Radius	in. mm	5 3/4 146	7 3/16 135	9 15/16 252	12 3/8 314	14 1/2 368
B	Outside Diameter	in. mm	4 3/32 104	5 1/8 130	7 1/2 191	9 9/16 243	11 1/2 292
C	End-to-end Threaded	in. mm	3 3/4 95	4 5/16 109	5 13/16 148	8 5/8 219	9 11/16 246
D	Inside Diameter	in. mm	3 3/16 81	4 3/16 106	6 9/32 160	8 1/4 209	10 5/16 262
Weight		lb kg	10 4.5	16 7.3	37 16.8	70 31.9	96 43.5
Material, Sub Material, Nut			SF SC	SF SF	SF SC	SF SC	SF SC

Figure 211 - 2,000 psi (138 bar) cold working pressure

Nominal Pipe Size		in.	1	2
Union Part No. Qty/Carton			3205369 40	3205343 16
A	Clearance Radius	in. mm	2 1/8 54	3 1/8 79
B	Outside Diameter	in. mm	1 9/16 40	2 7/8 73
C	End-to-end Threaded	in. mm	2 3/4 70	3 15/32 88
D	Inside Diameter	in. mm	1 1/8 28	2 5/32 55
Weight		lb kg	2 0.9	6 2.7
Material, Sub Material, Nut			CS DI	SF DI

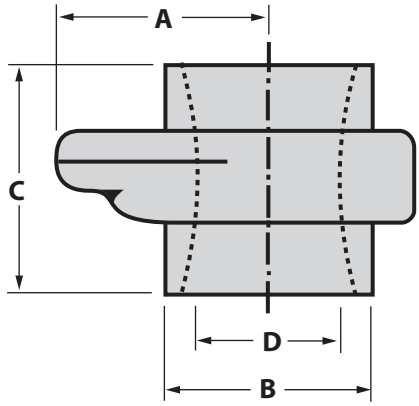


Figure 400 - 4,000 psi (276 bar) to 4"; 2,500 psi (172 bar) cold working pressure, 5" to 12"

Nominal Pipe Size		in.	2	2 1/2	3	4	5 1/2 OD*	6	7 OD*	8	12
Union Part No. Qty/Carton			3200291 6	3200290 5	3200292 4	3200337 3	3206347 1	3202179 1	3204333 1	3202060 1	3201578 1
A	Clearance Radius	in. mm	3 1/2 89	4 1/32 103	4 3/8 111	5 127	5 16/16 148	6 3/4 171	6 3/4 171	7 13/16 198	10 23/32 272
B	Outside Diameter	in. mm	3 1/16 78	3 1/2 89	4 5/32 106	5 7/32 133	6 1/4 159	7 3/4 197	7 3/4 171	9 19/32 244	14 356
C	End-to-end Threaded	in. mm	5 1/4 133	6 1/16 154	6 7/32 158	8 7/32 209	10 15/32 266	11 1/16 281	11 1/16 281	11 7/16 291	10 15/16 278
D	Inside Diameter	in. mm	2 5/32 55	2 9/16 65	3 3/16 81	4 3/16 106	5 1/8 130	6 9/32 160	6 21/32 169	8 1/4 209	12 11/32 313
Weight		lb kg	11 5	16 7.3	19 8.6	28 12.7	47 21.3	64 29	61 27.7	95 43.1	163 73.9
Material, Sub Material, Nut			SF SF	CS SF	SF SF	SF SF	SF SC	CS SC	CS SC	SF SC	SC SC

* Casing thread standard

Note: 2 inch does have O-ring

Materials: AS - Alloy Steel, CS - Carbon Steel, DI - Ductile Iron Casting, SC - Steel Casing, SF - Steel Forging

Weco® Wing Union Specifications

Figure 602 - 6,000 psi (414 bar) cold working pressure

Nominal Pipe Size		in.	1	1 ¼	1 ½	2	3	4
Union Part No. Qty/Carton			3202377 32	3202434 9	3202428 9	P533564 6	3202416 4	3202399 2
A	Clearance Radius	in. mm	2 3/8 60	3 1/4 83	3 1/4 83	3 5/8 92	4 1/2 114	5 3/16 132
B	Outside Diameter	in. mm	1 3/4 44	2 9/16 65	2 9/16 65	3 3/32 78	4 5/32 106	5 7/32 133
C	End-to-end Threaded	in. mm	3 17/32 90	4 7/8 124	4 7/8 124	5 3/4 146	6 1/4 159	8 1/4 210
D	Inside Diameter	in. mm	1 1/8 28	1 13/32 36	1 11/16 43	2 1/16 52	3 3/16 81	4 3/16 106
Weight		lb kg	3 1.4	10 4.5	9 4.1	15 6.8	21 9.5	31 14
Material, Sub Material, Nut			CS SF	CS SF	CS SF	SF SF	SF SF	SF SF

NOTES: AS - Alloy Steel, CS - Carbon Steel, DI - Ductile Iron Casting, CS - Steel Casting, SF - Steel Forging

Figure 1002 - 10,000 psi (690 bar) to 4"; 7,500 psi (517 bar) cold working pressure, 5"-6" *

Nominal Pipe Size		in.	1	1 ¼	1 ½	2	2 ½	2 ½ (EUE)	3	4
Union Part No. Qty/Carton			3205681 32	3205675 10	3205665 10	P535063 6	3205626 5	3206927 5	3205565 4	3205533 2
A	Clearance Radius	in. mm	2 7/32 56	3 1/32 77	3 1/32 77	3 13/16 97	3 7/8 99	4 102	4 17/32 115	4 31/32 126
B	Outside Diameter	in. mm	1 3/4 44	2 9/16 65	2 9/16 65	3 3/32 78	3 1/2 89	3 11/16 94	4 1/4 108	5 5/16 135
C	End-to-end Threaded	in. mm	3 17/32 90	4 7/8 124	4 7/8 124	5 3/4 146	6 1/8 156	5 15/16 151	6 7/32 158	8 7/32 209
D	Inside Diameter	in. mm	1 1/8 28	1 13/32 36	1 11/16 43	2 1/16 52	2 9/16 65	2 13/16 71	3 3/16 81	4 3/16 106
Weight		lb kg	4 1.8	10 4.5	9 4.1	16 7.3	18 8.2	16 7.3	22 10	32 14.5
Material, Sub Material, Nut			AS SF	AS SF	AS SF	SF SF	AS SC	AS SF	AS SF	AS SF

* 5" - 6" available with butt weld ends; consult factory for other configurations.

