TechnipFMC

Wellhead technology

Standard solutions creating customer success

Technology delivering customer success

Industry leading wellhead technology

TechnipFMC has a proven track record focusing on customers, challenging conventions, minimising non-productive time and delivering sustainable and successful economics with our standardised solutions.

Global capabilities

TechnipFMC is a world class equipment and service provider. We offer the best solutions to help exploration, production, and service companies succeed in achieving their drilling, completion, efficiency and safety goals. We also offer a suite of complementary aftermarket services.

TechnipFMC's extensive commitment to producing the highest-quality equipment and systems through advanced designs and manufacturing techniques is on full display at each of our plants. We use lean principles to deliver zero-defect cost-effective solutions. And we constantly explore new ways to optimise our customers' success by reducing complexity and the cost of ownership.

We have the expertise, contacts and resources worldwide to help our customers 24/7.

Our drilling technology

Experience faster time to production, lower operating costs and reduced non-productive time through field-proven standardised drilling systems

Field proven from cost effective conventional to high performance Uniheads®

TechnipFMC's structured and comprehensive portfolio delivers a broad set of standardised drilling products with cost and time efficient solutions, delivering the perfect balance of functionality and reliability for all our customers' well applications.

The technology is fully validated through rigorous test protocols that align with API standards, and when required exceed those limits providing a greater level of reliability for customer operations coupled with many years of field use, this ensures our technology meets our customer's requirements of reliability and quality.

We continually invest in research and development to meet the evolving needs of our industry. All innovations are subjected to exhaustive laboratory and field tests to ensure their reliability and integrity before they are released to the marketplace.

Safety and reliability

TechnipFMC's standardised equipment and renowned sealing technology help eliminate the threat of working under suspended loads, minimise BOP manipulation, reduce installation risks and improve safety throughout the drilling process.

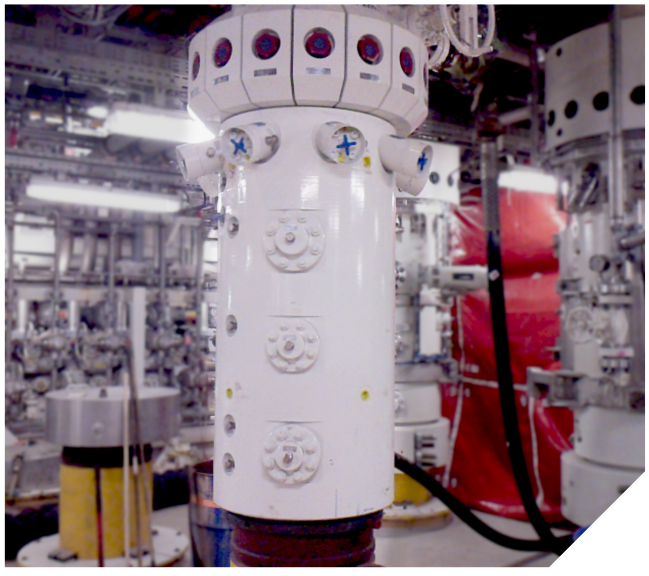
Our ability to address complex project challenges comes from a strong track record of project management expertise. We deliver projects on time, reducing installation risks and never compromising on quality or safety.

Shorter time to production

Non-productive time (NPT) can have a major impact on well economics. Our drilling technology mitigates risks through our robust design verification and validation program, optimising well integrity and minimising NPT and the risks associated with the drilling and equipment installation process.

TechnipFMC's stocking programs ensure our standard components and sub-assembly products are available and ready to be installed to help boost your productivity and accelerate time to first oil.

We deliver top-rated field execution services 24/7, with trained, competent technicians to make sure the job is done right and safely.



Surface wellhead system

TechnipFMC offers a fit for purpose range of drilling products covering simple onshore and offshore drilling to complex operations in harsh well conditions and environments.

Onshore technologies

- Conventional wellhead
- Unihead (UH-1, UH-2, UH-3, UH-4, UH-5)

Some systems can be installed on land and offshore platforms.

Offshore technologies

- Conventional wellhead
- Unihead (UH-2, UH-3, UH-4, UH-5)
- SPAR, TLP and SXS

System	Working pressure	Hanger / packoff retenion	Sealing technology	Nominal sizes	Temperature rating
Conventional	2K thru 20K	Lockscrew	Elastomer and Rough Casing Metal Seal (RCMS)	7⅛" thru 21¼"	-75° F to 350° F
UH-1	5K, 10K	Lockscrew	Elastomer	11", 13-⅝"	-75° F to 250° F
UH-2	5K, 10K	Internal latch	Elastomer	11", 13-⅝"	-20° F- 250° F
UH-3	5K, 10K	Internal latch	Hybrid PI-metal end cap	11", 13-⅝"	-75° F - 350° F
UH-4	5K, 10K	Internal latch	Single metal to metal	13⅝", 18¾"	-75° F - 250° F
UH-5	5K, 10K, 15k	Internal latch	Dual metal to metal	13⅝", 18¾"	-75° F - 400° F

Conventional wellhead

TechnipFMC offers a comprehensive range of conventional API 6A drilling equipment covering a wide range of applications from 2,000psi to 20,000psi.

This level of technology provides our customer the best balance between fit for purpose designs and cost.

Benefits

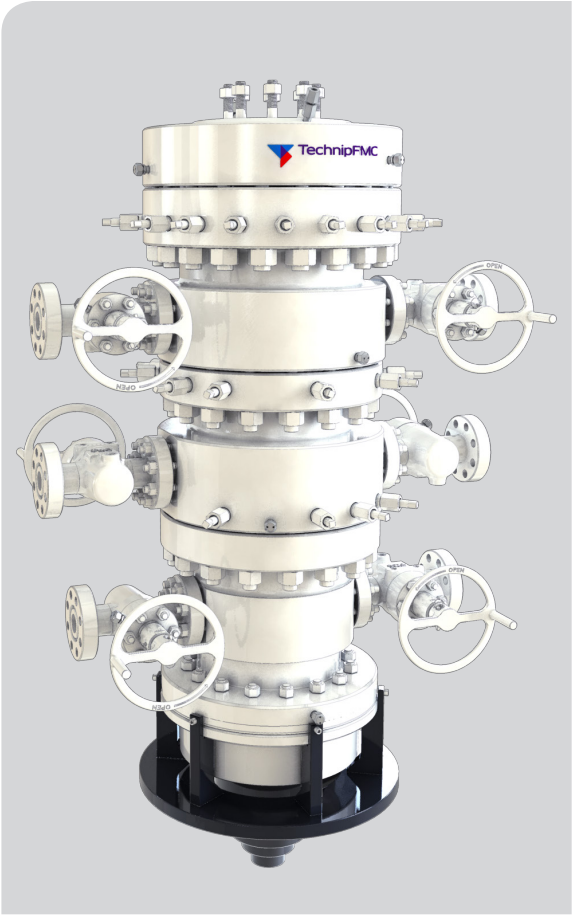
- Minimised CAPEX investment
- Interchangeability options
- Robust and fit for purpose installation tooling
- Stocking programs supporting short lead-times
- Field proven C-21/22/29 heads and casing hangers
- C-100/200 series of hanger with high-load capabilities
- C-22-EG casing heads and spools reducing complexity
- Single and dual completions
- Elastomer and metal-to-metal sealing technology
- Unique rough casing metal seal for sealing on raw casing
- Reduced need for field installation support
- Rig crews familiar with conventional flanged style drilling equipment

UH-1 Unihead® system

TechnipFMCs' Unihead® systems offer safer operation, rig time savings, through-bore installation efficiency and reduced height compared with conventional wellheads.

Time saving solution

Focused on onshore drilling, our simple and robust Unihead® system uses our standard C-22 casing head and delivers many benefits, including improved safety, reduced height, versatility and faster drilling times.



Benefits

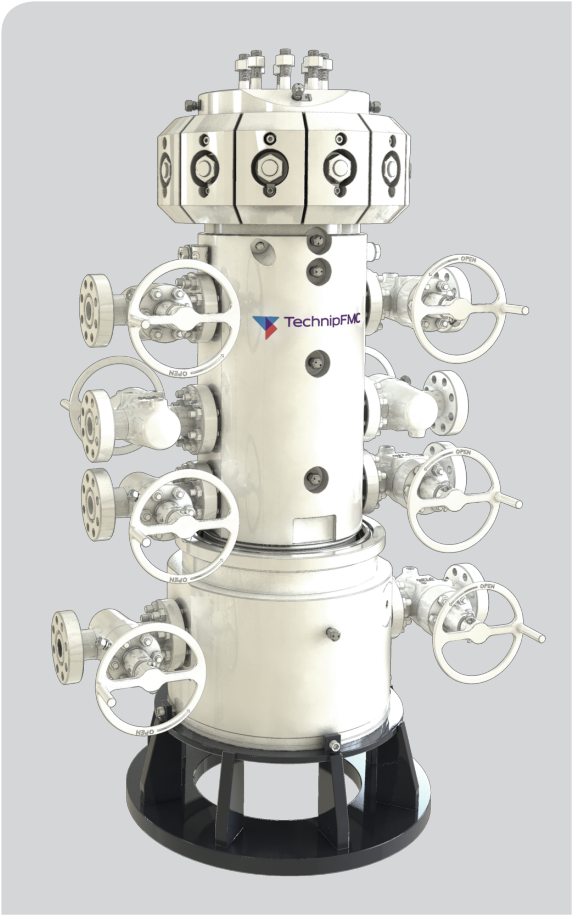
- Uses mandrel hangers for casing suspension, saving rig time
- Minimises BOP handling as production hanger, packoff and completion run through BOP
- Provides greater flexibility with multiple casing programs possible
- Offers maximum 10,000 psi working pressure
- Shares common tooling with conventional system
- Reduces installation time
- Comes in 11" and 13 5/8" nominal sizes
- Eliminates need for field welding with sliplock casing head options

UH-2 Unihead® system

The UH-2 Unihead® family uses an innovative internal latch mechanism to provide positive lockdown and integrated load shoulder.

Compact solution

The UH-2 drill-through Unihead® is a compact and unitised wellhead system that offers rig time savings, better well control and safer operations. This reliable system installs as a single unit and enables drilling, running casing, cementing and installing hangers and packoffs through the BOP stack.



Benefits

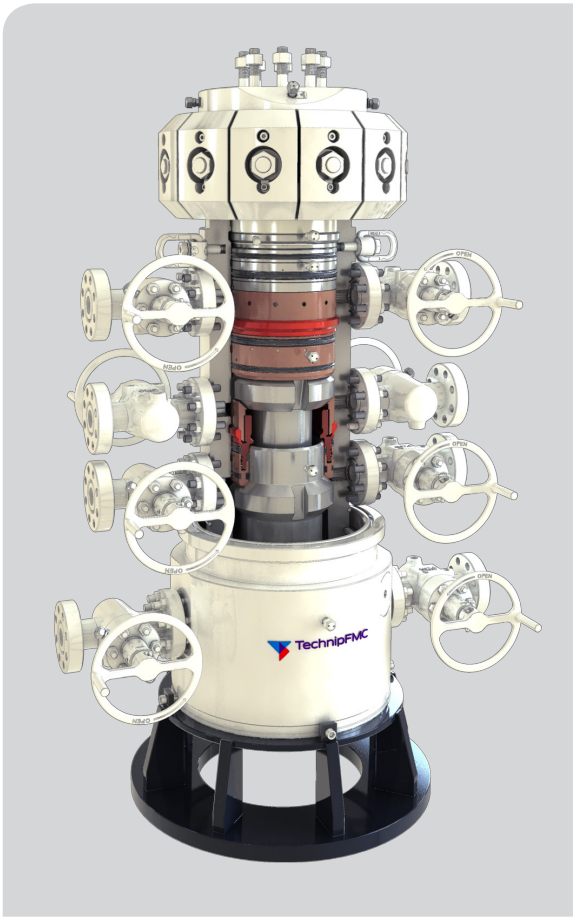
- No lockdown screws, improving safety and reducing installation time
- Innovative latch ring and load shoulder mechanism
- BOP handling minimised as production hanger, packoff and completion are run through the BOP improving safety.
- Faster installation times
- Independent load shoulders for hangers
- Flexible wellhead connections including Speedloc II clamps
- 13 3/8” bowl providing improved clearance when running through BOP/riser
- 10,000 psi max working pressure
- Available in nominal 11” and 13” sizes

UH-3 Unihead® system

The UH-3 Unihead® wellhead system has all the features and advantages of the UH-2, but takes sealing performance to a new level with the Pressure-Intensified Metal End Cap seal (PI-MEC) for low temperature and corrosive environment applications.

Superior seal technology

Well conditions and harsh environments demand a resilient seal package able to withstand temperatures from -75 degrees F to 250 degrees F while achieving gas-tight seal integrity and resistance to Rapid Gas Decompression (RGD). Through extensive research and development plus qualification testing, we have been able to develop a superior seal technology with the Pressure Intensified Metal End Cap seal (PI-MEC) performing on a similar manner to a metal seal.



Benefits

- Same internal profile of the UH-2 and UH-3 systems providing full interchangeability with the production packoff and completions
- Proprietary seal technology developed in-house using proprietary rubber compounds
- Innovative pressure intensified design, increasing bulk modulus of the PI-MEC seal to prevent the ingress of gas into the elastomer
- System suited for arctic or high temperature well conditions
- Tooling fully interchangeable between UH-2 and UH-3
- Maximum working pressure 10,000 psi
- Nominal 11” and 13” sizes available

UH-4 Unihead® system

To meet industry demands for full metal-to-metal (M2M) sealing wellheads, TechnipFMC has developed a comprehensive range of innovative wellhead solutions for 13 ⅝" and 18 ¾" applications.

Metal-to-metal sealing

The UH-4 drill-through Unihead is a critical application wellhead system with full metal-to-metal sealing capabilities. This system offers rig-time savings, better well control and safer operations for rig crews. Top-of-the-line materials and cladding ensure equipment will last through the life of the well with minimum unplanned maintenance and lost production.

Benefits

- Proven metal-to-metal seal technology with thousands of surface and subsea installations globally
- A range of global standards developed for our clients' well conditions
- Extensive product testing enhancing well integrity and minimising NPT
- Flexibility with a range of stuck pipe contingency solutions using both metal-to-metal sealing and elastomer
- Packoffs set under BOP pressure with no rotation (stab in/stab out)
- Hanger/packoff interface optimised to ensure elimination of alignment issues
- Standard and field proven tool package with single-trip options

UH-5 Unihead® system

TechnipFMC is renowned for technology innovation and the new UH-5 wellhead system is a prime example of listening to our customers and using our in-house expertise to develop an industry leading wellhead solution.

Unique value proposition

The foundation of any wellhead system is the sealing technology and the UH-5 uses a unique and unrivaled dual metal-to-metal packoff. The UH-5 packoff has a reputation for consistency and reliability with multiple installations successfully completed. The UH-5 wellhead solution and dual metal-to-metal packoff provides a unique value proposition by eliminating elastomers.

Benefits

- Dual metal-to-metal packoff with each seal independently tested
- Exceptional bidirectional sealing performance up to 15,000 psi and 400°F
- Packoff design eliminates need for elastomer test seals
- Standard wellhead configuration reduces complexity
- Full metal-to-metal stuck pipe/contingency solution available
- Installed through BOP and pressure set similar to UH-4 packoff
- Sealed with recessed seal areas and corrosion resistant alloy material
- Field-proven technology and tool package minimises nonproductive and installation time
- Enhanced well integrity through extensive product testing exceeds API PR2F

Global service and aftermarket support

Service has long been a key differentiator for TechnipFMC. We sustain our customers with a full range of services and aftermarket support 24/7 worldwide.

TechnipFMC supports client operations from our strategically located field bases, providing responsive service, quality equipment and local

expertise. Competent technicians deliver superior service including installation, repair, maintenance and asset management. We offer extensive local inventories and rental options. Our commitment to HSE, value and service excellence helps our clients maximise their potential.

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TechnipFMC.com

TechnipFMC

Reciprocating pumps

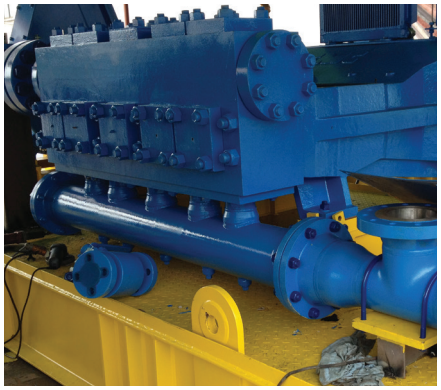
Performs better, lasts longer, operates efficiently

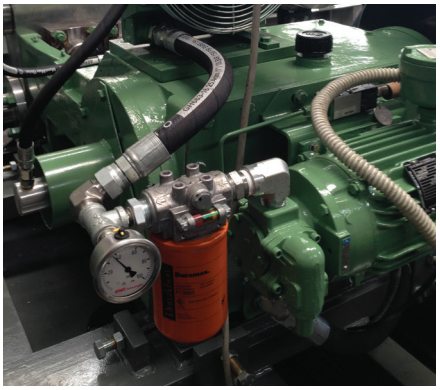
Oil & gas pumps

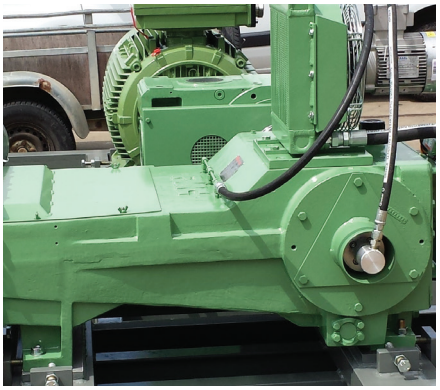
TechnipFMC Pumps are manufactured in our US based ISO-9001 and API Certified cutting-edge facility using the latest in advanced technology. Our state-of-the-art 3D CAD/CAM systems, operated by experience professionals, ensure that each component is machined to the most precise specifications increasing consistency across the pump product offering. We continue to invest in Research and Development to refine existing products, tackle new applications and create reliable, durable and efficient pumps for the markets we serve.

Proven reliability since 1884

Reciprocating pumps have been a major part of TechnipFMC's legacy since 1884, when John Bean developed the first continuous spray pump to combat orchard scale. Through the years, we have grown in many different industries to become the innovative solution for solving customers most difficult challenges.







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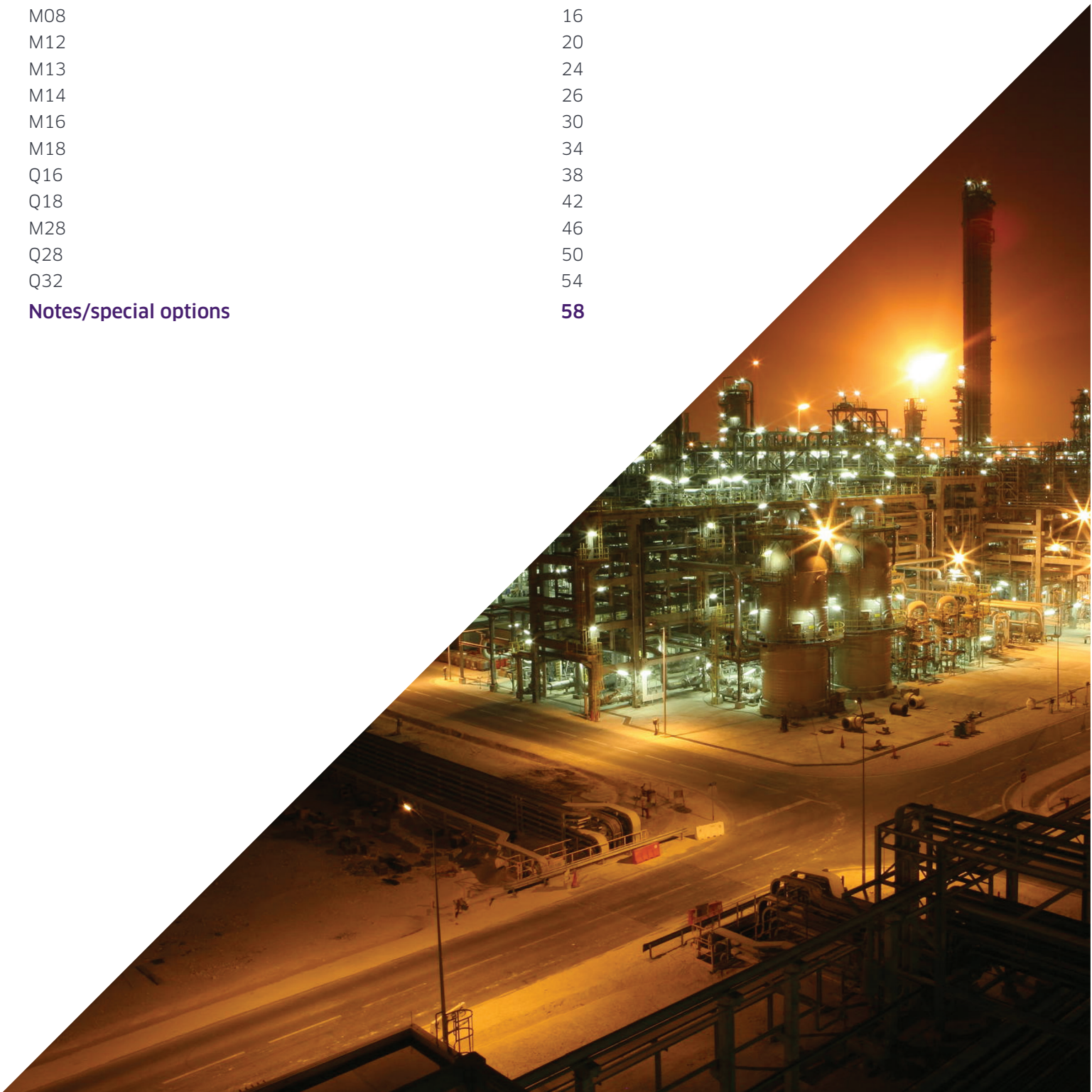


History

TechnipFMC has a 130-year history of experience in developing pumps for various pump applications. This legacy of market recognition that our products have set the performance and technical standards has enabled us to become the market leader. Even with this knowledge of our pumps being the standard, we continue to believe the best is yet to come. This commitment to a customer center approach and open collaboration will continue to lead us towards developing innovative products that increase productivity, lower the cost of ownership and maximizes customer profits.

At TechnipFMC, we encourage focused creativity and selfless risk taking to create everyday solutions for customer success. Our capabilities incorporate brilliantly engineered products with robust manufacturing and dependable delivery times. In other words, we commit to develop a quality product that exceeds our customers' requirements, is competitively priced and is delivered on time.

We believe the heart of our business comes from serving our customers. As a partner of TechnipFMC, you gain access to a network of experienced professionals dedicated to support throughout the life of the product. We understand that the life blood of innovation comes from our customers and by keeping them first, we keep them ahead.

Challenges

TechnipFMC's complete line of pumps for the oil and gas industry are designed to perform better, last longer, and operate flawlessly under the most difficult conditions.

The oil and gas industry presents many challenges and opportunities regarding the use of pumps. The applications may be different, but the underlying principles are the same: you must have reliable, tough and quality pumps to get the job done.

Unlike other pumps in the oil and gas market, TechnipFMC's API 674 pumps will improve your bottom line saving you time and money. This is accomplished with recognized industry leading durability, and maintenance minded design resulting in simplified asset management and less downtime.

Because our pumps are designed specifically for applications within the oil and gas market segment, they are tested and re-tested under the same conditions that they will be performing in the field. The result: a time-tested line of pumps that are durable, field-proven, and innovative.

TechnipFMC has long been the leader in innovation. Because of this, our pumps are designed to have the lowest cost of ownership and highest return on investment in the industry.

How do we do it? Simple. We listen to our customers. Since the 1990s, the TechnipFMC team has worked to design, build, and continually perfect a broad offering of piston and plunger pumps that require less service, perform in demanding conditions, produce high flow rates, and have an extended life cycle.

In addition, we have a dedicated engineering department and a dedicated support network that partners with our customers to create solutions. Our in-house product Research and Development department is focused on designing products to ensure customer success. We work with you to customize your pump specifically to your requirements.

Applications

TechnipFMC's offers a diverse line of pumps for oil and gas, each with its own set of industry-leading features, including heavy-duty power ends paired with main journal roller bearings and heavy duty rod journal bearings, heavy-duty crankshafts, fluid cylinders designed so packing and valves are easily accessible, and customized pumps made to order. With pressure ranges up to 10,000 psi and flow rates up to 1,500 gpm, our pumps can handle any job in virtually any conditions.

For those in **BLOWOUT PREVENTION** who are looking for a solution to recurring downtime, our line of blowout prevention pumps feature an economic ductile iron fluid cylinder design.

SALTWATER DISPOSAL always has its own set of unique demands. For that segment of the industry, TechnipFMC offers pumps with desirable options such as Cast aluminum bronze and forged duplex SST fluid cylinders with the option for a lubricated stuffing box, which will provide years of service to your production site.

TechnipFMC's API 674-3rd Edition pumps in both the **PIPELINE BOOSTING** process and the **POLYMER INJECTION** process will also improve your bottom line because of the speed and ease of maintenance. The most durable pump on the market has duplex SST fluid cylinders, abrasive resistant valve design and crosshead lubrication to allow our pumps to operate at a slower RPM.

Our superior pumps also address the **GLYCOL INJECTION/DEHYDRATION** process as well. The TechnipFMC line of glycol injection/dehydration pumps have high temp capability utilizing metal-seated valve designs and leak return-to-suction.

All of our pumps are supported by a staff of dedicated engineers, customer service professionals and others who use a team approach to maximize proven solutions to whatever situation may arise.

Page number	Pump series	Model	Rated pressure (psi)	Continuous duty capacity	Intermittent duty capacity	Gallons per revolution	DI	AB	CS	AS	DX
10	**D04 2.7/3.2 HP**	D0404	4,000	0.85 GPM @ 500 RPM	1.02 GPM @ 600 RPM	0.0017				▸	
		D0406	2,630	1.91 GPM @ 500 RPM	2.29 GPM @ 600 RPM	0.0038			▸	▸	▸
		D0408	1,480	3.40 GPM @ 500 RPM	4.08 GPM @ 600 RPM	0.0068			▸	▸	▸
		D0410	950	5.31 GPM @ 500 RPM	6.37 GPM @ 600 RPM	0.0106			▸	▸	▸
12	**M06 16.6/20.9 HP**	M0604	10,000	1.8 GPM @ 475 RPM	2.3 GPM @ 600 RPM	0.0038				▸	
		M0605	8,800	2.9 GPM @ 475 RPM	3.6 GPM @ 600 RPM	0.0060				▸	
		M0606	6,100	4.1 GPM @ 475 RPM	5.2 GPM @ 600 RPM	0.0086			▸	▸	▸
		M0608	3,400	7.3 GPM @ 475 RPM	9.2 GPM @ 600 RPM	0.0153	▸		▸	▸	▸
		M0610	2,200	11.4 GPM @ 475 RPM	14.3 GPM @ 600 RPM	0.0239	▸		▸	▸	▸
		M0612	1,500	16.3 GPM @ 475 RPM	20.6 GPM @ 600 RPM	0.0344	▸		▸	▸	▸
		M0614	1,120	22.3 GPM @ 475 RPM	28.1 GPM @ 600 RPM	0.0469	▸		▸	▸	▸
		M0615	1,000	25.6 GPM @ 475 RPM	32.3 GPM @ 600 RPM	0.0538	▸		▸	▸	▸
16	**M08 34/45 HP**	M0806	10,000	5.2 GPM @ 450 RPM	6.9 GPM @ 600 RPM	0.0115				▸	
		M0807	7,400	7.0 GPM @ 450 RPM	9.4 GPM @ 600 RPM	0.0156				▸	
		M0808	5,650	9.0 GPM @ 450 RPM	12.2 GPM @ 600 RPM	0.0204				▸	▸
		M0810	3,620	14.4 GPM @ 450 RPM	19.1 GPM @ 600 RPM	0.0319	▸		▸	▸	▸
		M0812	2,250	20.7 GPM @ 450 RPM	27.5 GPM @ 600 RPM	0.0459	▸	▸	▸	▸	▸
		M0814	1,850	28.1 GPM @ 450 RPM	37.5 GPM @ 600 RPM	0.0625	▸	▸	▸	▸	▸
		M0816	1,420	36.7 GPM @ 450 RPM	49.0 GPM @ 600 RPM	0.0816	▸	▸	▸	▸	▸
		M0818	1,120	46.5 GPM @ 450 RPM	62.0 GPM @ 600 RPM	0.1033	▸	▸	▸	▸	▸
		M0820	915	57.4 GPM @ 450 RPM	76.5 GPM @ 600 RPM	0.1275	▸	▸	▸	▸	▸
20	**M12 62/77 HP**	M1207	10,000	9.4 GPM @ 400 RPM	11.7 GPM @ 500 RPM	0.0234				▸	
		M1208	7,600	12.2 GPM @ 400 RPM	15.3 GPM @ 500 RPM	0.0306				▸	
		M1210	4,900	19.1 GPM @ 400 RPM	23.9 GPM @ 500 RPM	0.0478			▸	▸	▸
		M1212	3,400	27.5 GPM @ 400 RPM	34.4 GPM @ 500 RPM	0.0688	▸	▸	▸	▸	▸
		M1214	2,500	37.5 GPM @ 400 RPM	46.9 GPM @ 500 RPM	0.0937	▸	▸	▸	▸	▸
		M1216	1,900	49.0 GPM @ 400 RPM	61.2 GPM @ 500 RPM	0.1224	▸	▸	▸	▸	▸
		M1218	1,500	62.0 GPM @ 400 RPM	77.5 GPM @ 500 RPM	0.1549	▸	▸	▸	▸	▸
		M1220	1,250	76.5 GPM @ 400 RPM	95.6 GPM @ 500 RPM	0.1912	▸	▸	▸	▸	▸
		M1222	1,000	92.6 GPM @ 400 RPM	115.7 GPM @ 500 RPM	0.2314	▸	▸	▸	▸	▸
		M1224	850 1	10.2 GPM @ 400 RPM	137.7 GPM @ 500 RPM	0.2754	▸	▸	▸	▸	▸
24	**M13 84/108 HP**	M1308	10,000	12.8 GPM @ 387 RPM	16.6 GPM @ 500 RPM	0.0332				▸	
		M1310	6,450	20.0 GPM @ 387 RPM	25.9 GPM @ 500 RPM	0.0518				▸	
		M1312	4,470	28.9 GPM @ 387 RPM	37.3 GPM @ 500 RPM	0.0746			▸	▸	▸
		M1314	3,280	39.3 GPM @ 387 RPM	50.8 GPM @ 500 RPM	0.1015	▸	▸	▸	▸	▸
		M1316	2,500	51.3 GPM @ 387 RPM	66.3 GPM @ 500 RPM	0.1326	▸	▸	▸	▸	▸
		M1318	2,000	65.0 GPM @ 387 RPM	83.9 GPM @ 500 RPM	0.1678	▸	▸	▸	▸	▸
		M1320	1,600	80.2 GPM @ 387 RPM	103.6 GPM @ 500 RPM	0.2072	▸	▸	▸	▸	▸
		M1322	1,330	97.0 GPM @ 387 RPM	125.4 GPM @ 500 RPM	0.2507	▸	▸	▸	▸	▸
		M1324	1,120	115.5 GPM @ 387 RPM	149.2 GPM @ 500 RPM	0.2983	▸	▸	▸	▸	▸
		M1326	950	135.5 GPM @ 387 RPM	175.1 GPM @ 500 RPM	0.3501	▸	▸	▸	▸	▸

DI Cast ductile iron

CS Forged carbon steel

DX Forged duplex stainless steel

AB Cast aluminum bronze

AS Forged alloy steel

Page number	Pump series	Model	Rated pressure (psi)	Continuous duty capacity	Intermittent duty capacity	Gallons per revolution	DI	AB	CS	AS	DX
26	**M14 88/104 HP**	M1408	10,000	13.4 GPM @ 375 RPM	15.5 GPM @ 425 RPM	0.0357				▸	
		M1410	6,500	20.9 GPM @ 375 RPM	23.7 GPM @ 425 RPM	0.0558			▸	▸	▸
		M1412	4,500	30.1 GPM @ 375 RPM	34.1 GPM @ 425 RPM	0.0803			▸	▸	▸
		M1414	3,300	41.0 GPM @ 375 RPM	46.5 GPM @ 425 RPM	0.1093			▸	▸	▸
		M1416	2,500	53.6 GPM @ 375 RPM	60.7 GPM @ 425 RPM	0.1428			▸	▸	▸
		M1418	2,000	67.8 GPM @ 375 RPM	76.8 GPM @ 425 RPM	0.1807	▸		▸	▸	▸
		M1420	1,600	83.7 GPM @ 375 RPM	94.8 GPM @ 425 RPM	0.2231	▸		▸	▸	▸
		M1422	1,350	101.3 GPM @ 375 RPM	114.8 GPM @ 425 RPM	0.2700	▸		▸	▸	▸
		M1424	1,150	120.5 GPM @ 375 RPM	136.6 GPM @ 425 RPM	0.3213	▸		▸	▸	▸
		M1426	1,000	141.4 GPM @ 375 RPM	160.3 GPM @ 425 RPM	0.3771	▸		▸	▸	▸
		M1428	825	164.0 GPM @ 375 RPM	185.9 GPM @ 425 RPM	0.4373	▸		▸	▸	▸
		M1430	725	188.3 GPM @ 375 RPM	213.4 GPM @ 425 RPM	0.5020	▸		▸	▸	▸
		M1432	630	214.2 GPM @ 375 RPM	242.7 GPM @ 425 RPM	0.5712	▸		▸	▸	▸
30	**M16 117/142 HP**	M1609	10,000	18.1 GPM @ 350 RPM	21.9 GPM @ 425 RPM	0.0516				▸	
		M1610	8,000	22.3 GPM @ 350 RPM	27.1 GPM @ 425 RPM	0.0637				▸	▸
		M1612	5,500	32.1 GPM @ 350 RPM	39.0 GPM @ 425 RPM	0.0918				▸	▸
		M1614	4,065	43.7 GPM @ 350 RPM	53.1 GPM @ 425 RPM	0.1249			▸	▸	▸
		M1616	3,115	57.1 GPM @ 350 RPM	69.4 GPM @ 425 RPM	0.1632	▸		▸	▸	▸
		M1618	2,460	72.3 GPM @ 350 RPM	87.8 GPM @ 425 RPM	0.2065	▸		▸	▸	▸
		M1620	1,990	89.3 GPM @ 350 RPM	108.4 GPM @ 425 RPM	0.2550	▸	▸	▸	▸	▸
		M1622	1,650	108.0 GPM @ 350 RPM	131.1 GPM @ 425 RPM	0.3085	▸	▸	▸	▸	▸
		M1624	1,385	128.5 GPM @ 350 RPM	156.1 GPM @ 425 RPM	0.3672	▸	▸	▸	▸	▸
		M1626	1,180	150.8 GPM @ 350 RPM	183.1 GPM @ 425 RPM	0.4309	▸	▸	▸	▸	▸
		M1628	1,015	174.9 GPM @ 350 RPM	212.4 GPM @ 425 RPM	0.4998	▸	▸	▸	▸	▸
		M1630	885	200.8 GPM @ 350 RPM	243.8 GPM @ 425 RPM	0.5737	▸	▸	▸	▸	▸
		M1632	775	228.5 GPM @ 350 RPM	277.4 GPM @ 425 RPM	0.6528	▸	▸	▸	▸	▸
		M1634	650	257.9 GPM @ 350 RPM	313.2 GPM @ 425 RPM	0.7369	▸	▸	▸	▸	▸
		M1636	570	289.2 GPM @ 350 RPM	351.1 GPM @ 425 RPM	0.8262	▸	▸	▸	▸	▸
34	**M18 150/190 HP**	M1810	9,800	23.7 GPM @ 330 RPM	28.7 GPM @ 400 RPM	0.0717				▸	
		M1812	6,800	34.1 GPM @ 330 RPM	41.3 GPM @ 400 RPM	0.1033				▸	▸
		M1814	5,000	46.4 GPM @ 330 RPM	56.2 GPM @ 400 RPM	0.1406			▸	▸	▸
		M1816	3,800	60.6 GPM @ 330 RPM	73.4 GPM @ 400 RPM	0.1836			▸	▸	▸
		M1818	3,000	76.7 GPM @ 330 RPM	93.0 GPM @ 400 RPM	0.2324	▸		▸	▸	▸
		M1820	2,400	94.7 GPM @ 330 RPM	114.8 GPM @ 400 RPM	0.2869	▸		▸	▸	▸
		M1822	2,000	114.5 GPM @ 330 RPM	138.8 GPM @ 400 RPM	0.3471	▸	▸	▸	▸	▸
		M1824	1,700	136.3 GPM @ 330 RPM	165.2 GPM @ 400 RPM	0.4131	▸	▸	▸	▸	▸
		M1826	1,400	160.0 GPM @ 330 RPM	193.9 GPM @ 400 RPM	0.4848	▸	▸	▸	▸	▸
		M1828	1,200	185.6 GPM @ 330 RPM	224.9 GPM @ 400 RPM	0.5623	▸	▸	▸	▸	▸
		M1830	1,100	213.0 GPM @ 330 RPM	258.2 GPM @ 400 RPM	0.6455	▸	▸	▸	▸	▸
		M1832	1,000	242.4 GPM @ 330 RPM	293.8 GPM @ 400 RPM	0.7344	▸	▸	▸	▸	▸
		M1834	800	273.6 GPM @ 330 RPM	331.6 GPM @ 400 RPM	0.8291	▸	▸	▸	▸	▸
		M1836	750	306.7 GPM @ 330 RPM	371.8 GPM @ 400 RPM	0.9295	▸	▸	▸	▸	▸

DI Cast ductile iron

CS Forged carbon steel

DX Forged duplex stainless steel

AB Cast aluminum bronze

AS Forged alloy steel

Page number	Pump series	Model	Rated pressure (psi)	Continuous duty capacity	Intermittent duty capacity	Gallons per revolution	DI	AB	CS	AS	DX
38	**Q16 198/240 HP**	Q1609	10,000	30.1 GPM @ 350 RPM	36.6 GPM @ 425 RPM	0.0861				▸	
		Q1610	8,150	37.2 GPM @ 350 RPM	45.1 GPM @ 425 RPM	0.1062				▸	▸
		Q1612	5,650	53.6 GPM @ 350 RPM	65.0 GPM @ 425 RPM	0.1530				▸	▸
		Q1614	4,160	72.9 GPM @ 350 RPM	88.5 GPM @ 425 RPM	0.2082			▸	▸	▸
		Q1616	3,190	95.2 GPM @ 350 RPM	115.6 GPM @ 425 RPM	0.2720		▸	▸	▸	▸
		Q1618	2,520	120.5 GPM @ 350 RPM	146.3 GPM @ 425 RPM	0.3442		▸	▸	▸	▸
		Q1620	2,040	148.8 GPM @ 350 RPM	180.6 GPM @ 425 RPM	0.4250	▸	▸	▸	▸	▸
		Q1622	1,690	180.0 GPM @ 350 RPM	218.5 GPM @ 425 RPM	0.5142	▸	▸	▸	▸	▸
		Q1624	1,420	214.2 GPM @ 350 RPM	260.1 GPM @ 425 RPM	0.6120	▸	▸	▸	▸	▸
		Q1626	1,210	251.4 GPM @ 350 RPM	305.2 GPM @ 425 RPM	0.7182	▸	▸	▸	▸	▸
		Q1628	1,040	291.6 GPM @ 350 RPM	354.0 GPM @ 425 RPM	0.8330	▸	▸	▸	▸	▸
		Q1630	910	334.7 GPM @ 350 RPM	406.4 GPM @ 425 RPM	0.9562	▸	▸	▸	▸	▸
		Q1632	800	380.8 GPM @ 350 RPM	462.4 GPM @ 425 RPM	1.0880	▸	▸	▸	▸	▸
		Q1634	710	429.9 GPM @ 350 RPM	522.0 GPM @ 425 RPM	1.2282	▸	▸	▸	▸	▸
		Q1636	630	482.0 GPM @ 350 RPM	585.2 GPM @ 425 RPM	1.3770	▸	▸	▸	▸	▸
42	**Q18 265/325 HP**	Q1811	8,400	47.7 GPM @ 330 RPM	57.8 GPM @ 400 RPM	0.1446				▸	
		Q1812	7,100	56.8 GPM @ 330 RPM	68.8 GPM @ 400 RPM	0.1721				▸	▸
		Q1814	5,200	77.3 GPM @ 330 RPM	93.7 GPM @ 400 RPM	0.2343				▸	▸
		Q1816	4,000	101.0 GPM @ 330 RPM	122.4 GPM @ 400 RPM	0.3060			▸	▸	▸
		Q1818	3,100	127.8 GPM @ 330 RPM	154.9 GPM @ 400 RPM	0.3873			▸	▸	▸
		Q1820	2,500	157.8 GPM @ 330 RPM	191.2 GPM @ 400 RPM	0.4781			▸	▸	▸
		Q1822	2,100	190.9 GPM @ 330 RPM	231.4 GPM @ 400 RPM	0.5785	▸	▸	▸	▸	▸
		Q1824	1,800	227.2 GPM @ 330 RPM	275.4 GPM @ 400 RPM	0.6885	▸	▸	▸	▸	▸
		Q1826	1,500	266.6 GPM @ 330 RPM	323.2 GPM @ 400 RPM	0.8080	▸	▸	▸	▸	▸
		Q1828	1,300	309.2 GPM @ 330 RPM	374.8 GPM @ 400 RPM	0.9371	▸	▸	▸	▸	▸
		Q1830	1,100	355.0 GPM @ 330 RPM	430.3 GPM @ 400 RPM	1.0758	▸	▸	▸	▸	▸
		Q1832	1,000	403.9 GPM @ 330 RPM	489.6 GPM @ 400 RPM	1.2240	▸	▸	▸	▸	▸
		Q1834	900	456.0 GPM @ 330 RPM	552.7 GPM @ 400 RPM	1.3818	▸	▸	▸	▸	▸
		Q1836	800	511.2 GPM @ 330 RPM	619.6 GPM @ 400 RPM	1.5491	▸	▸	▸	▸	▸
46	**M28 350/440 HP**	M2812	10,000	38.5 GPM @ 240 RPM	48.2 GPM @ 300 RPM	0.1606				▸	
		M2814	10,000	52.5 GPM @ 240 RPM	65.6 GPM @ 300 RPM	0.2187				▸	
		M2816	7,960	68.5 GPM @ 240 RPM	85.7 GPM @ 300 RPM	0.2856				▸	▸
		M2818	6,300	86.8 GPM @ 240 RPM	108.5 GPM @ 300 RPM	0.3615				▸	▸
		M2820	5,100	107.1 GPM @ 240 RPM	133.9 GPM @ 300 RPM	0.4462			▸	▸	▸
		M2822	4,200	129.6 GPM @ 240 RPM	162.0 GPM @ 300 RPM	0.5400			▸	▸	▸
		M2824	3,540	154.2 GPM @ 240 RPM	192.8 GPM @ 300 RPM	0.6426			▸	▸	▸
		M2826	3,015	181.0 GPM @ 240 RPM	226.3 GPM @ 300 RPM	0.7542			▸	▸	▸
		M2828	2,600	209.9 GPM @ 240 RPM	262.4 GPM @ 300 RPM	0.8746			▸	▸	▸
		M2830	2,260	241.0 GPM @ 240 RPM	301.2 GPM @ 300 RPM	1.0041			▸	▸	▸
		M2832	1,990	274.2 GPM @ 240 RPM	342.7 GPM @ 300 RPM	1.1424			▸	▸	▸
		M2834	1,760	309.5 GPM @ 240 RPM	386.9 GPM @ 300 RPM	1.2897			▸	▸	▸
		M2836	1,570	347.0 GPM @ 240 RPM	433.7 GPM @ 300 RPM	1.4458			▸	▸	▸
		M2838	1,400	386.6 GPM @ 240 RPM	483.3 GPM @ 300 RPM	1.6110			▸	▸	▸
		M2840	1,275	428.4 GPM @ 240 RPM	535.5 GPM @ 300 RPM	1.7850			▸	▸	▸
		M2842	1,155	472.3 GPM @ 240 RPM	590.4 GPM @ 300 RPM	1.9680			▸	▸	▸
		M2844	1,050	518.4 GPM @ 240 RPM	647.9 GPM @ 300 RPM	2.1598			▸	▸	▸
		M2846	960	566.6 GPM @ 240 RPM	708.2 GPM @ 300 RPM	2.3607			▸	▸	▸
		M2848	880	616.9 GPM @ 240 RPM	771.1 GPM @ 300 RPM	2.5704			▸	▸	▸
		M2850	815	669.4 GPM @ 240 RPM	836.7 GPM @ 300 RPM	2.7891			▸	▸	▸