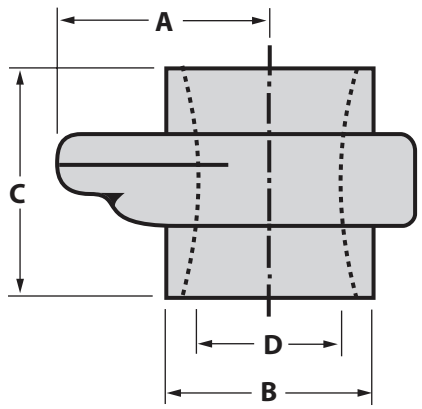


Figure 1003 - 10,000 psi (690 bar) 2"-3"; 7,500 psi (517 bar) cold working pressure 4"-5" *

Nominal Pipe Size		in.	2	3	4
Union Part No. Qty/Carton			3208519 6	3219928 2	3219932 1
A	Clearance Radius	in. mm	3 3/4 95	4 7/8 124	5 3/4 146
B	Outside Diameter	in. mm	3 76	4 3/8 111	5 1/2 140
C	End-to-end Threaded	in. mm	4 21/32 118	9 1/8 232	10 15/16 278
D	Inside Diameter	in. mm	2 5/32 55	3 3/16 81	4 102
Weight		lb kg	12 5.4	45 20.4	74 33.6
Material, Sub Material, Nut			AS SF	AS SC	AS SF

* 5" available with butt weld ends; consult factory for other configurations.

Weco® Wing Union Specifications

Figure 1502 - 15,000 psi (1034 bar) cold working pressure

Nominal Pipe Size		in.	1	1 ½	2	2 ½	3	4*
Union Part No. Qty/Carton			3254059 19	3254057 10	3201570 5	3203088 4	3207510 3	3252926 1
A	Clearance Radius	in. mm	2 7/8 73	3 21/32 93	3 29/32 99	4 5/32 106	4 ½ 114	6 300
B	Outside Diameter	in. mm	2 3/16 55	2 31/32 75	3 3/16 81	3 ¾ 95	4 13/32 112	5 ¾ 146
C	End-to-end Threaded	in. mm	4 11/32 110	5 13/32 137	7 178	7 ¼ 184	7 5/8 194	8 ½* 216
D	Inside Diameter	in. mm	1 ⅛ 28	1 11/16 43	2 1/16 52	2 9/16 65	3 3/16 81	— —
Weight		lb kg	9 4.1	17 7.7	19 8.6	22 10	30 13.6	64 29
Material, Sub Material, Nut			AS SF	AS SF	SF SF	AS SC	AS SF	AS SF

* Non-Pressure Seal

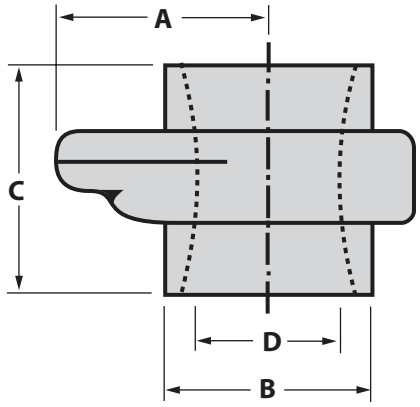


Figure 2002 - 20,000 psi (1380 bar) cold working pressure

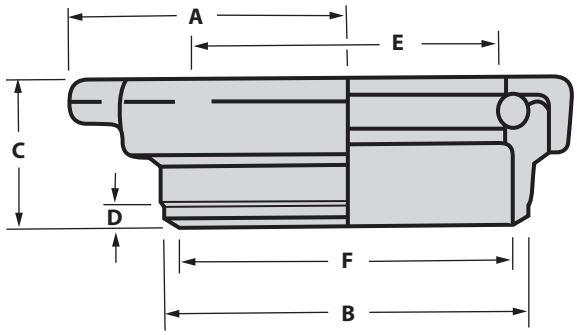
Nominal Pipe Size		in.	2	3
Union Part No. Qty/Carton			3222761 5	3245911 1
A	Clearance Radius	in. mm	3 ¾ 95	6 3/32 155
B	Outside Diameter	in. mm	2 19/32 66	5 ½ 140
C	End-to-end Threaded	in. mm	7 13/32 188	10 ½ 267
D	Inside Diameter	in. mm	1 5/16 33	3 76
Weight		lb kg	21 9.5	87 39.5
Material			AS	AS

Figure 2202 - 15,000 psi (1034 bar) cold working pressure

Nominal Pipe Size		in.	2	3
Union Part No. Qty/Carton			3235746 5	3257994 1
A	Clearance Radius	in. mm	3 ¾ 95	6 3/32 155
B	Outside Diameter	in. mm	2 7/8 73	5 ½ 140
C	End-to-end Threaded	in. mm	8 13/16 224	10 ½ 267
D	Inside Diameter	in. mm	1 5/16 33	3 76
Weight		lb kg	22 10	53 24
Material			AS	AS

Tank unions - 500 psi (34 bar) maximum line pressure

Nominal Pipe Size		in.	6	8	10	12
Union Part No. Qty/Carton			3255061 2	3254864 1	3255064 1	3255067 1
A	Clearance Radius	in. mm	6 ¼ 159	7 ½ 191	8 ½ 213	9 ¾ 244
B	Outside Diameter	in. mm	7 7/8 199	9 7/8 247	11 7/8 297	14 356
C	End-to-face	in. mm	4 3/8 111	4 3/8 111	4 ½ 114	4 ½ 114
D	Inside Diameter	in. mm	⅜ 19	⅜ 19	⅜ 19	⅜ 19
E	Seal inside diameter	in. mm	6 5/8 168	8 5/8 219	10 ¾ 273	12 ¾ 324
F	BW inside diameter	in mm	7 3/8 187	9 5/16 237	11 3/8 289	13 ½ 343
Weight		lb kg	22 10	31 14.1	37 16.8	58 21.8
Material			SC	SC	SC	SC

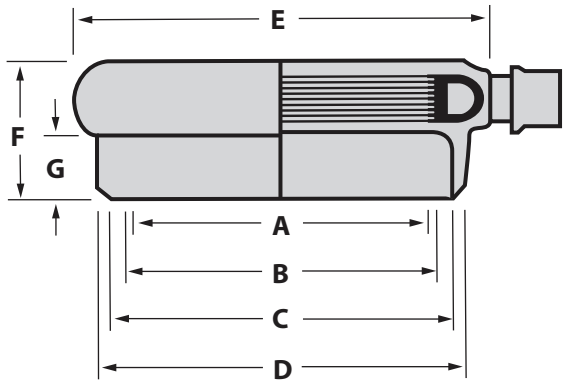


NOTES: AS - Alloy Steel, CS - Carbon Steel, DI - Ductile Iron Casting, CS - Steel Casting, SF - Steel Forging

Weco® Wing Union Specifications

Air-o-unions - 150 psi (10 bar) maximum line pressure

Nominal Pipe Size		in.	4	6	8	10	12	13	16
Union Part No. Qty/Carton			3207504 8	3207130 2	3207894 2	3207149 2	3207897 1	3207900 1	3207903 1
A	Tube inside diameter	in.	4 19/32	6 3/4	8 3/4	10 15/16	12 15/16	13 5/8	16 1/4
		mm	117	171	222	278	329	346	413
B	Body inside diameter	in.	4 19/32	6 15/16	8 15/16	11 1/8	13 1/8	13 3/4	16 3/8
		mm	117	176	227	283	333	349	416
C	Butt-weld inside dia.	in.	5 1/16	8	10 1/8	12 1/8	13 3/8	15 3/8	17 3/8
		mm	129	203	257	308	340	391	441
D	Butt-weld outside dia.	in.	5 9/16	8 5/8	10 3/4	12 3/4	14	16	18
		mm	141	219	273	324	356	406	457
E		in.	6 5/8	10 1/4	12 1/4	14 1/2	16 1/2	17 3/16	19 13/16
		mm	168	260	311	368	419	437	503
F	End-to-face	in.	3 1/8	4	4	4 1/4	4 1/4	4 3/8	4 1/4
		mm	79	102	102	108	108	111	108
G		in.	1 1/2	2	2	2	2	2	2
		mm	38	51	51	51	51	51	51
Misalignment, degrees			6	14	14	14	14	14	14
Weight		lb	7	18	22	26	30	42	45
		kg	3.2	8.2	10	11.8	13.6	19.1	20.4

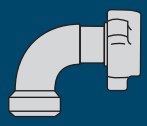
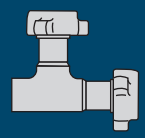
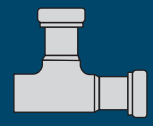


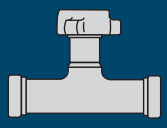
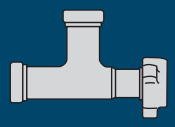
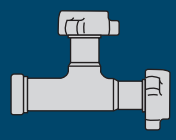
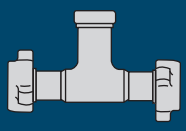
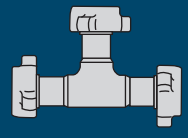
Suction-hose unions - 500 psi (34 bar) maximum line pressure

Size/Type	Part No.	Qty./ Carton	Length		Nut radius		Materials		Weight	
			in.	mm	in.	mm	Nut	Sub	lb	kg
6-inch hose	P512200	1	14 1/4	356	5	127	SF	CS	40	18.1
5-inch hose	3251341	1	14 1/4	356	5	127	SF	CS	22	10
5-inch socket weld	3202072	4	4 4/32	104	5	127	SF	SF	18	8.2
5-inch line pipe thread	3248972	2	7 3/4	194	5	127	SF	DI	25	11.3
4-inch line pipe thread	3215198	2	5 15/16	161	5	127	SF	DI	23	10.4
4-inch hose	3207912	2	14 15/32	368	5	127	SF	DI	22	10
Blanking cap assy.	3220990	2	3 11/16	92	5	127	SF	CS	22	10

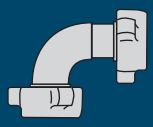
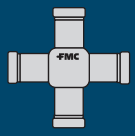
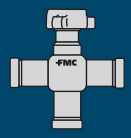
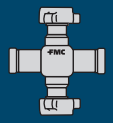
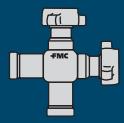
NOTES: AS - Alloy Steel, CS - Carbon Steel, DI - Ductile Iron Casting, CS - Steel Casting, SF - Steel Forging

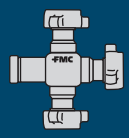
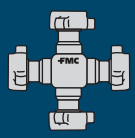
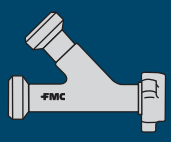
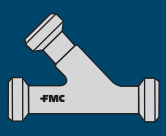
Weco® Integral Fitting Specifications

Nom. Size in.	Weco Wing Union Figure No.	CWP psi (bar)	Longsweep Elbow		Elbows						Tees	
												