Page number	Pump series	Model	Rated pressure (psi)	Continuous duty capacity	Intermittent duty capacity	Gallons per revolution	DI	AB	CS	AS	DX
50	**Q28 650/800 HP**	Q2814	10,000	87.5 GPM @ 240 RPM	109.3 GPM @ 300 RPM	0.3644			▸		
		Q2816	8,750	114.2 GPM @ 240 RPM	142.8 GPM @ 300 RPM	0.4760			▸		
		Q2818	6,920	144.6 GPM @ 240 RPM	180.7 GPM @ 300 RPM	0.6024			▸	▸	
		Q2820	5,600	178.5 GPM @ 240 RPM	223.1 GPM @ 300 RPM	0.7437			▸	▸	
		Q2822	4,630	216.0 GPM @ 240 RPM	270.0 GPM @ 300 RPM	0.8999		▸	▸	▸	
		Q2824	3,890	257.0 GPM @ 240 RPM	321.3 GPM @ 300 RPM	1.0710		▸	▸	▸	
		Q2826	3,310	301.7 GPM @ 240 RPM	377.1 GPM @ 300 RPM	1.2569		▸	▸	▸	
		Q2828	2,860	349.8 GPM @ 240 RPM	437.3 GPM @ 300 RPM	1.4577		▸	▸	▸	
		Q2830	2,490	401.6 GPM @ 240 RPM	502.0 GPM @ 300 RPM	1.6734		▸	▸	▸	
		Q2832	2,190	457.0 GPM @ 240 RPM	571.2 GPM @ 300 RPM	1.9040		▸	▸	▸	
		Q2834	1,940	515.9 GPM @ 240 RPM	644.8 GPM @ 300 RPM	2.1494		▸	▸	▸	
		Q2836	1,730	578.3 GPM @ 240 RPM	722.9 GPM @ 300 RPM	2.4097		▸	▸	▸	
		Q2838	1,550	644.4 GPM @ 240 RPM	805.5 GPM @ 300 RPM	2.6849		▸	▸	▸	
		Q2840	1,400	714.0 GPM @ 240 RPM	892.5 GPM @ 300 RPM	2.9750		▸	▸	▸	
		Q2842	1,270	787.2 GPM @ 240 RPM	984.0 GPM @ 300 RPM	3.2799		▸	▸	▸	
		Q2844	1,160	863.9 GPM @ 240 RPM	1,079.9 GPM @ 300 RPM	3.5997		▸	▸	▸	
		Q2846	1,060	944.3 GPM @ 240 RPM	1,180.3 GPM @ 300 RPM	3.9344		▸	▸	▸	
		Q2848	970	1,028.2 GPM @ 240 RPM	1,285.2 GPM @ 300 RPM	4.2840		▸	▸	▸	
		Q2850	900	1,115.6 GPM @ 240 RPM	1,394.5 GPM @ 300 RPM	4.6484		▸	▸	▸	
54	**Q32 700/1,000 HP**	Q3214	10,000	87.5 GPM @ 210 RPM	125.0 GPM @ 300 RPM	0.4165			▸		
		Q3216	9,550	114.2 GPM @ 210 RPM	163.2 GPM @ 300 RPM	0.5440			▸		
		Q3218	7,500	144.6 GPM @ 210 RPM	206.6 GPM @ 300 RPM	0.6885			▸		
		Q3220	6,125	178.5 GPM @ 210 RPM	255.0 GPM @ 300 RPM	0.8500			▸		
		Q3222	5,050	216.0 GPM @ 210 RPM	308.6 GPM @ 300 RPM	1.0285		▸	▸	▸	
		Q3224	4,250	257.0 GPM @ 210 RPM	367.2 GPM @ 300 RPM	1.2240		▸	▸	▸	
		Q3226	3,620	301.7 GPM @ 210 RPM	431.0 GPM @ 300 RPM	1.4365		▸	▸	▸	
		Q3228	3,125	349.9 GPM @ 210 RPM	499.8 GPM @ 300 RPM	1.6660		▸	▸	▸	
		Q3230	2,720	401.6 GPM @ 210 RPM	573.8 GPM @ 300 RPM	1.9125		▸	▸	▸	
		Q3232	2,390	457.0 GPM @ 210 RPM	652.8 GPM @ 300 RPM	2.1760		▸	▸	▸	
		Q3234	2,110	515.9 GPM @ 210 RPM	737.0 GPM @ 300 RPM	2.4565		▸	▸	▸	
		Q3236	1,890	578.3 GPM @ 210 RPM	826.2 GPM @ 300 RPM	2.7540		▸	▸	▸	
		Q3238	1,690	644.4 GPM @ 210 RPM	920.6 GPM @ 300 RPM	3.0685		▸	▸	▸	
		Q3240	1,530	714.0 GPM @ 210 RPM	1,020.0 GPM @ 300 RPM	3.4000		▸	▸	▸	
		Q3242	1,390	787.2 GPM @ 210 RPM	1,124.6 GPM @ 300 RPM	3.7485		▸	▸	▸	
		Q3244	1,260	863.9 GPM @ 210 RPM	1,234.2 GPM @ 300 RPM	4.1140		▸	▸	▸	
		Q3246	1,160	944.3 GPM @ 210 RPM	1,349.0 GPM @ 300 RPM	4.4965		▸	▸	▸	
		Q3248	1,060	1,028.2 GPM @ 210 RPM	1,468.8 GPM @ 300 RPM	4.8960		▸	▸	▸	
		Q3250	980	1,115.5 GPM @ 210 RPM	1,593.8 GPM @ 300 RPM	5.3125		▸	▸	▸	

DI Cast ductile iron

CS Forged carbon steel

DX Forged duplex stainless steel

AB Cast aluminum bronze

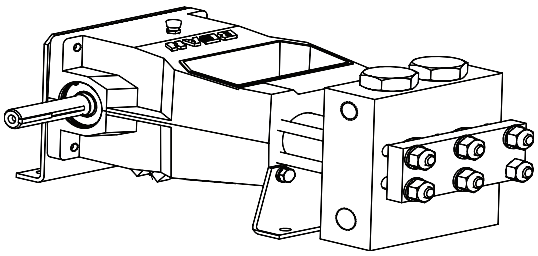
AS Forged alloy steel

D04

Specifications

Design Standard	API-674, Third Edition
Configuration	Horizontal Duplex Plunger
Number of Plungers	2
Continuous Duty	3.3 BHP
Intermittent Duty	3.9 BHP
Stroke Length	1.0 Inches
Frame Load Rating	1,162 lbs
Pump Weight (Average)	75 lbs
Intermittent Duty Speed Rating	600 RPM
Continuous Duty Speed Rating	500 RPM
Minimum Speed	25 RPM
Mechanical Efficiency	90%
Lubrication System	Splash, Gravity Return
Crankcase Oil Capacity	1 Quart
Lube Oil Type	SAE 30
Fluid Temperature Range	-20 to 350 °F
Valve Type	Disc Valve

Forged ISO drawing



Standard connection sizes

Pump Model	Suction (in)	Discharge (in)
D0404 - D0408	0.75 - NPT	0.50 - NPT
D0410	1.0 - NPT	0.75 - NPT

NPT connections available

Fluid cylinder materials

Forged	Cast
A350-LF2 Carbon Steel	Not Currently Available
Hi-Strength CArbon Alloy Steel	
2205 Duplex Stainless Steel	

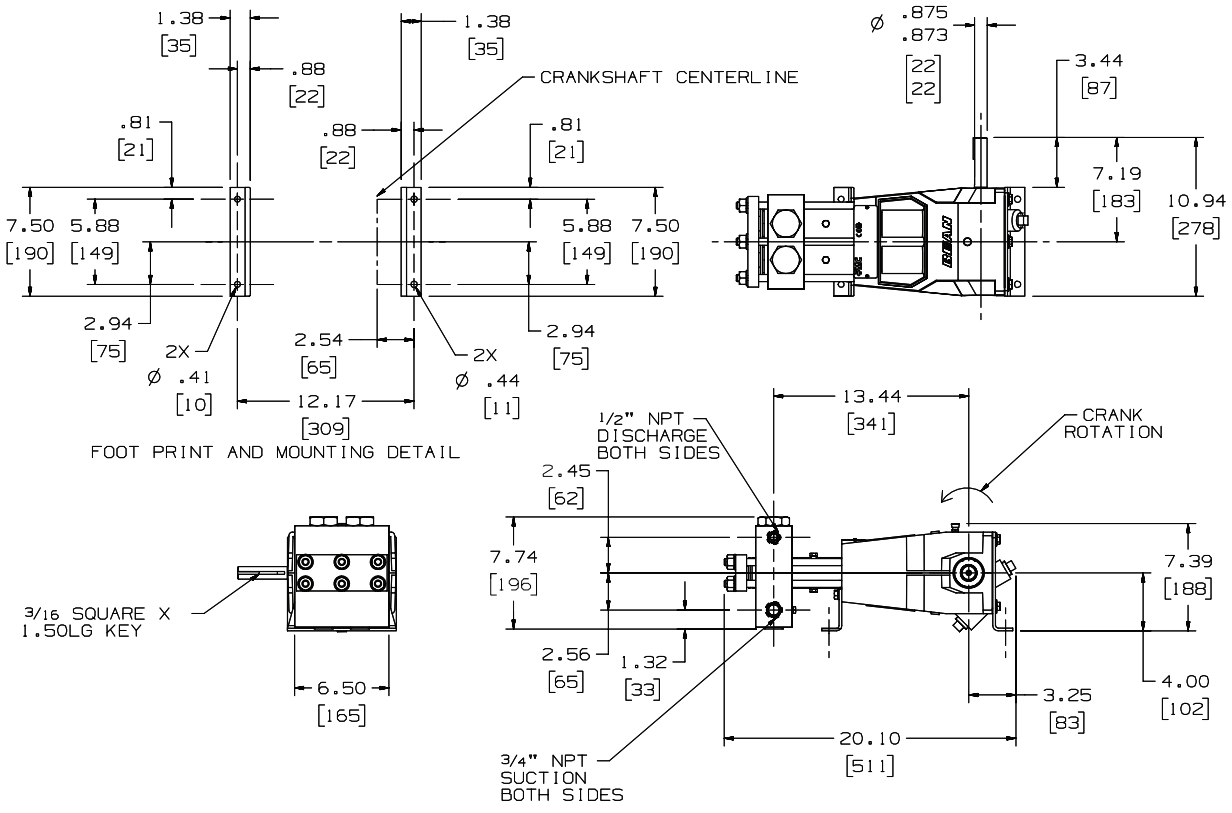
Special materials available on request

Performance data

Pump Model	Plunger Diameter (in)	Displacement (GAL/REV)	Maximum Pressure (PSI)	Pump Capacity (GPM) @ Input Speed (RPM)				
				100 RPM	250 RPM	400 RPM	**500 RPM**	600 RPM
D0404	0.500	0.0017	4,000	0.17	0.42	0.68	**0.85**	1.02
D0406	0.750	0.0038	2,630	0.38	0.96	1.53	**1.91**	2.29
D0408	1.000	0.0068	1,480	0.68	1.70	2.72	**3.40**	4.08
D0410	1.250	.0106	950	1.06	2.66	4.25	**5.31**	6.37

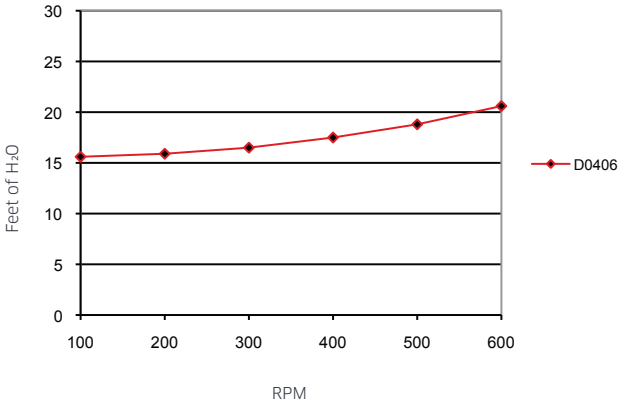
D04

Forged pump engineering dimensional outline



NPSHR value

Standard Disc Valves



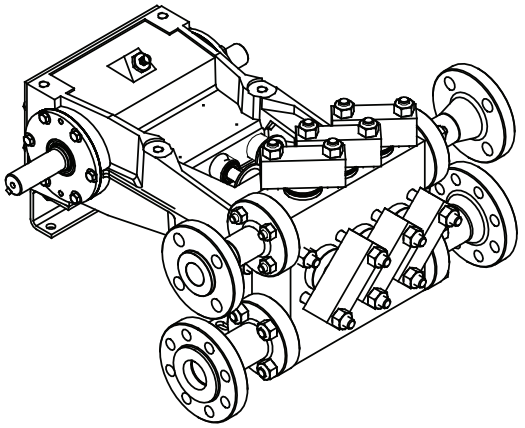
M06

Specifications

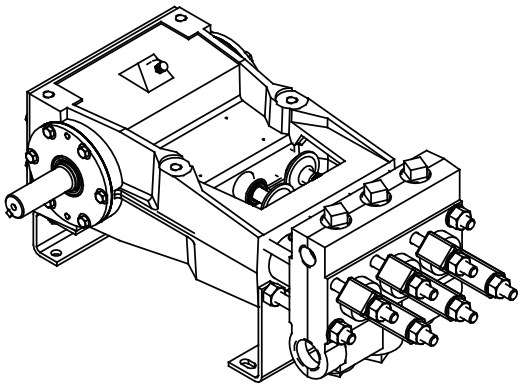
Design Standard	API-674, Third Edition
Configuration	Horizontal Triplex Plunger
Number of Plungers	3
Continuous Duty	16.6 BHP
Intermittent Duty	20.9 BHP
Stroke Length	1.5 Inches
Frame Load Rating	2,700 lbs
Pump Weight (Average)	245 lbs
Intermittent Duty Speed Rating	600 RPM
Continuous Duty Speed Rating	475 RPM
Minimum Speed *	100 RPM
Mechanical Efficiency	90%
Lubrication System	Splash, Gravity Return
Lubrication System (Optional)	Pressurized
Crankcase Oil Capacity	2 Quarts
Lube Oil Type	SAE 30
Fluid Temperature Range	-20 to 350 °F
Valve Types	Disc Valves, Abrasion Resistant Valves

Slower RPM can be achieved with the addition of a pressurized lubrication system

Forged ISO drawing



Cast ISO drawing



Performance data

Pump Model	Plunger Diameter (in)	Displacement (GAL/REV)	Maximum Pressure (PSI)	Pump Capacity (GPM) @ Input Speed (RPM)						
				100 RPM	200 RPM	300 RPM	400 RPM	**475 RPM**	500 RPM	600 RPM
M0604	0.500	0.0038	10,000	0.4	0.8	1.1	1.5	**1.8**	1.9	2.3
M0605	0.625	0.0060	8,800	0.6	1.2	1.8	2.4	**2.9**	3.0	3.6
M0606	0.750	0.0086	6,100	0.9	1.7	2.6	3.4	**4.1**	4.3	5.2
M0608	1.000	0.0153	3,400	1.5	3.1	4.6	6.1	**7.3**	7.7	9.2
M0610	1.250	0.0239	2,200	2.4	4.8	7.2	9.6	**11.4**	12.0	14.3
M0612	1.500	0.0344	1,500	3.4	6.9	10.3	13.8	**16.3**	17.2	20.6
M0614	1.750	0.0469	1,120	4.7	9.4	14.1	18.8	**22.3**	23.5	28.1
M0615	1.875	0.0538	1,000	5.4	10.8	16.1	21.5	**25.6**	26.9	32.3

M06

Standard connection sizes

Pump Model	Suction (in)	Discharge (in)
M0604-M0607	1.5	0.75
M0608-M0615	1.5	1.0
M0608-M0615 HV	2.0	1.5

NPT connections available

Fluid cylinder materials

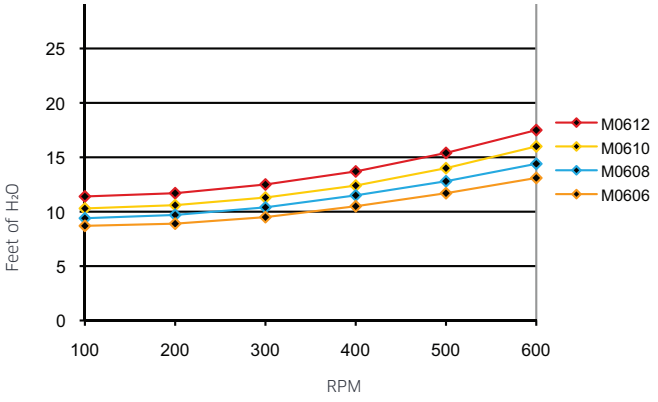
Forged	Cast
A350-LF2 Carbon Steel	Ductile Iron
Hi-Strength Carbon Alloy Steel	
2205 Duplex Stainless Steel	

Special materials available on request

M06 NPSHr values

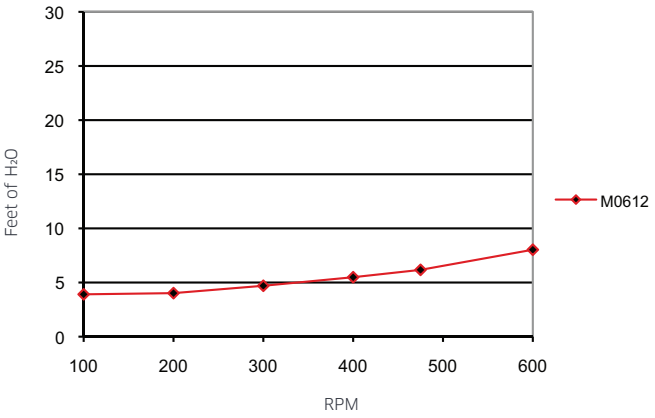
Disc Valves with 1-spring (Standard Stiffness)

For disc valves with stiff spring add 5tf.



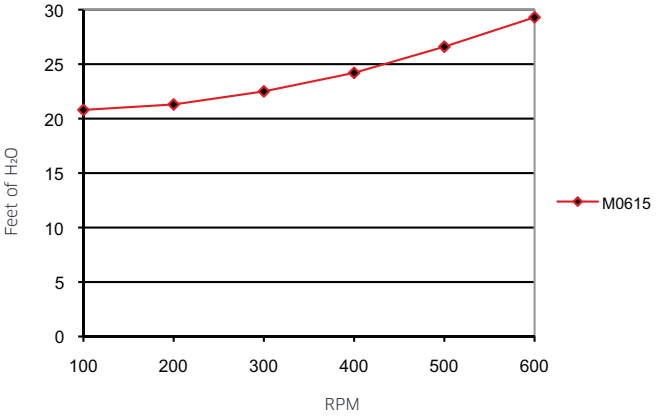
M0612 NPSHR Value

Disc Valves with 1-spring (Large Flow Valves)



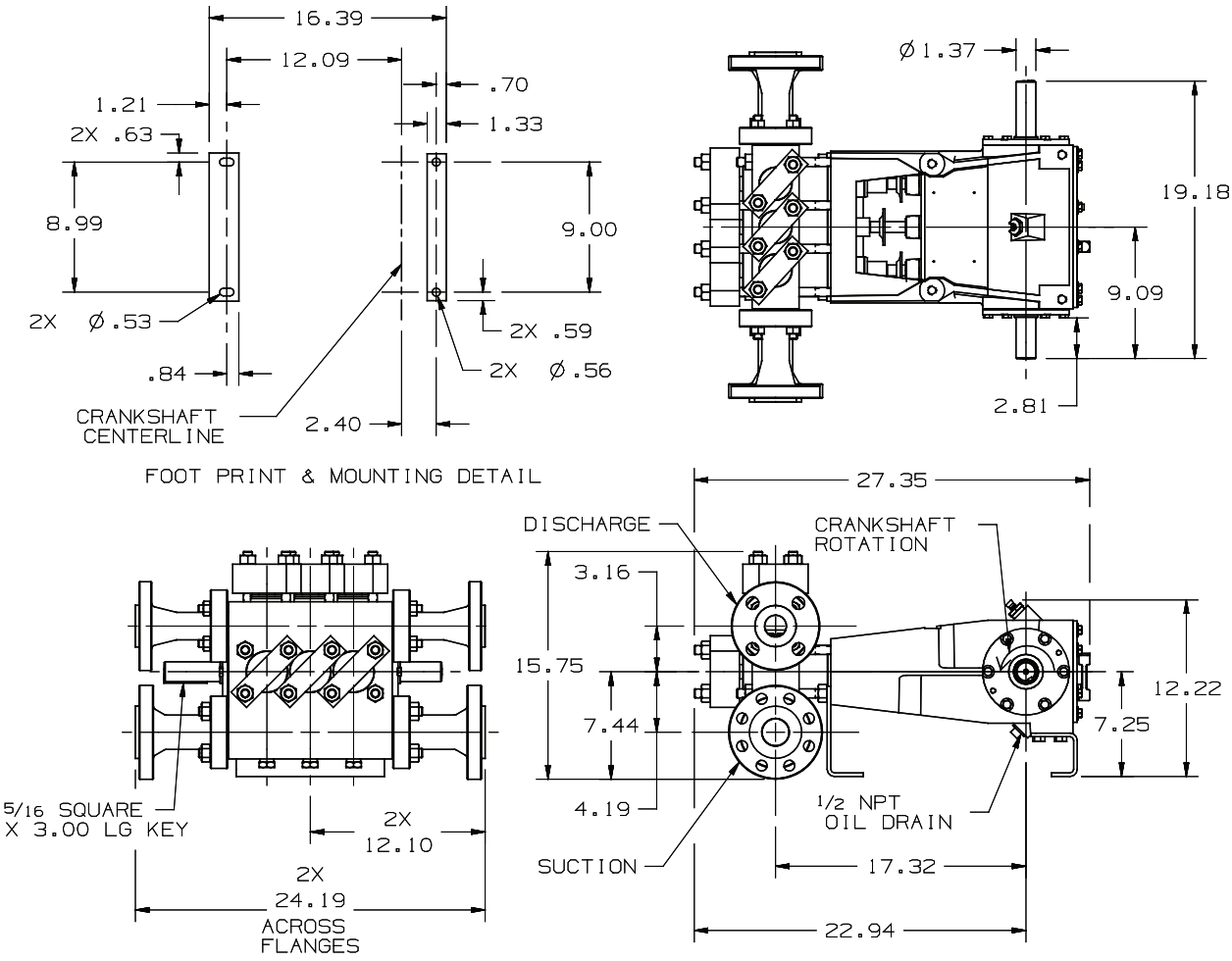
M0615 NPSHr values

Disc Valves with 1-spring



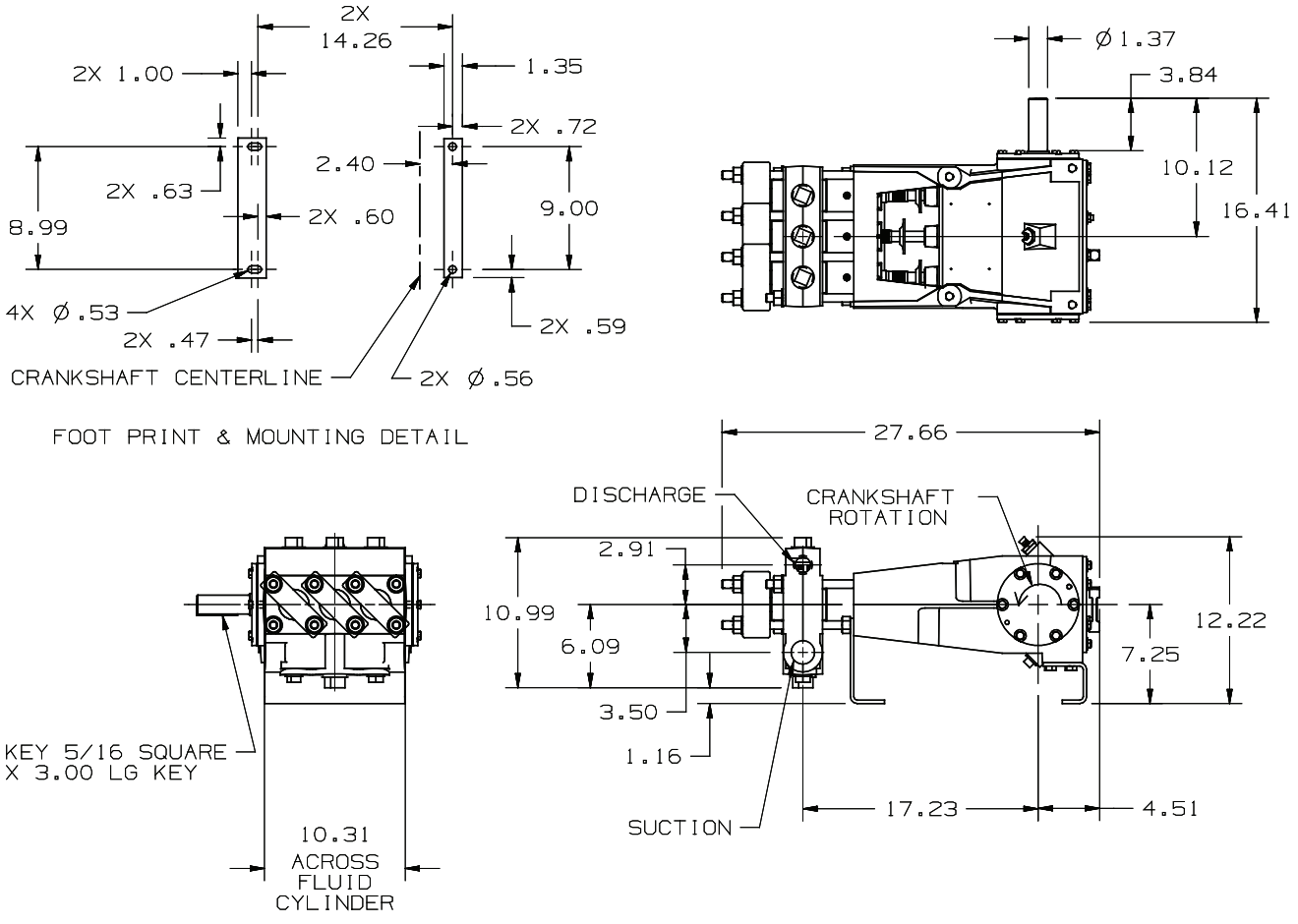
M06

Forged pump engineering dimensional outline



M06

Cast pump engineering dimensional outline



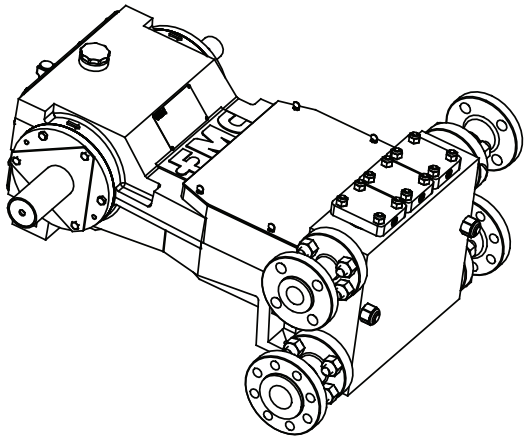
M08

Specifications

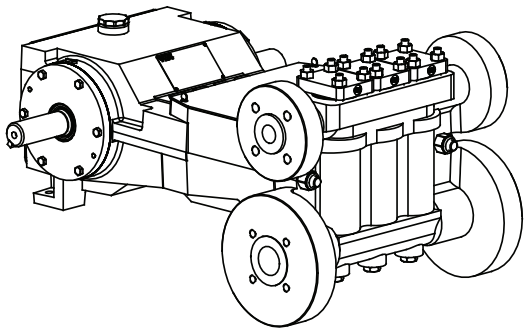
Design Standard	API-674, Third Edition
Configuration	Horizontal Triplex Plunger
Number of Plungers	3
Continuous Duty	34 BHP
Intermittent Duty	45 BHP
Stroke Length	2.0 Inches
Frame Load Rating	4,450 lbs
Pump Weight (Average)	550 lbs
Intermittent Duty Speed Rating	600 RPM
Continuous Duty Speed Rating	450 RPM
Minimum Speed *	100 RPM
Mechanical Efficiency	90%
Lubrication System	Splash, Gravity Return
Crankcase Oil Capacity	1.75 Gallons
Lube Oil Type	SAE 30
Fluid Temperature Range	-20 to 350 °F
Valve Types	Disc Valves, Abrasion Resistant Valves

Slower RPM can be achieved with the addition of a pressurized lubrication system

Forged ISO drawing



Cast ISO drawing



Performance data

Pump Model	Plunger Diameter (in)	Displacement (GAL/REV)	Maximum Pressure (PSI)	Pump Capacity (GPM) @ Input Speed (RPM)						
				100 RPM	200 RPM	300 RPM	400 RPM	**450 RPM**	500 RPM	600 RPM
M0806	0.750	0.0115	10,000	1.2	2.3	3.5	4.6	**5.2**	5.8	6.9
M0807	0.875	0.0156	7,400	1.6	3.1	4.7	6.2	**7.0**	7.8	9.4
M0808	1.000	0.0204	5,650	2.0	4.1	6.1	8.2	**9.2**	10.2	12.2
M0810	1.250	0.0319	3,620	3.2	6.4	9.6	12.8	**14.4**	16.0	19.1
M0812	1.500	0.0459	2,520	4.6	9.2	13.8	18.4	**20.7**	23.0	27.5
M0814	1.750	0.0625	1,850	6.3	12.5	18.8	25.0	**28.1**	31.3	37.5
M0816	2.000	0.0816	1,420	8.2	16.3	24.5	32.6	**36.7**	40.8	49.0
M0818	2.250	0.1033	1,120	10.3	20.7	31	41.3	**46.5**	51.7	62.0
M0820	2.500	0.1275	915	12.8	25.5	38.3	51.0	**57.4**	63.8	76.5

M08

Standard connection sizes

Pump Model	Suction (in)	Discharge (in)
M0806-M0808	1.5	0.75
M0809-M0820	2.0	1.5
M0815-M0820	2.5	1.5

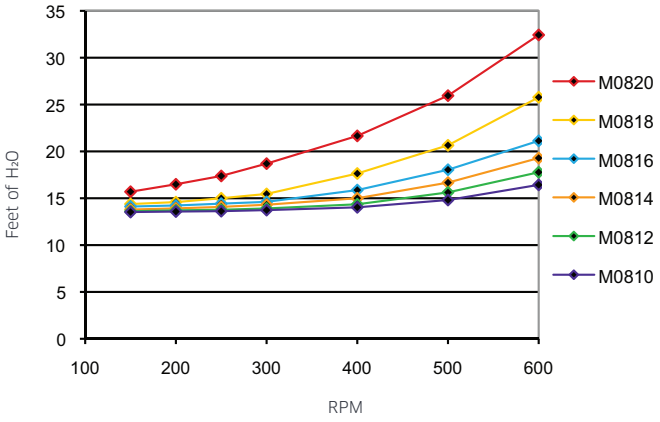
NPT connections available

Fluid cylinder materials

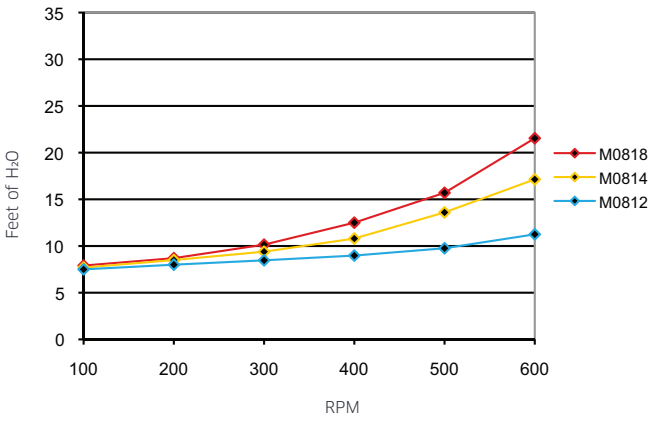
Forged	Cast
A350-LF2 Carbon Steel	Ductile Iron
Hi-Strength Carbon Alloy Steel	Aluminum Bronze
2205 Duplex Stainless Steel	

Special materials available on request

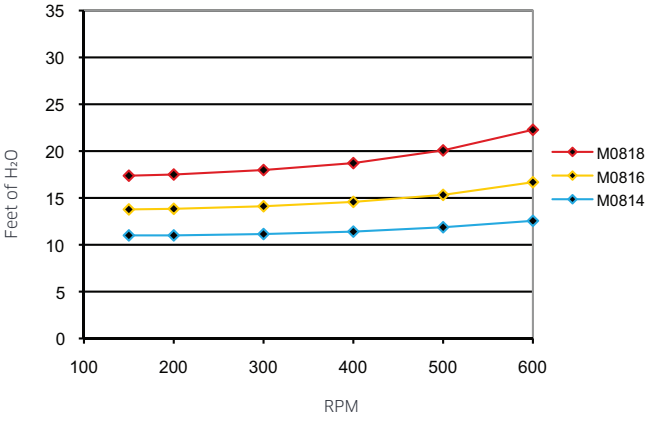
M08 NPSHr values
Disc Valves with 2-springs



M08 NPSHr values
AR Valves with 1-spring

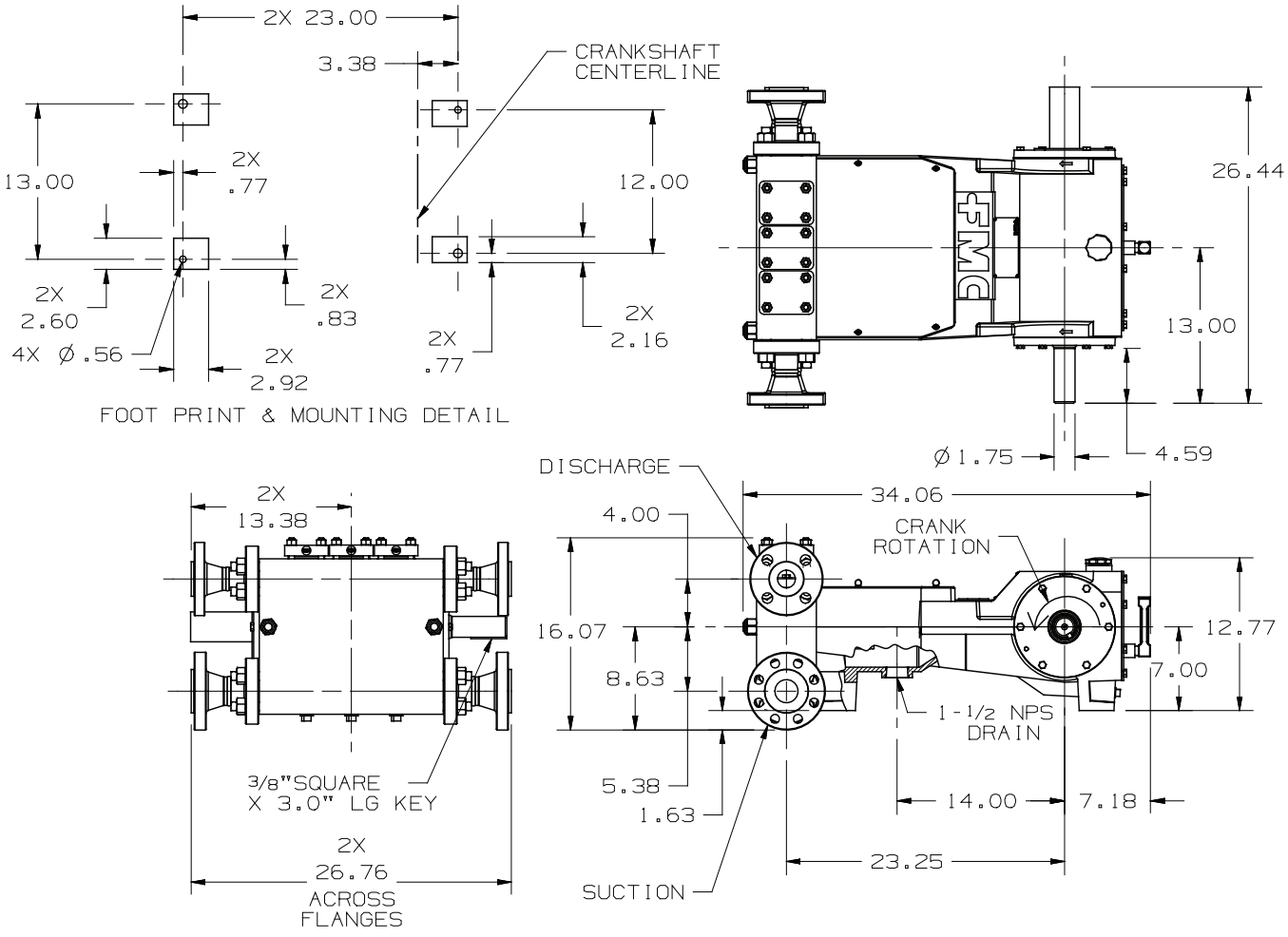


M08 NPSHr values
Disc Valves with 1-spring



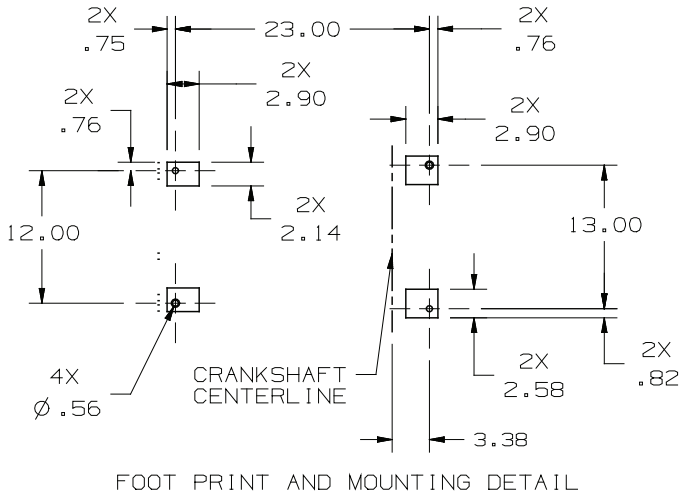
M08

Forged pump engineering dimensional outline

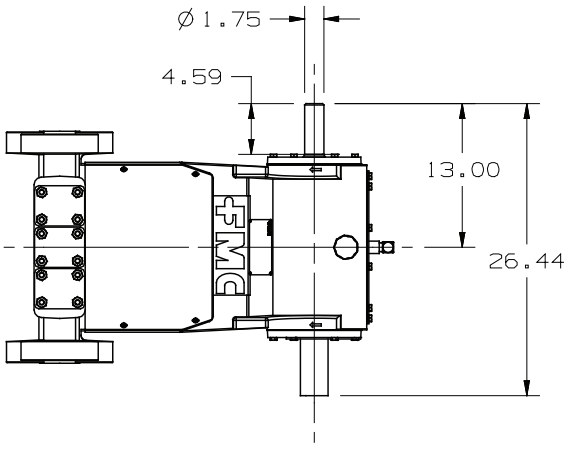


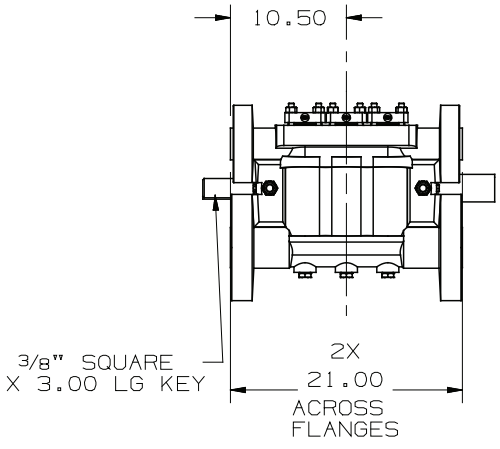
M08

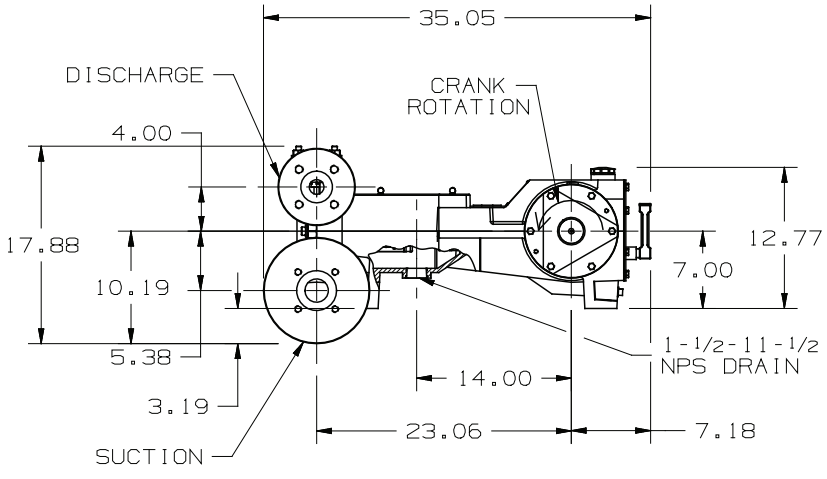
Cast pump engineering dimensional outline



FOOT PRINT AND MOUNTING DETAIL







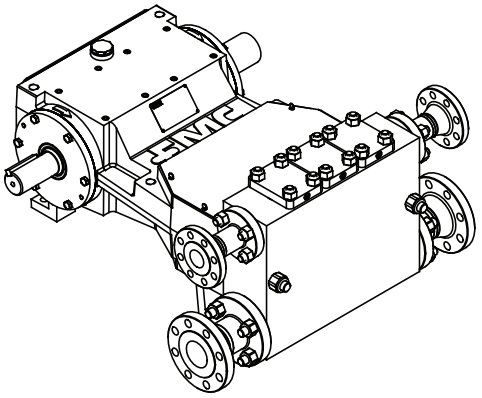
M12

Specifications

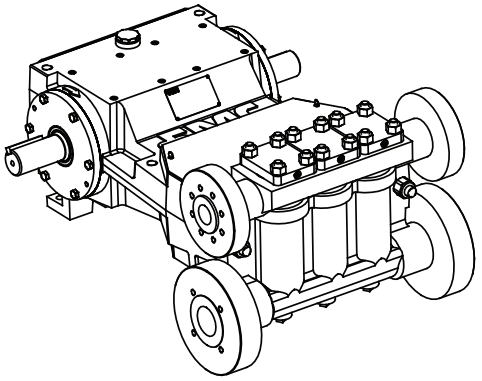
Design Standard	API-674, Third Edition
Configuration	Horizontal Triplex Plunger
Number of Plungers	3
Continuous Duty	62 BHP
Intermittent Duty	77 BHP
Stroke Length	3.0 Inches
Frame Load Rating	6,000 lbs
Pump Weight (Average)	950 lbs
Intermittent Duty Speed Rating	500 RPM
Continuous Duty Speed Rating	400 RPM
Minimum Speed *	100 RPM
Mechanical Efficiency	90%
Lubrication System	Splash, Gravity Return
Crankcase Oil Capacity	3.25 Gallons
Lube Oil Type	SAE 30
Fluid Temperature Range	-20 to 350 °F
Valve Types	Disc Valves, Abrasion Resistant Valves

Slower RPM can be achieved with the addition of a pressurized lubrication system

Forged ISO drawing



Cast ISO drawing



Performance data

Pump Model	Plunger Diameter (in)	Displacement (GAL/REV)	Maximum Pressure (PSI)	Pump Capacity (GPM) @ Input Speed (RPM)						
				100 RPM	200 RPM	300 RPM	350 RPM	**400 RPM**	450 RPM	500 RPM
M1207	0.875	0.0234	10,000	2.3	4.7	7.0	8.2	**9.4**	10.5	11.7
M1208	1.000	0.0306	7,600	3.1	6.1	9.2	10.7	**12.2**	13.8	15.3
M1210	1.250	0.0478	4,900	4.8	9.6	14.3	16.7	**19.1**	21.5	23.9
M1212	1.500	0.0688	3,400	6.9	13.8	20.6	24.1	**27.5**	31	34.4
M1214	1.750	0.0937	2,500	9.4	18.7	28.1	32.8	**37.5**	42.2	46.9
M1216	2.000	0.1224	1,900	12.2	24.5	36.7	42.8	**49**	55.1	61.2
M1218	2.250	0.1549	1,500	15.5	31	46.5	54.2	**62**	69.7	77.5
M1220	2.500	0.1912	1,250	19.1	38.2	57.4	66.9	**76.5**	86	95.6
M1222	2.750	0.2314	1,000	23.1	46.3	69.4	81	**92.6**	104	116
M1224	3.000	0.2754	850	27.5	55.1	82.6	96.4	**110**	124	138

M12

Standard connection sizes

Pump Model	Suction (in)	Discharge (in)
M1207-M1211	2.0	1.0
M1209-M1216	3.0	1.5
M1212-M1226	3.0	2.0

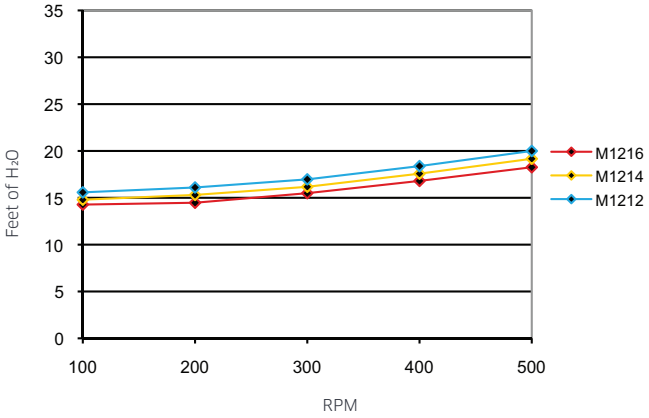
NPT connections available

Fluid cylinder materials

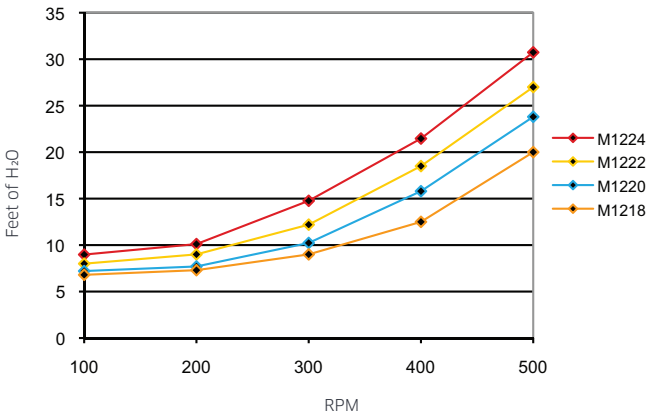
Forged	Cast
A350-LF2 Carbon Steel	Ductile Iron
Hi-Strength Carbon Alloy Steel	Aluminum Bronze
2205 Duplex Stainless Steel	

Special materials available on request

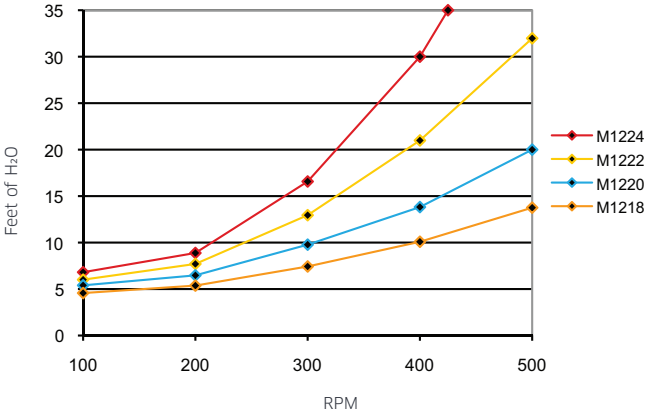
M12 NPSHr values
Disc Valves with 2-springs



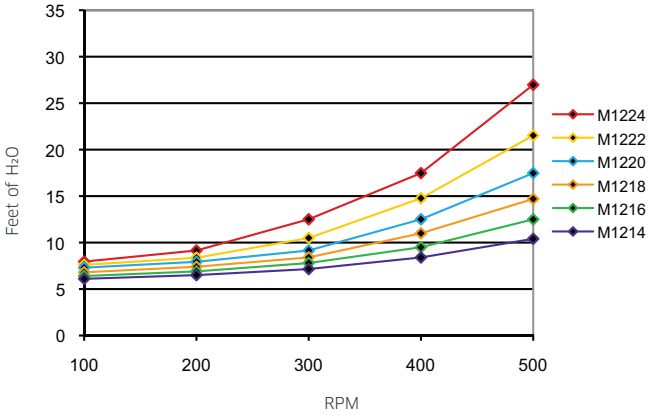
M12 NPSHr values
Disc Valves with 2-springs



M12 NPSHr values
Disc Valves with 1-spring

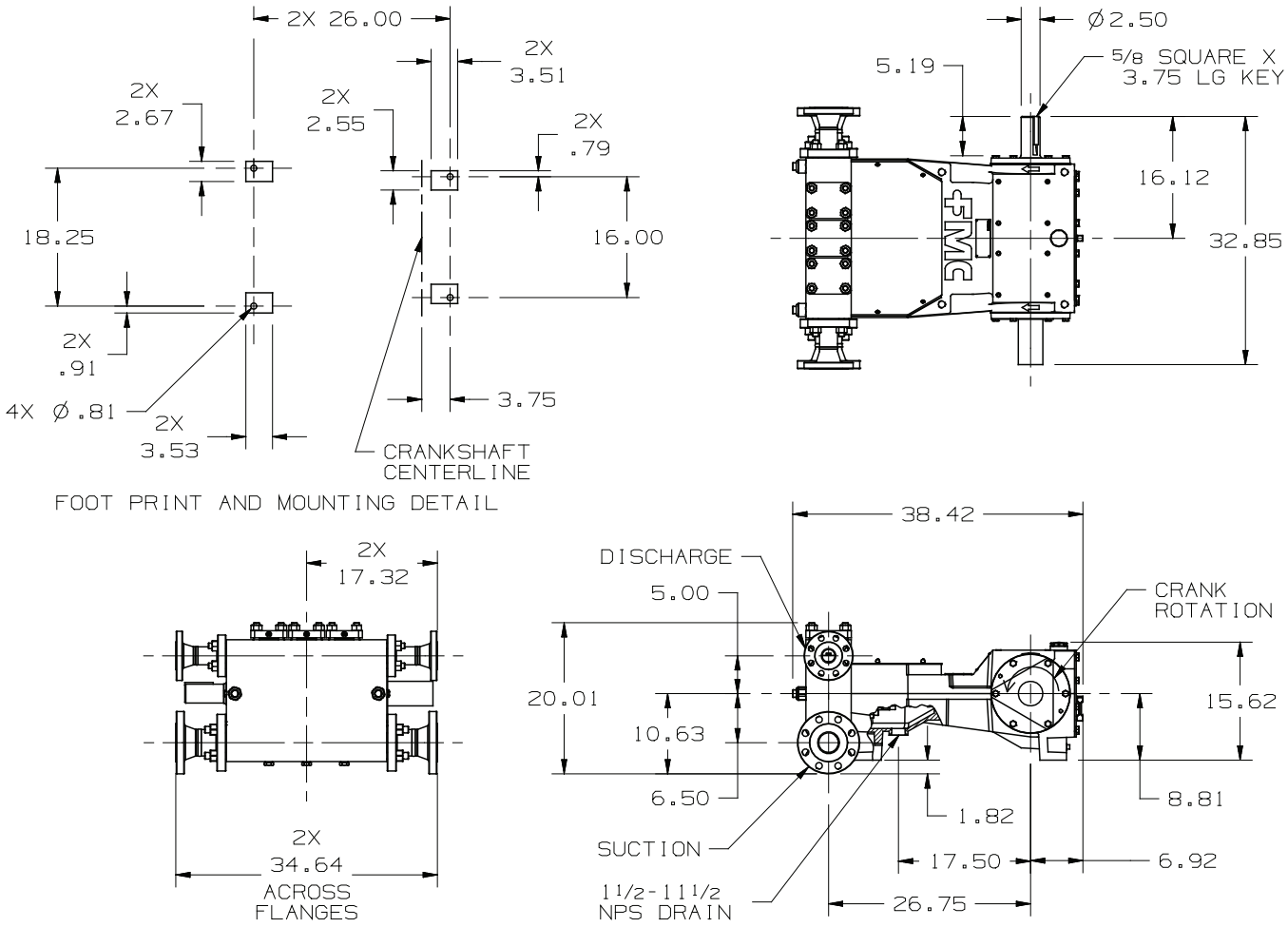


M12 NPSHr values
AR Valves with 1-spring



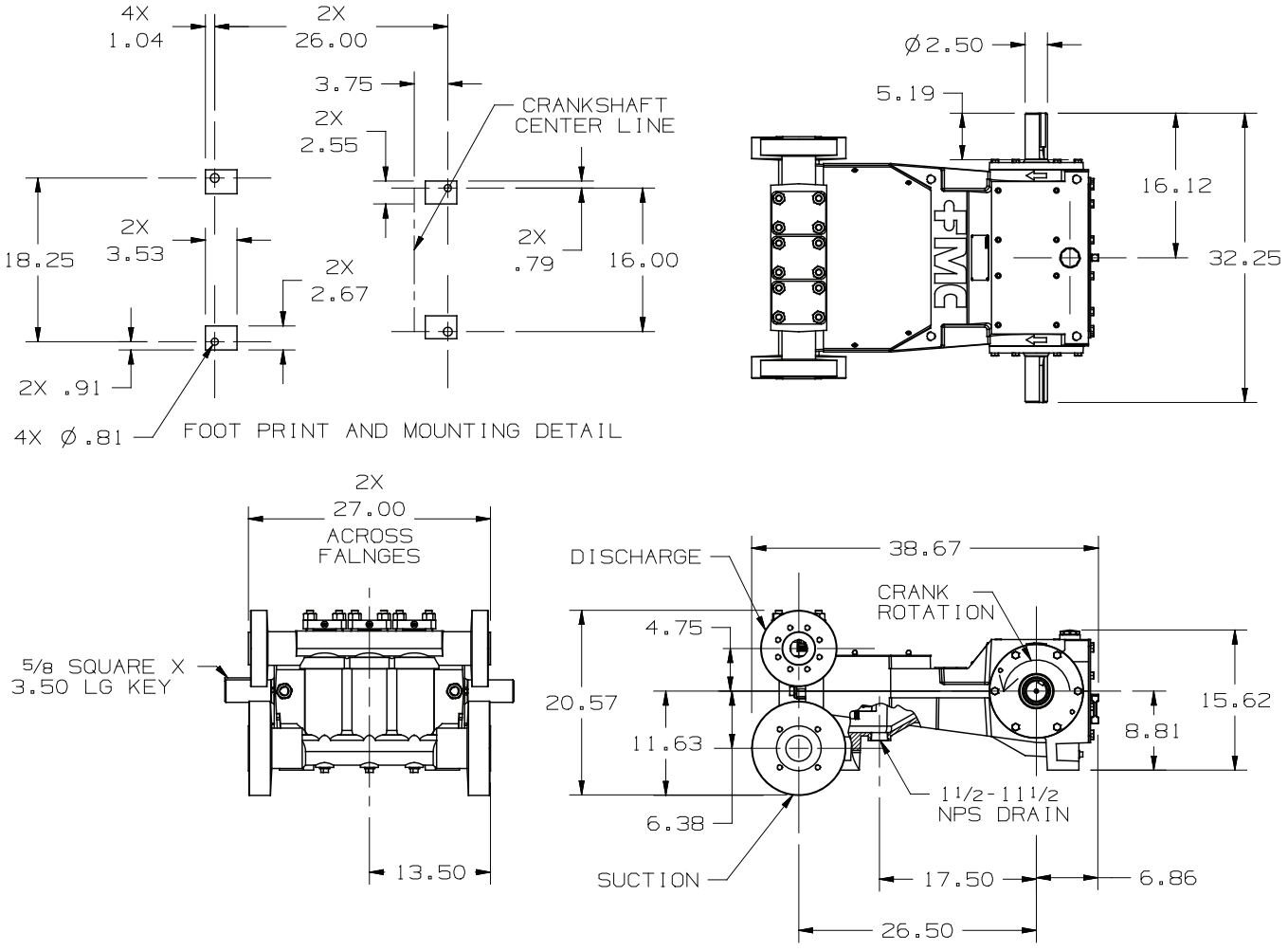
M12

Forged pump engineering dimensional outline



M12

Cast pump engineering dimensional outline



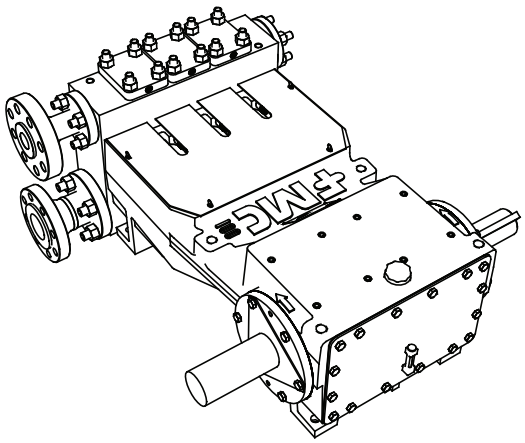
M13

Specifications

Design Standard	API-674, Third Edition
Configuration	Horizontal Triplex Plunger
Stroke Length	3.25 Inches
Continuous Duty	84 BHP
Intermittent Duty	108 BHP
Frame Load Rating	7,900 lbs
Pump Weight (Average)	1,400 lbs
Intermittent Duty Speed Rating	500 RPM
Continuous Duty Speed Rating	387 RPM
Minimum Speed *	100 RPM
Mechanical Efficiency	90%
Lubrication System	Splash, Gravity Return
Crankcase Oil Capacity	4 Gallons
Lube Oil Type	SAE 30
Fluid Temperature Range	-20 to 350 °F

Slower RPM can be achieved with the addition of a pressurized lubrication system

Forged ISO drawing

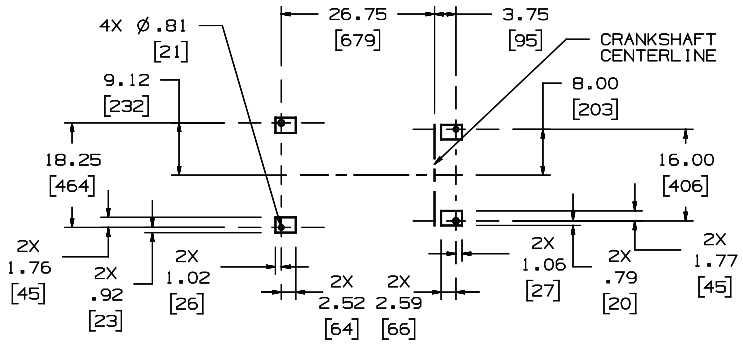


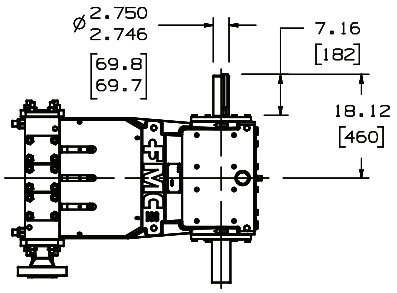
Performance data

Pump Model	Plunger Diameter (in)	Displacement (GAL/REV)	Maximum Pressure (PSI)	Pump Capacity (GPM) @ Input Speed (RPM)									
				100 RPM	150 RPM	200 RPM	250 RPM	300 RPM	350 RPM	**387 RPM**	400 RPM	450 RPM	500 RPM
M1308	1.000	0.0332	10,060	3.3	5.0	6.6	8.3	9.9	11.6	**12.8**	13.3	14.9	16.6
M1310	1.250	0.0518	6,450	5.2	7.8	10.4	13.0	15.5	18.1	**20.0**	20.7	23.3	25.9
M1312	1.500	0.0746	4,470	7.5	11.2	14.9	18.6	22.4	26.1	**28.9**	29.8	33.6	37.3
M1314	1.750	0.1015	3,280	10.2	15.3	20.3	25.4	30.5	35.5	**39.3**	40.6	45.7	50.8
M1316	2.000	0.1326	2,500	13.3	19.9	26.5	33.2	39.8	46.4	**51.3**	53.0	59.7	66.3
M1318	2.250	0.1678	2,000	16.8	25.2	33.6	42.0	50.4	58.7	**65.0**	67.1	75.5	83.9
M1320	2.500	0.2072	1,600	20.7	31.1	41.4	51.8	62.2	72.5	**80.2**	82.9	93.2	103.6
M1322	2.750	0.2507	1,330	25.1	37.6	50.1	62.7	75.2	87.7	**97.0**	100.3	112.8	125.4
M1324	3.000	0.2983	1,120	29.8	44.8	59.7	74.6	89.5	104.4	**115.5**	119.3	134.3	149.2
M1326	3.250	0.3501	950	35.0	52.5	70.0	87.5	105.0	122.5	**135.5**	140.0	157.6	175.1

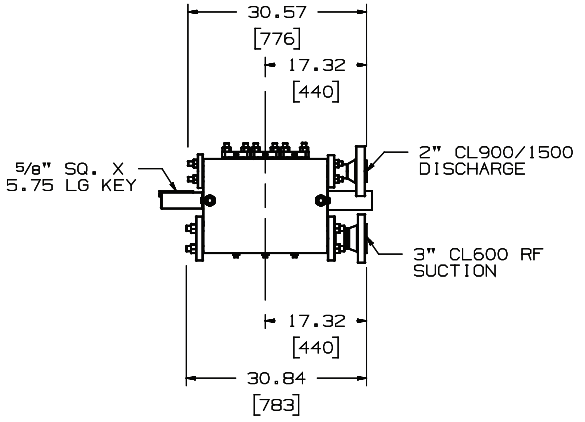
M13

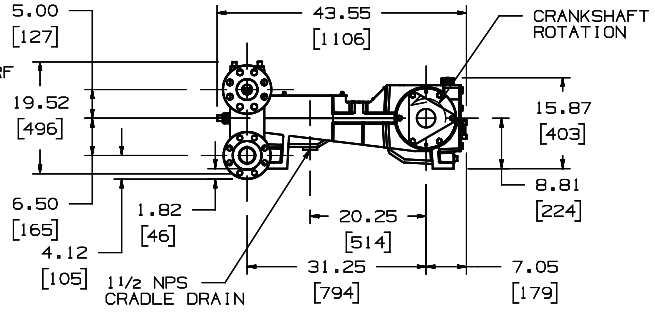
Forged pump engineering dimensional outline





FOOT PRINT & MOUNTING DETAIL





Standard connection sizes

Pump Model	Suction (in)	Discharge (in)
M1308-M1310	2.0	1.5
M1312-M1320	3.0	1.5
M1322-M1326	4.0	2.0

NPT connections available

Fluid cylinder materials

Forged	Cast
A350-LF2 Carbon Steel	Ductile Iron
Hi-Strength Carbon Alloy Steel	Aluminum Bronze
2205 Duplex Stainless Steel	

Special materials available on request

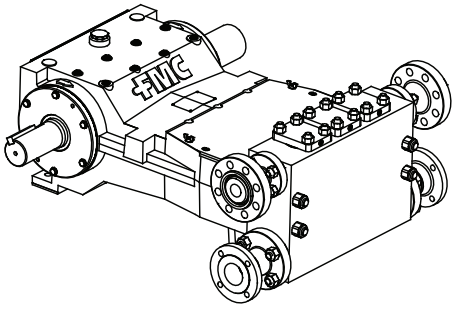
M14

Specifications

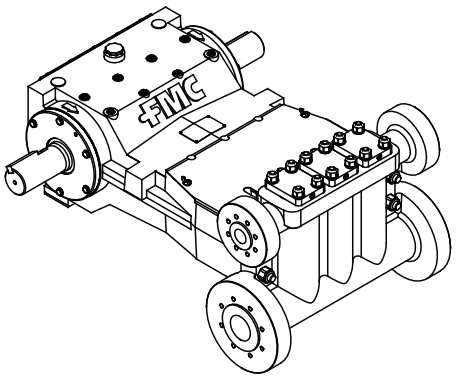
Design Standard	API-674, Third Edition
Configuration	Horizontal Triplex Plunger
Number of Plungers	3
Continuous Duty	88 BHP
Intermittent Duty	104 BHP
Stroke Length	3.5 Inches
Frame Load Rating	8,000 lbs
Pump Weight (Average)	1,800 lbs
Intermittent Duty Speed Rating	425 RPM
Continuous Duty Speed Rating	375 RPM
Minimum Speed *	100 RPM
Mechanical Efficiency	90%
Lubrication System	Splash, Gravity Return
Crankcase Oil Capacity	6 Gallons
Lube Oil Type	SAE 30
Fluid Temperature Range	-20 to 350 °F
Valve Types	Disc Valves, Abrasion Resistant Valves

Slower RPM can be achieved with the addition of a pressurized lubrication system

Forged ISO drawing



Cast ISO drawing



Performance data

Pump Model	Plunger Diameter (in)	Displacement (GAL/REV)	Maximum Pressure (PSI)	Pump Capacity (GPM) @ Input Speed (RPM)						
				100 RPM	200 RPM	300 RPM	350 RPM	**375 RPM**	400 RPM	425 RPM
M1408	1.000	0.0357	10,000	3.6	7.1	10.7	12.5	**13.4**	14.3	15.2
M1410	1.250	0.0558	6,500	5.6	11.2	16.7	19.5	**20.9**	22.3	23.7
M1412	1.500	0.0803	4,500	8.0	16.1	24.1	28.1	**30.1**	32.1	34.1
M1414	1.750	0.1093	3,300	10.9	21.9	32.8	38.3	**41**	43.7	46.5
M1416	2.000	0.1428	2,500	14.3	28.6	42.8	50.0	**53.6**	57.1	60.7
M1418	2.250	0.1807	2,000	18.1	36.1	54.2	63.2	**67.8**	72.3	76.8
M1420	2.500	0.2231	1,600	22.3	44.6	66.9	78.1	**83.7**	89.2	94.8
M1422	2.750	0.2700	1,350	27	54	81	95	**101**	108	115
M1424	3.000	0.3213	1,150	32.1	64.3	96.4	112	**120**	129	137
M1426	3.250	0.3771	1,000	37.7	75.4	113	132	**141**	151	160
M1428	3.500	0.4373	825	43.7	87.5	131	153	**164**	175	186
M1430	3.750	0.5020	725	50.2	100	151	176	**188**	201	213
M1432	4.000	0.5711	650	57	114	171	200	**214**	228	243

M14

Standard connection sizes

Pump Model	Suction (in)	Discharge (in)
M1408-M1420	3.0	2.0
M1418-M1432	4.0	2.0
M1428-M1432	4.0	3.0

NPT connections available

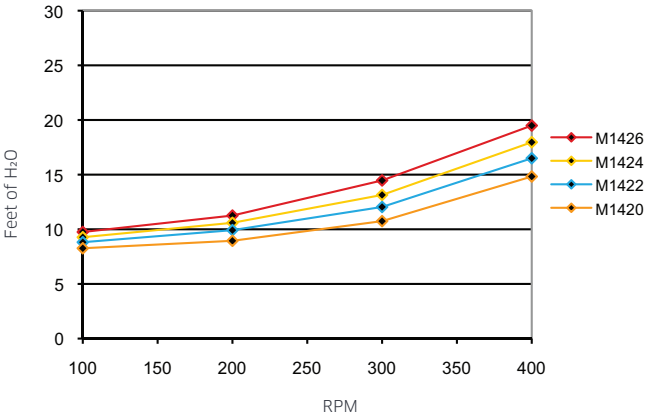
Fluid cylinder materials

Forged	Cast
A350-LF2 Carbon Steel	Ductile Iron
Hi-Strength Carbon Alloy Steel	
2205 Duplex Stainless Steel	

Special materials available on request

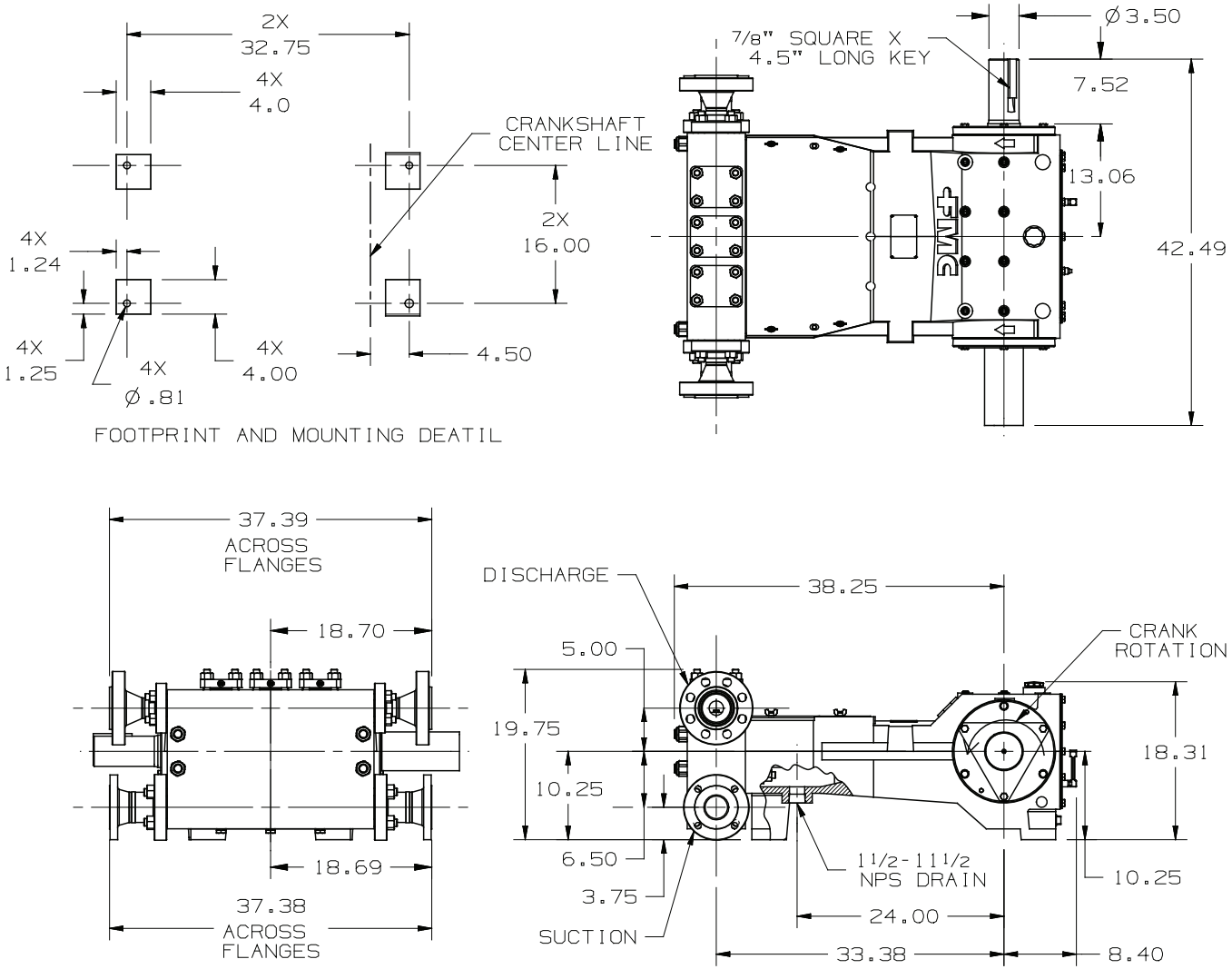
M14 NPSHr values

AR Valves with 1-spring



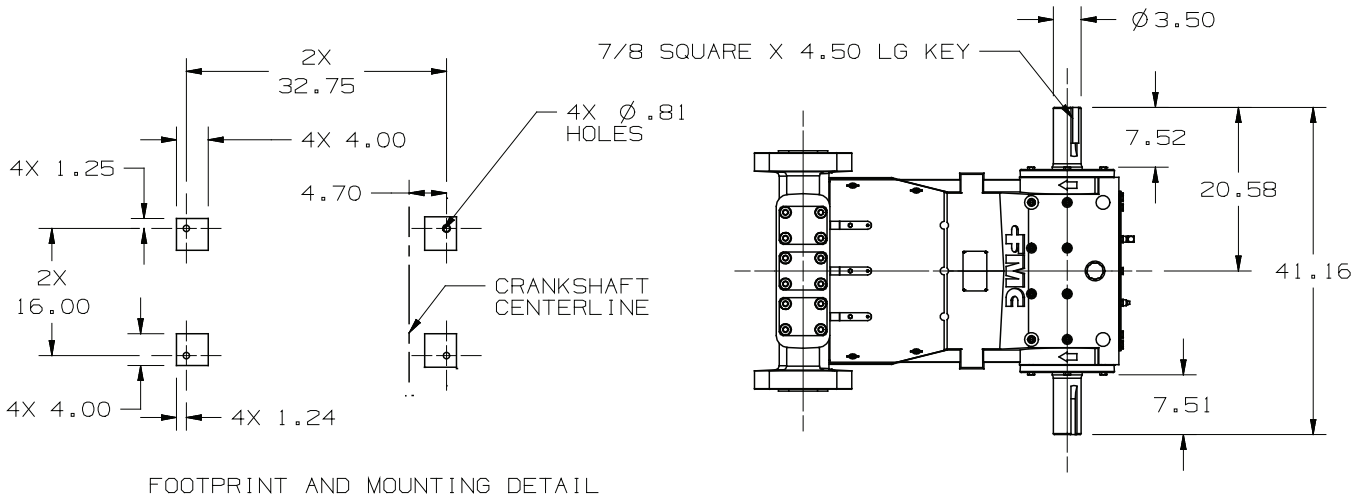
M14

Forged pump engineering dimensional outline

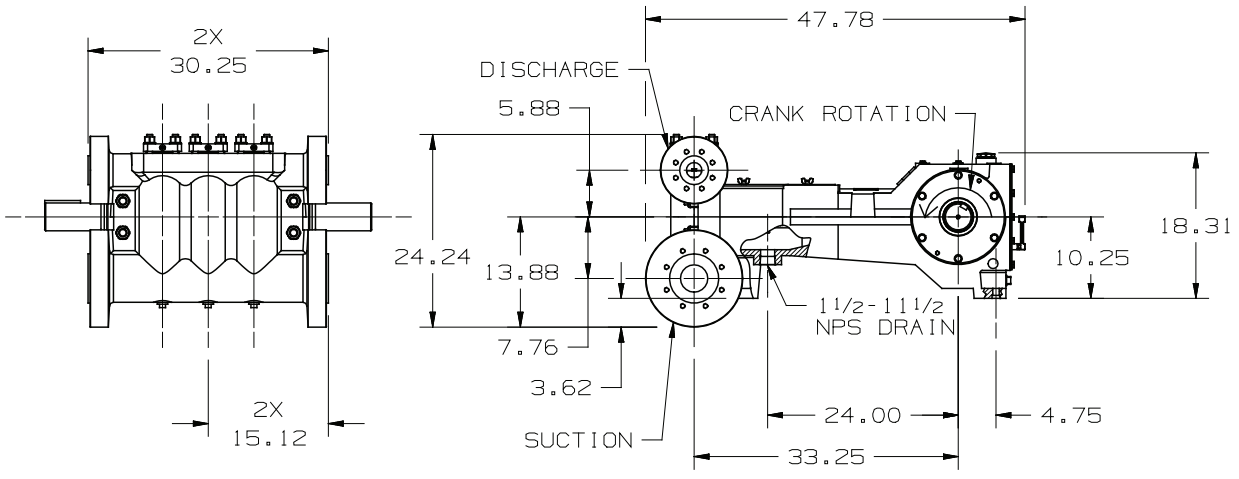


M14

Cast pump engineering dimensional outline



FOOTPRINT AND MOUNTING DETAIL



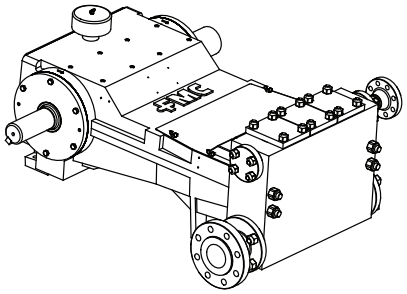
M16

Specifications

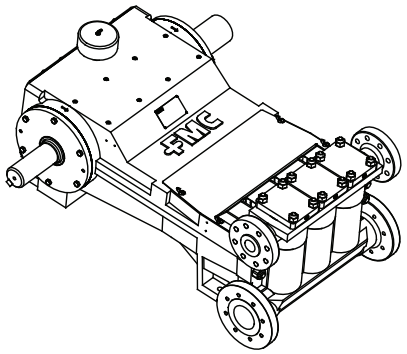
Design Standard	API-674, Third Edition
Configuration	Horizontal Triplex Plunger
Number of Plungers	3
Continuous Duty	117 BHP
Intermittent Duty	142 BHP
Stroke Length	4.0 Inches
Frame Load Rating	9,800 lbs
Pump Weight (Average)	2,400 lbs
Intermittent Duty Speed Rating	425 RPM
Continuous Duty Speed Rating	350 RPM
Minimum Speed *	100 RPM
Mechanical Efficiency	90%
Lubrication System	Splash, Gravity Return
Crankcase Oil Capacity	9 US Gallons
Lube Oil Type	SAE 30
Fluid Temperature Range	-20 to 350 °F
Valve Types	Disc Valves, Abrasion Resistant Valves

Slower RPM can be achieved with the addition of a pressurized lubrication system

Forged ISO drawing



Cast ISO drawing



Performance data

Pump Model	Plunger Diameter (in)	Displacement (GAL/REV)	Maximum Pressure (PSI)	Pump Capacity (GPM) @ Input Speed (RPM)					
				100 RPM	200 RPM	300 RPM	**350 RPM**	400 RPM	425 RPM
M1609	1.125	0.0516	10,000	5.2	10.3	15.5	**18.1**	20.6	21.9
M1610	1.250	0.0637	8,000	6.4	12.7	19.1	**22.3**	25.5	27.1
M1612	1.500	0.0918	5,500	9.2	18.4	27.5	**32.1**	36.7	39.0
M1614	1.750	0.1249	4,065	12.5	25.0	37.5	**43.7**	50.0	53.1
M1616	2.000	0.1632	3,115	16.3	32.6	49.0	**57.1**	65.3	69.4
M1618	2.250	0.2065	2,460	20.7	41.3	62.0	**72.3**	82.6	87.8
M1620	2.500	0.2550	1,990	25.5	51.0	76.5	**89.3**	102	108
M1622	2.750	0.3085	1,650	30.9	61.7	92.6	**108**	123	131
M1624	3.000	0.3672	1,385	36.7	73.4	110	**128**	147	156
M1626	3.250	0.4309	1,180	43.1	86.2	129	**151**	172	183
M1628	3.500	0.4998	1,015	50.0	100	150	**175**	200	212
M1630	3.750	0.5737	885	57.4	115	172	**201**	229	244
M1632	4.000	0.6528	775	65.3	131	196	**228**	261	277
M1634	4.250	0.7369	650	73.7	147	221	**258**	295	313
M1636	4.500	0.8262	570	82.6	165	248	**289**	330	351

M16

Standard connection sizes

Pump Model	Suction (in)	Discharge (in)
M1609-M1618	3.0	1.5
M1618-M1636	4.0	2.0
M1628-M1636	6.0	3.0

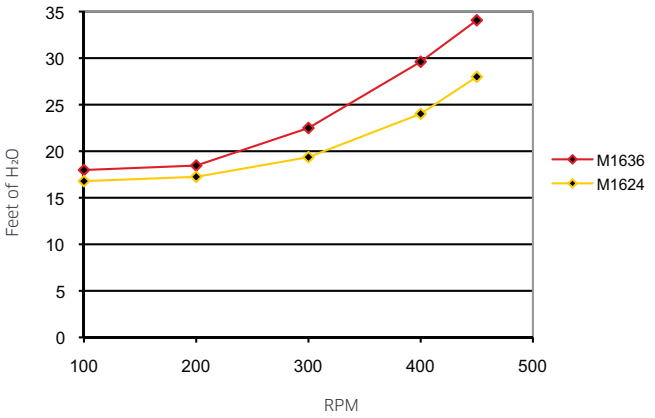
NPT connections available

Fluid cylinder materials

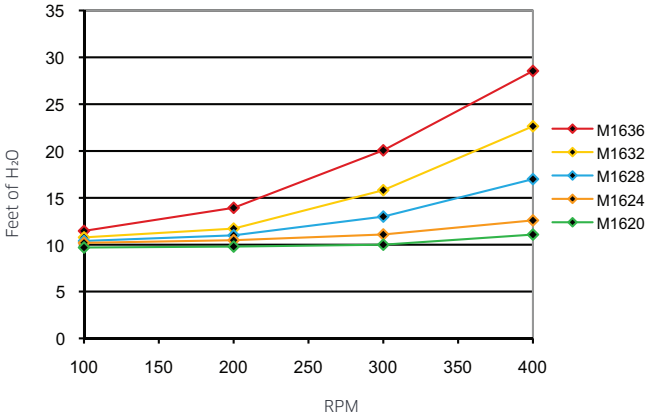
Forged	Cast
A350-LF2 Carbon Steel	Ductile Iron
Hi-Strength Carbon Alloy Steel	Aluminum Bronze
2205 Duplex Stainless Steel	

Special materials available on request

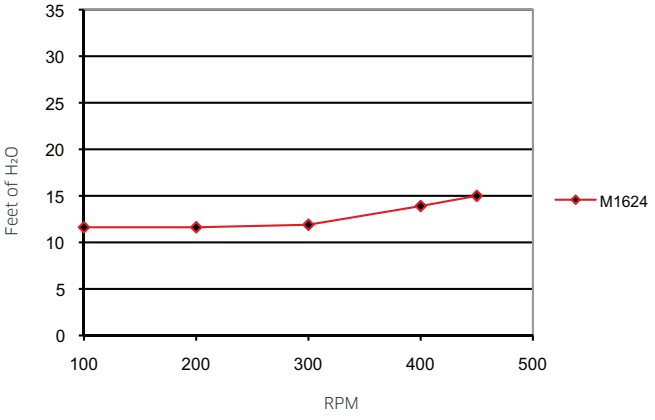
M16 NPSHr values
Disc Valves with 2-springs