			P/N P/N-LT	Wt. lb (kg)	P/N P/N-LT	Wt. lb (kg)	P/N P/N-LT	Wt. lb (kg)	P/N P/N-LT	Wt. lb (kg)	P/N P/N-LT	Wt. lb (kg)
1	1502	15,000 (1034)	—	—	P506048 P506048-LT	27 (12.4)	P506053 P506053-LT	CF	P506061 P506061-LT	CF	P506069 P506069-LT	29 (13.2)
1.5	1502	15,000 (1034)	—	—	P506049 P506049-LT	CF	P506054 P506054-LT	CF	P506062 P506062-LT	CF	P506070 P506070-LT	34 (15.4)
2	602	6,000 (414)	3262554	22 (10)	P506050 P506050-LT	27 (12.4)	P506055 P506055-LT	36 (16.3)	P506063 P506063-LT	18 (8.2)	P506071 P506071-LT	26.6 (12)
	1502	15,000 (1034)	3260403	27 (12.6)	P503846 P503846-LT	32 (14.7)	P506056 P506056-LT	41 (18.5)	P506064 P506064-LT	24 (10.9)	P503842 P503842-LT	29 (13.2)
	2002	20,000 (1380)	CF	CF	P506051 P506051-LT	36 (16.3)	P506057 P506057-LT	CF	P506065 P506065-LT	CF	P506072 P506072-LT	32 (14.5)
3	602	6,000 (414)	3259683 3259683-LT	54 (24.5)	3267335 3267335-LT	101 (45.6)	P506058 P506058-LT	115 (52.2)	P506066 P506066-LT	84 (38.1)	P506073 P506073-LT	112 (50.8)
	1502	15,000 (1034)	3259845 3259845-LT	51 (22.9)	3265950 3265950-LT	102 (46.3)	P506059 P506059-LT	121 (54.9)	P506067 P506067-LT	87 (39.5)	3268575 3268575-LT	114 (51.7)
	2002	20,000 (1380)	—	—	P519448 P519448-LT	221 (100)	CF	CF	CF	CF	P524672 P524672-LT	220 (99.8)
4	602	6,000 (414)	P506172 P506172-LT	89 (40.4)	P506052 P506052-LT	CF	P506060 P506060-LT	CF	P506068 P506068-LT	CF	P506075 P506075-LT	99 (44.9)
	1002	10,000 (690)	3261102 3261102-LT	89 (40.4)	3268033 3268033-LT	101 (45.8)	3268115 3268115-LT	105 (47.6)	3268113 3268113-LT	75 (34)	P500631 P500631-LT	101 (45.8)
	1502	15,000 (1034)	—	—	CF	CF	CF	CF	CF	CF	P524677 P524677-LT	200 (90.7)

Nom. Size in.	Weco Wing Union Figure No.	CWP psi (bar)	Tees									
												
			P/N P/N-LT	Wt. lb (kg)	P/N P/N-LT	Wt. lb (kg)	P/N P/N-LT	Wt. lb (kg)	P/N P/N-LT	Wt. lb (kg)	P/N P/N-LT	Wt. lb (kg)
1	1502	15,000 (1034)	P506076 P506076-LT	32 (14.4)	P506083 P506083-LT	32(14.4)	P506087 P506087-LT	35(15.9)	P506093 P506093-LT	35(15.9)	P506100 P506100-LT	38(17.2)
1.5	1502	15,000 (1034)	P506077 P506077-LT	40 (18)	P505457 P505457-LT	40(18)	P506088 P506088-LT	47(21.1)	P506094 P506094-LT	47(21.1)	P506101 P506101-LT	52(23.6)
2	602	6,000 (414)	P506078 P506078-LT	31(14.2)	P506084 P506084-LT	31(14.2)	P506089 P506089-LT	36(16.3)	P506095 P506095-LT	36(16.3)	P506102 P506102-LT	41(18.6)
	1502	15,000 (1034)	P503850 P503850-LT	38(17)	P503840 P503840-LT	38(17)	P503848 P503848-LT	46(20.9)	P505362 P505362-LT	46(20.9)	P505364 P505364-LT	54(24.7)
	2002	20,000 (1380)	P506090 P506090-LT	42(19)	P505584 P505584-LT	42(19)	P506080 P506080-LT	52(23.6)	P506096 P506096-LT	52(23.6)	P506103 P506103-LT	62(28.1)
3	602	6,000 (414)	P506081 P506081-LT	124(56.2)	P506085 P506085-LT	124(56.2)	P506091 P506091-LT	136(61.7)	P506097 P506097-LT	136(61.7)	P506104 P506104-LT	148(67.1)
	1502	15,000 (1034)	3263821 3263821-LT	128(58)	3262298 3262298-LT	128(58)	3265538 3265538-LT	142(64.4)	3265947 3265947-LT	142(64.4)	3268629 3268629-LT	156(70.8)
	2002	20,000 (1380)	P524673 P524673-LT	253(115)	P519451 P519451-LT	253(115)	P524674 P524674-LT	285(129)	P524675 P524675-LT	285(129)	P524676 P524676-LT	318(144)
4	602	6,000 (414)	P506082 P506082-LT	114(51.7)	P506086 P506086-LT	114(51.7)	P506092 P506092-LT	127(57.6)	P506098 P506098-LT	127(57.6)	P506105 P506105-LT	141(64)
	1002	10,000 (690)	P500633 P500633-LT	116(52.6)	3268031 3268031-LT	116(52.6)	P500632 P500632-LT	130(59)	P506099 P506099-LT	130(59)	P506106 P506106-LT	143(64.9)
	1502	15,000 (1034)	P518756 P518756-LT	234(106)	P518790 P518790-LT	234(106)	P524680 P524680-LT	268(122)	P524681 P524681-LT	268(122)	P524682 P524682-LT	302(137)