M16 NPSHr values
AR Valves with 1-spring

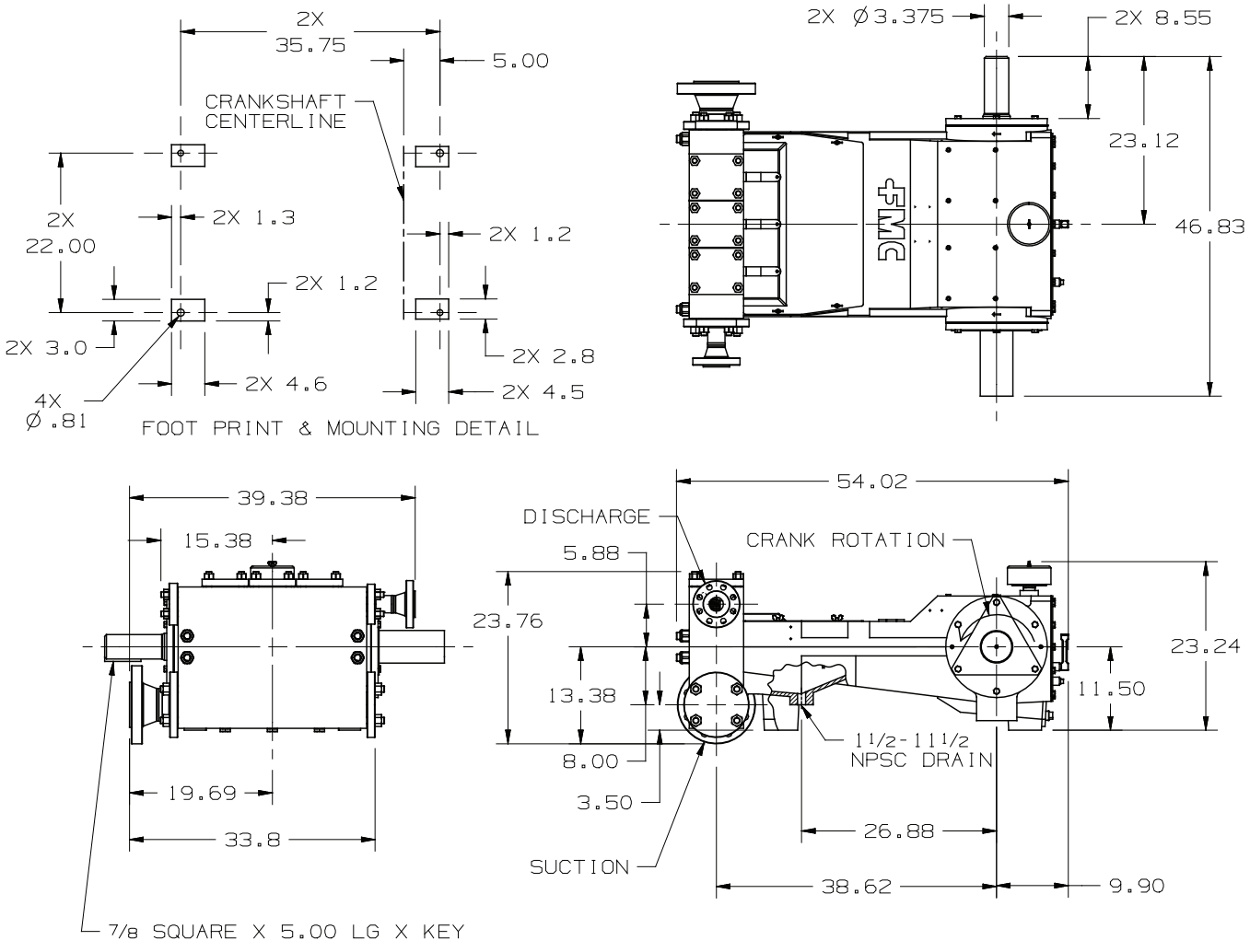


M16 NPSHr values
Disc Valves with 1-spring



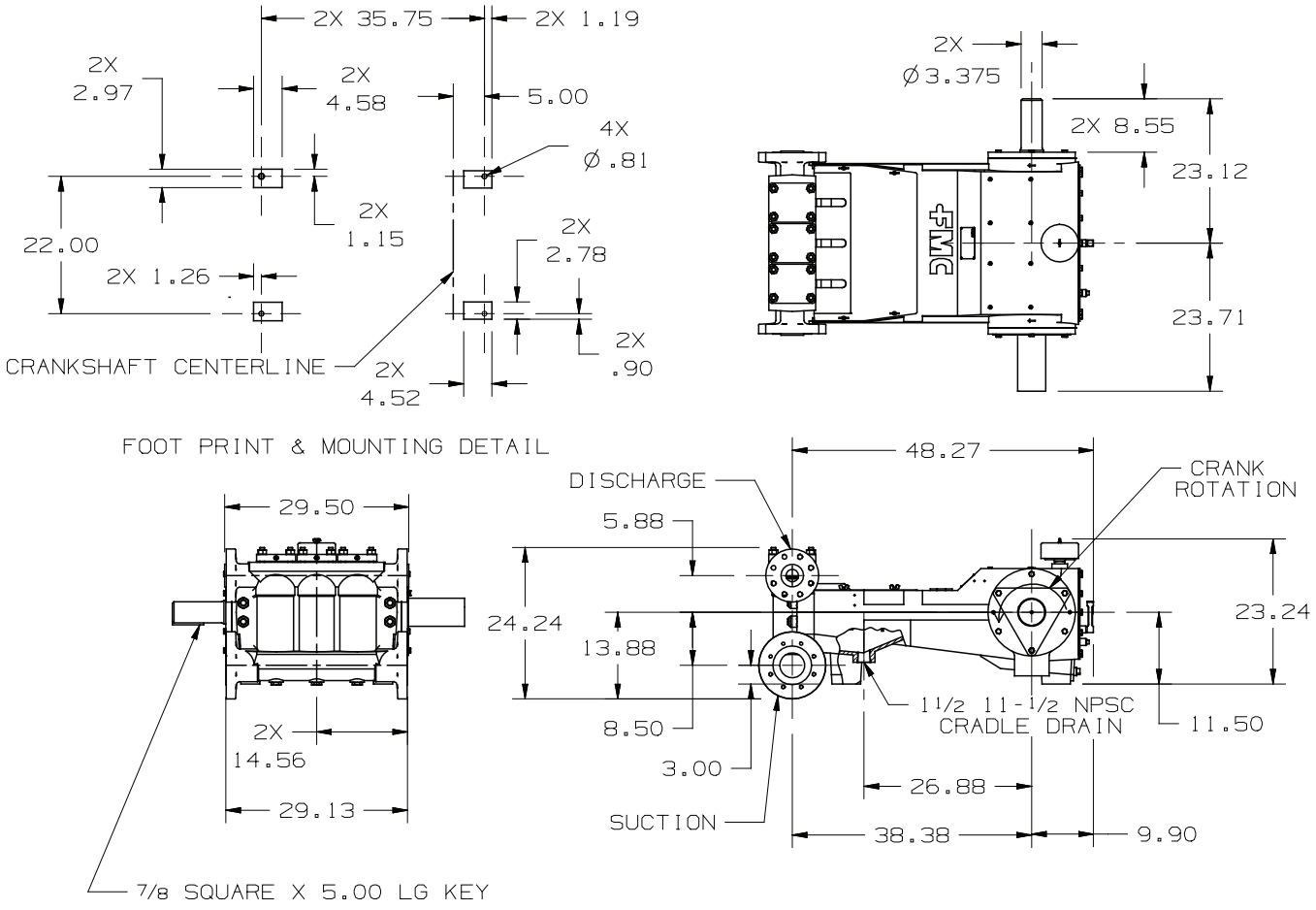
M16

Forged pump engineering dimensional outline



M16

Cast pump engineering dimensional outline



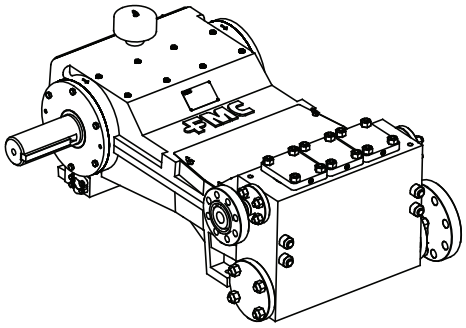
M18

Specifications

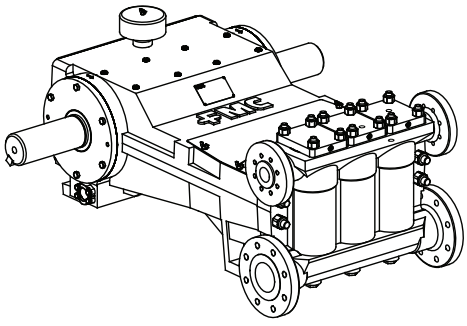
Design Standard	API-674, Third Edition
Configuration	Horizontal Triplex Plunger
Number of Plungers	3
Continuous Duty	150 BHP
Intermittent Duty	190 BHP
Stroke Length	4.5 Inches
Frame Load Rating	12,000 lbs
Pump Weight (Average)	2,400 lbs
Intermittent Duty Speed Rating	400 RPM
Continuous Duty Speed Rating	330 RPM
Minimum Speed	100 RPM
Mechanical Efficiency *	90%
Lubrication System	Splash, Gravity Return
Crankcase Oil Capacity	9 Gallons
Lube Oil Type	SAE 30
Fluid Temperature Range	-20 to 350 °F
Valve Types	Disc Valves, Abrasion Resistant Valves

Slower RPM can be achieved with the addition of a pressurized lubrication system

Forged ISO drawing



Cast ISO drawing



Performance data

Pump Model	Plunger Diameter (in)	Displacement (GAL/REV)	Maximum Pressure (PSI)	Pump Capacity (GPM) @ Input Speed (RPM)					
				100 RPM	200 RPM	300 RPM	**330 RPM**	350 RPM	400 RPM
M1810	1.250	0.0717	9,800	7.2	14	22	**24**	25	29
M1812	1.500	0.1033	6,800	10	21	31	**34**	36	41
M1814	1.750	0.1406	5,000	14	28	42	**46**	49	56
M1816	2.000	0.1836	3,800	18	37	55	**61**	64	73
M1818	2.250	0.2324	3,000	23	47	70	**77**	81	93
M1820	2.500	0.2869	2,400	29	57	86	**95**	100	115
M1822	2.750	0.3471	2,000	35	69	104	**115**	122	139
M1824	3.000	0.4131	1,700	41	83	124	**136**	145	165
M1826	3.250	0.4848	1,480	49	97	145	**160**	170	194
M1828	3.500	0.5623	1,200	56	113	169	**186**	197	225
M1830	3.750	0.6455	1,100	65	129	194	**213**	226	258
M1832	4.000	0.7344	1,000	73	147	220	**242**	257	294
M1834	4.250	0.8291	800	83	166	249	**274**	290	332
M1836	4.500	0.9295	750	93	186	279	**307**	325	372

M18

Standard connection sizes

Pump Model	Suction (in)	Discharge (in)
M1810-M1816	3.0	1.5
M1818-M1826	4.0	2.0
M1828-M1836	6.0	3.0

NPT connections available

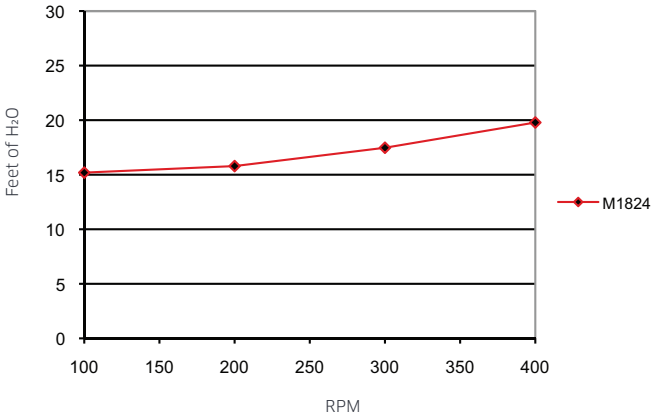
Fluid cylinder materials

Forged	Cast
A350-LF2 Carbon Steel	Ductile Iron
Hi-Strength Carbon Alloy Steel	Aluminum Bronze
2205 Duplex Stainless Steel	

Special materials available on request

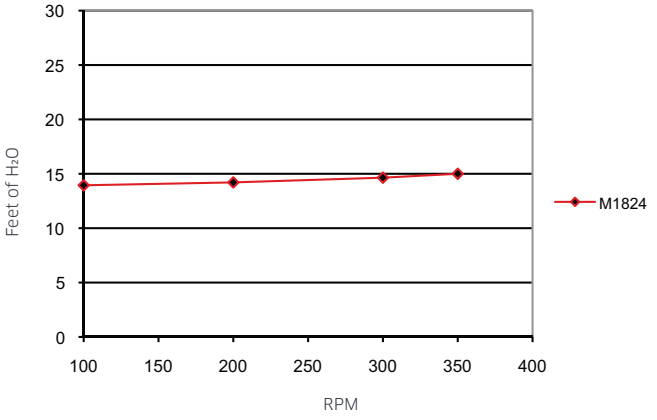
M18 NPSHr values

Disc Valves with 2-springs



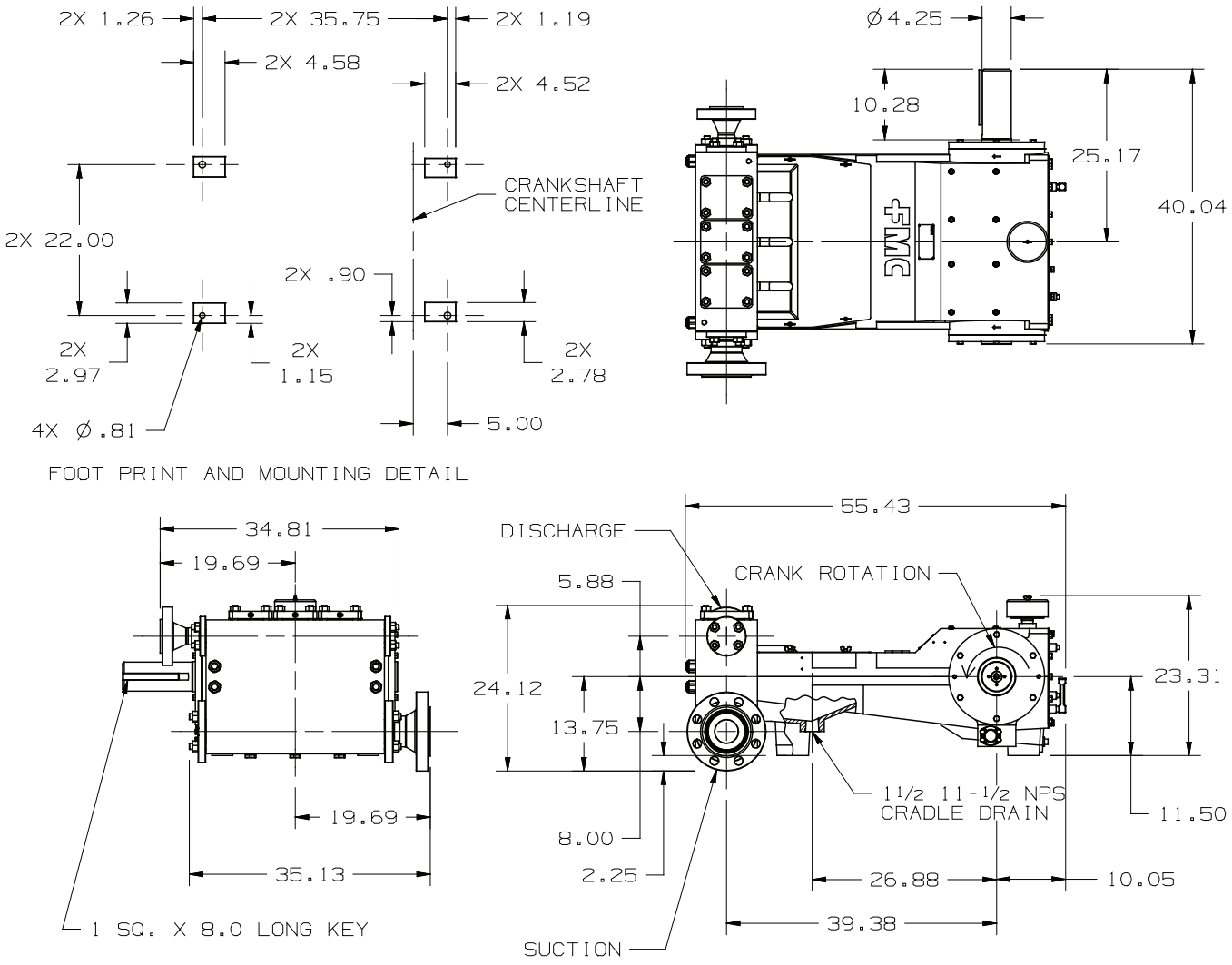
M18 NPSHr values

AR Valves with 1-spring



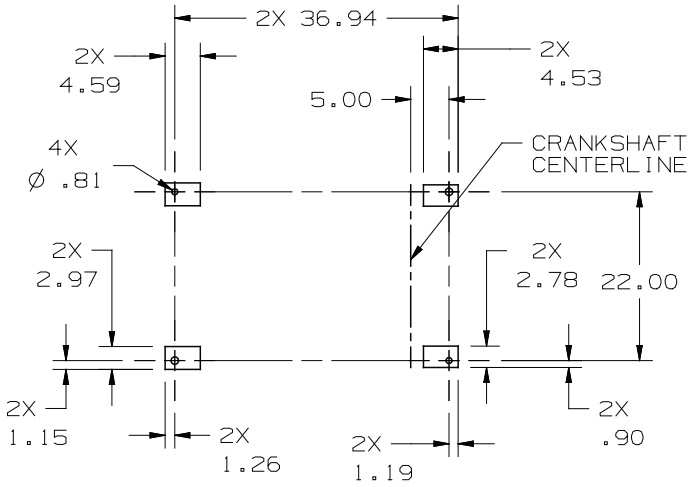
M18

Forged pump engineering dimensional outline

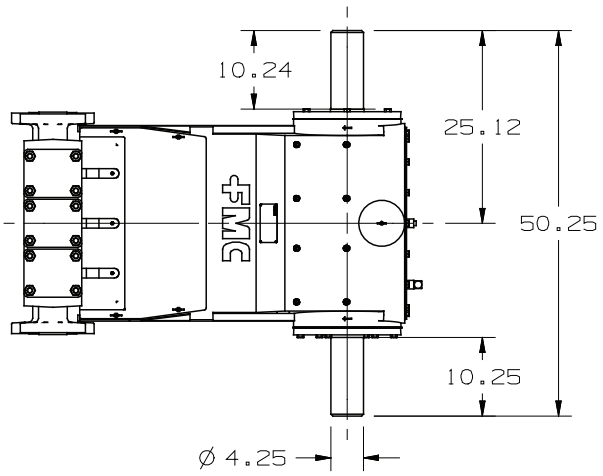


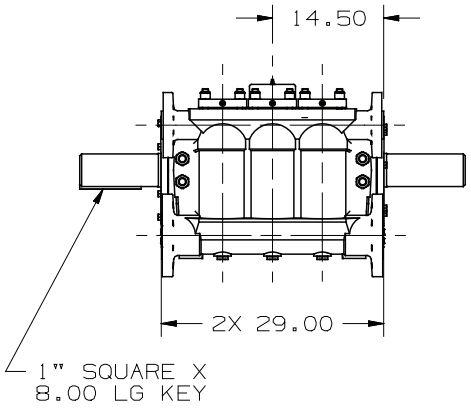
M18

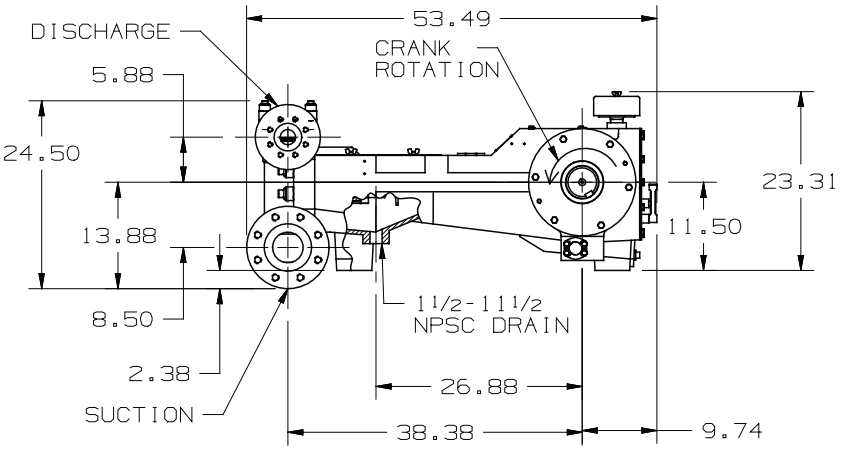
Cast pump engineering dimensional outline



FOOT PRINT & MOUNTING DETAIL







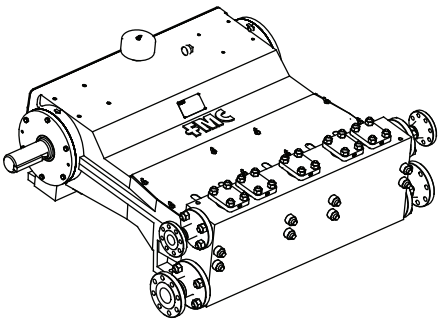
Q16

Specifications

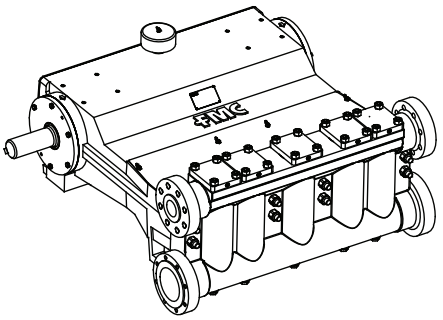
Design Standard	API-674, Third Edition
Configuration	Horizontal Quintuplex Plunger
Number of Plungers	5
Continuous Duty	198 BHP
Intermittent Duty	240 BHP
Stroke Length	4.0 Inches
Frame Load Rating	10,000 lbs
Pump Weight (Average)	4,500 lbs
Intermittent Duty Speed Rating	425 RPM
Continuous Duty Speed Rating	350 RPM
Minimum Speed *	100 RPM
Mechanical Efficiency	90%
Lubrication System	Splash, Gravity Return
Crankcase Oil Capacity	16 Gallons
Lube Oil Type	SAE 30
Fluid Temperature Range	-20 to 350 °F
Valve Types	Disc Valves, Abrasion Resistant Valves

Slower RPM can be achieved with the addition of a pressurized lubrication system

Forged ISO drawing



Cast ISO drawing



Performance data

Pump Model	Plunger Diameter (in)	Displacement (GAL/REV)	Maximum Pressure (PSI)	Pump Capacity (GPM) @ Input Speed (RPM)					
				100 RPM	200 RPM	300 RPM	**350 RPM**	400 RPM	425 RPM
Q1609	1.125	0.0861	10,000	8.6	17	26	**30**	34	37
Q1610	1.250	0.1062	8,150	11	21	32	**37**	43	45
Q1612	1.500	0.1530	5,650	15	31	46	**54**	61	65
Q1614	1.750	0.2082	4,160	21	42	63	**73**	83	89
Q1616	2.000	0.2720	3,190	27	54	82	**95**	109	116
Q1618	2.250	0.3442	2,520	34	69	103	**121**	138	146
Q1620	2.500	0.4250	2,040	43	85	128	**149**	170	181
Q1622	2.750	0.5142	1,690	51	103	154	**180**	206	219
Q1624	3.000	0.6120	1,420	61	122	184	**214**	245	260
Q1626	3.250	0.7182	1,210	72	144	216	**251**	287	305
Q1628	3.500	0.8330	1,040	83	167	250	**292**	333	354
Q1630	3.750	0.9562	910	96	191	287	**335**	383	406
Q1632	4.000	1.0880	800	109	218	326	**381**	435	462
Q1634	4.250	1.2282	710	123	246	369	**430**	491	522
Q1636	4.500	1.3770	630	138	275	413	**482**	551	585

Q16

Standard connection sizes

Pump Model	Suction (in)	Discharge (in)
Q1609-Q1618	4.0	2.0
Q1620-Q1628	6.0	3.0
Q1628-Q1636	8.0	4.0

NPT connections available

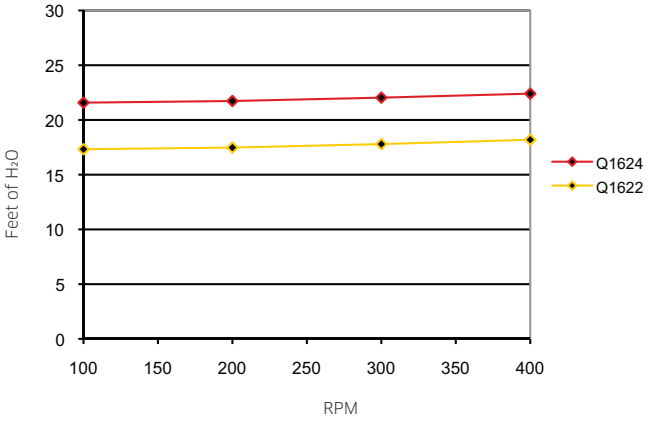
Fluid cylinder materials

Forged	Cast
A350-LF2 Carbon Steel	Ductile Iron
Hi-Strength Carbon Alloy Steel	Aluminum Bronze
2205 Duplex Stainless Steel	

Special materials available on request

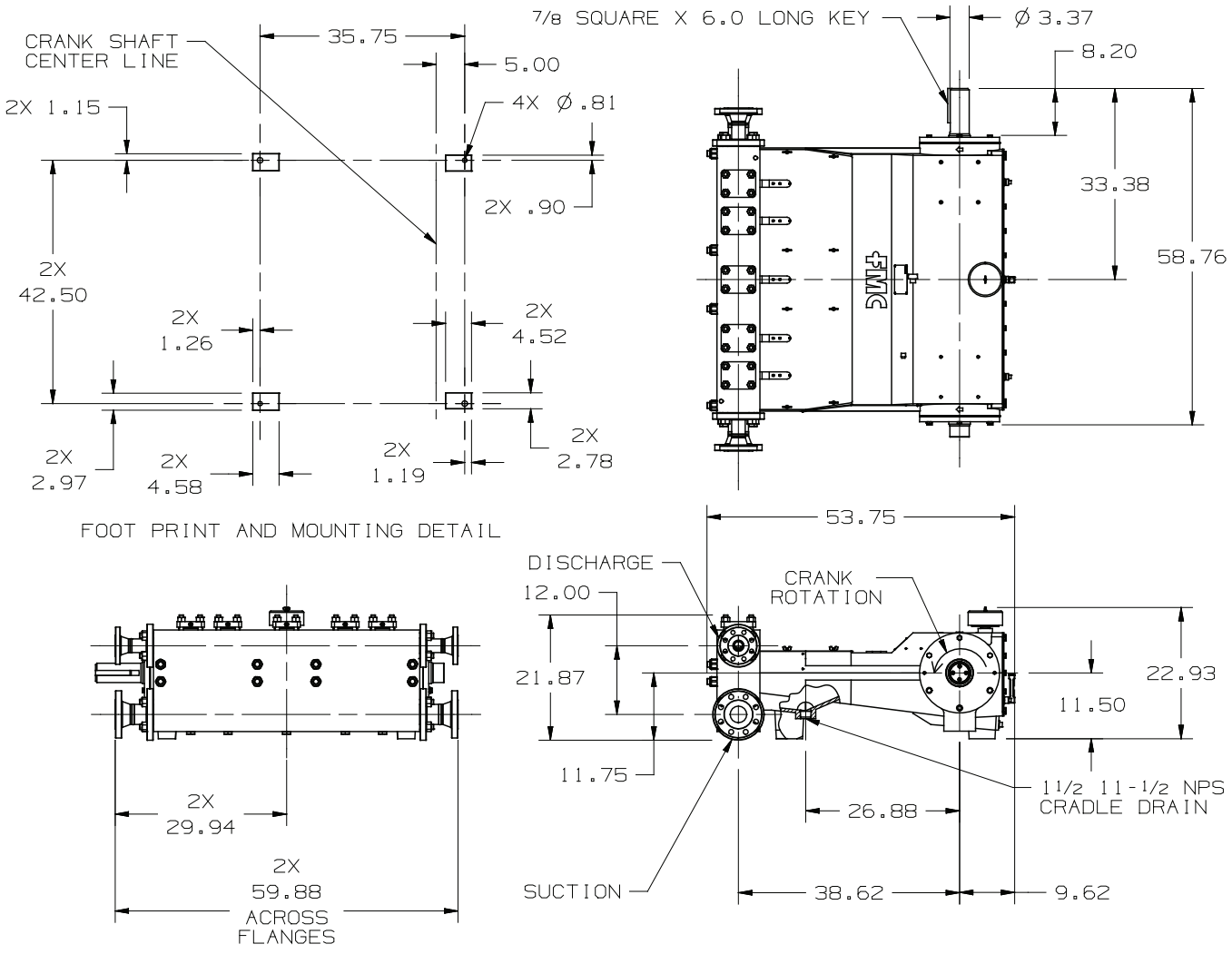
Q16 NPSHr values

Disc Valves with 2-springs



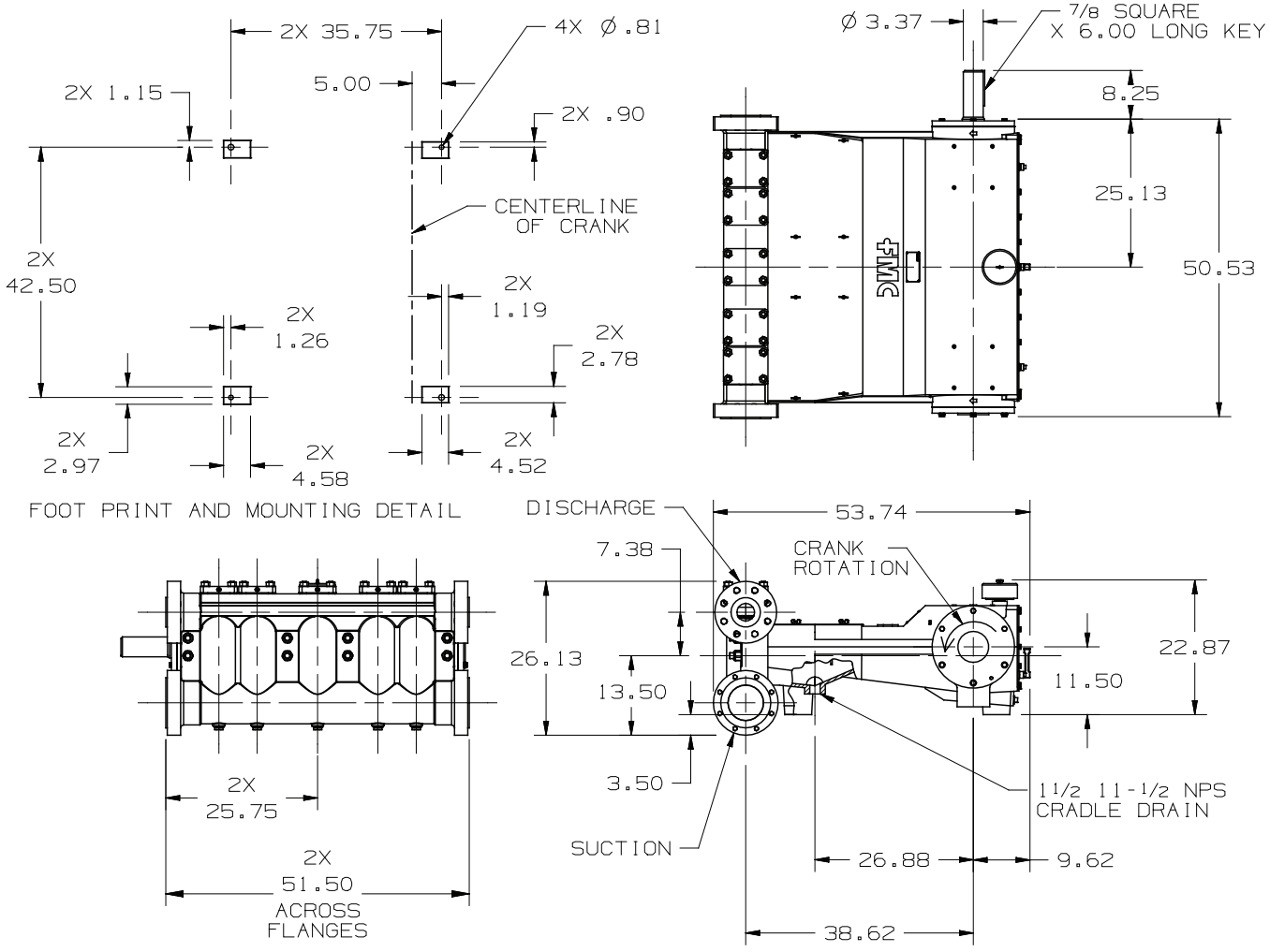
Q16

Forged pump engineering dimensional outline



Q16

Cast pump engineering dimensional outline



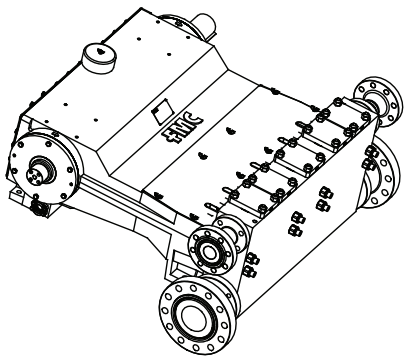
Q18

Specifications

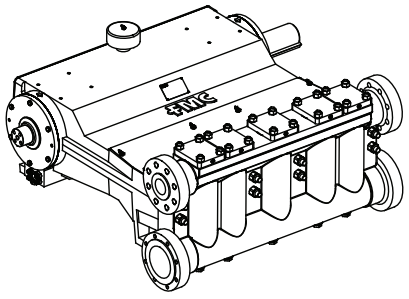
Design Standard	API-674, Third Edition
Configuration	Horizontal Quintuplex Plunger
Number of Plungers	5
Continuous Duty	265 BHP
Intermittent Duty	325 BHP
Stroke Length	4.5 Inches
Frame Load Rating	12,500 lbs
Pump Weight (Average)	4,500 lbs
Intermittent Duty Speed Rating	400 RPM
Continuous Duty Speed Rating	330 RPM
Minimum Speed *	100 RPM
Mechanical Efficiency	90%
Lubrication System	Splash, Gravity Return
Crankcase Oil Capacity	16 Gallons
Lube Oil Type	SAE 30
Fluid Temperature Range	-20 to 350 °F
Valve Types	Disc Valves, Abrasion Resistant Valves

Slower RPM can be achieved with the addition of a pressurized lubrication system

Forged ISO drawing



Cast ISO drawing



Performance data

Pump Model	Plunger Diameter (in)	Displacement (GAL/REV)	Maximum Pressure (PSI)	Pump Capacity (GPM) @ Input Speed (RPM)					
				100 RPM	200 RPM	300 RPM	**330 RPM**	350 RPM	400 RPM
Q1811	1.375	0.1446	8,400	15	29	44	**48**	51	58
Q1812	1.500	0.1721	7,100	17	34	52	**57**	60	69
Q1814	1.750	0.2343	5,200	23	47	70	**77**	82	94
Q1816	2.000	0.3060	4,000	31	61	92	**101**	107	122
Q1818	2.250	0.3873	3,100	39	78	116	**128**	136	155
Q1820	2.500	0.4781	2,500	48	96	143	**158**	167	191
Q1822	2.750	0.5785	2,100	58	116	174	**191**	202	231
Q1824	3.000	0.6885	1,800	69	138	207	**227**	241	275
Q1826	3.250	0.8080	1,500	81	162	242	**267**	283	323
Q1828	3.500	0.9371	1,300	94	187	281	**309**	328	375
Q1830	3.750	1.0758	1,100	108	215	323	**355**	377	430
Q1832	4.000	1.2240	1,000	122	245	367	**404**	428	490
Q1834	4.250	1.3818	900	138	276	415	**456**	484	553
Q1836	4.500	1.5491	800	155	310	465	**511**	542	620

Q18

Standard connection sizes

Pump Model	Suction (in)	Discharge (in)
Q1811-Q1818	4.0	2.0
Q1820-Q1828	6.0	3.0
Q1830-Q1836	8.0	4.0

NPT connections available

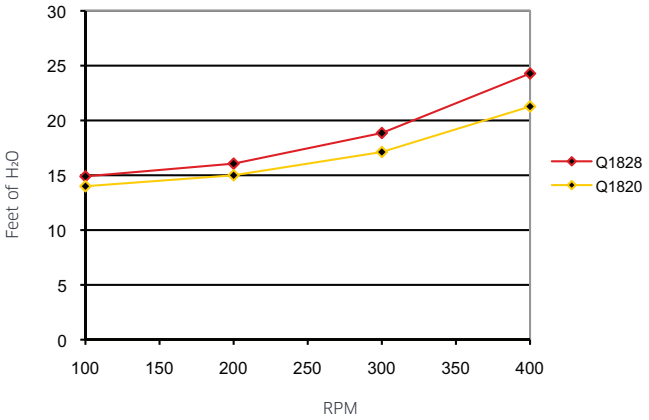
Fluid cylinder materials

Forged	Cast
A350-LF2 Carbon Steel	Ductile Iron
Hi-Strength Carbon Alloy Steel	Aluminum Bronze
2205 Duplex Stainless Steel	

Special materials available on request

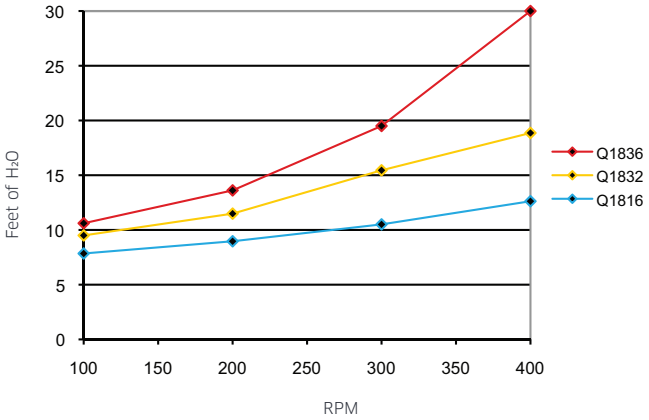
Q18 NPSHr values

Disc Valves with 2-springs



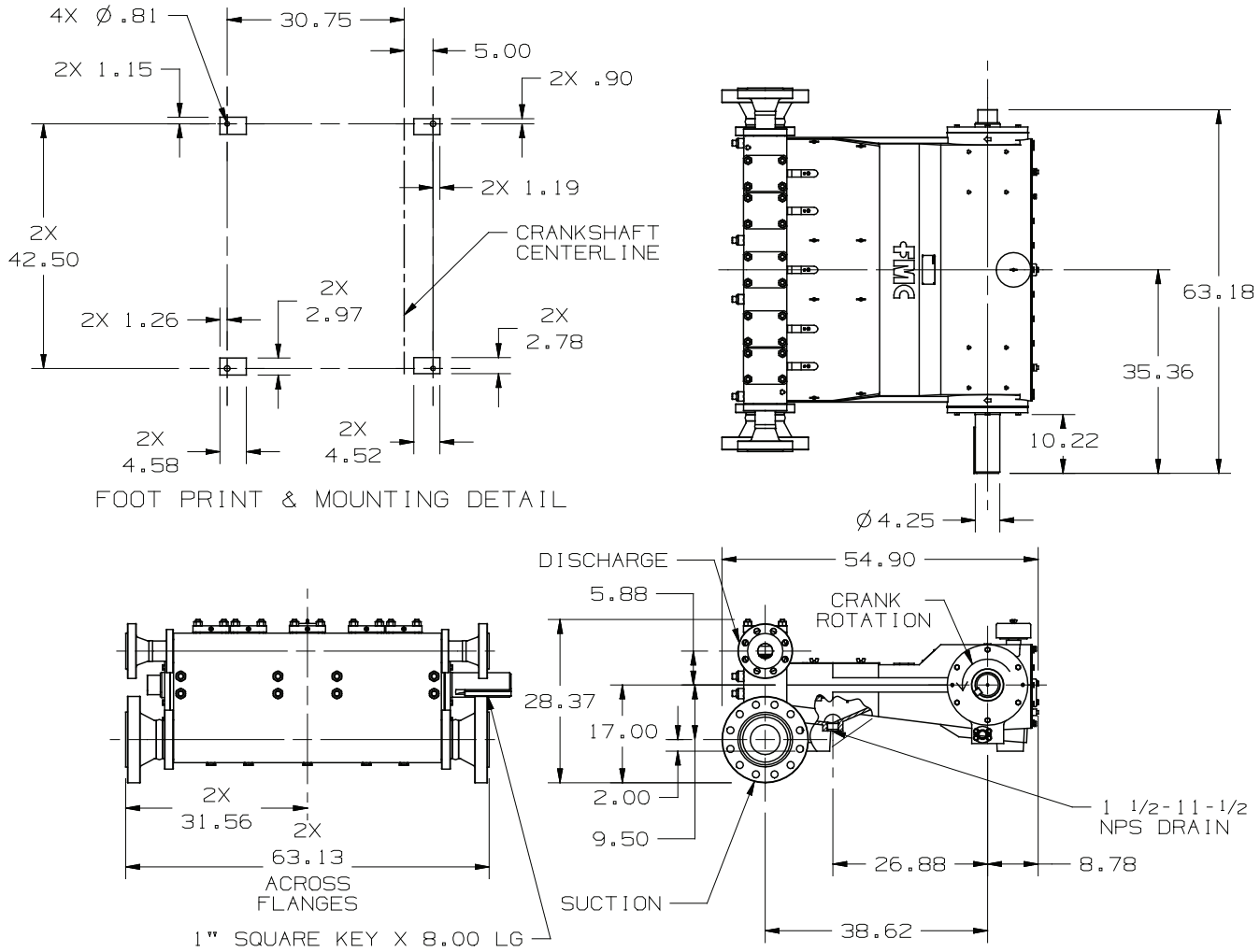
Q18 NPSHr values

AR Valves with 1-springs



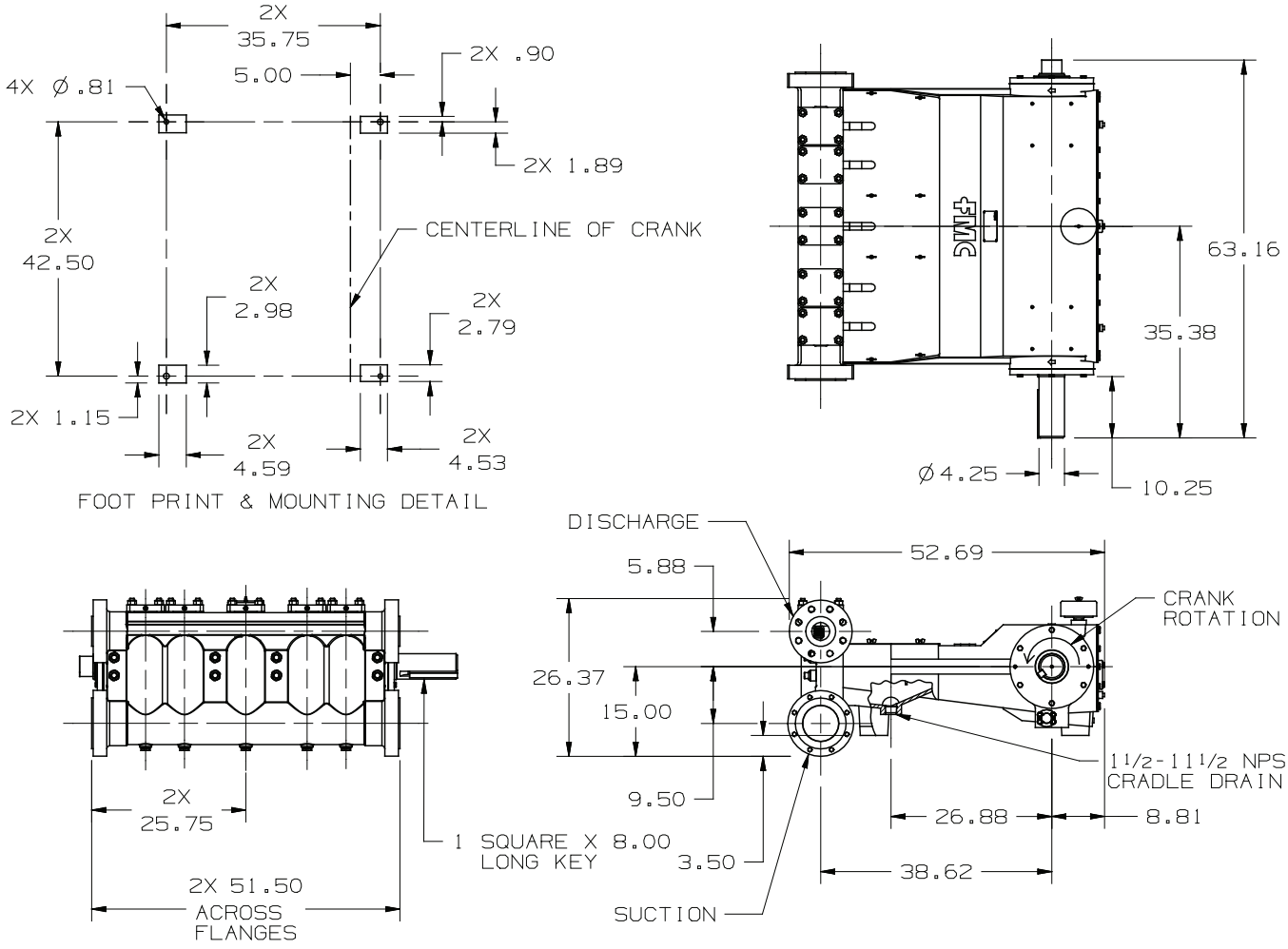
Q18

Forged pump engineering dimensional outline



Q18

Cast pump engineering dimensional outline



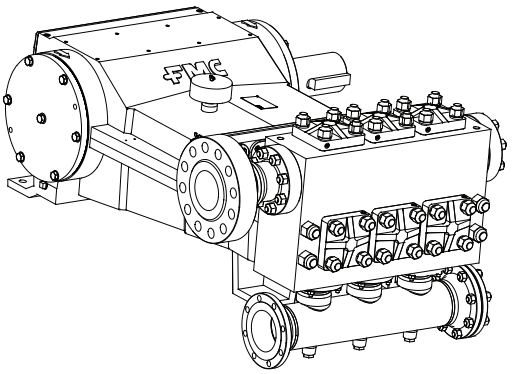
M28

Specifications

Design Standard	API-674, Third Edition
Configuration	Horizontal Triplex Plunger
Number of Plungers	3
Continuous Duty	350 BHP
Intermittent Duty	440 BHP
Stroke Length	7.0 Inches
Frame Load Rating	25,000 lbs
Pump Weight (Average)	5,500 lbs
Intermittent Duty Speed Rating	300 RPM
Continuous Duty Speed Rating	240 RPM
Minimum Speed *	100 RPM
Mechanical Efficiency	90%
Lubrication System	Splash, Gravity Return
Crankcase Oil Capacity	14.25 Gallons
Lube Oil Type	SAE 30
Fluid Temperature Range	-20 to 350 °F
Valve Types	Disc Valves, Abrasion Resistant Valves

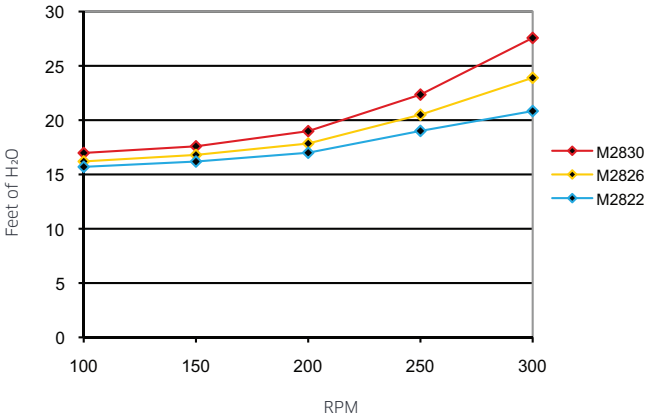
Slower RPM can be achieved with the addition of a pressurized lubrication system

Forged ISO drawing



M28 NPSHr values

Disc Valves with 2-springs



Bolt-on gearbox ratios available

6.17 : 1
7.44 : 1
9.55 : 1

M28

Performance data

Pump Model	Plunger Diameter (in)	Displacement (GAL/REV)	Maximum Pressure (PSI)	Pump Capacity (GPM) @ Input Speed (RPM)					
				100 RPM	150 RPM	200 RPM	**240 RPM**	250 RPM	300 RPM
M2812	1.500	0.1606	10,000	16	24	32	**39**	40	48
M2814	1.750	0.2187	10,000	22	33	44	**53**	55	66
M2816	2.000	0.2856	7,960	29	43	57	**69**	71	86
M2818	2.250	0.3615	6,300	36	54	72	**87**	90	109
M2820	2.500	0.4462	5,100	45	67	89	**107**	112	134
M2822	2.750	0.5400	4,200	54	81	108	**130**	135	162
M2824	3.000	0.6426	3,540	64	96	129	**154**	161	193
M2826	3.250	0.7542	3,015	75	113	151	**181**	189	226
M2828	3.500	0.8746	2,600	88	131	175	**210**	219	262
M2830	3.750	1.0041	2,260	100	151	201	**241**	251	301
M2832	4.000	1.1424	1,990	114	171	229	**274**	286	343
M2834	4.250	1.2897	1,760	129	194	258	**310**	322	387
M2836	4.500	1.4458	1,570	145	217	289	**347**	361	434
M2838	4.750	1.6110	1,400	161	242	322	**387**	403	483
M2840	5.000	1.7580	1,275	176	264	352	**422**	440	527
M2842	5.250	1.9680	1,155	197	295	394	**472**	492	590
M2844	5.500	2.1598	1,050	216	324	432	**518**	540	648
M2846	5.750	2.3607	960	236	354	472	**567**	590	708
M2848	6.000	2.5704	880	257	386	514	**617**	643	771
M2850	6.250	2.7891	815	279	418	558	**669**	697	837

Standard connection sizes

Pump Model	Suction (in)	Discharge (in)
M2812-M2820	4.0	2.0
M2822-M2832	6.0	3.0
M2834-M2842	8.0	4.0
M2844-M2850	10.0	4.0

NPT connections available

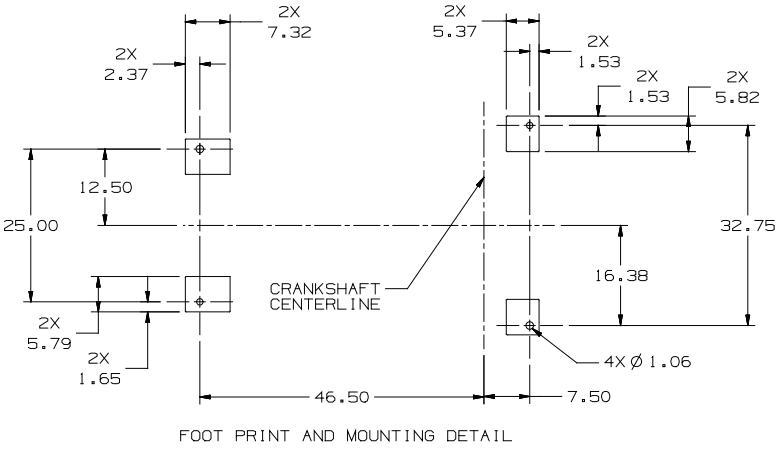
Fluid cylinder materials

Forged	Cast
A350-LF2 Carbon Steel	Currently not available
Hi-Strength Carbon Alloy Steel	
2205 Duplex Stainless Steel	

Special materials available on request

M28

Forged pump engineering dimensional outline



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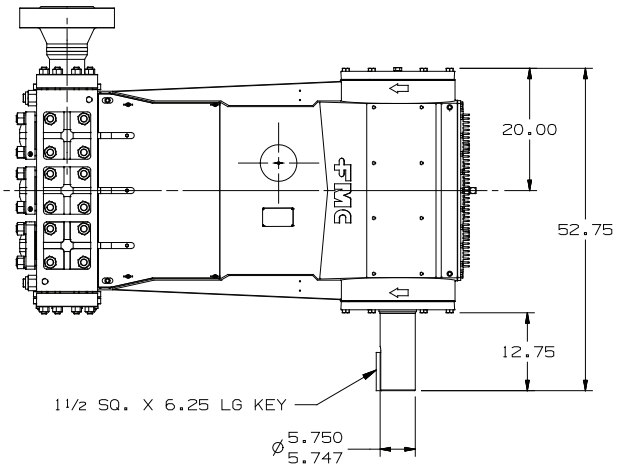
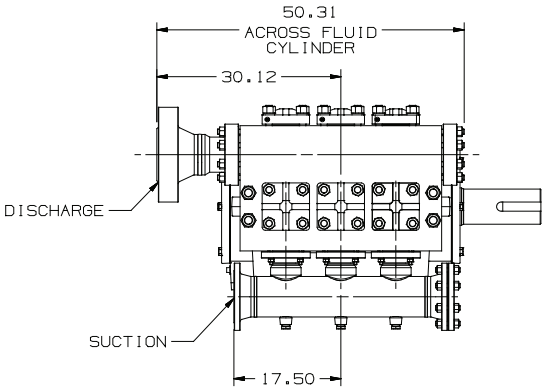
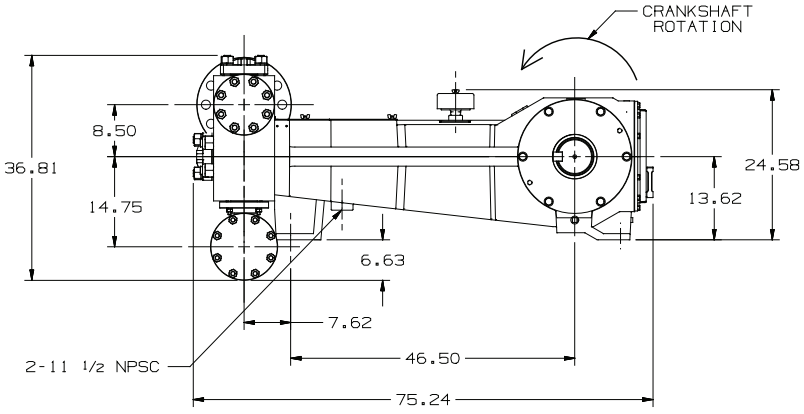
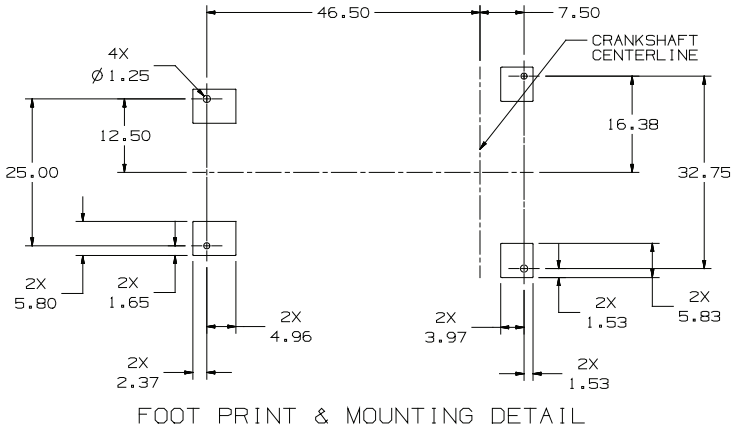


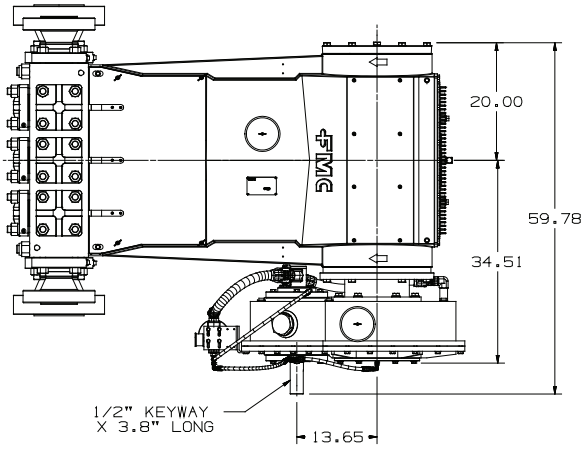


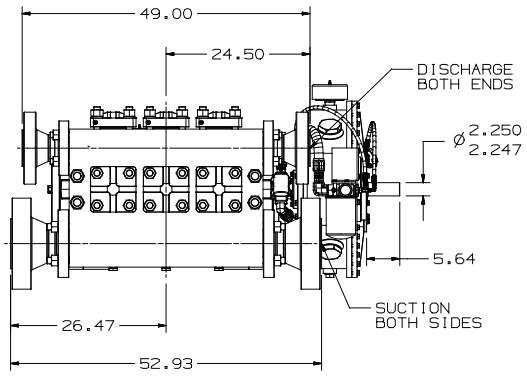


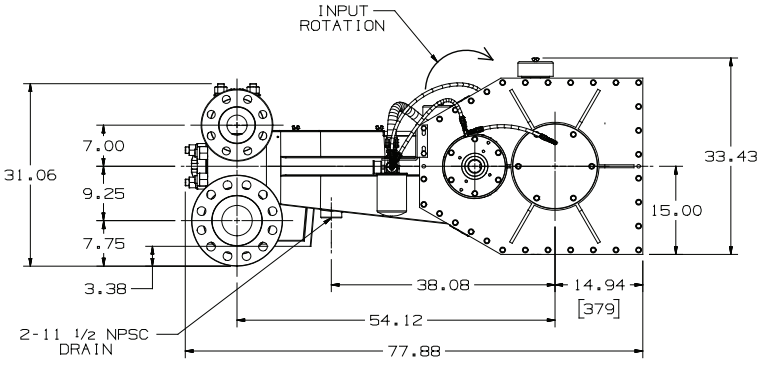
M28

Cast pump engineering dimensional outline









Q28

Specifications

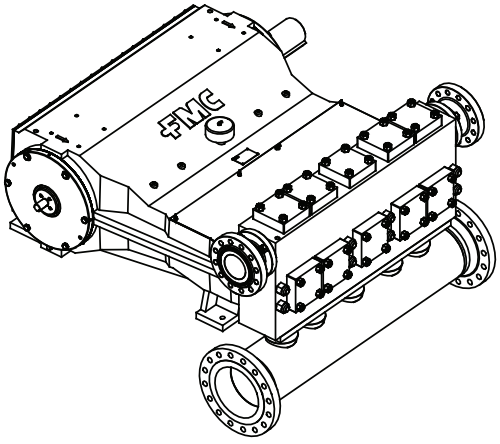
Design Standard	API-674, Third Edition
Configuration	Horizontal Quintuplex Plunger
Number of Plungers	5
Continuous Duty	650 BHP
Intermittent Duty	800 BHP
Stroke Length	7.0 Inches
Frame Load Rating	27,500 lbs
Pump Weight (Average)	13,000 lbs
Intermittent Duty Speed Rating	300 RPM
Continuous Duty Speed Rating	240 RPM
Minimum Speed *	100 RPM
Mechanical Efficiency	90%
Lubrication System	Splash, Gravity Return
Crankcase Oil Capacity	38 Gallons
Lube Oil Type	SAE 30
Fluid Temperature Range	-20 to 350 °F
Valve Types	Disc Valves, Abrasion Resistant Valves

Slower RPM can be achieved with the addition of a pressurized lubrication system

Bolt-on gearbox ratios available

6.17 : 1
6.50 : 1
7.30 : 1
9.57 : 1

Forged ISO drawing



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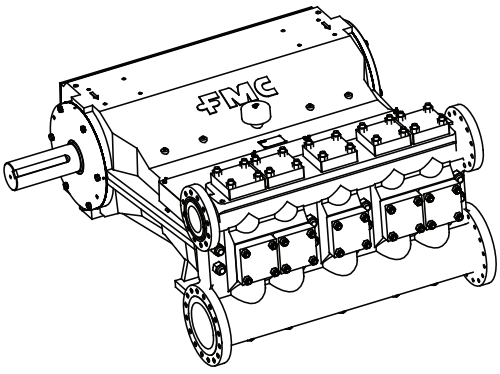


Q28

Performance data

Pump Model	Plunger Diameter (in)	Displacement (GAL/REV)	Maximum Pressure (PSI)	Pump Capacity (GPM) @ Input Speed (RPM)					
				100 RPM	150 RPM	200 RPM	**240 RPM**	250 RPM	300 RPM
Q2814	1.750	0.3644	10,000	36	55	73	**87**	91	109
Q2816	2.000	0.4760	8,750	48	71	95	**114**	119	143
Q2818	2.250	0.6024	6,920	60	90	120	**145**	151	181
Q2820	2.500	0.7437	5,600	74	112	149	**178**	186	223
Q2822	2.750	0.8999	4,630	90	135	180	**216**	225	270
Q2824	3.000	1.0710	3,890	107	161	214	**257**	268	321
Q2826	3.250	1.2569	3,310	126	189	251	**302**	314	377
Q2828	3.500	1.4577	2,860	146	219	292	**350**	364	437
Q2830	3.750	1.6734	2,490	167	251	335	**402**	418	502
Q2832	4.000	1.9040	2,190	190	286	381	**457**	476	571
Q2834	4.250	2.1494	1,940	215	322	430	**516**	537	645
Q2836	4.500	2.4097	1,730	241	361	482	**578**	602	723
Q2838	4.750	2.6849	1,550	268	403	537	**644**	671	805
Q2840	5.000	2.9750	1,400	297	446	595	**714**	744	892
Q2842	5.250	3.2799	1,270	328	492	656	**787**	820	984
Q2844	5.500	3.5997	1,160	360	540	720	**864**	900	1,080
Q2846	5.750	3.9344	1,060	393	590	787	**944**	984	1,180
Q2848	6.000	4.2840	970	428	643	857	**1,028**	1,071	1,285
Q2850	6.250	4.6484	900	465	697	930	**1,116**	1,162	1,395

Standard connection sizes

Pump Model	Suction (in)	Discharge (in)
Q2814-Q2820	4.0	3.0
Q2814-Q2824	6.0	3.0
Q2826-Q2836	8.0	4.0
Q2838-Q2842	10.0	6.0
Q2844-Q2850	12.0	6.0

NPT connections available

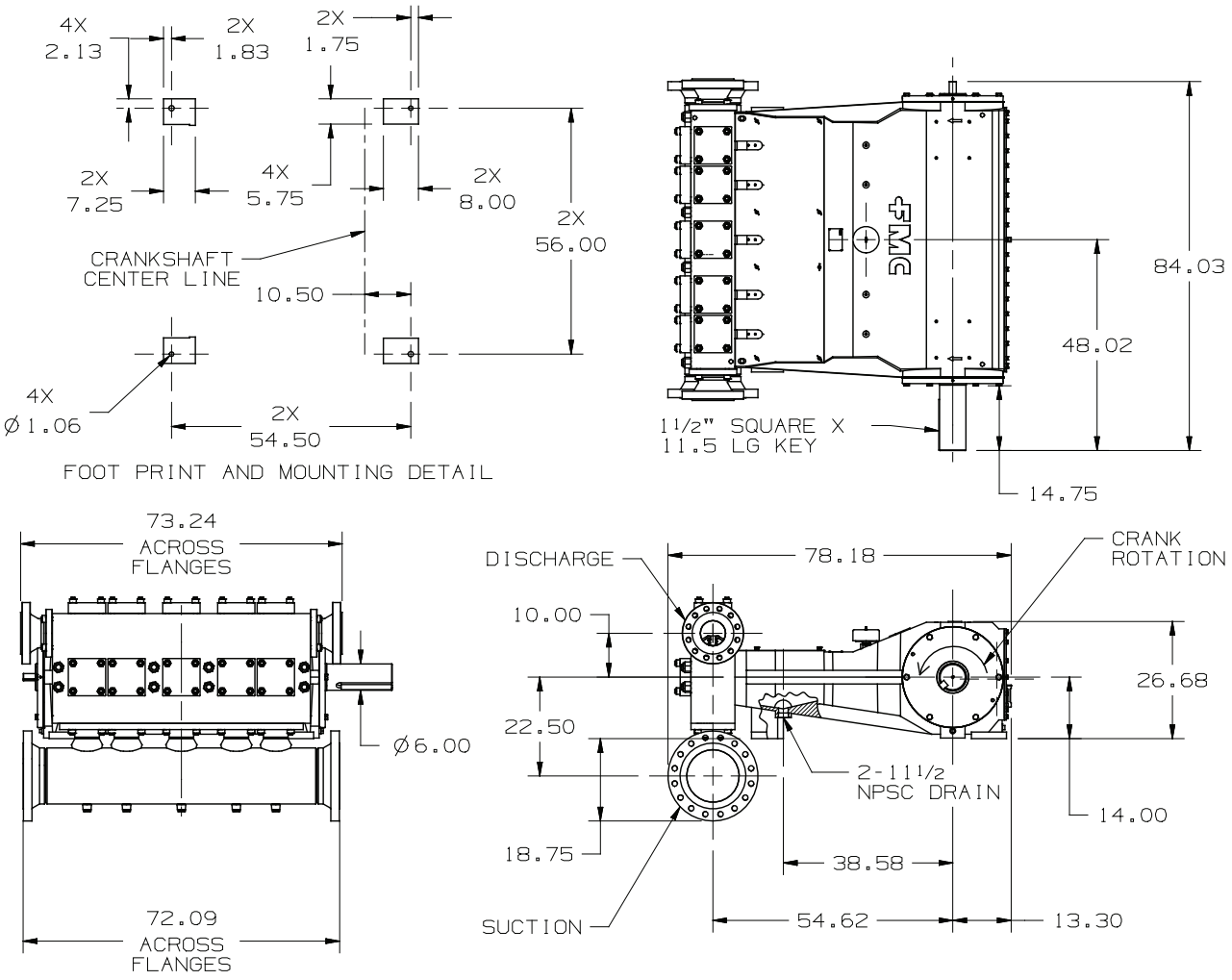
Fluid cylinder materials

Forged	Cast
A350-LF2 Carbon Steel	Currently not available
Hi-Strength Carbon Alloy Steel	
2205 Duplex Stainless Steel	

Special materials available on request

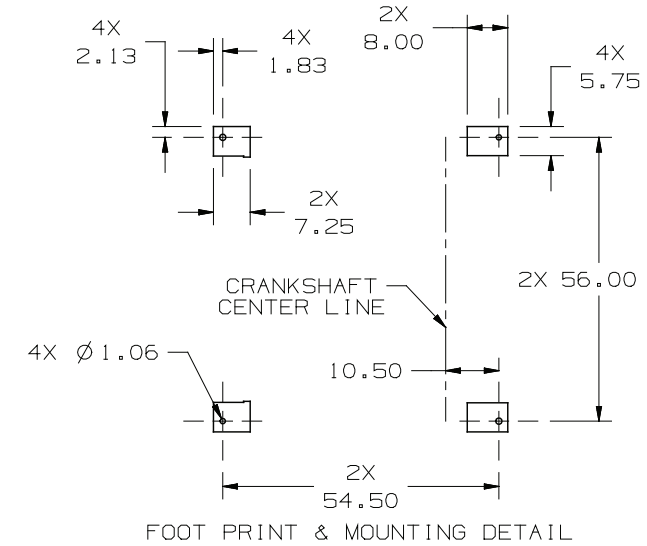
Q28

Forged pump engineering dimensional outline

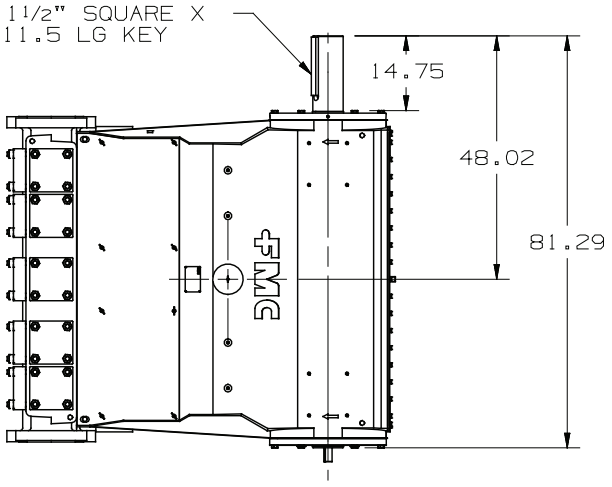


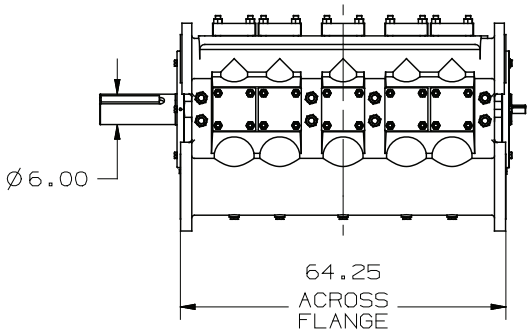
Q28

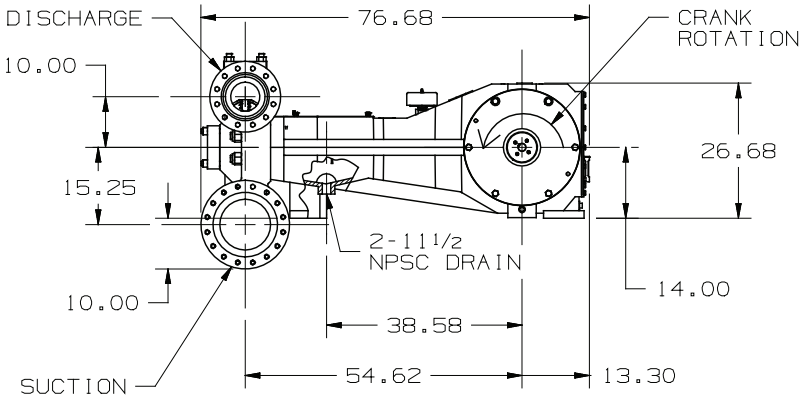
Cast pump engineering dimensional outline



FOOT PRINT & MOUNTING DETAIL







Q32

Specifications

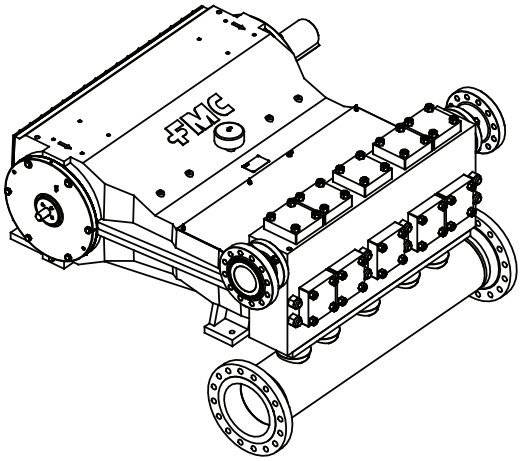
Design Standard	API-674, Third Edition
Configuration	Horizontal Quintuplex Plunger
Number of Plungers	5
Continuous Duty	700 BHP
Intermittent Duty	1000 BHP
Stroke Length	8.0 Inches
Frame Load Rating	30,000 lbs
Pump Weight (Average)	13,000 lbs
Intermittent Duty Speed Rating	300 RPM
Continuous Duty Speed Rating	210 RPM
Minimum Speed *	100 RPM
Mechanical Efficiency	90%
Lubrication System	Splash, Gravity Return
Crankcase Oil Capacity	38 Gallons
Lube Oil Type	SAE 30
Fluid Temperature Range	-20 to 350 °F
Valve Types	Disc Valves, Abrasion Resistant Valves

Slower RPM can be achieved with the addition of a pressurized lubrication system

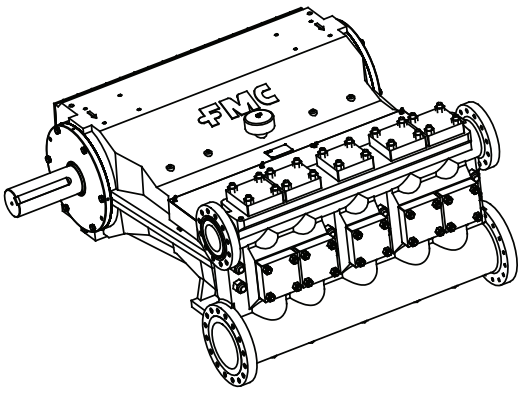
Bolt-on gearbox ratios available

6.17 : 1
6.50 : 1
7.30 : 1
9.57 : 1

Forged ISO drawing



Cast ISO drawing



Q32

Performance data

Pump Model	Plunger Diameter (in)	Displacement (GAL/REV)	Maximum Pressure (PSI)	Pump Capacity (GPM) @ Input Speed (RPM)					
				100 RPM	150 RPM	200 RPM	**210 RPM**	250 RPM	300 RPM
Q3214	1.750	0.4165	10,000	42	62	83	**87**	104	125
Q3216	2.000	0.5440	9,550	54	82	109	**114**	136	163
Q3218	2.250	0.6885	7,500	69	103	138	**145**	172	207
Q3220	2.500	0.8500	6,125	85	128	170	**179**	213	255
Q3222	2.750	1.0285	5,025	103	154	206	**216**	257	309
Q3224	3.000	1.2240	4,250	122	184	245	**257**	306	367
Q3226	3.250	1.4365	3,620	144	215	287	**302**	359	431
Q3227	3.375	1.5491	3,355	155	233	310	**325**	387	465
Q3228	3.500	1.6660	3,125	167	250	333	**350**	417	500
Q3230	3.750	1.9125	2,720	191	287	383	**402**	478	574
Q3232	4.000	2.1760	2,390	218	326	435	**457**	544	653
Q3234	4.250	2.4565	2,110	246	368	491	**516**	614	737
Q3236	4.500	2.7540	1,890	275	413	551	**578**	689	826
Q3237	4.625	2.9091	1,790	291	436	581	**610**	727	873
Q3238	4.750	3.0685	1,690	307	460	614	**644**	767	921
Q3240	5.000	3.4000	1,530	340	510	680	**714**	850	1,020
Q3242	5.250	3.7485	1,390	375	562	750	**787**	937	1,125
Q3244	5.500	4.1140	1,260	411	617	823	**864**	1,029	1,234
Q3246	5.750	4.4965	1,160	450	674	899	**944**	1,124	1,349
Q3248	6.000	4.8960	1,060	490	734	979	**1,028**	1,224	1,469
Q3250	6.250	5.3125	980	531	797	1,063	**1,116**	1,328	1,594

Standard connection sizes

Pump Model	Suction (in)	Discharge (in)
Q3214-Q3220	4.0	3.0
Q3214-Q3224	6.0	3.0
Q3226-Q3234	8.0	4.0
Q3236-Q3240	10.0	6.0
Q3242-Q3250	12.0	6.0

NPT connections available

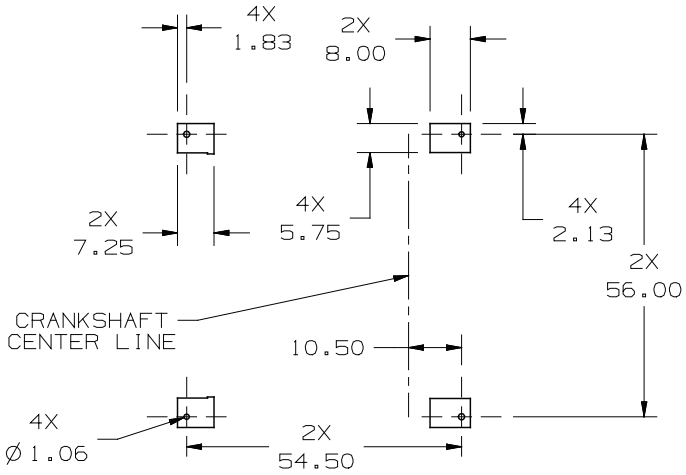
Fluid cylinder materials

Forged	Cast
A350-LF2 Carbon Steel	Currently not available
Hi-Strength Carbon Alloy Steel	
2205 Duplex Stainless Steel	

Special materials available on request

Q32

Forged pump engineering dimensional outline



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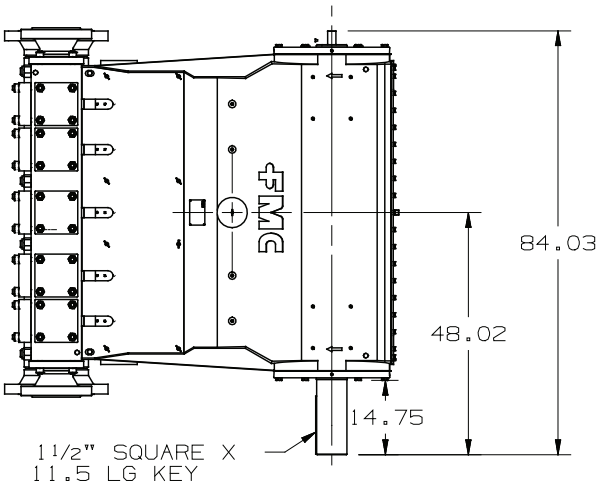
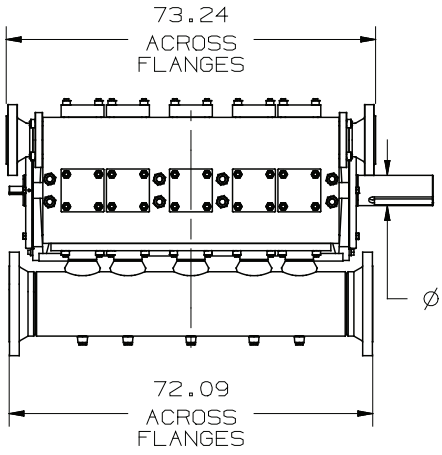
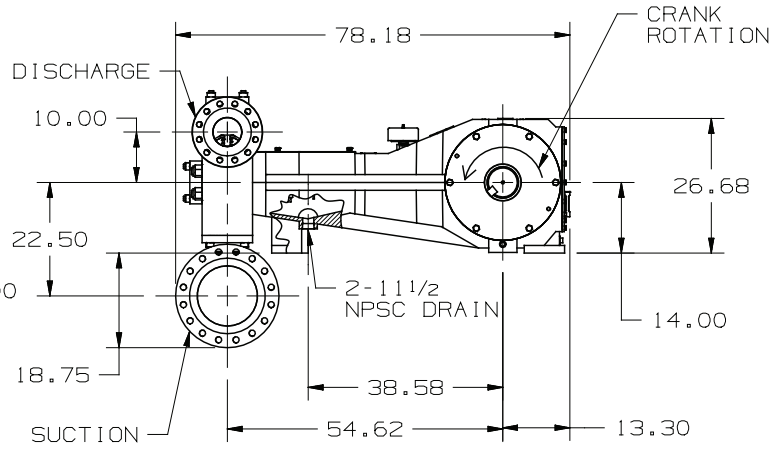
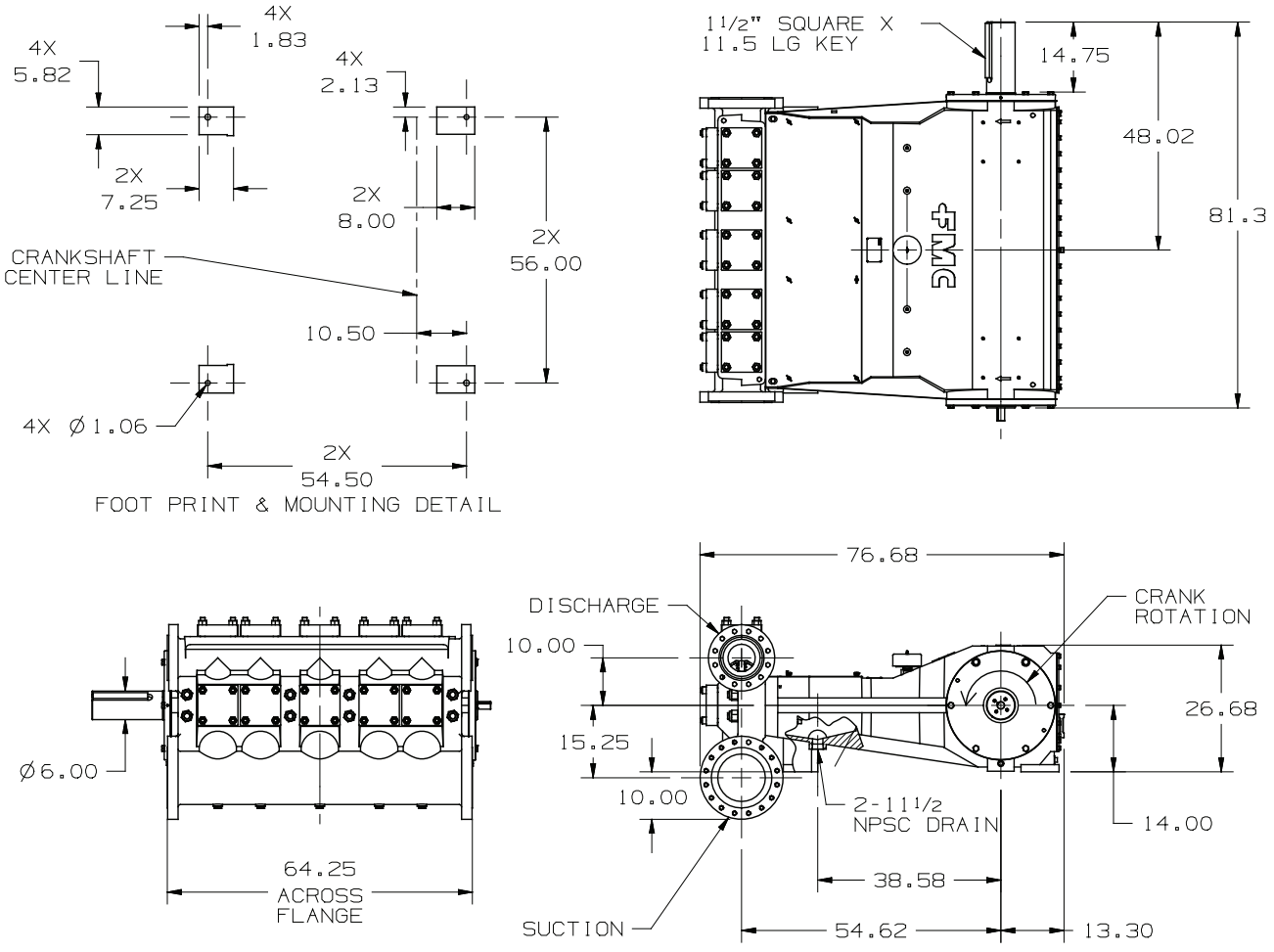






Q32

Cast pump engineering dimensional outline



Notes

1. **CS** = Carbon steel
   SS = Stainless steel
   DX = Duplex stainless steel
   AB = Aluminum bronze
   DEL = Delrin disc valves
   TI = Titanium disc valves
   AR = Abrasion resistant valves

2. Horsepower based on 85 or 90% mechanical efficiency. Actual application horsepower requirements can be calculated using the equation:
   BHP = (GPM * PSI) / (1714 * 0.85 or 0.90)

3. Pump capacities shown are based on 100% volumetric efficiency.

4. Dimensions shown are for general sizing purposes and should not be used for construction. Contact TechnipFMC for actual dimensions of pump ordered.

5. Pump drawing dimensions in inches.

6. Take special consideration when calculating NPSHa. Recalculate NPSHa after pump model has been selected for more accurate values.

7. NPSHr values are in feet of water. If you are pumping a different liquid than water, convert the required NPSH from water to the liquid being pumped by dividing the published NPSHr value by the specific gravity of the liquid being pumped.

8. TechnipFMC recommends NPSHa (available) exceeds NPSHr (required) by 5 feet of water.

9. TechnipFMC published NPSHr values are based on test data collected on specific pumps at the factory and are estimated values. Actual NPSHr values for an ordered pump can only be determined by a factor test. For NPSH critical applications, contact the factory for additional information and request an NPSHr test performed on your pump before shipment.

10. There are many variations of packings available for every applications. Consult with TechnipFMC to determine the best option to suit your fluid type, temperature and lubrication needs.

11. When using a packing lubricator, a small amount of packing lubricant will enter the pumped liquid.

12. Tungsten coated stainless steel plungers are the most commonly used and well suited for all fluids. Solid ceramic plungers work well with abrasive fluids such as water applications but should not be used where thermal shock or flammable liquids or gases are present.

13. Consult with TechnipFMC on the correct grade of CS or SS to use for your application.

14. Adjusting Nuts that are made from SS and used in SS stuffing boxes have an anti-seize coating to prevent galling.

15. Vaporless Stuffing Boxes should be used when pumping a flammable or hazardous liquid that should be prevented from leaking to atmosphere.

16. TechnipFMC reserves the right to modify this information without prior notice.

Fluid end options

- **Material certification** Documentation of the material certification of the pressure containing fluid end components.
- **NACE** Used in sour (H2S / Chlorides) applications where certain materials are not allowed due to corrosion and/or reduction of material strength.
- **Lubricated stuffing box** Ported stuffing box that allows a packing lubricant to be pumped directly into the packing area for better lubrications than an external drip. Used to reduce friction and extend the life of wearable components.
- **Vaporless stuffing box** Ported stuffing box with secondary packing that allows any leakage to be collected and sent to the vent manifold system. Packing lubrication is required for this option to lubricate and cool the secondary seals.
- **Flushable stuffing box** A ported stuffing box that allows a clean fluid to flush out contamination that can damage wearable components prematurely or to cool the friction surfaces.
- **Packing lubricator** Used in conjunction with a lubricated or vaporless stuffing box to provide forced lubrication to the stuffing box for reduced friction and extended life of the wearable components.
- **Sealed cradle** Provides a complete seal of the cradle area to prevent all leakage from exiting the cradle area except from the appropriate drain points.
- **Cradle purge system** Used in conjunction with a sealed cradle to purge the oxygen, flammable, or toxic gases from the cradle area with an inert gas such as Nitrogen. This would be used to prevent any hydrocarbon or other reactive exposure in the cradle area.
- **Vent manifold** System Used in conjunction with the vaporless stuffing box to collect any leakage fro removal, collection and/or disposal. The vent manifold system uses an orifice to build back pressure and a pressure switch to send a signal fro alarm and/ or shutdown in the case that the leakage exceeds the set limit.

Valve options

- **AR Valves** Abrasion resistant valves use hardened metallic components and feature an angled seat to reduce the wear on the valves. An elastomeric seal traps abrasive particles from the pumped fluid and seals around them to avoid wash-out. When the temperature of the fluid exceeds the limits of the Urethane seal an metal-to-metal seal option is available.
- **Disc valves** The spring loaded disc valve is the most common type of valve used in reciprocating pumps. Stainless steal, Delrin, or titanium discs are available for a variety of fluid types, temperatures, and pressures.
- **Valve hold downs** Used in extremely hot or cold applications where the potential exists for the valve to unseat due to material expansion or contraction.

Plunger packing options

- **Braided packing** Braided ring (Rope) packing is made from braided strands material. They are designed to leak a minimal amount in order to ensure proper lubrication. Braided packing can be used in both adjustable and spring loaded packing arrangements.
- **V-ring packing** V-ring packing is molded from shaped elastomer and fiber sheets. They are designed to reduce leakage. Depending on the pumped fluid, v-rings may require additional lubrication. V-ring packing can be used with spring loaded arrangements and with header rings.
- **Header ring** Used in conjunctions with v-ring packing as a wiper for abrasive fluid particles to prevent them from wearing the primary packing. Also provides the energizing force to preload the v-ring packing.
- **Spring loaded (nonadjustable)** Packing Non-adjustable packing uses a spring to ensure the correct energizing load is applied to the packing. As the packing wears, the energizing load is automatically adjusted by the spring for optimal packing life.
- **Adjustable packing** Adjustable packing requires maintenance and allows the user to tighten the packing and reduce leakage to acceptable levels. Avoid over-tightening to optimize packing life.

Plunger options

- **Tungsten Carbide** The standard plunger option on a stainless steel base material for the best all-round resistance to abrasion and corrosion.
- **Ceramic** Ceramic plungers are very abrasion resistant, but due to susceptibility to thermal shock, they are not recommended for use with any flammable or hazardous fluids. Used in abrasive water based applications like saltwater disposal.
- **Chrome oxide** Recommended for use in amine or other fluids requiring restricted lubrication. One type of a chrome oxide coating is Rokide.
- **Premium tungsten carbide** Similar to the standard tungsten carbide plunger, but a higher grade of tungsten carbide coating.

Paint options

- **Standard blue** Standard water reducible enamel paint available for general pumping applications.
- **2-Coat epoxy** Used more frequently in on-shore oil and gas applications where extra coating protection is required.
- **3-Coat epoxy** Used more frequently in off-shore oil and gas applications where extra coating protection is required.

Power end options

- **Crankshaft extensions** Crankshaft side designation is classified by viewing the power end while standing at the fluid end side. Left hand (LH) is standard. Right hand (RH) is optional.
- **Double extended crankshafts** Crankshaft extension on both sides of the power end. Typically available on most pumps and is for drive from either side of power end or to drive accessory equipment.

Power end options (continued)

- **Crankshaft Extensions** Crankshaft side designation is classified by viewing the power end while standing at the fluid end side. Left hand (LH) is standard. Right hand (RH) is optional.
- **Double extended crankshafts** Crankshaft extension on both sides of the power end. Typically available on most pumps and is for drive from either side of power end or to drive accessory equipment.
- **Low oil level switch** Used to monitor the oil level in the power end of the pump and send a signal for alarm or shutdown in the case that the level falls too low for proper lubrication.
- **Power end pressure lube system** This system force feeds lubricant to the critical bearing surfaces to insure lubrication, minimize friction, reduce heat generation, and extend wear component life. Used in applications with high suction pressures, slow running speeds (less than 100 crankshaft RPM), and/or high power end temperatures due to high ambient temperatures. Driven by electric motor (standard) or by pump crankshaft extension.
- **Pressure switch (high and low)** Use in conjunction with the power end pressure lube system to send a signal for an alarm and/or shutdown in the case that the power end system drops below a minimal level indicating not enough pressure to feed the lubricant or above a maximum level indicating a clogged line or filter.
- **Oil coolers** Used in conjunction with the power end pressure lube system to cool the lubrication oil before returning to the power end. Typically used in applications with hot ambient temperatures, hot pumped fluid temperatures, and/or high suctions pressures.
- **Oil heater** Used to maintain a minimum temperature of the power end lubrications to maintain a minimal lubrication oil viscosity in cold ambient temperatures while running or shutdown. An oil heater is also used to maintain a minimum power end temperature in humid environments to prevent water condensate forming in the power end and contaminating the lubrication oil.
- **Thermocouple interfaces** Thermocouple interfaces for temperature sensors are available on most pump models to measure power end and bearing temperatures for input into a monitoring and control system.
- **Vibration switch** Vibrations switches are available for direct mount to the pump power frame to monitor the pump vibrations and send a signal for an alarm and/or shutdown in the case that the vibration exceeds maximum limits.
- **Wrist pin needle bearings** Available on most pump models and used in applications with high suction pressure and/or high ambient temperature applications to allow for better lubrication on the wrist pin area.

Accessory options

- **Bolt-on gearbox** Available on some pump models to allow for direct mounting of a gearbox to reduce the overall cost, size and weight of a pump system. This allows the direct coupling of the drive to the pump reducing the extra components needed to couple with an external gear reducer or belts and pulleys.