Weco® Integral Fitting Specifications

Nom. Size in.	Weco Wing Union Figure No.	CWP psi (bar)	Longsweep Elbow		Crosses							
												
			P/N P/N-LT	Wt. lb (kg)	P/N P/N-LT	Wt. lb (kg)	P/N P/N-LT	Wt. lb (kg)	P/N P/N-LT	Wt. lb (kg)	P/N P/N-LT	Wt. lb (kg)
1	1502	15,000 (1034)	—	—	P506107 P506107-LT	CF	P506113 P506113-LT	CF	P506118 P506118-LT	CF	P506129 P506129-LT	CF
1.5	1502	15,000 (1034)	—	—	P503531 P503531-LT	70 (31.8)	3269120 3269120-LT	77 (35)	P506119 P506119-LT	83 (37.6)	P506130 P506130-LT	83 (37.6)
2	602	6,000 (414)	P506171 P506171-LT	27 (12.2)	P506108 P506108-LT	58 (26.3)	P506114 P506114-LT	62 (28.1)	3262655 3262655-LT	67 (30.4)	P506131 P506131-LT	67 (30.4)
	1502	15,000 (1034)	3261768 3261768-LT	34 (15.4)	3257972 3257972-LT	59 (26.8)	3257973 3257973-LT	66 (30)	3258450 3258450-LT	73 (33.1)	3258451 3258451-LT	73 (33.1)
	2002	20,000 (1380)	CF	CF	3267282 3267282-LT	80 (36.3)	P506115 P506115-LT	CF	P506120 P506120-LT	CF	P506132 P506132-LT	CF
3	602	6,000 (414)	P506174 P506174-LT	66 (30)	P506109 P506109-LT	157 (71.2)	P506116 P506116-LT	168 (76.2)	P506121 P506121-LT	180 (81.6)	P506133 P506133-LT	180 (81.6)
	1502	15,000 (1034)	P506175 P506175-LT	65 (29.5)	P506110 P506110-LT	136 (61.7)	P517401 P517401-LT	178 (80.7)	P506122 P506122-LT	183 (83)	P506134 P506134-LT	183 (83)
	2002	20,000 (1380)	—	—	—	—	—	—	—	—	—	—
4	602	6,000 (414)	P506175 P506175-LT	CF	P506111 P506111-LT	144 (65.3)	P504791 P504791-LT	157 (71.2)	P506123 P506123-LT	170 (77.1)	P506135 P506135-LT	170 (77.1)
	1002	10,000 (690)	P506177 P506177-LT	CF	P506112 P506112-LT	144 (65.3)	P506117 P506117-LT	157 (71.2)	P206124 P206124-LT	170 (77.1)	P506136 P506136-LT	170 (77.1)
	1502	15,000 (1034)	—	—	—	—	—	—	—	—	—	—

Nom. Size in.	Weco Wing Union Figure No.	CWP psi (bar)	Crosses				Laterals				Wyes	
												
			P/N P/N-LT	Wt. lb (kg)	P/N P/N-LT	Wt. lb (kg)	P/N P/N-LT	Wt. lb (kg)	P/N P/N-LT	Wt. lb (kg)	P/N P/N-LT	Wt. lb (kg)
1	1502	15,000 (1034)	P506137 P506137-LT	CF	P506146 P506146-LT	CF	P506154 P506154-LT	58 (26.3)	P506160 P506160-LT		P506164 P506164-LT	CF
1.5	1502	15,000 (1034)	P506138 P506138-LT	89 (40.4)	P506147 P506147-LT	94 (42.6)	P505434 P505434-LT	62 (27.9)	—	—	P506166 P506166-LT	44 (20)
2	602	6,000 (414)	P506139 P506139-LT	72 (32.7)	P506148 P506148-LT	77 (35)	3263029 3263029-LT	48 (21.5)	—	—	3262652 3262652-LT	28 (12.7)
	1502	15,000 (1034)	3257976 3257976-LT	80 (36.3)	3257975 3257975-LT	87 (39.5)	3261420 3261420-LT	54 (24.5)	—	—	3208846 3208846-LT	27 (12.2)
	2002	20,000 (1380)	P506140 P506140-LT	CF	P506149 P506149-LT	CF	P506156 P506156-LT	CF	—	—	3254106 3254106-LT	28 (12.7)
3	602	6,000 (414)	P506141 P506141-LT	192 (87.1)	P506150 P506150-LT	203 (92.1)	CF	CF	CF	CF	—	—
	1502	15,000 (1034)	P506142 P506142-LT	197 (89.4)	P506151 P506151-LT	211 (95.7)	3266805 3266805-LT	88 (40.1)	P506161 P506161-LT	90 (40.9)	—	—
	2002	20,000 (1380)	—	—	—	—	CF	CF	CF	CF	—	—
4	602	6,000 (414)	P506144 P506144-LT	183 (83)	P506152 P506152-LT	197 (89.4)	P506158 P506158-LT	117 (53.1)	CF	CF	—	—
	1002	10,000 (690)	P506145 P506145-LT	183 (83)	P506153 P506153-LT	197 (89.4)	P519459 P519459-LT	174 (78.9)	CF	CF	—	—
	1502	15,000 (1034)	—	—	—	—	P518757 P518757-LT	310 (141)	CF	CF	—	—

Weco® Integral Fitting Specifications

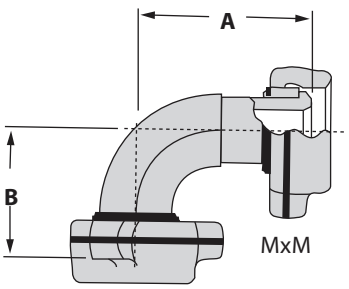
Dimensional Data

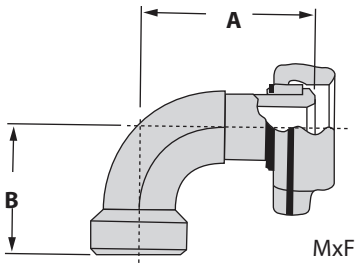
Nominal Size in.	Longsweep Elbow				Elbow
	M xM		M x F		
	A in. (mm)	B in. (mm)	C in. (mm)	D in. (mm)	A in. (mm)
1	N/A	N/A	N/A	N/A	6.06 (154)
1.5	N/A	N/A	N/A	N/A	6.06 (154)
2	7.16 (182)	5.13 (130)	7.16 (182)	5.5 (140)	6.06 (154)
3	10 (254)	7.59 (193)	10 (254)	7.94 (202)	8 (203)
4	12.62 (321)	9.69 (246)	12.62 (321)	9.69 (246)	8.2 (208)

Nominal Size in.	Wyes		Tees		Cross	
	A in. (mm)	B in. (mm)	A in. (mm)	B in. (mm)	A in. (mm)	B in. (mm)
1	5.25 (133)	5 (127)	6.06 (154)	12.12 (308)	7.50 (191)	15 (381)
1.5	5.25 (133)	5 (127)	6.06 (154)	12.12 (308)	7.50 (191)	15 (381)
2	5.25 (133)	5 (127)	6.06 (154)	12.12 (308)	7.50 (191)	15 (381)
3	N/A	N/A	8 (203)	16 (406)	8 (203)	16 (406)
4	N/A	N/A	8.20 (208)	16.40 (417)	8.20 (208)	16.40 (417)

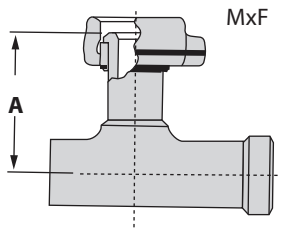
Nominal Size in.	Weco Wing Union End	45° Lateral			60° Lateral		
		A in. (mm)	B in. (mm)	C in. (mm)	A in. (mm)	B in. (mm)	C in. (mm)
1	—	10.50 (267)	15.75 (400)	5.25 (133)	N/A	N/A	N/A
1.5	—	10.50 (267)	15.75 (400)	5.25 (133)	N/A	N/A	N/A
2	—	10.50 (267)	15.75 (400)	5.25 (133)	N/A	N/A	N/A
3	602	N/A	N/A	N/A	8.5 (216)	16 (406)	6.63 (168)
3	1502	N/A	N/A	N/A	8.5 (216)	16 (406)	6.63 (168)
3	2002	15 (381)	20.26 (515)	7.63 (194)	N/A	N/A	N/A
4	602	N/A	N/A	N/A	11.50 (292)	19.50 (495)	8 (203)
4	1002	N/A	N/A	N/A	11.50 (292)	19.50 (495)	8 (203)
4	1502	15 (381)	20.26 (515)	7.63 (194)	N/A	N/A	N/A

Weco® Integral Fitting Specifications

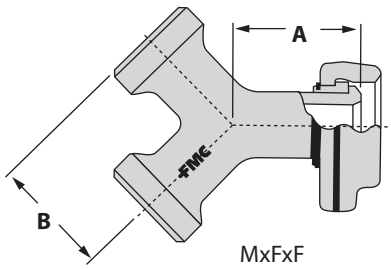




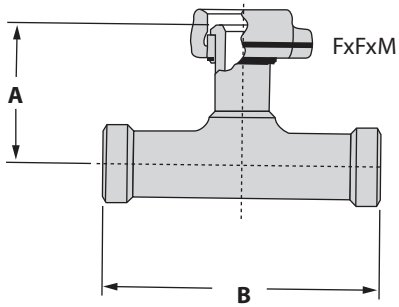
Longsweep Elbows



Elbow



Wye



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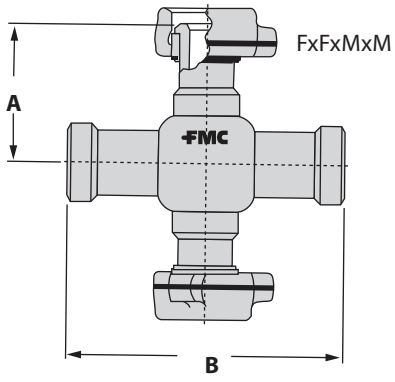

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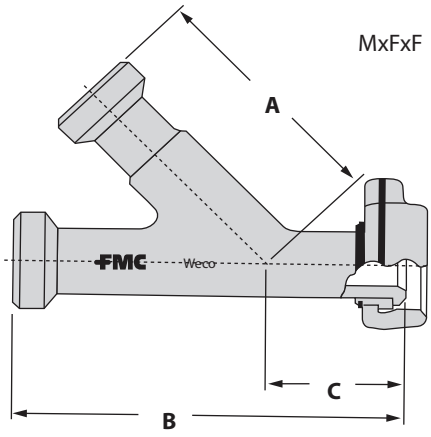
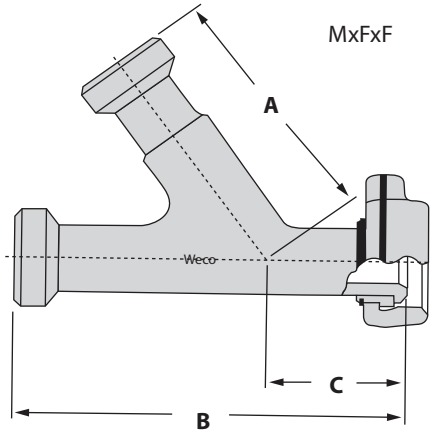


45° Lateral



60° Lateral

Weco® Pup Joints Specifications

Integral

Sizes	Weco Union End	CWP psi (bar)	2 ft (610 mm)		3 ft (914 mm)		4 ft (1,219 mm)		5 ft (1,524 mm)		6 ft (1,829 mm)		8 ft (2,438 mm)		10 ft (3,048 mm)	
			P/N P/N-LT	lb (kg)	P/N P/N-LT	lb (kg)	P/N P/N-LT	lb (kg)	P/N P/N-LT	lb (kg)	Part No.	lb (kg)	P/N P/N-LT	lb (kg)	P/N P/N-LT	lb (kg)
1″	1502	15,000 (1034)	3263200 3263200-LT	18 (8.2)	P512501 P512501-LT	25 (11.3)	3262915 3262915-LT	31 (14.1)	3261090 3261090-LT	37 (16.8)	3262229 3262229-LT	43 (19.5)	3266745 3266745-LT	55 (25)	3261496 3261496-LT	67 (30.4)