Testing options - Certified or witnessed certified

- **Mechanical run test** All TechnipFMC pumps have mechanical run tests to insure the material, manufacturing, and assembly quality of the pump assembly. The test is run at the maximum speed and rated pressure for a specified minimum time based on pump model.
- **Hydrostatic fluid cylinder test** When required by customer specifications, or API Standards, fluid cylinders will be hydrostatically tested. All fluid cylinders for API pumps with suction and discharge flanges are to be hydrostatically tested. Fluid cylinders are tested to 1.5 times its respective rated suction and discharge pressure for 30 minutes.
- **Performance test** When required by customer specifications, pumps will have full performance tests that measure and record specific data that allows comparison of actual input and output parameters to determine pump efficiencies. Typically run at the normal operating condition of the application provided by the customer for 1 hour.
- **NPSHr test** When required by customer specifications, net positive suction head required (NPSHr) test is the factory test to measure the minimum amount of suction pressure required for the pump to operate with no more than a 3% reduction in flowrate due to cavitation. Typically the NPSHr test is run at the normal operation condition of the application provided by the customer. This test can be repeated up to 5 total points for curve generation when required by the customer.

Service options

- **Short term storage for severe environments** Proper storage of your TechnipFMC pump will insure that it is ready for service when started. TechnipFMC pumps come from the factory without crankcase oil and are prepared for storage periods of up to six (6) months in proper environmental conditions. Indoor storage in a dry, temperature-controlled location is always recommended. If pumps are to be stored short term (less than six (6) months) in a severe environment, they should be prepared using the TechnipFMC procedures outlining "Short Term Storage for Severe Environments" to protect the power end components from rusting and seizing due to the lack of lubricant and/or preservative.
- **Long term storage** Proper storage of you TechnipFMC pump will insure that it is ready for service when started. TechnipFMC pumps come from the factory without crankcase oil and are prepared for storage periods of up to six (6) months in proper environmental conditions. Indoor storage in a dry, temperature-controlled location is always recommended. If the pump is to be stored, or is inactive, for periods in excess of six (6) months, it is necessary to prepare the pump as outlined by TechnipFMC's "Long Term Storage" procedure to protect the power end components from rusting and seizing due to the lack of lubricant and/or preservative.
- **Engineering application training** TechnipFMC provides a complete in-house engineering training course for design, application, and maintenance engineers on basic to advance practical concepts for the proper selection, installation and application of reciprocating pumps and systems.
- **Maintenance training** TechnipFMC provides a complete in-house maintenance training course for the maintenance technician and manager for reciprocating pumps and pump systems.
- **Pump commissioning** Commissioning of a pump unit before start up at the application sight is crucial to the success of the pump over the lifetime of the pump system. This is also a good time for the maintenance staff to review the important aspects of the pump system. TechnipFMC and its distributors are available to help in the commissioning and start up process.

Reference calculations

Pump displacement [GPR]

$$\textbf{GPR} = d^2 \times S \times Np \times 0.0034$$

Pump displacement [GPM]

$$\textbf{GPM} = (RPM \times GPR \times VE)$$

Piston/plunger/rod load [lbf]

$$\textbf{RL} = Ap \times PSI$$

Fluid velocity [ft/sec]

$$\textbf{FV} = \frac{(GPM \times 0.321)}{FA} = \frac{(0.41 \times GPM)}{d^2}$$

Flow area of pipe [in²]

$$\textbf{FA} = d^2 \times 0.7854$$

Static head of liquid [ft of water]

$$\textbf{Hs} = (2.31 \times PSI) \times S.G.$$

Acceleration head [ft of liquid]

$$\textbf{Ha} = \frac{(L \times V \times N \times C)}{(K \times g)}$$

NPSHa [ft of water]

$$= Hs + Pa - Pv - Hf - Ha$$

Assumes tank at atmospheric pressure otherwise, add tank pressure.

Absolute viscosity [cp]

$$= S.G. \times cSt$$

Torque [ft-lb]

$$\textbf{T} = \frac{(hp \times 5252)}{RPM}$$

Brake horsepower [hp]

$$\textbf{HP} = \frac{(GPM \times PSI_{Discharge})}{1714 \times ME}$$

Excluding suction pressure

Brake horsepower [hp]

$$\textbf{HP} = \frac{(GPM \times PSI_{Discharge})}{(1714 \times ME)} - \frac{(GPM \times PSI_{Suction} \times (ME - 0.05))}{1714}$$

Including suction pressure

Abbreviations

Ap	Area of piston or plunger in square inches
C	Constant (0.066 Triplex, 0.200 Duplex, 0.040 Quintuplex)
d	Diameter in inches
g	Gravity (32.2 ft/sec)
GPM	Gallons per minute
Ha	Acceleration head in feet of liquid
Hf	Friction loss in feet of water
Hs	Static head in feet of water
K	Constant 1.4 Deaerated water 1.5 Water, Glycol, Amine 2.0 Most hydrocarbons 2.5 Hot oil
L	Length in feet
ME	Mechanical efficiency (90% for non-internal gear reduction, 85% for internal gear reduction)
N	Pump speed (RPM)
Np	Number of pistons or plungers
Pa	Atmospheric pressure in feet of water
Pv	Vapor pressure in feet of water
PSI	Pounds per square inch
S	Stroke-length in inches
S.G.	Specific gravity
V	Velocity of fluid in suction line
VE	Volumetric efficiency

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TechnipFMC

Flowline products and services

Worldwide distribution

TechnipFMC 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, TechnipFMC's flowline family of products and services enables customers to achieve maximum life and value from their flowline systems through a range of applications.

The success of TechnipFMC's flowline 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, TechnipFMC is helping its customers face tomorrow's technical and economic challenges today.

Chiksan and Weco products are distributed from more than 60 locations worldwide. Our facilities stock flowline products in the specific sizes, pressures, and materials common to each region. From a replacement seal for a Chiksan swivel joint to a platform full of well servicing equipment, TechnipFMC delivers.

Experienced, knowledgeable, productive people

TechnipFMC's global flowline team is structured around top flowline professionals 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, TechnipFMC stresses overall health, safety, and environment (HSE) in all of its operations and processes. With a proven record of outstanding HSE performance, TechnipFMC 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.

Research and development

To meet the evolving needs of its customers, TechnipFMC 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 market-place. Research and development capabilities include exhaustive laboratory and field testing, destructive and nondestructive testing, three-dimensional finite element analysis, computational fluid dynamics, and the flowline industry's only high-velocity flow loop.

Manufacturing leader

TechnipFMC's flowline manufacturing facility is located in Stephenville, Texas. The plant was constructed in 1980 and expanded in 1984, 1987, 1996 and 2012. The facility occupies a 39-acre site and comprises 350,000 square feet of manufacturing and office space for 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 surface equipment for distribution worldwide.

Flowline manufacturing facility, Stephenville, Texas

Unsurpassed quality

TechnipFMC's flowline quality system has been surveyed and approved by the American Petroleum Institute (API) for Q1 and ISE 9001:2015. The facility has also been surveyed and approved by DNVGL to meet Annex III Module H of Directive 2014/68/EU on all pressure equipment. Most products are supplied with the CE marking. Chiksan and Weco products also can be supplied-with both type and case approval from DNVG:, Lloyds, ABS, GGTN, and others. Products for sour gas service meet NACE MR-01-75 and API RP-14-E. Material certification and traceability are also available.

World class manufacturing and quality.

Integrated services

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

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Contents


WARNING
FMC

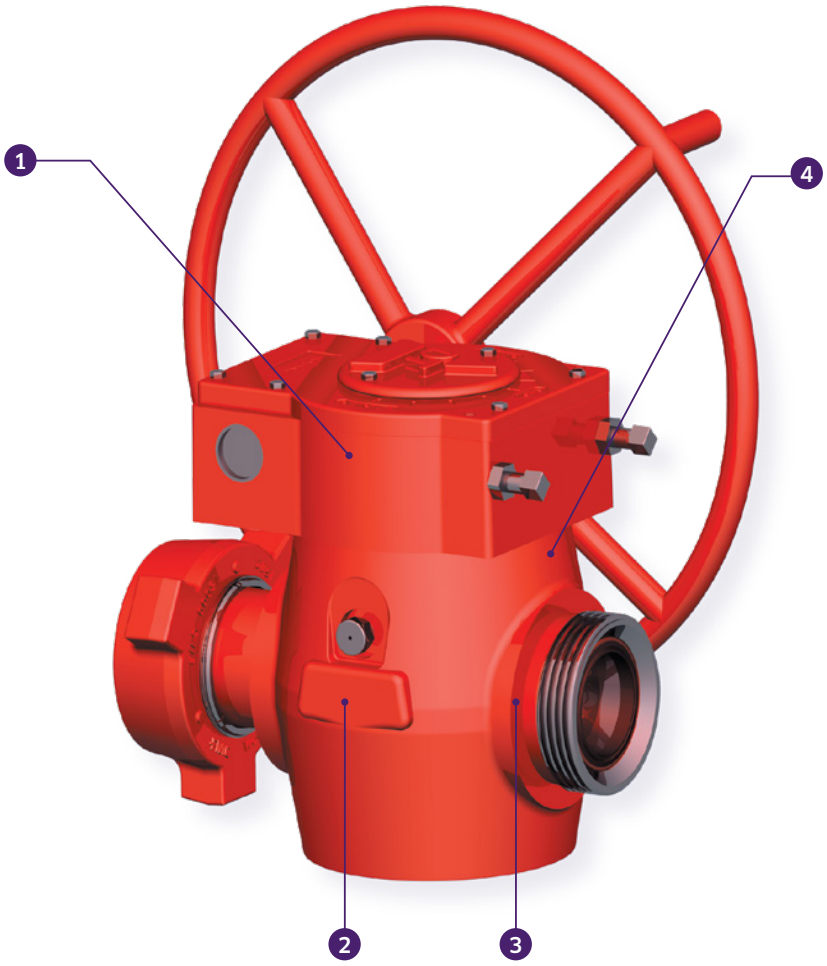
Weco® plug valves

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 up 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 warnings and cautions, pg. 88).

Benefits

The benefits of TechnipFMC'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.

1. **Choice of operators, actuators**
   Gear operators, pneumatic actuators and hydraulic actuators are available.
2. **Ultimate sealability, no adjustments required**
   Floating plug improves sealability and reduces plug wear.
3. **Low torque operation at all pressures**
   Cylindrical plug fits between seal and side segments, reducing plug drag on the valve body.
4. **Body erosion virtually eliminated**
   Fluid is forced between the plug/seal interface, limiting wear to replaceable parts.



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..

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.

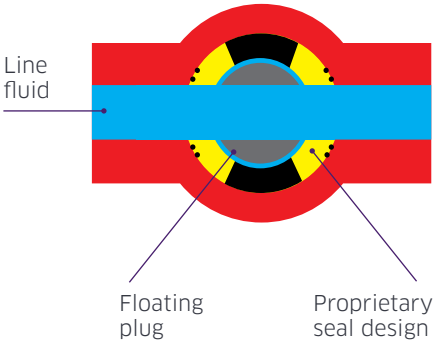
Ultimate life cycle cost savings

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 that 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.

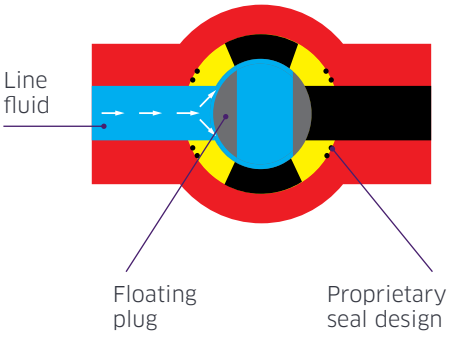
See specifications tables **(pgs. 10-11)** for sizes, dimensions, weights, materials, and part numbers.

Operating principal:

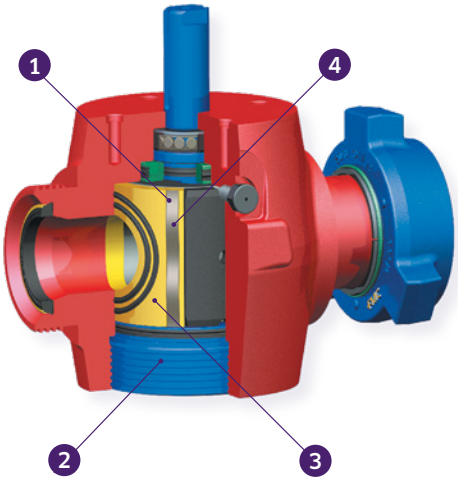
Top view - valve open



Top view - valve closed



Weco® plug valves

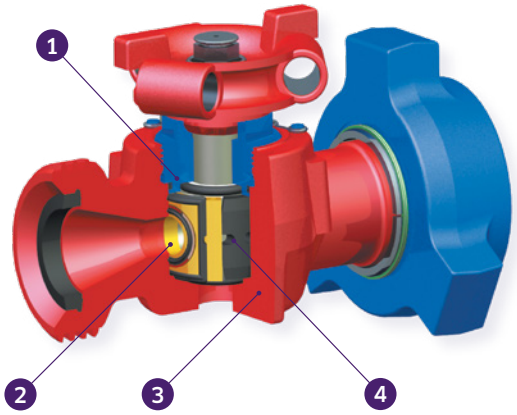


ULT plug valves (3-inch and larger)

Up to 20,000 psi cold working pressure

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

1. **Two-piece floating plug/stem**
   Proprietary floating plug and stem uniformly distribute load against the downstream seat to improve sealability and reduce plug wear..
2. **Fast, simple field repair**
   Bottom entry design provides access to all valve internals without having to remove the operator or actuator.
3. **Eliminates body washout, extends body life**
   Dual seals direct flow between the seal segment and plug to provide long, trouble-free service life.
4. **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.



ULT plug valves (below 3-inch)

Up to 20,000 psi cold working pressure

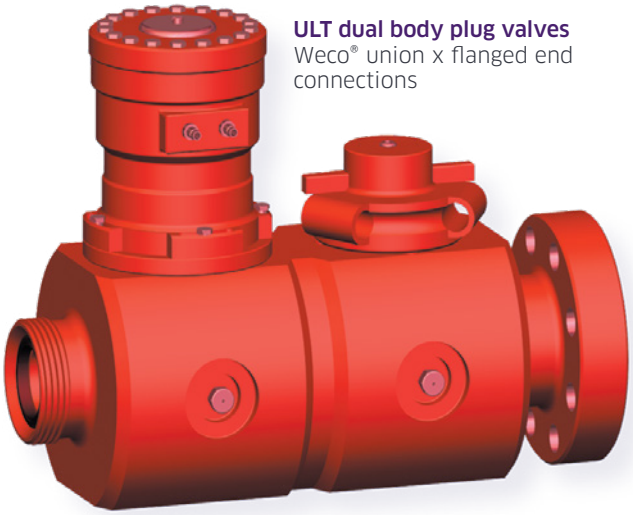
Recommended service
Slick water, sand, proppant/gel, energized fluids, inhibited acids and cement

1. **Eliminates body washout, extends body life**
   Dual seals direct flow between the seal segment and plug to provide long, trouble-free service life.
2. **Fast assembly**
   Integral stem and plug provide fast, sure assembly without adjustments.
3. **Interchangeable design**
   Internal components of 1” size interchange with Weco® DR valve components, potentially extending the life of those valve bodies.
4. **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.

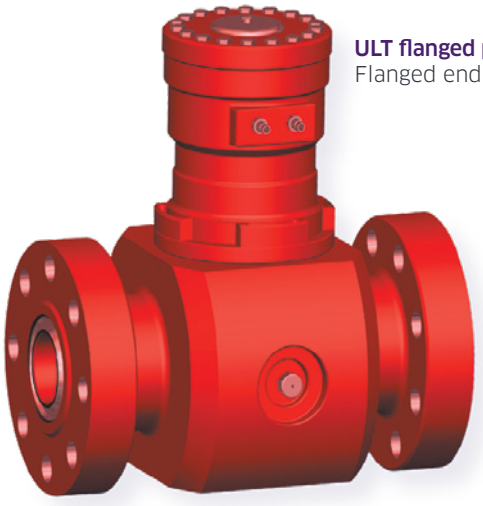
Specialty ULT Plug Valves

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).**

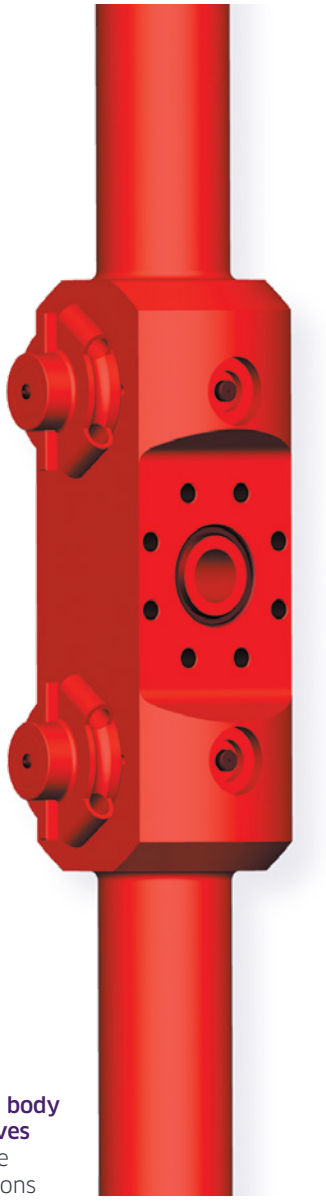
See specifications tables **(pgs. 8-9)** for sizes, dimensions, weights, materials, and part numbers.



ULT dual body plug valves
Weco® union x flanged end connections



ULT flanged plug valves
Flanged end connections



ULT dual body plug valves
Drill pipe connections

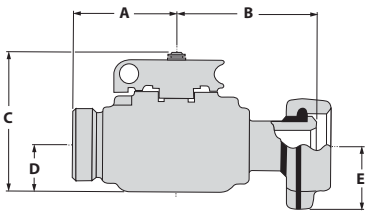
Weco® plug valve specifications

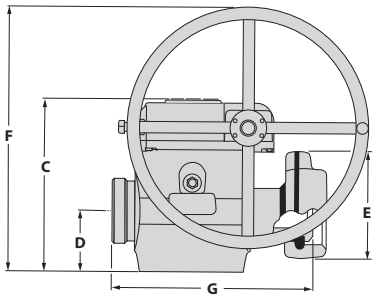
Weco® and Chiksan® low temperature ranges (LT)

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

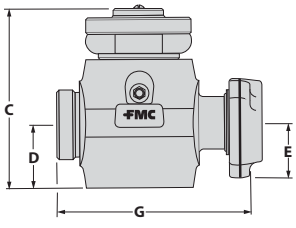
Plug valve model	Nominal size, in.	P/N	P/N-LT	Weco end connection *	Service	CWP psi bar	lb kg
ULT 150	1	P516114	–	1502	Standard	**15,000** 1034	**33** 15
ULT 100	1	P524578	–	1502	Sour	**10,000** 690	**33** 15
ULT 150	1x2	P516108	P516108-LT	1502	Standard	**15,000** 1034	**43** (19.5)
	1x2 (.38 bore)	P516146	–	1502	Standard	**15,000** 1034	**58** (26.3)
ULT 100	1x2	P516208	–	1502	Sour	**10,000** 690	**43** (20)
ULT 150	2	P537789	–	1502	Standard	**15,000** 1034	**84** (38)
DR 200	2	3234183	–	2202	Sour	**15,000** 1034	**98** (45)
ULT 150 (Manual)	3	3265904		1502	Standard	**15,000** 1034	**238** (108)
ULT 100 (Manual)	3	P501010	–	1502	Sour	**10,000** 690	**231** (105)
ULT 150 (Manual)	3	P555686	–	1505	Standard	**15,000** 1034	**247** (112)
ULT 100 (Handwheel)	3	P556455	–	1505	Standard	**15,000** 1034	**314** (143)
ULT 150 (Hydraulic)	3	3265123	–	1502	Standard	**15,000** 1034	**412** (187)
ULT 100 (Hydraulic)	3	3267427	–	1502	Sour	**10,000** 690	**405** (184)
ULT 150 (Handwheel)	3	3265122	–	1502	Standard	**15,000** 1034	**305** (139)
ULT 100 (Handwheel)	3	3265257	–	1502	Sour	**10,000** 690	**315** (143)
ULT 200 (Hydraulic)	3	P519087	P519087-LT	2002	Standard	**20,000** (1380)	**845** (384)
ULT 150 (Handwheel)	3	P522233	–	2202	Sour	**15,000** 1034	**689** (313)
ULT 100 (Hydraulic)	4	P518352	P518352-LT	1002	Standard	**10,000** 690	**830** (377)
ULT 100 (Handwheel)	4	P518356	P518356-LT	1002	Standard	**10,000** 690	**633** (287)
ULT 150 (Hydraulic)	4	P516015	P516015-LT	1502	Standard	**15,000** 1034	**871** (395)
ULT 150 (Handwheel)	4	P518749	P518749-LT	1502	Standard	**15,000** 1034	**716** (325)

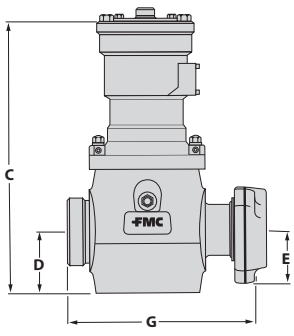
Note: * Other end connections are available. Consult factory.





Plug valve 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)	**5.25** (133)	–	**15.69** (399)
ULT 150 (Manual)	3	–	–	**14.49** (368)	**5** (127)	**5.25** (133)	–	**15.69** (399)
ULT 100 (Handwheel)	3	–	–	**14.49** (368)	**5** (127)	**5.25** (133)	–	**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)





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

Weco® check valves

TechnipFMC has redesigned the top entry check valve and added new, proprietary materials. These changes provide improved structural support and erosion tolerance, including added resistance to corrosive chemicals. The result is extended valve life – 2-3X life in acid service or 4-5X life in standard service.

Extended life 3” 15k top entry check valve

The WECO® Extended life 3”15k top entry check Valve eliminates the need for special tools and reduces non-productive time which saves you time and money. The hammer union style body cap is easily detached, allowing access to hand removable internals for field servicing.

Like all pressure containing products, Weco check valves require special handling. **(See See warnings and cautions, pg. 88)**

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

Top entry check valve parts
Part No. P558733
Standard Flow Check Valve Assembly

Part No. P561165
Reverse Flow Check Valve Assembly

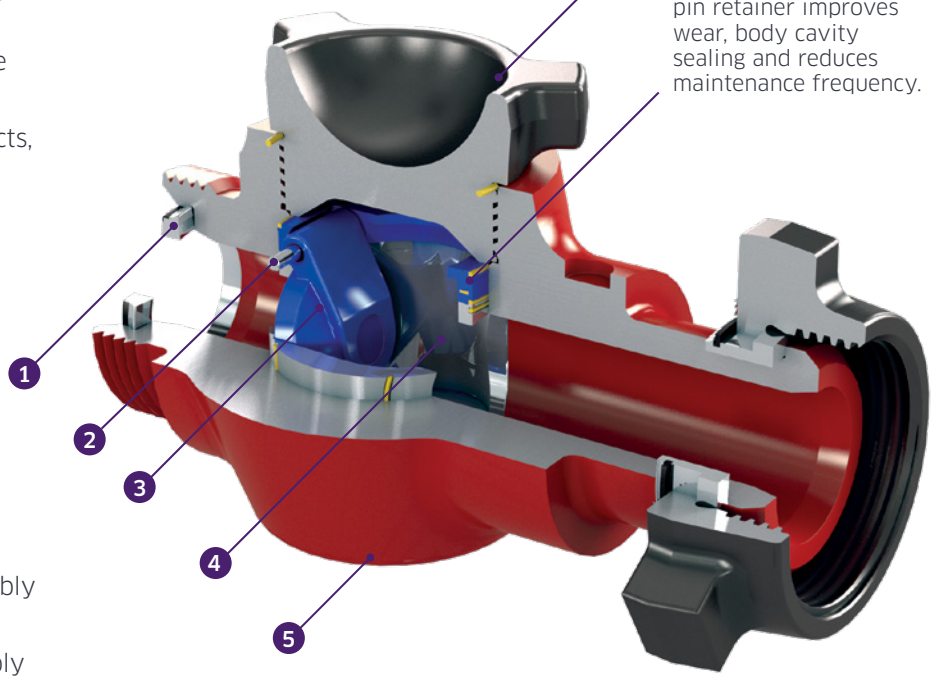
Replacement kits
Kit 1 – Part No. P561370
(Flapper and pin)

Kit 2 – Part No. P561369
(Flapper, pin, o-rings and body plug)

Kit 3 – Part No. P561861
(Cartridge insert, pin, body plug, o-rings)

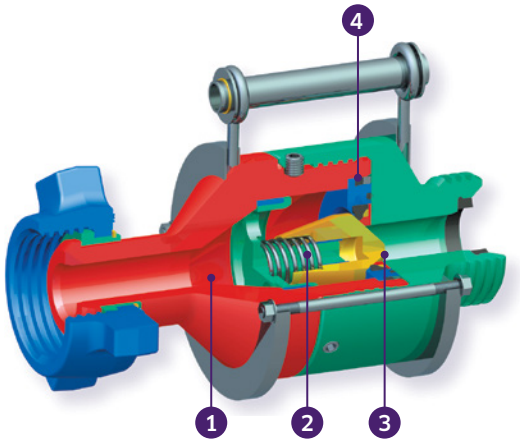
Body cap
Fast, easy field service – no special tools required.

Pin retainer
Patent-pending pivot pin retainer improves wear, body cavity sealing and reduces maintenance frequency.



1. Seal ring
2. Pivot pin
3. Flapper
4. Seat cartridges
5. Body plug

Dart check valves

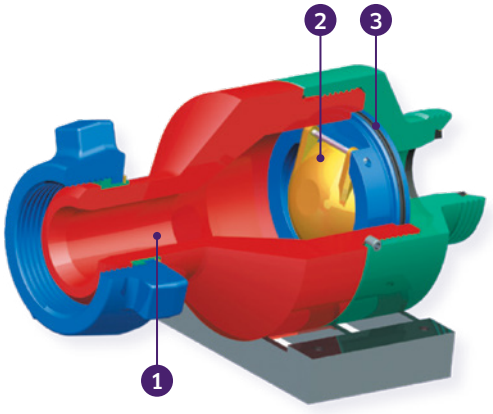


Recommended service
Extreme nitrogen and carbon dioxide services; wet or dry non-erosive flow.

1. **Minimizes explosive decompression**
   Explosive decompression resistant materials and design for long service life.
2. **N2 and CO2 capability**
   Stainless steel internal components and special elastomer seal handle gas velocities in excess of 250 feet/second.
3. **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.
4. **Easy, low-cost service**
   Main seal is located on seat, reducing exposure to flow. Enables seal to be replaced without replacing seat or dart.

See specifications tables **(pg. 12)** for sizes, dimensions, weights, materials, and part numbers.

Inline flapper check valves



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

1. **Open flow path**
   Flapper dynamics provide optimum flow through the valve and low flow differential.
2. **Abrasion resistant flapper**
   Carboxylated nitrile flapper face is abrasion resistant against a complete range of well fluids.
3. **Replaceable seat**
   Separate seat/body design ensures the seat can be replaced as needed.

Weco® check valves

Top entry check valves

Nominal size	CWP	Service	End connections	Flow	Part number	P/N - LT	in. (mm)	in. (mm)	lb kg	Repair kit	Elastomer set
2"	15,000	Standard	1502 MxF	Standard	P530589	P530589-LT	**13.12** 333	**8.27** 211	**70** 31.75	P528681	P528686
	15,000	Standard	1502 FxM	Reverse		P537198-LT	**13.12** 333	**8.27** 211	**70** 31.75	P528681	P528686
	15,000	Standard	1502 MxF	Standard		P537131-LT*	**13.12** 333	**8.27** 211	**69** 31.3	P528681	P528686
	10,000	Sour Gas	1502 FxM	Standard		P537196-LT	**13.12** 333	**8.27** 211	**70** 31.75	P537904	P537905
3"	15,000	Standard	1502 MxF	Standard	P558733	–	**15.67** 398	**9.52** 242	**130** 59	P561370 P561369 P561861	–
	15,000	Standard	1505 MxF	Standard	P562345	–	**15.67** 398	**9.52** 242	**141** 64	P561370 P561369 P561861	–
	15,000	Standard	1502 MxF	Reverse	P561165	–	**15.67** 398	**9.52** 242	**130** 59	P561370 P561369 P561861	–
	10,000	Sour Gas	1502 FxM	Standard	P537225		**15.67** 398	**9.54** 242	**127** 58	P508059	P508060
	6,000	Standard	602 MxF	Standard	P537202	–	**15.67** 398	**9.54** 242	**124** 57	P522215	P523359
	6,000	Standard	602 FxM	Reverse	P527120		**15.67** 398	**9.54** 242	**124** 57	P522215	P523359
4"	15,000	Standard	1502 MxF	Standard	P524760		**19.75** 502	**11.88** 302	**276** 126	P525441	P525505
	15,000	Standard	1502 MxF	Reverse	P527699		**19.75** 502	**11.88** 302	**276** 126	P525441	P525505
	10,000	Standard	1002 MxF	Standard	P525809	–	**19.75** 502	**11.88** 302	**240** 109	P525441	P525505
	10,000	Standard	1002 MxF	Reverse	P527018		**19.75** 502	**11.88** 302	**240** 109	P525441	P525505
	6,000	Standard	602 MxF	Standard	P527592		**19.75** 502	**11.88** 302	**239** 109	P525441	P525505

Note: * Vent cap

In-Line flapper check valves

Nominal size	CWP	Service	End connections	Flow	Part number	P/N - LT	in. mm	in. mm	lb kg	Repair kit	Elastomer set
2"	20,000	Standard	2002 MxF	Standard	P3269158	–	**16.91**	**8.00**	**123** 56	P519720	P535387
	20,000	Standard	2002 MxF	Reverse	P558714		**16.91**	**8.00**	**123** 56	P519720	P535387
1"	20,000	Standard	2002 MxF	Standard	P524738	–	**16.91**	**8.00**	**123** 56	P519720	P535387
1½"	20,000	Standard	2002 MxF	Standard	P543340	–	**16.91**	**8.00**	**123** 56	P519720	P535387
	20,000	Standard	2002 MxF	Reverse	P519734		**16.91**	**8.00**	**123** 56	P519720	P519720
3"	20,000	Standard	2002 MxF	Standard	P520099	–	**16.91**	**8.00**	**123** 56	P519720	P535387

Dart check valves

Nominal size	CWP	Service	End connections	Flow	Part number	P/N - LT	in. mm	in. mm	lb kg	Repair kit	Elastomer set
1"	15,000	Standard	1502 MxF	Standard	P536118	–	**14.04**	**10.31**	**76** 35	P518835	P518834
1½"	15,000	Standard	1502 MxF	Reverse	P523811	–	**14.04**	**10.31**	**86** 39	P518835	P518834
	15,000	Standard	1502 MxF	Standard	P525269	–	**14.04**	**10.31**	**84** 39	P518835	P518834
2"	15,000	Standard	1502 MxF	Standard	P510771	–	**14.04**	**10.31**	**87** 40	P518835	P518834
3"	15,000	Standard	1502 MxF	Standard	P510773	–	**15.67**	**11.43**	**130** 59	P519874	P519873

Pressure relief valves

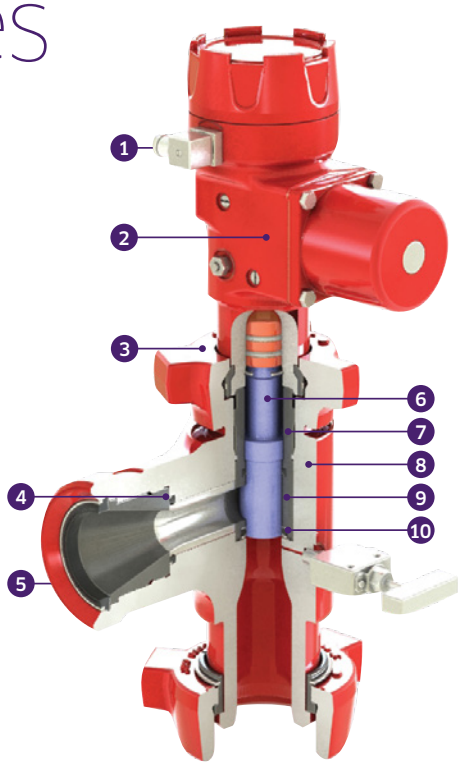
The TechnipFMC electronically controlled pressure relief valve (ePRV) automatically reseats after an over pressure event and improves reliability and accuracy while reducing personnel exposure at the wellsite. Unlike other full opening pressure relief valves, the ePRV is electrically powered and requires no gas bottles or hoses, reducing the exposure of your people and protecting your equipment.

Solution engineered

Currently the markets' primary option for a full-opening pressure relief valve is complex, requiring nitrogen storage cylinders, control panels and additional plumbing. Their ability to maintain accurate set points is compromised by changes in ambient conditions. The TechnipFMC Electronically Controlled Pressure Relief Valve (ePRV) is solution engineered with simplicity, reduced exposure and reliability in mind.

With the ability to re-seat itself without manual intervention, your employees stay out of the red zone, resulting in less personnel exposure, less downtime and improved production. Unlike other full-opening pressure relief valves, the ePRV is electrically powered and requires no gas bottles or hoses, improving the protection of your people and equipment. The ePRV provides means for a moreaccurate trip pressure due to fact that is controlled by customer pressure transducers.

The cost of an over-pressure event is difficult to quantify. These costs could include scrapped equipment, downtime, equipment recertification, and pollution or litigation liability, which can all potentially have long standing negative effects on the success of your company. The ePRV will accurately and rapidly relieve the full line pressure allowing you to trouble shoot the root cause of the incident. It also comes standard with Weco® end connections, which are known for their proven reliability.



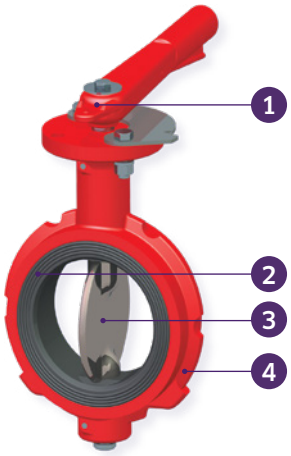
ePRV

1. Electrical inlet
2. Pilot valve body
3. Pilot valve mounting nut
4. ePRV exit bore insert
5. ePRV main valve body
6. ePRV poppet
7. ePRV cage
8. Cage to main valve body seal
9. Cage to poppet seal
10. ePRV port seal
    ePRV cage face seal

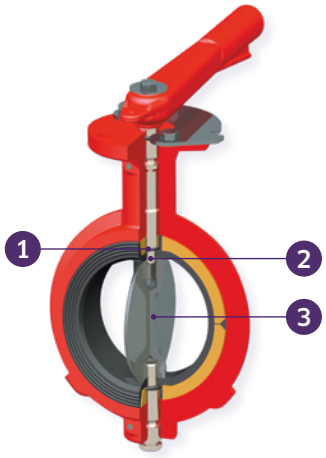
Nominal size	CWP	Service	End connections	Product	Part number	in. mm	in. mm	lb kg	Repair kit
2"	1000	Standard	1502 MxF	Spring Stack	P526296	7.50 191	7.50 191	62 29	P540417
2"	15,000	Standard	1502 MxF	-	3266005	7.50 191	7.50 191	62 29	3267382
2"	20,000	Standard	2002 MxF	-	P556564	6.06 154	6.87 175	64 29	P504268
3"	15,000	Standard	1502 MxF	-	3267874	8.00 203	8.00 203	182 83	P507520
2"	10,000	Sour	1502 MxF	Sour Gas	P500374	7.50 191	7.50 191	62 29	P504649
3"	15,000	Standard	1502 MxF	Electronic	P557316	8.38 213	8.38 213	159 73	P557277

Weco® butterfly valves

Weco® butterfly valves offers 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



1. **Choice of operators, actuators**
   All Weco® butterfly valve models can be equipped with a wide range of operators and actuators.
2. **Leak-proof installation**
   Ribbed seat face eliminates the need for flange gaskets and ensures leak-proof installation.
3. **Outstanding flow efficiency**
   Streamlined disc design minimizes turbulence and pressure drop for greater flow efficiency.
4. **Fast, simple field repair**
   If a valve should need repair, it can be completely reconditioned in the field using interchangeable stock parts.



1. **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..
2. **No in-line pins, screws or bolts**
   Hex drive provides positive disc movement without in-line pins, screws, or bolts.
3. **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.

Body styles

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

- 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

- 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

- 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

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

See specifications tables **(pgs. 17-31)** for sizes, dimensions, weights, materials, and part numbers.

Weco® butterfly valve operators and 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.

Standard handle

2 through 12-inch valve sizes

Recommended service

Manual on/off service

- 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

Throttling handle

2 through 12-inch valve sizes

Recommended service

Manual throttling service

- 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

Pneumatic actuators

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

Recommended service

Compact, pneumatic actuator for on/off valve operation

- 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

- 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

Stem extension

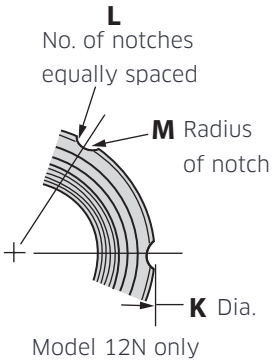
Weco® butterfly valve specifications

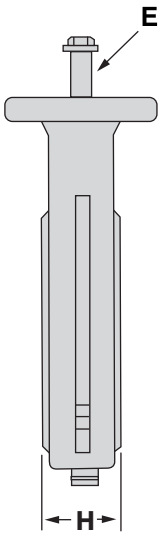
Model 12

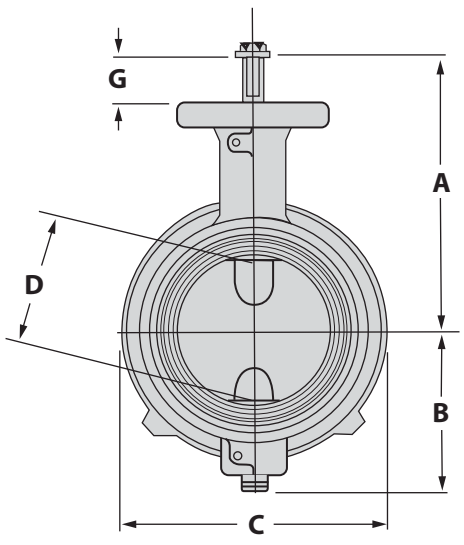
Sizes		2"	2 ½"	3"	4"	6"	8"	10"	12"	14"	16"
P/N		3227485	3227486	3227487	3245819	3227493	3232417	3227495	3227496	3255865	3255869
P/N - LT											
Dimensions, in., mm	A	4 3/32 126	5.91 150	5 29/32 150	7 9/32 185	7 25/32 198	9 13/32 239	10 21/32 271	12 5/32 309	14 3/32 380	17 7/16 443
	B	3 76.2	3 1/32 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 1/32 32.5	1 1/32 32.5	1 1/32 32.5	1 1/32 32.5	1 1/32 32.5	1 1/32 32.5	3 1/16 81
	H	1 1/8 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

Note: – **Body:** Ductile iron **Disc:** Ductile iron **Stems:** Stainless steel **Seat:** Nitrile

* 2 inch diameter with ½ inch keyway





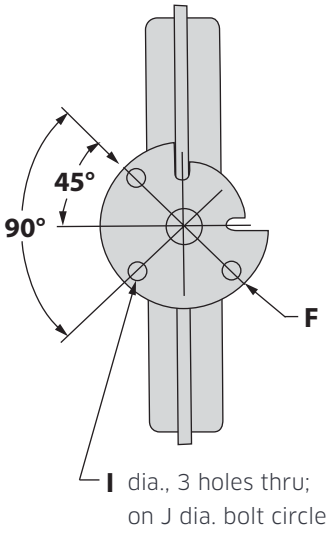


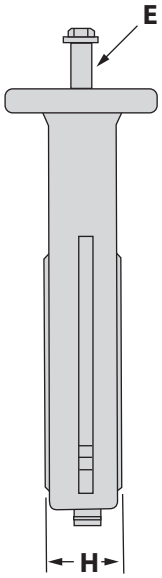
Weco® butterfly valve specifications

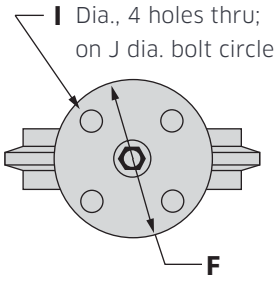
Model 12N (For use with lightweight industrial flanges.)

Sizes		2”	3”	4”	5”	6”
P/N		3229885	3230052	3229886	3229887	3229888
P/N - LT						
Dimensions, in., mm	A	4 3/32 126	5 29/32 150	7 3/32 185	7 3/32 185	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

Note: – **Body:** Ductile iron **Disc:** Ductile iron **Stems:** 416 Stainless steel **Seat:** Nitrile







Weco® butterfly valve specifications

Model 22

Sizes		2”	2 ½”	3”	4”
P/N		3225730	3225731	3225732	3225733
P/N - LT					
Dimensions, in., mm	A	**7 9/32** 185	**7 25/32** 198	**8 1/16** 205	**9 5/32** 233
	B	**3** 76.2	**3 1/32** 84.9	**3 5/8** 92.1	**4 1/4** 108
	C	**4 1/8** 105	**4 7/8** 124	**5 3/8** 131	**6 7/8** 175
	D	**2 1/16** 52.4	**2 1/2** 63.5	**3 1/16** 77.8	**4 1/16** 103
	E	**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
	G	**1 1/32** 26.2	**1 1/32** 26.2	**1 1/32** 26.2	**1 3/32** 23.5
	H	**1 5/8** 41.3	**1 3/4** 44.5	**1 3/4** 44.5	**2** 50.8
	I	**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

Note: – **Body:** Ductile iron **Disc:** Ductile iron **Stems:** 416 stainless steel **Seat:** Nitrile

Model 22

5”	6”	8”	10”	12”
3225734	3225735	3225736	3225737	3225738
9 23/32 245	**10 5/32** 258	**11 19/32** 294.5	**12 27/32** 326	**14 1/32** 364
4 13/16 122	**5 5/16** 135	**7** 178	**8 1/4** 210	**9 3/4** 248
7 3/4 197	**8 3/4** 222	**11** 279	**13 3/8** 340	**16 1/16** 408
5 1/16 129	**6 1/16** 154	**8 1/16** 205	**10** 254	**12** 305
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
4 101.6	**4** 101.6	**6** 152.4	**6** 152.4	**6** 152.4
1 3/32 32.5	**1 3/32** 32.5	**1 3/32** 32.5	**1 3/32** 32.5	**1 3/32** 32.5
2 1/4 54	**2 1/4** 54	**2 1/2** 63.5	**2 1/2** 63.5	**3** 76.2
7/16 11.1	**7/16** 11.1	**9/16** 14.3	**9/16** 14.3	**9/16** 14.3
3 1/4 82.6	**3 1/4** 82.6	**5** 127	**5** 127	**5** 127

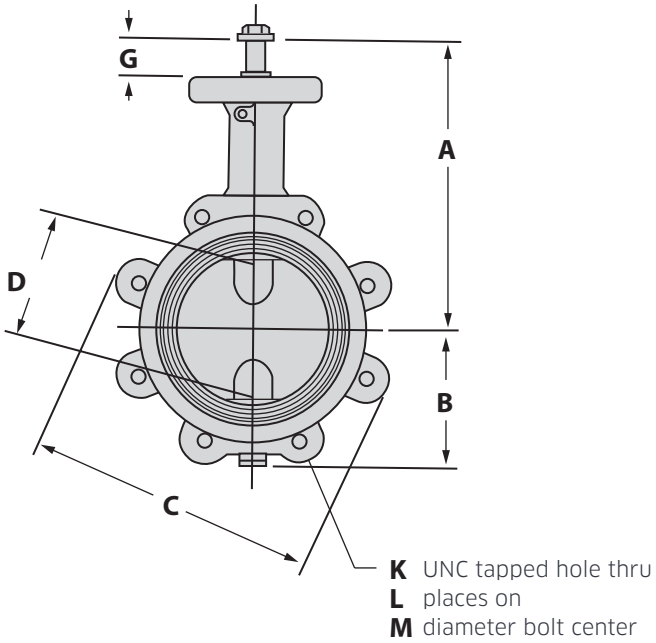
Weco® butterfly valve specifications

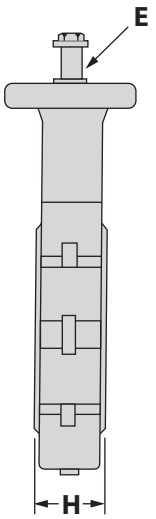
Model 22L

Sizes		2	2½	3	4	5	6	8
P/N		3225748	3225749	3225750	3222751	3225752	3225753	3225754
P/N - 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
	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
	C	6 152	7 178	7 1/2 191	9 229	10 254	11 279	13 1/2 343
	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
	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
	F	4 101.6	4 101.6	4 101.6	4 101.6	4 101.6	4 101.6	6 152.4
	G	1 1/32 26.2	1 1/32 26.2	1 1/32 26.2	1 3/32 32.5	1 3/32 32.5	1 3/32 32.5	1 3/32 32.5
	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
	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
	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
	K	5/8 11	5/8 11	5/8 11	5/8 11	3/4 10	3/4 10	3/4 10
	L	4 102	4 102	4 102	8 204	8 204	8 204	8 204
	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

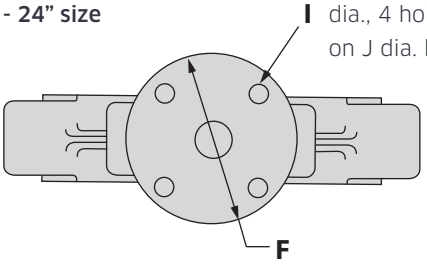
10	12	14	16	18	20	24
3225755	3225756	3255867	3255870	3255871	3255872	3255873
12 27/32 326	14 1/32 364	14 31/32 380	17 7/16 443	18 7/16 468	19 7/16 494	23 3/4 603
8 1/4 210	9 3/4 248	10 3/8 264	11 15/16 303	12 15/16 329	13 15/16 354	17 3/8 435
16 406	19 483	20 3/4 527	23 1/4 591	25 635	27 1/4 692	32 813
10 254	12 305	13 1/4 337	15 3/32 388	17 3/32 439	19 1/4 489	23 584
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
6 152.4	6 152.4	6 152.4	8 203.2	8 203.2	8 203.2	8 203.2
1 3/32 32.5	1 3/32 32.5	1 3/32 32.5	3 3/16 81	3 3/16 81	3 3/16 81	4 3/8 111
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
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
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
7/8 9	7/8 9	1 8	1 8	1 1/8 7	1 1/8 7	1 1/4 7
12 305	12 305	12 305	16 406	16 406	20 508	20 508
14 1/4 362	17 432	18 3/4 476	21 1/4 540	22 3/4 578	25 635	29 1/2 750

Weco® butterfly valve specifications

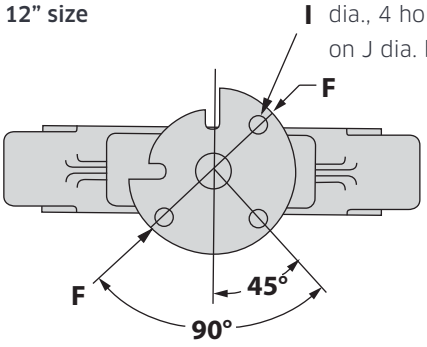




14" - 24" size



2" - 12" size



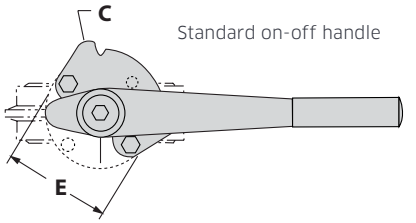
Note:

- **Body:** Ductile iron
  Disc: Ductile iron
  Stems: 416 stainless steel
  Seat: Nitrile
- * 2 inch diameter with ½ inch keyway
- ** 2.5 inch diameter with ⅝ inch keyway

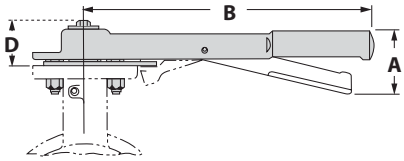
Weco® butterfly valve specifications

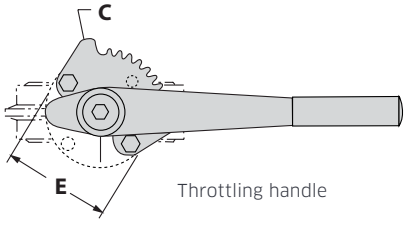
Standard and throttle handles

		Valve size, in.			
		2 - 3	4 and 6	8 and 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	**2⅜** 60.3	**2½** 63.5	**3** 76.2	**2¾** 69.9
	B	**9½** 241	**10⅞** 276	**15** 381	**19** 483
	C	**2¾** 69.9	**2¾** 69.9	**4** 102	**4** 102
	D	**1⁷⁄₁₆** 36.5	**1¹⁄₁₆** 42.9	**1¹⁄₁₆** 42.9	**1¹⁄₁₆** 42.9
	E	**4** 102	**4** 102	**6** 152	**6** 152



Standard on-off handle



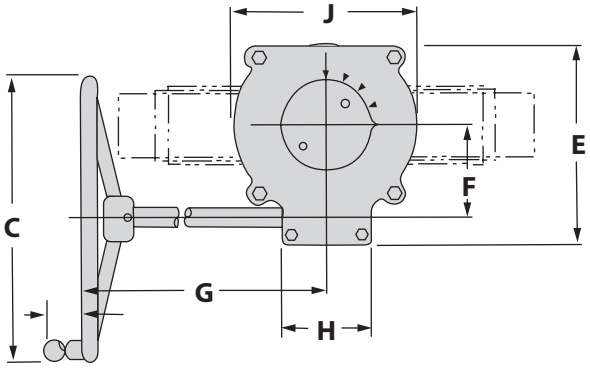


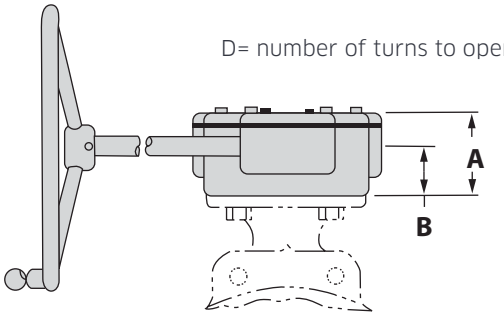
Throttling handle

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.

Gear operators

		Valve size, in.		
		2 - 6	8 and 10	12
Standard handwheel		P561734	P561735	P561736
Dimensions, in., mm	A	**2.13** 54	**4.07** 104	**4.07** 104
	B	**1.13** 28.6	**1 .59** 40.5	**1.59** 40.5
	C	**6.00** 152.4	**9.84** 249.9	**9.84** 249.9
	D	**9.25**	**8.5**	**8.5**
	E	**5.53** 141	**7.91** 201	**7.91** 201
	F	**2.05** 52	**2.8** 71	**2.8** 71
	G	**8.54** 216.9	**10.04** 255	**10.91** 277
	H	**4.02** 102	**5.12** 130	**5.12** 130
	I	–	–	–
	J	**4.02** 102	**5.43** 138	**5.43** 138





D= number of turns to open

Weco® butterfly valve specifications

Sizing information

Non-compressible fluid

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.

C_v Values
Resilient seated BFV'S – all models

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 open and 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 ΔPof .061 psi. Now, using same procedure as above, extend vertical line to 60˚ open line and project horizontally to the left to read ΔPof .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

$$\Delta P = 1.0\left[\frac{500}{2020}\right] \quad .0613$$

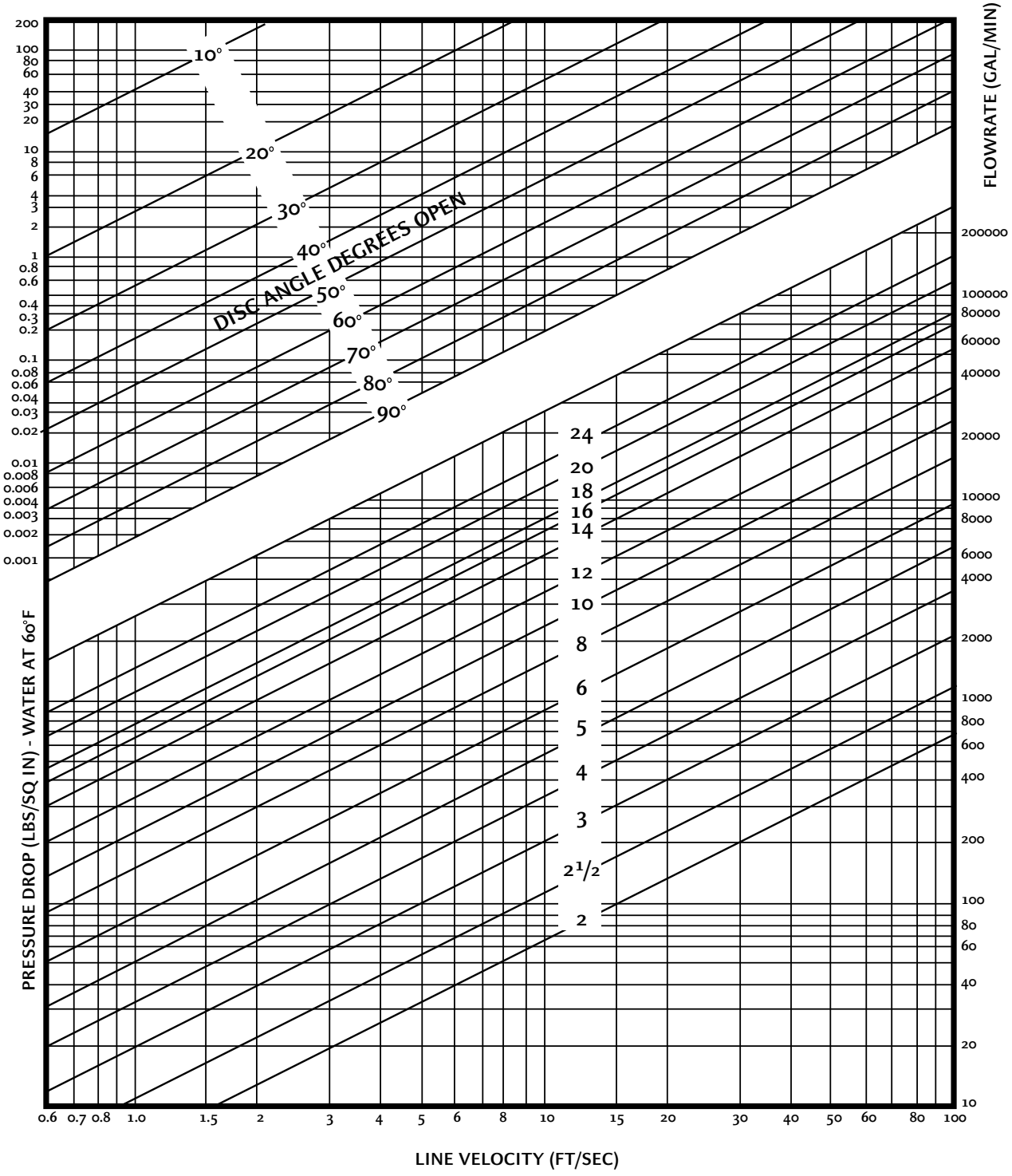
Now: C_V = 610 gpm @ 60˚ open, and

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

GPM @ PSI @ various disc angles									
Valve size, In.	**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
2½	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 specifications

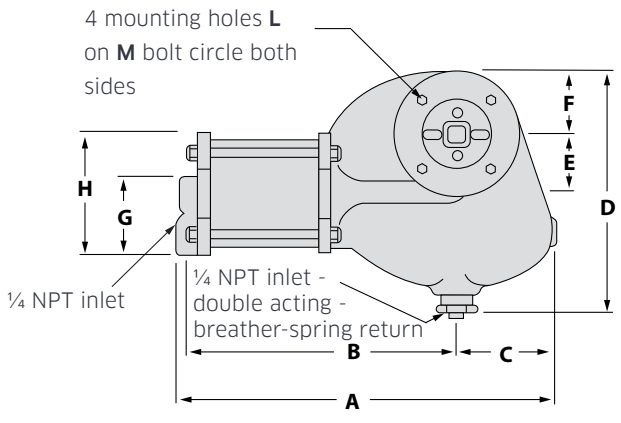
Nomogram for sizing Weco butterfly valves

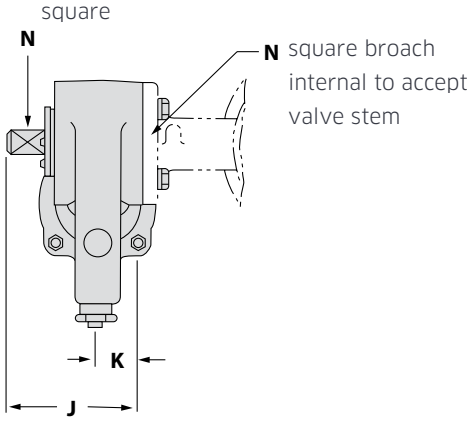


Weco® butterfly valve specifications

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	12	20	38	38	67	67
	kg	5.1	9	18	18	31	31
A	in.	12 9/16	16 1/8	19 3/8	19 3/8	22	22
	mm	319	511	492	492	559	559
B	in.	8 3/4	12 5/16	13 11/16	13 11/16	15 7/8	15 7/8
	mm	222	313	348	348	403	403
C	in.	3 5/16	3 5/16	5 3/16	5 3/16	5 3/16	5 3/16
	mm	84.1	84.1	133	132	132	139
D	in.	7 13/16	7 13/16	12 1/16	12 1/16	12 1/16	12 1/16
	mm	198	198	308	308	308	308
E	in.	1 15/16	1 15/16	3 3/16	3 3/16	3 3/16	3 3/16
	mm	49.2	49.2	90.5	90.5	81	81
F	in.	2 1/16	2 1/16	3 1/16	3 1/16	3 1/16	3 1/16
	mm	52.4	52.4	77.8	77.8	77.8	77.8
G	in.	2	3 5/16	3 5/16	3 5/16	5 5/16	5 5/16
	mm	50.8	84.1	84.1	84.1	135	135
H	in.	3 7/8	6 1/2	6 1/2	6 1/2	10 9/16	10 9/16
	mm	98.4	165.1	165	165	268	268
J	in.	4 5/16	4 5/16	5 5/16	5 5/16	5 5/16	5 5/16
	mm	110	110	135	135	135	135
K	in.	1 7/16	1 7/16	1 7/8	1 7/8	1 7/8	1 7/8
	mm	36.5	36.5	47.6	47.6	47.6	47.6
L	in.	3/8	3/8	1/2	1/2	1/2	1/2
		16 UNC	16 UNC	13 UNC	13 UNC	13 UNC	13 UNC
M	in.	3 1/4	3 1/4	5	5	5	5
	mm	82.6	82.6	127	127	127	127
N	in.	5/8	5/8	7/8	1 1/8	7/8	1 1/8
	mm	15.9	15.9	22.2	28.6	22.2	28.6

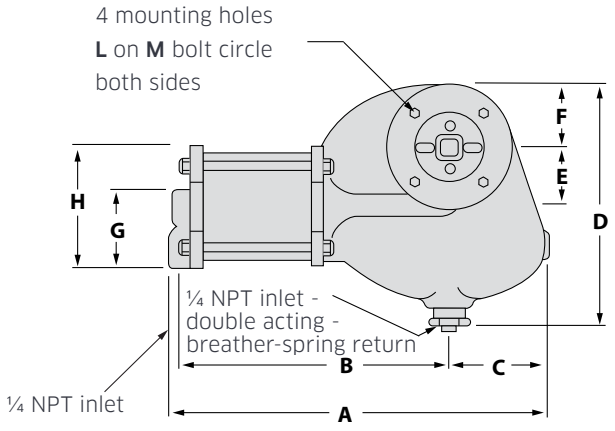


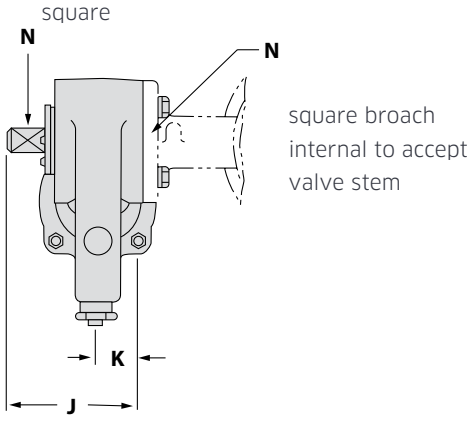


Weco® butterfly valve specifications

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	17	19	29	35	112	125
	kg	7.5	8.5	13	16	51	57
A	in.	19 9/16	19 9/16	20 1/4	20 1/4	30 1/8	30 1/8
	mm	497	497	514	514	765	765.2
B	in.	15 3/4	15 3/4	16 7/16	16 7/16	24	24
	mm	400	400	418	418	610	610
C	in.	3 5/16	3 5/16	3 5/16	3 5/16	5 1/16	5 5/16
	mm	84.1	84.1	84.1	84.1	129	132
D	in.	8 5/8	8 5/8	8 5/8	8 5/8	13 1/8	13 1/8
	mm	219	219	219	219	333	333
E	in.	1 15/16	1 15/16	1 15/16	1 15/16	3 3/16	3 3/16
	mm	49.2	49.2	49.2	49.2	81	81
F	in.	2 1/16	2 1/16	2 1/16	2 1/16	3 1/16	3 1/16
	mm	52.4	52.4	52.4	52.4	77.8	77.8
G	in.	2	2	3 5/16	3 5/16	5 5/16	5 5/16
	mm	50.8	50.8	84.1	84.1	135	135
H	in.	3 7/8	3 7/8	6 1/2	6 1/2	10 5/16	10 5/16
	mm	98.4	98.4	165	165	268	268
J	in.	4 5/16	4 5/16	4 5/16	4 5/16	5 5/16	5 5/16
	mm	110	110	110	110	135	135
K	in.	1 7/16	1 7/16	1 7/16	1 7/16	1 7/8	1 7/8
	mm	36.5	36.5	36.5	36.5	47.6	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.	3 1/4	3 1/4	3 1/4	3 1/4	5	5
	mm	82.6	82.6	82.6	82.6	127	127
N	in.	5/8	5/8	5/8	5/8	7/8	1 1/8
	mm	15.9	15.9	15.9	15.9	22.2	28.6





Weco® butterfly valve specifications

Weco® actuator sizing specifications

Required operating torques:

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

- **Seating torque** - The torque required to displace a resilient seat and effect shutoff
- **Bearing torque** - The torque required to overcome friction forces on the valve shaft bearing surfaces
- **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 **(C_t)** 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
C_t	0	.007	.014	.022	.033	.050	.087	.143	.215	0

Valve Part	Standard Material	Optional Materialsr
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	

Weco® butterfly valve specifications

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	50 psi	75 psi	100 psi	125 psi	150 psi	175 psi
	0 kPa	345 kPa	517 kPa	690 kPa	862 kPa	1034 kPa	1207 kPa
2	**90** 10	**90** 10	**92** 10	**94** 11	**96** 11	**98** 11	**100** 11
2½	**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® butterfly valve specifications

Weco® actuator sizing specifications

Minimum air pressure for Weco® pneumatic actuators operating Weco® valves at 175 psi rated pressure

Double acting models	Actuator air pressure: psi (kPa)		
	30	50	75
	207	345	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			
	30 (207)	40 (276)	60 414	70 (483)
	40 (276)	50 (345)	70 (483)	80 (552)
	Valve sizes			
332	2" - 2½"	2 - 2½"	2 - 2½"	2 - 2½"
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"

Note:

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

Weco® pneumatic actuator torque ratings (note the 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	Displacement 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
354	**25** 40	**425** 48	**850** 96	**725** 82	**300** 34
596	**72** 1180	**425** 48	**850** 96	**2,641** 298	**2,216** 250
550A	**72** 1180	**1,050** 119	**2,100** 237	**2,016** 228	**966** 109
590	**355** 5820	**3,300** 373	**6,600** 746	**11,366** 1280	**8,066** 911
590A	**355** 5820	**5,000** 565	**10,000** 1130	**9,666** 1100	**4,666** 527

Note:

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

Torque data

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

Minimum actuator pressure for Weco valves at 175 psi line pressure

Valve size		2" - 4"	5"	6"
Pressure	psi	30	45	60
	kPa	207	310	414

Original Chiksan® swivel joints

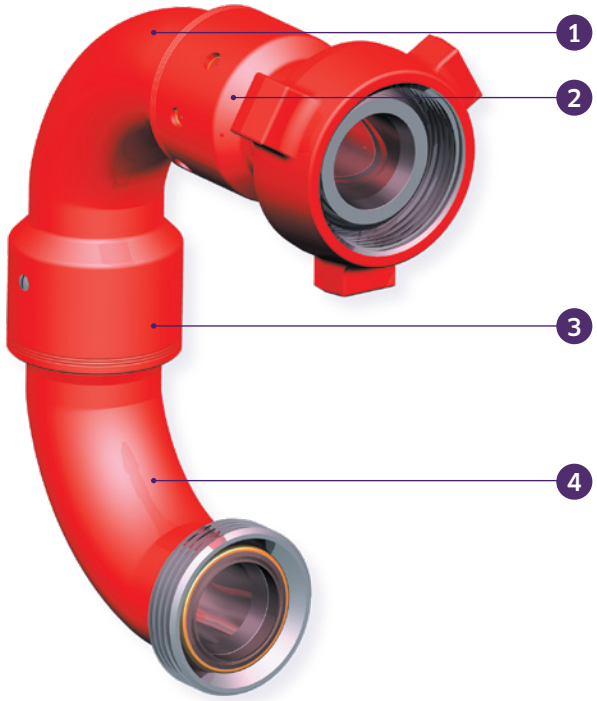
Chiksan swivel joints deliver significantly longer life, superior performance, and reduced maintenance. Designed for standard and sour gas services, these world proven fittings come in 3⁄8 to 12-inch sizes and can handle pressures from vacuum to 20,000 psi. Many different Chiksan assembly configurations 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 warnings and cautions, pg. 88).**

1. **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.

2. **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.

3. **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.

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



Swivel Family	Color coding	Cold working pressure psi (bar)	Material	End connections	Nominal sizes, In.								Notes
					⅜	½	1	1 ¼	1 ½	2	3	4	
High-pressure swivel joints	Silver	**6,000** (414)	Carbon steel	Female line pipe threads	▸	▸	▸	▸	▸	▸	▸	▸	1,3,5
Low-pressure swivel joints	No color coding	**600** (41)	Ductile Iron	Threaded		▸	▸	▸	▸	▸	▸	▸	6
		175 (12)	Ductile Iron	Flanged							▸	▸	6
		1,000 (69)	Carbon Steel	Threaded or beveled						▸	▸	▸	6
		275 (19)	Carbon Steel	Flanged						▸	▸	▸	6
Longsweep® swivel joints	Olive green (sour gas)	**7,500** (517)	Alloy steel	Weco figure 1002 union							▸		2
	Olive green (sour gas)	**10,000** (690)	Alloy steel	Weco figure 1502 union			▸			▸	▸	▸	2
	Black	**10,000** (690)	Alloy steel	Female line pipe threads			▸		▸	▸			1,3,4
	Olive green (sour gas)	**15,000** (1034)	Alloy steel	Weco figure 2202 union						▸	▸		2
	Red	**15,000** (1034)	Alloy steel	Weco figure 1502 union			▸		▸	▸			1
	Light blue	**20,000** (1034)	Alloy steel	Weco figure 2002 union						▸			1
TripleStep swivel joints	Silver	**6,000** (414)	Alloy steel	Weco figure 602 union							▸		1
	Black	**10,000** (690)	Alloy steel	Weco figure 1002 union							▸	▸	1
	Red	**15,000** (1034)	Alloy steel	Weco figure 1502 union							▸	▸	1
	Light blue	**20,000** (1034)	Alloy steel	Weco figure 2002 union							▸		1
TripleStep Plus swivel joints	Red	**15,000** (1034)	Alloy steel	Weco figure 1505 union							▸		1

1 3/8 - to 4-inch sizes furnished with nitrile packing and brass or stainless steel anti-extrusion ring.

2 Furnished with Fluoroelestomer or HNBR packing and stainless steel anti-extrusion ring. TechnipFMC does not warrant the performance of any elastomer seal for sour gas service.

3 Power make-up must be used for line pipe threaded connections to achieve rated cold working pressure.

4 3-inch size rated at 10,000 psi cold working pressure with integral Weco® 1002 union ends only.

5 5-inch size available with threaded or bevelled ends; limited to 3,000 psi cold working pressure.

6 3/4, 2 1/2, 6 and 8-inch sizes also available.

Sour gas service:
TechnipFMC 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.

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

TripleStep swivel joints

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.

1. 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.

2. 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.

3. Instream packing for long seal life

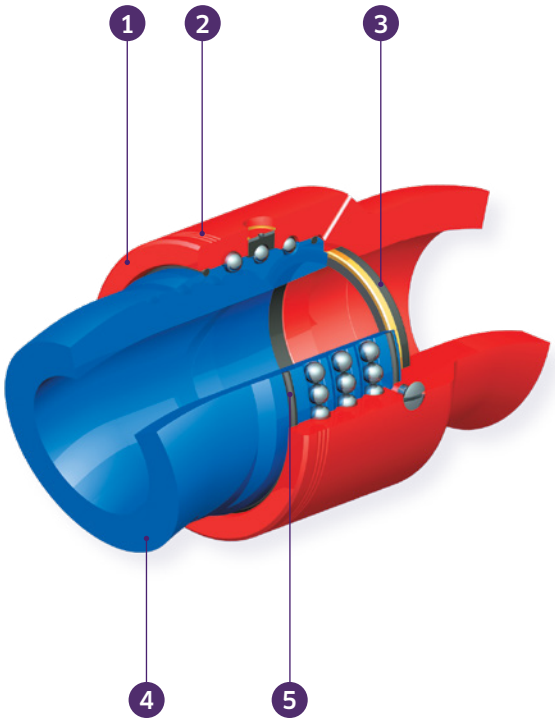
World proven instream packing technology provides unsurpassed sealability and reliability in the harshest oilfield conditions. An integral anti-extrusion ring serves as a retainer and bearing to reduce friction between the resilient packing material and the packing chamber as the joint is rotated.

4. 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.

5. 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.



TSi+(TripleStep) swivel joints

The TSi+ adds a second seal which significantly extends the swivel life, customers have seen over one year of intensive use without disassembly, by stopping aggressive flow and internal erosion due to failure of the primary seal.

- 6,000 psi cold working pressure; 3 inch.
- 10,000 psi cold working pressure; 3 inch.
- 15,000 psi cold working pressure; 3 inch.

Recommended service

For the most extreme, abrasive, high-pressure points in fracturing, choke-and-kill, cementing or acidizing applications.

TSi (TripleStep) swivel joints

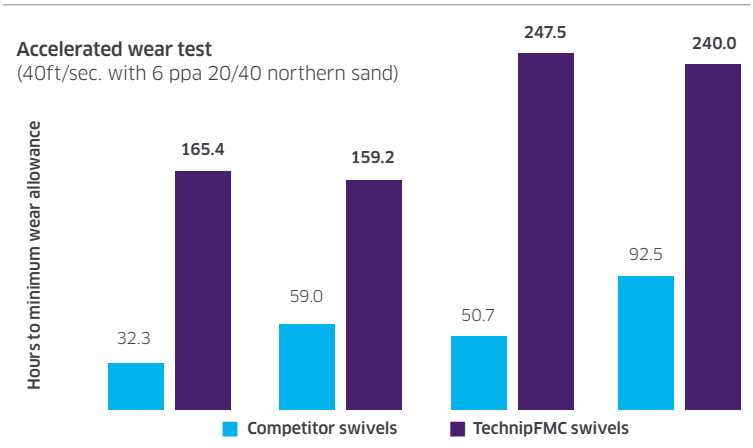
Recommended service

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.

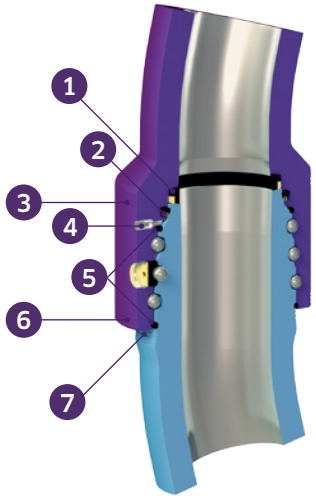
- 6,000 psi cold working pressure; 3 inch size.
- 10,000 psi cold working pressure; 3 and 4-inch sizes.
- 15,000 psi cold working pressure; 3 and 4 inch.
- 20,000 psi cold working pressure; 3 inch size.

Thicker where it counts

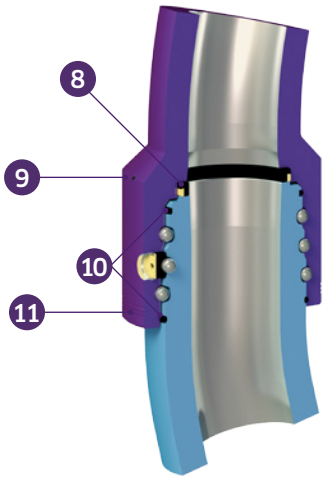
Competitive swivels wear out first in the ball races, meaning they must be disassembled for inspection. TripleStep swivels wear in the elbows, meaning they can be inspected and returned to service without disassembly. The TripleStep design places more material under the male ball race - a location that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



TSi+ 15K



TSI 15K



TSi+

1. Primary packing
2. Second primary S-seal packing
3. 2 marks on bell front = 2 seals
4. Weep hole
5. O-ring
6. 3 marks on bell end = triple step
7. 2 marks on male = 2 seals

TSI

8. Primary packing
9. Weep hole
10. O-ring
11. 3 marks on bell end = triple step

TSI and TSi+ will not be cross assembled

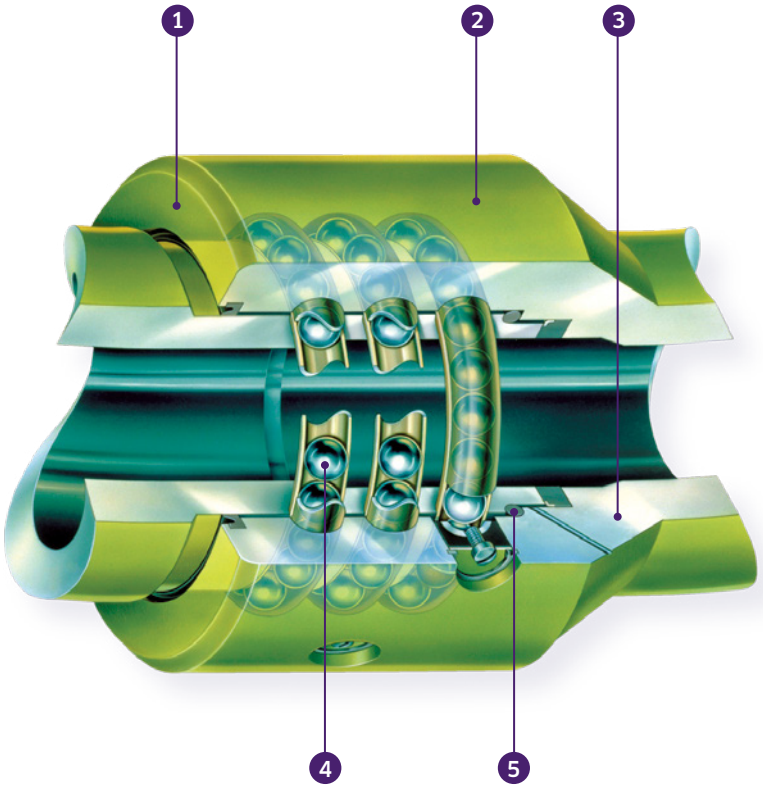
Chiksan sour gas swivel joint

TechnipFMC 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 that is unique to sour gas equipment.

1. **Controlled hardness**
   Swivel components are specially heat-treated and 100% tested for controlled hardness.
2. **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.
3. **Leak detection**
   A leak detection port between the packing and O-ring seal signals the need for packing replacement.
4. **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.
5. **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.



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.

Style 20

Style 30

Style 40

Style 50

Style 60

Style 70

Style 80

Style 10

Style 100

Chiksan swivel joints for sour gas service

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

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
- 20,000 psi cold working pressure, 2-inch size; Weco Figure 2002 wing union end connections

Warning:
Although Chiksan swivel joints can be rotated while under fluid pressure, they are not recommended for service requiring continuous rotary motion. **See warnings and cautions, pg 88.**

See specifications tables **(pgs. 39-45** 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

Chiksan coiled tubing reel swivel

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

Recommended service

High-pressure coiled tubing applications

Consult factory for special coiled tubing applications.

1. **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.

2. **Converts for sour gas service**

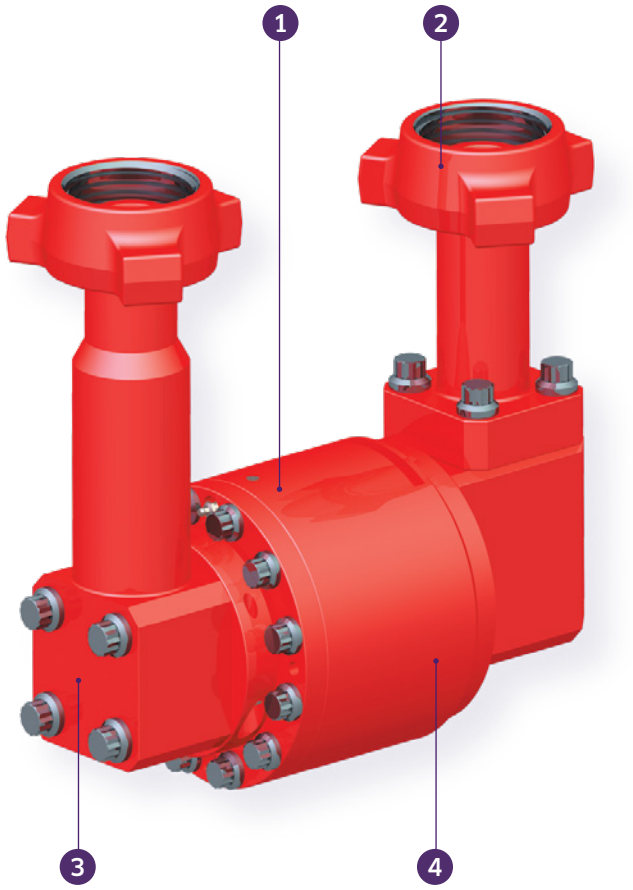
   By changing out the Weco® wing union subs, the assembly is converted to a sour gas swivel. This exclusive feature reduces inventory and lowers costs.

3. **Fast, easy field maintenance**

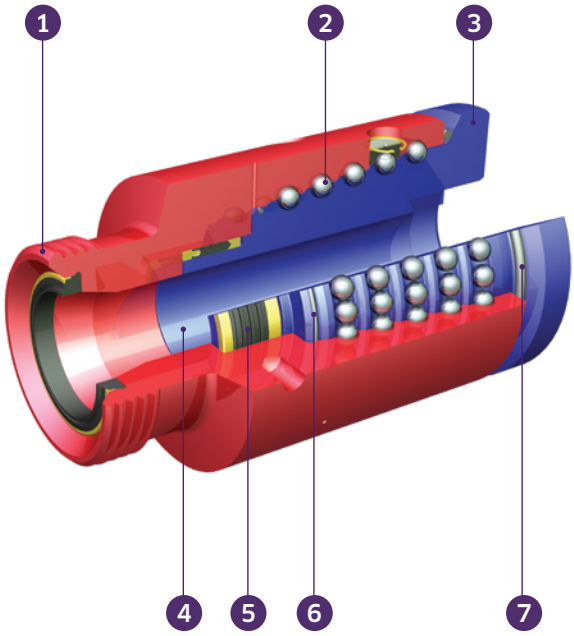
   The swivel internal components can be serviced from the front without removing the housing from the coiled tubing unit.

4. **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.



See specifications tables **(pgs. 39-45)** for sizes, dimensions, weights, and materials.



Chiksan coiled tubing frac swivel

10,000 psi cold working pressure; 2⁹⁄₁₆ inch bore

Recommended service

High pressure coiled tubing well fracturing application.

Features

- 10,000 psi cold working pressure
- Temperature ratings from -20°F to 225°F
- Maximum rotational speed of 10 rpm

1. 3 inch 15K Wing union connection
2. Patented stepped ball bearing race handles load at full working pressure under rotation
3. Flanged end connection with optional Grayloc™ clamp
4. Smooth straight through-bore greatly reduced erosion in well fracturing applications
5. Patented and field proven UV-packing seal all non-elastomeric stack or hybrid packing stack used optional low cost all elastomeric packing available
6. Leak detection seal
7. Environment seal

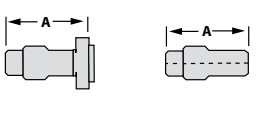
See specifications tables **(pgs. 39-45)** for sizes, dimensions, weights, and materials..