Integral with Retention Shoulder

Sizes	Weco Union End	CWP psi (bar)	3 ft (914 mm)		4 ft (1,219 mm)		5 ft (1,524 mm)		6 ft (1,829 mm)		8 ft (2,438 mm)		10 ft (3,048 mm)		12 ft (3,658 mm)	
			P/N P/N-LT	lb (kg)	P/N P/N-LT	lb (kg)	P/N P/N-LT	lb (kg)	P/N P/N-LT	lb (kg)	Part No.	lb (kg)	P/N P/N-LT	lb (kg)	P/N P/N-LT	lb (kg)
2″	1502	15,000 (1034)	P516825 P516825-LT	41 (18.6)	P516823 P516823-LT	50 (22.7)	P516821 P516821-LT	58 (26.3)	P516820 P516820-LT	67 (30.4)	P516810 P516810-LT	84 (38.1)	P516485 P516485-LT	101 (45.8)	P516817 P516817-LT	118 (53.5)
3″	1502	15,000 (1034)	P517538 P517538-LT	73 (33.1)	P517582 P517582-LT	91 (41.3)	P517664 P517664-LT	108 (49)	P517672-LT	125 (56.7)	P517674 P517674-LT	160 (72.6)	P517111 P517111-LT	195 (88.5)	CF	
3″	2002	20,000 (1380)	P502323	151 (68.5)	P502324	205 (93)	P519440	257 (117)	P502326	313 (142)	P519441 P519441-LT	365 (166)	P525905 P525905-LT	542 (246)	P502327	583 (264)
4″	1502	15,000 (1034)	CF		P520516 P520516-LT	249 (113)	P518458 P518458-LT	247 (112)	CF		P518450 P518450-LT	371 (168)	P518437 P518437-LT	453 (206)	CF	

NPS Detachable Nut with Retention Shoulder

Sizes	Weco Union End	CWP psi (bar)	2 ft (610 mm)		3 ft (914 mm)		4 ft (1,219 mm)		5 ft (1,524 mm)		6 ft (1,829 mm)	
			P/N P/N-LT	lb (kg)	P/N P/N-LT	lb (kg)	P/N P/N-LT	lb (kg)	P/N P/N-LT	lb (kg)	P/N P/N-LT	lb (kg)
2″	1502	15,000 (1034)	P508589 P508589-LT	32 (14.5)	P508590 P508590-LT	39 (17.7)	P508591 P508591-LT	46 (20.9)	P508592 P508592-LT	53 (24)	P508593 P508593-LT	60 (27.2)
3″	1502	15,000 (1034)	P508600 P508600-LT	56 (25.4)	P508601 P508601-LT	70 (31.8)	P508602 P508602-LT	84 (38.1)	P508603 P508603-LT	99 (44.9)	P508604 P508604-LT	113 (51.3)
4″	602	6,000 (414)	CF		CF		P510406 P510406-LT	101 (45.8)	P510407 P510407-LT	118 (53.5)	P510408 P510408-LT	134 (60.8)
4″	1002	10,000 (690)	P512866 P512866-LT	79 (35.8)	P512867 P512867-LT	98 (45)	P510400 P510400-LT	122 (55.3)	P510401 P510401-LT	143 (64.9)	P510402 P510402-LT	165 (74.8)
4″	1502	15,000 (1034)	P520514 P520514-LT	125 (57)	P520515 P520515-LT	155 (70)	P520520 P520520-LT	36 (83.9)	P520521 P520521-LT	215 (98)	P520522 P520522-LT	245 (111)

Sizes	Weco Union End	CWP psi (bar)	8 ft (2,438 mm)		10 ft (3,048 mm)		12 ft (3,658 mm)		20 ft (6,096 mm)	
			P/N P/N-LT	lb (kg)	P/N P/N-LT	lb (kg)	P/N P/N-LT	lb (kg)	P/N P/N-LT	lb (kg)
2″	1502	15,000 (1034)	P508594 P508594-LT	73 (33.1)	P508595 P508595-LT	87 (39.5)	P508596 P508596-LT	101 (45.8)	P508598 P508598-LT	156 (70.8)
3″	1502	15,000 (1034)	P508605 P508605-LT	142 (64.4)	P508606 P508606-LT	170 (77.1)	P508607 P508607-LT	199 (90.3)	P508609 P508609-LT	313 (142)
4″	602	6,000 (414)	P510409 P510409-LT	167 (75.8)	P510410 P510410-LT	200 (90.7)	P510411 P510411-LT	233 (106)	P512873 P512873-LT	463 (210)
4″	1002	10,000 (690)	P510403 P510403-LT	207 (93.9)	P510404 P510404-LT	250 (113)	P510405 P510405-LT	293 (133)	P512105 P512105-LT	464 (211)
4″	1502	15,000 (1034)	P531126 P531126-LT	305 (138)	P513472 P513472-LT	365 (166)	CF		P520526 P520526-LT	665 (302)

Weco® Pup Joints Specifications

NPS Non-Detachable Nut

Sizes	Weco Union End	CWP psi (bar)	2 ft (610 mm)		3 ft (914 mm)		4 ft (1,219 mm)		5 ft (1,524 mm)		6 ft (1,829 mm)	
			P/N P/N-LT	lb (kg)	P/N P/N-LT	lb (kg)	P/N P/N-LT	lb (kg)	P/N P/N-LT	lb (kg)	P/N P/N-LT	lb (kg)
1″	1502	15,000 (1034)	P515014 P515014-LT	15 (6.8)	3265578 3265578-LT	18 (8.2)	3265579 3265579-LT	21 (9.5)	3265580 3265580-LT	24 (10.9)	3262631 3262631-LT	27 (12.2)
1.5″	1502	15,000 (1034)	3256224 3256224-LT	29 (13.2)	3265598 3265598-LT	35 (15.9)	3254968 3254968-LT	42 (19.1)	3265599 3265599-LT	24 (10.9)	3265600 3265600-LT	55 (24.9)
2″	602	6,000 (414)	CF		P528321 P528321-LT	34 (15)	CF		P528320 P528320-LT	48 (22)	3265733 3265733-LT	45 (20.4)
2″	1502	15,000 (1034)	3255329 3255329-LT	31 (14.1)	3255328 3255328-LT	38 (17.2)	3255522 3255522-LT	45 (20.4)	3255327 3255327-LT	52 (23.6)	3255524 3255524-LT	59 (26.8)
3″	602	6,000 (414)	3268620 3268620-LT	49 (22.2)	3267340 3267340-LT	63 (28.6)	3267722 3267722-LT	78 (35.4)	3267339 3267339-LT	92 (41.7)	P501345	106 (48.1)
3″	1502	15,000 (1034)	3255323 3255323-LT	55 (24.9)	3255322 3255322-LT	69 (31.3)	3255380 3255380-LT	84 (38)	3255321 3255321-LT	98 (44.5)	3255379 3255379-LT	112 (50.8)
4″	602	6,000 (414)	P507216 P507216-LT	62 (28.1)	CF		3251806 3251806-LT	95 (43.1)	6101173 6101173-LT	136 (62)	3251807 3251807-LT	128 (58.1)
4″	1502	10,000 (690)	3265769 3265769-LT	69 (31.3)	P506629 P506629-LT	91 (41.3)	3265771 3265771-LT	112 (50.8)	3265772 3265772-LT	133 (60.3)	3265773 3265773-LT	155 (70.3)

Sizes	Weco Union End	CWP psi (bar)	8 ft (2,438 mm)		10 ft (3,048 mm)		12 ft (3,658 mm)		20 ft (6,096 mm)	
			P/N P/N-LT	lb (kg)	P/N P/N-LT	lb (kg)	P/N P/N-LT	lb (kg)	P/N P/N-LT	lb (kg)
1″	1502	15,000 (1034)	3256612 3256612-LT	33 (15)	3265583 3265583-LT	21 (9.5)	P504985 P504985-LT	45 (20.4)	CF	45 (20.4)
1.5″	1502	15,000 (1034)	3254969 3254969-LT	68 (30.8)	3256062 3256062-LT	81 (36.7)	CF		CF	
2″	602	6,000 (414)	CF		P528319 P528319-LT	82 (38)	3265739	80 (36.3)	CF	80 (36.3)
2″	1502	15,000 (1034)	3255326 3255326-LT	73 (33.1)	3255325 3255325-LT	86 (39)	3255324 3255324-LT	100 (45.4)	3265728 3265728-LT	100 (45.4)
3″	602	6,000 (414)	P504506 P504506-LT	135 (61.2)	3267338 3267338-LT	163 (73.9)	P501344 P501344-LT	192 (87.1)	CF	192 (87.1)
3″	1502	15,000 (1034)	3255320 3255320-LT	141 (64)	3255423 3255423-LT	169 (76.7)	3255381 3255381-LT	198 (89.8)	3255427 3255427-LT	198 (89.8)
4″	602	6,000 (414)	P514350 P514350-LT	161 (73)	3251808 3251808-LT	194 (88)	CF		CF	
4″	1502	10,000 (690)	3265775 3265775-LT	198 (89.8)	3265777 3265777-LT	240 (109)	CF		CF	

NPS Detachable Nut *

Sizes	Weco Union End	CWP psi (bar)	2 ft (610 mm)		3 ft (914 mm)		4 ft (1,219 mm)		5 ft (1,524 mm)	
			P/N P/N-LT	lb (kg)	Part No.	lb (kg)	P/N P/N-LT	lb (kg)	P/N P/N-LT	lb (kg)
2″	1502	15,000 (1034)	3265907	31 (14.1)	P513374 P513374-LT	38 (17.2)	3265908 3265908-LT	45 (20.4)	3265909 3265909-LT	52 (23.6)
3″	1502	15,000 (1034)	3267024 3267024-LT	56 (25.4)	CF		3267025 3267025-LT	84 (38.1)	3267026 3267026-LT	99 (44.9)
4″	602	6,000 (414)	CF		CF		CF		P514712 P514712-LT	112 (50.8)

Sizes	Weco Union End	CWP psi (bar)	6 ft (1,829 mm)		8 ft (2,438 mm)		10 ft (3,048 mm)		12 ft (3,658 mm)	
			P/N P/N-LT	lb (kg)	Part No.	lb (kg)	P/N P/N-LT	lb (kg)	P/N P/N-LT	lb (kg)
2″	1502	15,000 (1034)	P511842 P511842-LT	59 (26.8)	P512102 P512102-LT	73 (33.1)	3265906 3265906-LT	86 (39)	CF	CF
3″	1502	15,000 (1034)	P513301 P513301-LT	113 (51.3)	CF		3267053 3267053-LT	170 (77.1)	CF	
4″	602	6,000 (414)	P514711 P514711-LT	128 (58.1)	P514713 P514713-LT	161 (73)	P514715 P514715-LT	194 (88)	3265739 3265739-LT	80 (36.3)

* 20 ft (6,096 mm) size: consult factory

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.

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

- Never mix or assemble components, part, 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 direction 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.
- Do not subject FMC Technologies products to excessive external loads These include axial loads, bending and torsional loads. The product's design rating is only valid in the absence of external loading. Improper external loading may severely limit the performance of the product and create an unsafe condition.

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.

FMC Technologies

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