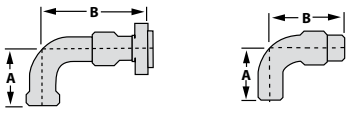
Chiksan® swivel joint specifications

TripleStep and Longsweep® swivel joints

Size/model bore in. (mm)	CWP psi bar	End connections	Style 20			Style 30			
			Part No.	A in. mm	lb kg	Part No.	A in. mm	B in. mm	lb kg
1" LS10 .88 (22)	**10,000** 690	Threaded	CF*	–	–	**6101537**	**4.38** 111	**7.14** 181	**8** 3.6
1" LS15 .88 (22)	**15,000** 1034	1502 (MxF)	CF*	–	–	**3259291**	**4.06** 103	**8.4** 213	**14** 6.3
		1502 (MxM)	CF*	–	–	N/A	–	–	–
1.5" LS10 1.3 (33)	**10,000** 690	Threaded	CF*	–	–	CF*	–	–	–
1.5" LS15 1.3 (33)	**15,000** 1034	1502 (MxF)	CF*	–	–	CF*	–	–	–
		1502 (MxM)	CF*	–	–	N/A	–	–	–
2" LS10 1.88 (48)	**10,000** 690	Threaded	CF*	–	–	**3139889**	**6.38** 162	**9.01** 228.854	**21** 9.5
2" LS15 1.88 (48)	**15,000** 1034	1502 (MxF)	**3144126**	**11.15** 283	**31** 14	**3144125**	**5.5** 139.7	**10.91** 277.12	**36** 17
		1502 (MxM)	CF*	–	–	N/A	–	–	–
		1502 (FxF)	CF*	–	–	–	–	–	–
2" LS20 1.88 (48)	**20,000** 1379	2002 (MxF)	CF*	–	–	CF*	–	–	–
		2002 (MxM)	**P524579**	**14.12** 359	**45.72** 20.7	CF*	–	–	–
3" TSi15 2.75 (70)	**7,500** 517	Threaded	CF*	–	–	N/A	–	–	–
3" TSi17 2.75 (70)	**15,000** 1034	1502 (FxM)	**P505417**	**12.6** 320	**52** 23.8	**P505416**	**7.9** 201	**14.4** 366	**68** 31
		1502 (MxM)	CF*	–	–	N/A	–	–	–
3" TSi15 Plus 2.75 (70)	**15,000** 1034	1505 (MxF)	CF*	–	–	N/A	–	–	–
3" TSi20 3 (76)	**20,000** 1379	2002 (MxF)	CF*	–	–	CF*	–	–	–
4" TSi10 3.88 (98)	**10,000** 690	1002 (MxF)	**P516092**	**14.15** 359	**74** 33.6	**P517487**	**8.3** 211	**16.2** 411	**99** 45
		1002 (MxM)	CF*	–	–	N/A	–	–	–
4" TSi15 3.5 (89)	**15,000** 690	1502 (MxF)	CF*	–	–	CF*	–	–	–

*Consult factory

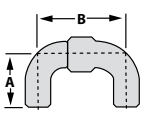


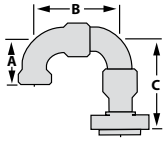


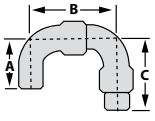
Chiksan® swivel joint specifications

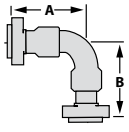
TripleStep and Longsweep® swivel joints

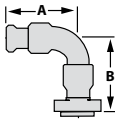
Style 40				Style 50					Style 60			
Part No.	A in. mm	B in. mm	lb kg	P/N P/N-LT	A in. mm	B in. mm	C in. mm	lb kg	Part No.	A in. mm	B in. mm	lb kg
N/A	–	–	–	**3139546**	**4.38** 111	**7.28** 185	**7.02** 178	**16** 7.2	CF*	–	–	–
N/A	–	–	–	**3139547**	**4.06** 103	**7.35** 187	**8.4** 213	**22** 10.2	CF*	–	–	–
N/A	–	–	–	N/A	–	–	–	–	–	–	–	–
N/A	–	–	–	**3139777**	**5.62** 143	**9.37** 238	**7.96** 203	**21** 9.2	CF*	–	–	–
N/A	–	–	–	**3139778**	**5** 127	**9.4** 239	**10.1** 257	**36** 17	CF*	–	–	–
N/A	–	–	–	N/A	–	–	–	–	CF*	–	–	–
3139890	**6.36** 162	**10.73** 273	**29.8** 13.5	**3139904**	**6.4** 163	**10.74** 273	**9** 229	**37** 16.8	CF*			
N/A				**3139475** 3139475-LT	**5.5** 140	**10.74** 273	**10.92** 277	**52** 24	**3144630**	**11** 279	**11** 279	**48** 22
N/A	–	–	–	**3267203**	**7.28** 185	**10.74** 273	**10.92** 277	**63** 29	**6101559**	**11** 279	**11** 279	**56** 26
N/A	–	–	–	**P509888**	**5.5** 140	**10.74** 273	**8.79** 223	**40** 19	**P504952**	**8.79** 223	**10.97**	**37** 16.9
N/A	–	–	–	**3144569**	**5.12** 130	**10.9** 277	**12.51** 318	**62** 28.3	CF*	–	–	–
N/A	–	–	–	N/A	–	–	–	–	CF*	–	–	–
N/A	–	–	–	N/A	–	–	–	–	CF*	–	–	–
N/A	–	–	–	**P505327**	**7.9** 201	**16.4** 417	**14.4** 366	**107** 48.4	**P505420**	**14.5** 368	**14.5** 368	**91** 41.3
N/A	–	–	–	N/A	–	–	–	–	CF*	–	–	–
N/A	–	–	–	**P563781**	7.9 201	16.4 417	14.4 366	114 52	CF*	–	–	–
N/A	–	–	–	**P527340**	**9.69** 246	**21.2** 538	**20.4** 518	**288** 131	CF*	–	–	–
N/A	–	–	–	**P516091**	**8.3** 211	**18.1** 460	**16.2** 411	**161** 73.3	CF*	–	–	–
N/A	–	–	–	N/A	–	–	–	–	CF*	–	–	–
N/A	–	–	–	**P527331** P527331-LT	**9.69** 246	**21.2** 538	**20.4** 518	**255** 116	CF*	–	–	–

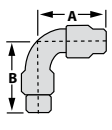










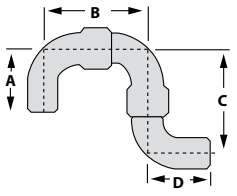


*Consult factory

Chiksan® swivel joint specifications

TripleStep and Longsweep® swivel joints

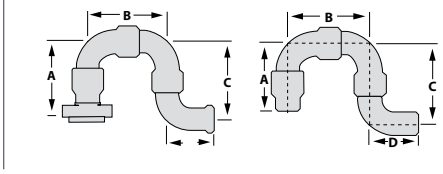
Size/model bore in. (mm)	CWP psi bar	End connections	Style 70					
			Part No.	A in. mm	B in. mm	C in. mm	D in. mm	lb kg
1" LS10 .88 (22)	**10,000** 690	Threaded	N/A	–	–	–	–	–
1" LS15 .88 (22)	**15,000** 1034	1502 (MxF)	N/A	–	–	–	–	–
		1502 (MxM)	N/A	–	–	–	–	–
1.5" LS10 1.3 (33)	**10,000** 690	Threaded	N/A	–	–	–	–	–
1.5" LS15 1.3 (33)	**15,000** 1034	1502 (MxF)	N/A	–	–	–	–	–
		1502 (MxM)	N/A	–	–	–	–	–
2" LS10 1.88 (48)	**10,000** 690	Threaded	**3139891**	**6.38** 162	**10.73** 273	**10.73** 273	**6.38** 162	**47** 21.2
2" LS15 1.88 (48)	**15,000** 1034	1502 (MxF)	**P505482**	**5.5** 140	**10.73** 273	**10.73** 273	**5.5** 140	**58** 27
		1502 (MxM)	N/A	–	–	–	–	–
		1502 (FxF)	N/A	–	–	–	–	–
2" LS20 1.88 (48)	**20,000** 1379	2002 (MxF)	N/A	–	–	–	–	–
		2002 (MxM)	N/A	–	–	–	–	–
3" TSi15 2.75 (70)	**7,500** 517	Threaded	N/A	–	–	–	–	–
3" TSi15 2.75 (70)	**15,000** 1034	1502 (MxF)	N/A	–	–	–	–	–
		1502 (MxM)	N/A	–	–	–	–	–
3" TSi15 Plus 2.75 (70)	**15,000** 1034	1505 (MxM)	N/A	–	–	–	–	–
3" TSi20 3 (76)	**20,000** 1379	2002 (MxF)	N/A	–	–	–	–	–
4" TSi10 3.88 (98)	**10,000** 690	1002 (MxF)	N/A	–	–	–	–	–
		1002 (MxM)	N/A	–	–	–	–	–
4" XHTL 3.5 (89)	**10,000** 690	1502 (MxF)	N/A	–	–	–	–	–

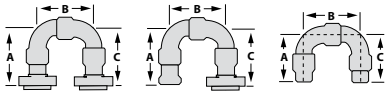


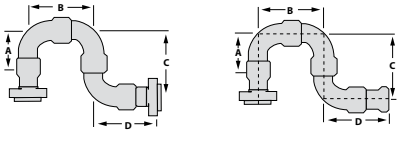
Chiksan® swivel joint specifications

TripleStep and Longsweep® swivel joints

Style 80						Style 10					Style 100					
Part No.	A in. mm	B in. mm	C in. mm	D in. mm	lb kg	Part No.	A in. mm	B in. mm	C in. mm	lb kg	Part No.	A in. mm	B in. mm	C in. mm	D in. mm	lb kg
CF*	–	–	–	–	–	**3141454**	**7.14** 181	**7.46** 189	**7.14** 181	**24** 10.9	N/A	–	–	–	–	–
P516135	**8.4** 181	**7.47** 190	**7.47** 190	**4.06** 103	**28** 12.9	**3139550**	**8.4** 213	**7.4** 188	**8.4** 213	**22** 10	CF*	–	–	–	–	–
N/A	–	–	–	–	–	**3145886**	**8.4** 213	**7.4** 188	**8.4** 213	**27** 12.1	CF*	–	–	–	–	–
CF*	–	–	–	–	–	**P501542**	**7.96** 202	**9.37** 238	**7.96** 202	**26** 11.8	N/A	–	–	–	–	–
P502504	**10.12** 257	**9.37** 238	**9.37** 238	**5** 127	**45** 21	**3139781**	**10.12** 257	**9.37** 238	**10.12** 257	**42** 20	CF*	–	–	–	–	–
N/A	–	–	–	–	–	**3139780**	**10.12** 257	**9.37** 238	**10.12** 257	**52** 23.5	CF*	–	–	–	–	–
3139892	**8.91** 226	**10.73** 273	**10.73** 273	**6.38** 162	**56** 25.6	**3139476**	**9** 229	**10.7** 272	**9** 229	**45** 20.5	N/A	–	–	–	–	–
3139901	**10.9** 277	**10.73** 256	**10.73** 256	**5.5** 140	**68** 31	**3139905** 3139905-LT	**10.9** 277	**10.7** 272	**10.9** 277	**63** 29	**3144094** 3144094-LT	**10.97** 279	**10.73** 273	**10.73** 273	**10.91** 277	**79** 36
P527697	**10.9** 277	**10.7** 272	**10.7** 272	**7.3** 186	**79** 36	**3139477** 3139477-LT	**10.9** 277	**10.7** 272	**10.9** 277	**72** 33	**3139903**	**10.97** 279	10.73 273	**10.73** 273	**10.91** 277	**88** 40
N/A	–	–	–	–	–	**P518960**	**8.8** 224	**10.7** 272	**10.9** 277	**52** 24	CF*	–	–	–	–	–
CF*	–	–	–	–	–	**3144570**	**10.85** 275.59	**10.85** 275.59	**12.51** 318	**78** 35.2	CF*	–	–	–	–	–
N/A	–	–	–	–	–	**3144571**	**12.46** 316.48	**10.85** 275.59	**12.52** 318	**87** 39.5	**3144572**	**12.5** 318	**10.9** 277	**10.9** 277	**12.5** 318	**108** 49.1
N/A	–	–	–	–	–	**P524218**	**12.88** 327	**16.42** 417	**12.88** 327	**102** 46.4	CF*	–	–	–	–	–
P505409	**14.4** 366	**16.4** 417	**16.4** 417	**7.9** 201	**145** 65.9	**P505325**	**14.5** 368	**16.4** 417	**14.4** 366	**129** 58.7	**P505410**	**14.4** 366	**16.4** 417	**16.4** 417	**14.6** 371	**168** 76.1
N/A	–	–	–	–	–	**P505326**	**14.4** 366	**16.4** 417	**14.4** 366	**143** 64.8	**P505411**	**14.4** 366	**16.4** 417	**16.4** 417	**14.6** 371	**181** 82.2
N/A	–	–	–	–	–	–	–	–	–	–	**P562241**	**14.4** 366	**16.4** 417	**16.4** 417	**14.6** 371	**198** 90
CF*	–	–	–	–	–	**P516094** P516094-LT	**16.1** 409	**18.1** 460	**16.2** 411	**198** 89.8	CF*	–	–	–	–	–
N/A	–	–	–	–	–	**P516093** P516093-LT	**15.9** 404	**18.1** 460	**16.2** 411	**209** 95	CF*	–	–	–	–	–
CF*	–	–	–	–	–	**3130501**	**20.4** 518	**21.2** 538	**20.4** 518	**338** 154	CF*	–	–	–	–	–







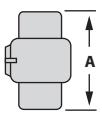
*Consult factory

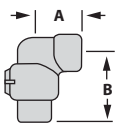
Chiksan® swivel joint specifications

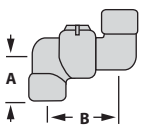
High-pressure swivel joints

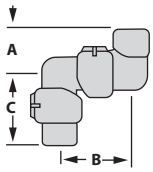
Nom. sizes in.	CWP psi bar	Ends	Style 20			Style 30				Style 40				Style 50				
			Part No.	A in. mm	lb kg	Part No.	A in. mm	B in. mm	lb kg	Part No.	A in. mm	B in. mm	lb kg	Part No.	A in. mm	B in. mm	C in. mm	lb kg
.38	6,000 414	Threaded	3111290	3.31 84	1.5 0.7	3111291	1.94 49	2.81 71	1.8 0.8	3111292	2.0	1.94 49	2 54	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	2.0	1.94 49	2 54	3111317	1.94 49	2.88 73	2.81 71	3.3 1.5
.75	6,000 414	Threaded	3220946	5.19 131	3.6 1.63	3220947	2.72 69	4.62 117	4.39 1.99	3220948	2.72	2.72 69	4.5 2	3220883	2.72 69	4.22 107	4.62 117	7.2 3.24
1	6,000 414	Threaded	3207727	5.19 131	3.16 1.43	3207728	2.72 69	4.62 117	3.6 1.6	3207729	2.72	2.72 69	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	6.8 3.10	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	10 4.5	3207743	3.19 81	4.72 120	6.2 2.80	3207744	3.19 81	4.28 109	7.9 3.58	3205400	3.19 81	4.28 109	4.72 120	10 4.5
2	6,000 414	Threaded	3207749	6.66 169	13 5.5	3207750	4.03 102	5.84 148	16 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	–	–	–	–	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	30 14	3207757	4.62 117	9.44 240	37 16.8	3207758	4.62 117	8.75 222	43 20	3207759	4.62 117	7.94 202	8.62 219	53 24.1
4	6,000 414	Threaded	3207764	9.59 244	42 19	3207765	5.56 141	10.81 275	57 26	3207766	5.56 141	10.56 268	64 29.1	3207767	5.56 141	9.83 250	9.88 251	90 41

*Consult factory







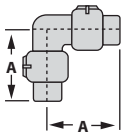


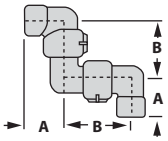
Chiksan® swivel joint specifications

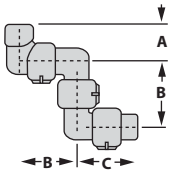
High-pressure swivel joints

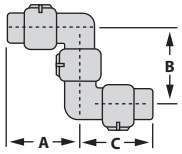
Nom. sizes in.	CWP psi bar	Ends	Style 60			Style 70				Style 80					Style 10				
			Part No.	A in. mm	lb kg	Part No.	A in. mm	B in. mm	lb kg	Part No.	A in. mm	B in. mm	C in. mm	lb kg	Part No.	A in. mm	B in. mm	C in. mm	lb kg
.38	6,000 414	Threaded	3111294	2.81 71	2.8 1.3	CF*	–	–	–	N/A	–	–	–	–	N/A	–	–	–	–
.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	8.9 4.03	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	14 5.9
1.5	6,000 414	Threaded	3207745	4.72 120	8.2 3.72	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	22 9.7	3207753	4.03 102	5.88 149	29 13	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	77 34.9
4	6,000 414	Threaded	3207768	9.88 251	73 33.2	3207769	5.56 141	9.62 244	98 45	3207763	5.56 141	9.62 244	10.81 275	111 50.3	3207763	9.88 251	10.31 262	10.81 275	111 50.2

*Consult factory







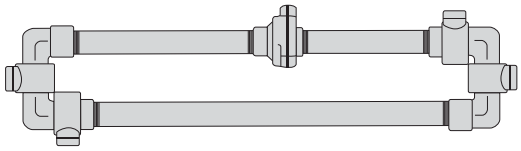


Chiksan® cementing and circulating hoses

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*	
					Part No.	lb kg	Part No.	lb kg	Part No.	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	**76** 34.5	N/A	–
1 - ½" LS	Black	**10,000** 690	1502	50 / 50	**3264538** 3264538-LT	**62.9** 28.5	**3254780** 3254780-LT	**114** 52	N/A	–
	Red	**15,000** 1034	1502	50 / 50	N/A	–	N/A	–	3267266	**134** 61
2" HP	Silver	**6,000** 414	602	50 / 50	3206495	**122** 56	3205876	**134** 61	N/A	–
2" LS	Black	**10,000** 690	1502	50 / 50	**3144394** 3144394-LT	**142** 65	**3144001** 3144001-LT	**156** 71	N/A	–
	Red	**15,000** 1034	1502	50 / 10	N/A	–	N/A	–	**6102805** 6102805-LT	**152** 68.9
2" LSG	Olive green (sour gas)	**10,000** 690	1502	50 / 10	N/A	–	N/A	–	6102809	**155** 70
3" HP	Silver	**6,000** 414	602	50 / 50	3247975	**253** 115	3231262	**234** 106	N/A	–

Typical integral construction

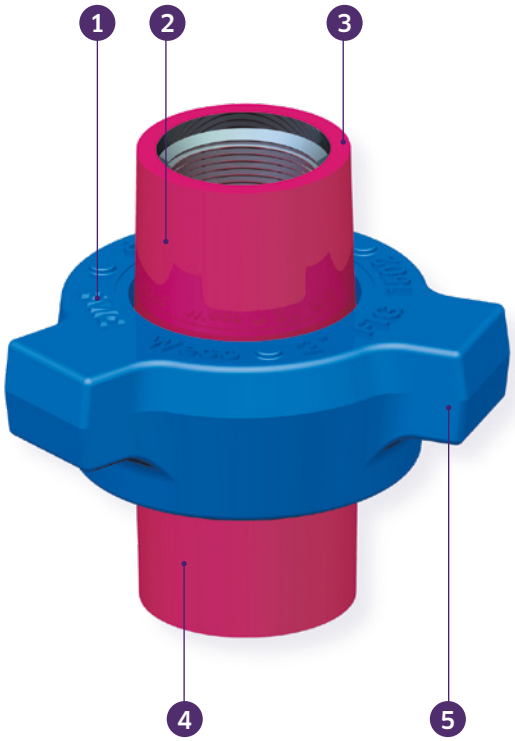


Typical threaded construction

Original Weco® wing unions

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 Warnings, page 66).**



1. **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, for sour gas service are stamped “Sour Gas.”

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

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

4. **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.

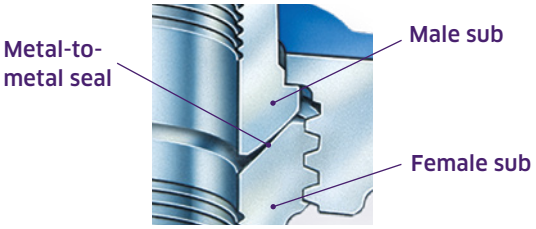
5. **Fast make-up, break-out**
   Three lug nuts and self-locking ACME threads provide fast make-up and break-out regardless of position or space restrictions.

Proven seal designs

Pressure rating shown for integral and non-threaded end configuration. May be derated for threaded end configuration.

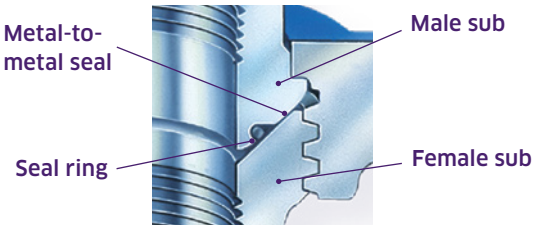
Low-pressure services (1,000 to 2,000 psi)

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.



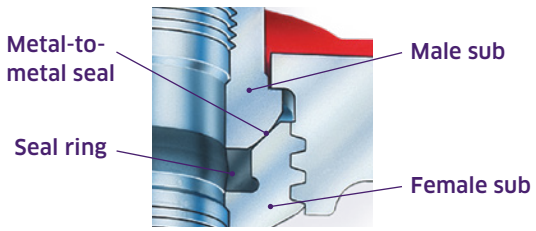
Medium-pressure services (2,000 to 4,000 psi)

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.



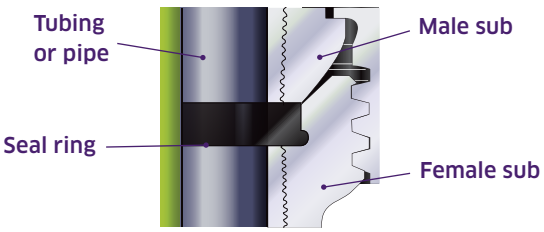
High-pressure services (6,000 to 20,000 psi)

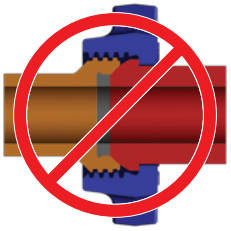
Weco® wing unions for high-pressure services feature a replaceable, lip-type seal ring in the female sub. This primary seal protects the secondary metal-to-metal seal from abrasion and corrosion while minimizing flow turbulence.



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.



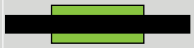
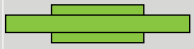


Warning

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.

Wing Unions

Figure No.	Assembly color key standard service	Pressure rating, psi, bar				Nominal pipe sizes, inches		
		Standard		Sour gas (see note 8)		1 25	1¼ 32	1½ 40
		Cold working	Test	Cold working	Test			
100		**1,000** 69	**1,500** 103	N/A	N/A			
200		**2,000** 138	**3,000** 207	N/A	N/A	▸	▸	▸
206		**2,000** 238	**3,000** 207	N/A	N/A	▸	▸	▸
207		**2,000** 138	**3,000** 207	N/A	N/A			
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	▸		▸
1505		**15,000** 1034	**22,500** 1551	**10,000** 690	**15,000** 1034			
2002		**20,000** 1379	**30,000** 2068	N/A	N/A			
2202		N/A	N/A	**15,000** 1034	**22,500** 1551			

***** N/A - 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 1⁄2 - and 7-inch OD with casing threads.
7. Available in butt-weld ends only.
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.
11. Available as integral end connection only.

Nominal pipe sizes, inches									Notes
2 50	2½ 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
		▸							11
▸		▸							7
▸		▸							7

Sour Gas TechnipFMC 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.

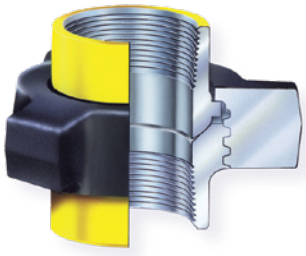


Figure 100

1,000 psi cold working pressure

Recommended service
Manifold and line connections

Features

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

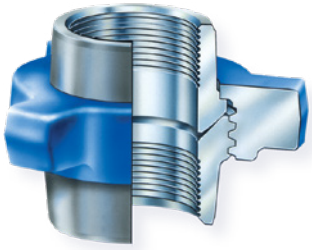


Figure 200

2,000 psi cold working pressure

Recommended service
General service manifolds and lines

Features

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

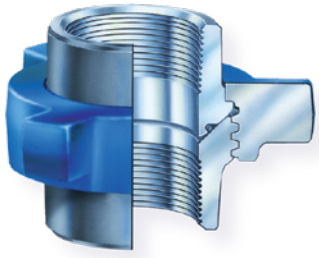


Figure 206

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

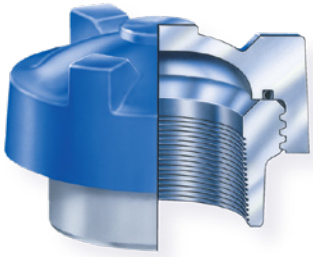


Figure 207

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

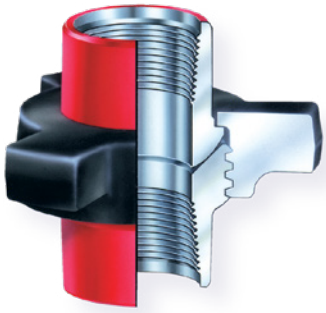


Figure 400

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

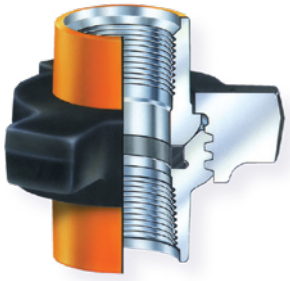


Figure 602

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

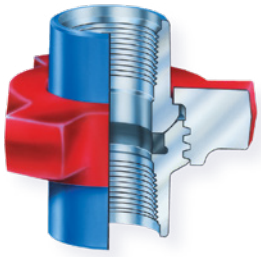


Figure 1002

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

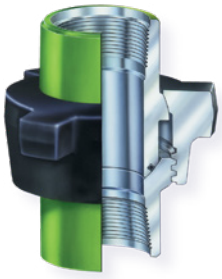


Figure 1003

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

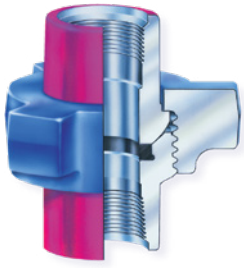


Figure 1502

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

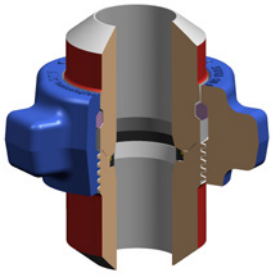


Figure 1505

15,000 psi cold working pressure

Recommended service

Fracturing,

Features

- Significant improvements in critical areas significantly extending life (available in 3-inch only)
- Thread start marker on nut eliminates cross-threading and reduces make up time
- Backward connectable with Weco® 3” 1502 iron
- Butt-weld available

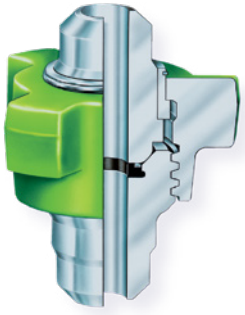


Figure 2002

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

To enhance safety,

2” Figure 602 and 1002 female subs have been modified so they cannot engage the 2” Figure 1502 nut. 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.

See specifications tables **(pgs. 52-55)** for sizes, dimensions, weights, materials, and part numbers.

Weco® wing union specifications

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

Nominal pipe size		in.	2	2½	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.	3⅜	3¹⁵⁄₁₆	4½	5⅜	6¹⁵⁄₁₆	8³⁄₃₂
		mm	81	100	114	135	176	209
B	Outside diameter	in.	2¾	3¼	4	5³⁄₁₆	7⅜	9¹⁵⁄₃₂
		mm	69.8	83	102	132	186	241
C	End-to-end threaded	in.	3⅝	4¹⁵⁄₃₂	4⅞	5¾	6²³⁄₃₂	7³⁄₁₆
		mm	92	109	124	146	171	183
D	Inside diameter	in.	2⁵⁄₃₂	2⁹⁄₁₆	3³⁄₁₆	4³⁄₁₆	6³⁄₃₂	8¼
		mm	54.7	65	81	106	160	209
Weight		lb	6	10	14	22	45	66
		kg	2.7	4.5	6.4	10	20.4	30
Material, sub Material, nut			DI DI	DI DI	DI DI	DI DI	DI DI	DI DI

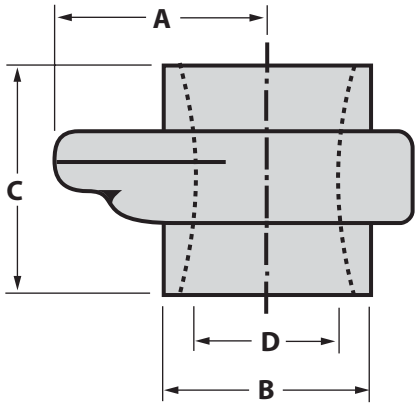


Figure 200 - 2,000 psi (138 bar) cold working pressure

Nominal pipe Size		in.	1	1¼	1½	2	2½	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.	1³³⁄₃₂	2¼	2½	3	3⅜	4	4¹⁄₁₆
		mm	50	57	64	76	90	102	119
B	Outside diameter	in.	1⁹⁄₃₂	2	2¼	2²⁹⁄₃₂	3³⁄₃₂	4³⁄₃₂	5⅛
		mm	40	51	57	74	84	104	130
C	End-to-end threaded	in.	2⁹⁄₃₂	2²⁵⁄₃₂	2²⁵⁄₃₂	3⅜	4⅛	4¹⁷⁄₃₂	4¹⁵⁄₁₆
		mm	66	71	71	90	105	115	125
D	Inside diameter	in.	1⅛	1¹⁵⁄₃₂	1²³⁄₃₂	2⁵⁄₃₂	2⁹⁄₁₆	3³⁄₁₆	4³⁄₁₆
		mm	28	37	43	55	65	81	106
Weight		lb	2	2	3	5	9	13	18
		kg	0.9	0.9	1.4	2.3	4.1	5.9	8.2
Material, sub Material, nut			CS DI	CS DI	CS DI	DI DI	CS DI	SF SF	SF SF

Note:

- **Materials**
- **AS** - alloy steel
- **CS** - carbon steel
- **DI** - ductile iron casting
- **SC** - steel casing
- **SF** - steel forging

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

Nominal pipe size		in.	1	1¼	1½	2	2½	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.	2	2¼	2½	3	3⅜	4	4¹⁄₁₆	6¼	7⅛	9
		mm	51	57	64	76	90	102	119	159	189	229
B	Outside diameter	in.	1⁹⁄₃₂	1³⁄₃₂	2¼	2¹³⁄₁₆	3³⁄₃₂	4³⁄₃₂	5⅛	7½	9⅜	11½
		mm	40	50	57	71	85	104	130	191	243	292
C	End-to-end threaded	in.	2²⁹⁄₃₂	2²⁵⁄₃₂	2²⁵⁄₃₂	3¼	4⅛	4¹⁷⁄₃₂	5	6²³⁄₃₂	7³⁄₁₆	9³⁄₃₂
		mm	67	71	71	83	105	115	127	169	183	231
D	Inside diameter	in.	1⅛	1¹⁵⁄₃₂	1²³⁄₃₂	2⁵⁄₃₂	2⁹⁄₁₆	3³⁄₁₆	4³⁄₁₆	6³⁄₃₂	8¼	10⅜
		mm	28	37	43	55	65	81	106	160	209	262
Weight		lb	2	2	3	5	8	13	18	42	65	90
		kg	0.9	0.9	1.4	2.3	3.6	5.9	8.2	19.1	29.5	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

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.	5¾	7⅜₁₆	9¹⁵⁄₁₆	12⅜	14½
		mm	146	135	252	314	368
B	Outside diameter	in.	4³⁄₃₂	5⅛	7½	9⅜₁₆	11½
		mm	104	130	191	243	292
C	End-to-end threaded	in.	3¾	4⅜₁₆	5¹³⁄₁₆	8⅝	9¹⁄₁₆
		mm	95	109	148	219	246
D	Inside diameter	in.	3³⁄₁₆	4³⁄₁₆	6³⁄₃₂	8¼	10⁵⁄₁₆
		mm	81	106	160	209	262
Weight		lb	10	16	37	70	96
		kg	4.5	7.3	16.8	31.9	43.5
Material, sub Material, nut			SF SC	SF SF	SF SC	SF SC	SF SC

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	2½	3	4	5½ 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.	3½	4³⁄₃₂	4⅜	5	5¹⁵⁄₁₆	6¾	6¾	7¹³⁄₁₆	10²³⁄₃₂
		mm	89	103	111	127	148	171	171	198	272
B	Outside diameter	in.	3⅛	3½	4³⁄₃₂	5⁷⁄₃₂	6¼	7¾	7¾	9¹³⁄₃₂	14
		mm	78	89	106	133	159	197	171	244	356
C	End-to-end threaded	in.	5¼	6⅛₁₆	6²⁄₃₂	8²⁄₃₂	10¹⁵⁄₃₂	11⅛₁₆	11⅛₁₆	11⅞₁₆	10¹⁵⁄₁₆
		mm	133	154	158	209	266	281	281	291	278
D	Inside diameter	in.	2³⁄₃₂	2⅜₁₆	3⅜₁₆	4⅜₁₆	5⅛	6³⁄₃₂	6³⁄₃₂	8¼	12¹⁄₃₂
		mm	55	65	81	106	130	160	169	209	313
Weight		lb	11	16	19	28	47	64	61	95	163
		kg	5	7.3	8.6	12.7	21.3	29	27.7	43.1	73.9
Material, sub Material, nut			SF SF	CS SF	SF SF	SF SF	SF SC	CS SC	CS SC	SF SC	SC SC

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

Nominal pipe size		in.	1	1¼	1½	2	3	4
Union part No. Qty/carton			3202377 32	3202434 9	3202428 9	P533564 6	3202416 4	3202399 2
A	Clearance radius	in.	2⅜	3¼	3¼	3⅝	4½	5³⁄₁₆
		mm	60	83	83	92	114	132
B	Outside diameter	in.	1¾	2⁹⁄₁₆	2⁹⁄₁₆	3³⁄₃₂	4³⁄₃₂	5²⁄₃₂
		mm	44	65	65	78	106	133
C	End-to-end threaded	in.	3¹⁷⁄₃₂	4⅞	4⅞	5¾	6¼	8¼
		mm	90	124	124	146	159	210
D	Inside diameter	in.	1⅛	1¹³⁄₃₂	1¹⁄₁₆	2⅛	3³⁄₁₆	4³⁄₁₆
		mm	28	36	43	52	81	106
Weight		lb	3	10	9	15	21	31
		kg	1.4	4.5	4.1	6.8	9.5	14
Material, sub Material, nut			CS SF	CS SF	CS SF	SF SF	SF SF	SF SF

Note:

* Casing thread standard

- 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 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.	3¾	4⅞	5¾
		mm	95	124	146
B	Outside diameter	in.	3	4⅜	5½
		mm	76	111	140
C	End-to-end threaded	in.	4²⁹⁄₃₂	9⅛	10¹⁵⁄₁₆
		mm	118	232	278
D	Inside diameter	in.	2⅝₃₂	3⅜₆	4
		mm	55	81	102
Weight		lb	12	45	74
		kg	5.4	20.4	33.6
Material, sub Material, nut			AS SF	AS SC	AS SF

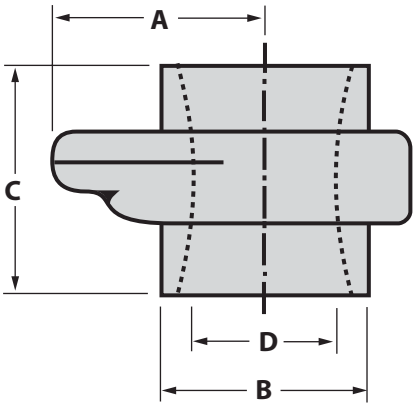


Figure 1002 - 10,000 psi (690 bar) to 4”; 7,500 psi (517 bar) cold working pressure, 5”-6” *

Nominal pipe size		in.	1	1¼	1½	2	2½	2½ (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.	2²⁷⁄₃₂	3³⁄₃₂	3³⁄₃₂	3¹³⁄₁₆	3⅞	4	4¹⁷⁄₃₂	4³³⁄₃₂
		mm	56	77	77	97	99	102	115	126
B	Outside diameter	in.	1¾	2⅝₆	2⅝₆	3³⁄₃₂	3½	3¹⁵⁄₁₆	4¼	5⅝₆
		mm	44	65	65	78	89	94	108	135
C	End-to-end threaded	in.	3¹⁷⁄₃₂	4⅞	4⅞	5¾	6⅛	5¹⁵⁄₁₆	6⁷⁄₃₂	8⁷⁄₃₂
		mm	90	124	124	146	156	151	158	209
D	Inside diameter	in.	1⅛	1¹³⁄₃₂	1¹⁵⁄₁₆	2⅛	2⅝₆	2¹⁵⁄₁₆	3⅜₆	4³⁄₁₆
		mm	28	36	43	52	65	71	81	106
Weight		lb	4	10	9	16	18	16	22	32
		kg	1.8	4.5	4.1	7.3	8.2	7.3	10	14.5
Material, sub Material, nut			AS SF	AS SF	AS SF	SF SF	AS SC	AS SF	AS SF	AS SF

Note:

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

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

Nominal pipe size		in.	1	1½	2	2½	3	4*
Union part No. Qty/carton			3254059 19	3254057 10	3201570 5	3203088 4	3207510 3	3252926 1
A	Clearance radius	in.	2⅞	3²⁹⁄₃₂	3²⁵⁄₃₂	4³⁄₃₂	4½	6
		mm	73	93	99	106	114	300
B	Outside diameter	in.	2⅜₆	2³⁹⁄₃₂	3⅜₆	3¾	4¹⁹⁄₃₂	5¾
		mm	55	75	81	95	112	146
C	End-to-end threaded	in.	4¹⁹⁄₃₂	5¹³⁄₃₂	7	7¼	7⅞	8½*
		mm	110	137	178	184	194	216
D	Inside diameter	in.	1⅛	1¹⁵⁄₁₆	2⅛	2⅝₆	3⅜₆	–
		mm	28	43	52	65	81	
Weight		lb	9	17	19	22	30	64
		kg	4.1	7.7	8.6	10	13.6	29
Material, sub Material, nut			AS SF	AS SF	SF SF	AS SC	AS SF	AS SF

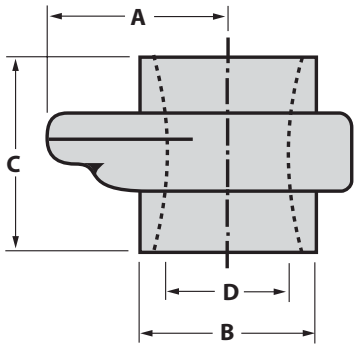
Note:

* Non-pressure seal

Weco® wing union specifications

Figure 1505 - 15,000 psi (1034 bar) cold working pressure

Nominal pipe size		in.	1	1½	2	2½	3	4*
Union part No. Qty/carton			3254059 19	3254057 10	3201570 5	3203088 4	3207510 3	3252926 1
A	Clearance radius	in.	2⅞	3²⁵⁄₃₂	3²⁹⁄₃₂	4³⁄₃₂	4½	6
		mm	73	93	99	106	114	300
B	Outside diameter	in.	2³⁄₁₆	2³¹⁄₃₂	3³⁄₁₆	3¾	4¹³⁄₃₂	5¾
		mm	55	75	81	95	112	146
C	End-to-end threaded	in.	4¹⁵⁄₃₂	5¹³⁄₃₂	7	7¼	7⅜	8½*
		mm	110	137	178	184	194	216
D	Inside diameter	in.	1⅛	1¹⁄₁₆	2¹⁄₁₆	2³⁄₁₆	3³⁄₁₆	–
		mm	28	43	52	65	81	
Weight		lb	9	17	19	22	30	64
		kg	4.1	7.7	8.6	10	13.6	29
Material, sub Material, nut			AS SF	AS SF	SF SF	AS SC	AS SF	AS SF



Note:

* Non-pressure seal

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

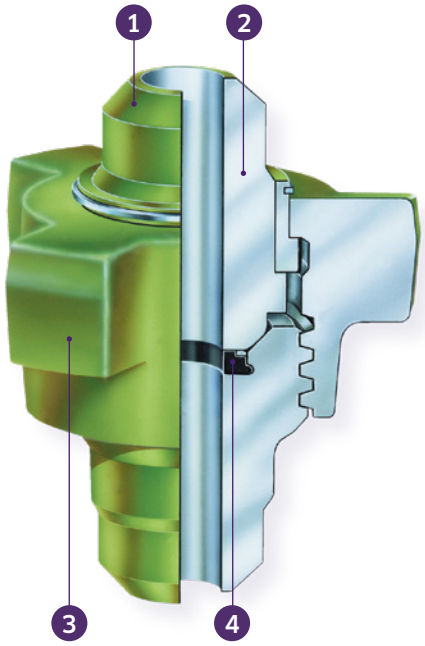
Nominal pipe size		in.	2	3
Union part No. Qty/carton			3222761 5	3245911 1
A	Clearance radius	in.	3¾	6³⁄₃₂
		mm	95	155
B	Outside diameter	in.	2¹³⁄₃₂	5½
		mm	66	140
C	End-to-end threaded	in.	7¹³⁄₃₂	10½
		mm	188	267
D	Inside diameter	in.	1⅜	3
		mm	33	76
Weight		lb	21	87
		kg	9.5	39.5
Material			AS	AS

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.	3¾	6³⁄₃₂
		mm	95	155
B	Outside diameter	in.	2⅞	5½
		mm	73	140
C	End-to-end threaded	in.	8¹³⁄₁₆	10½
		mm	224	267
D	Inside diameter	in.	1⅜	3
		mm	33	76
Weight		lb	22	53
		kg	10	24
Material			AS	AS

Sour gas service

TechnipFMC 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. TechnipFMC flowline products use fluoroelastomer seals or O-rings in all sour gas unions, but do not warrant the performance of any elastomer for sour gas service. **(See Warnings).**



1. **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.

2. **Meets industry standards**

   All Weco® wing unions for sour gas service meet both the NACE Standard MR-01-75 and API Standard RP-14-E.

3. **Controlled hardness**

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

4. **Positive sealing**

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

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 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 **(pgs .52-55)** for sizes, dimensions, weights, materials, and part numbers.

Other Weco® unions

Suction-hose unions

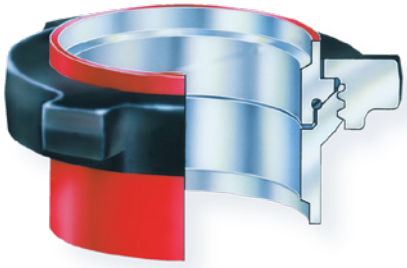
500 psi maximum line pressure, 4, 5, and 6-inch sizes

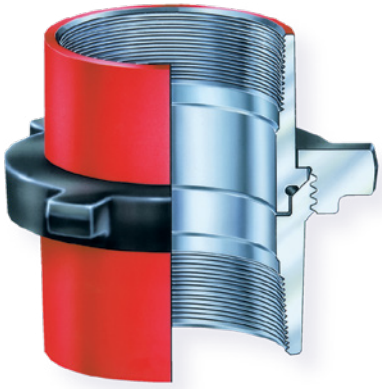
Recommended service

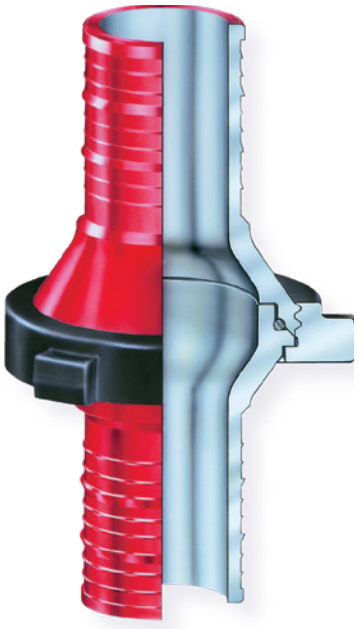
Mud system suction lines

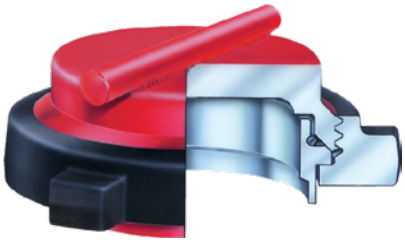
Features

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









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 warnings and cautions, page 88)**.

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	14¼	356	5	127	SF	CS	40	18.1
5-inch hose	3251341	1	14¼	356	5	127	SF	CS	31	14
5-inch socket weld	3202072	4	4$^{9}/_{32}$	104	5	127	SF	SF	18	8.2
5-inch line pipe thread	3248972	2	7¾	194	5	127	SF	DI	28	13
4-inch line pipe thread	3215198	2	5$^{15}/_{16}$	161	5	127	SF	DI	26	12
4-inch hose	3207912	2	14$^{13}/_{32}$	368	5	127	SF	DI	25	12
Blanking cap assy.	3220990	2	3$^{1}/_{16}$	92	5	127	SF	CS	25	12

Note: – **Materials** - **AS** - alloy steel, **CS** - carbon steel, **DI** - ductile iron casting, **CS** - steel casting, **SF** - steel forging

Weco® fittings and pup joints

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.

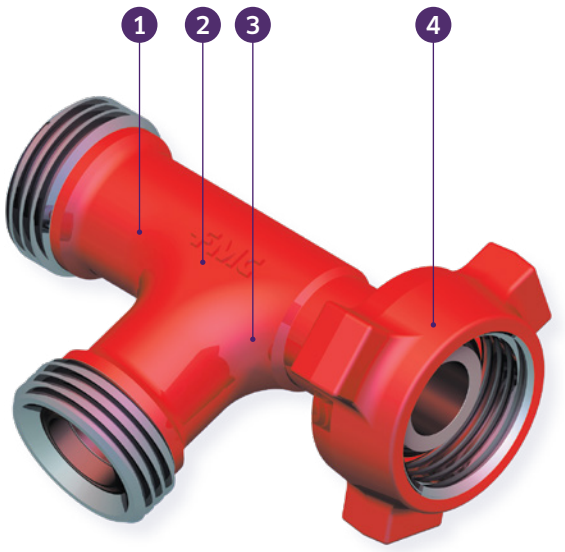
Available in 1 to 4-inch sizes, both fittings and pups feature forged construction with integral Weco® wing union ends for a high-strength, high-integrity connection every time. Weco® pups and fittings come with full material traceability and can be supplied with Charpy impact values. Like all pressure containing products, Weco® pups and fittings require special handling (See Warnings).

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



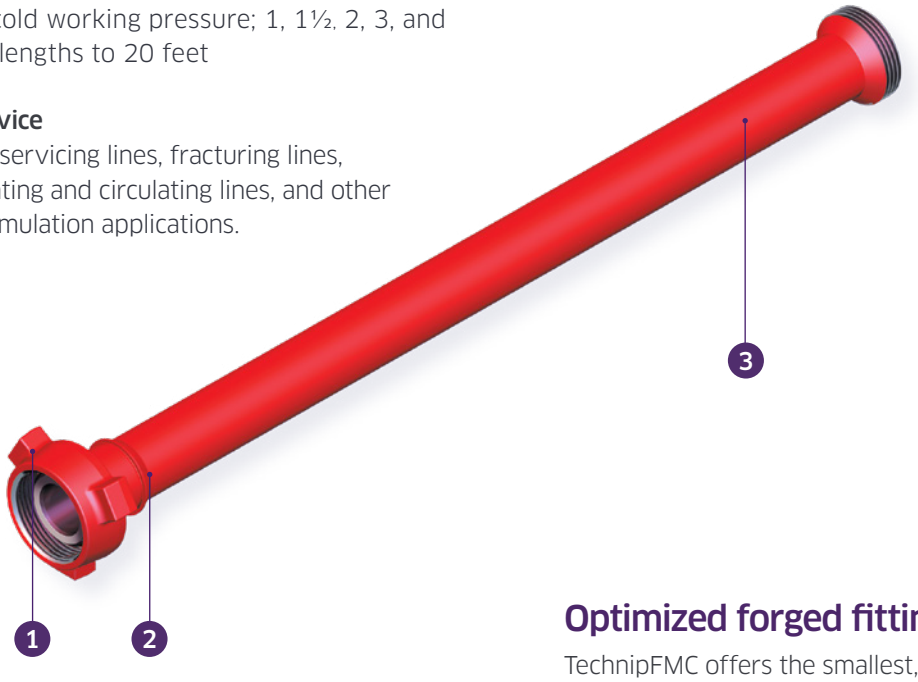
1. **Forged construction with full traceability**
2. **Optimized, lightweight designs**
   Save valuable weight and space.
3. **Complete range of configurations**
   Tees, elbows, crosses, wyes, and laterals can be combined to suit virtually any application.
4. **Integral Weco® wing union end connections**
   High-strength, high integrity connections every time.

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.



1. Weco® wing union nut detaches for field repair

Permits fast, easy service at the job site.

- Standard on Integral design.
- Optional on NPST design.

2. Patented retention shoulder prevents nut from sliding down pup

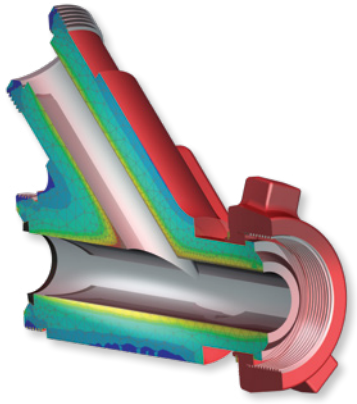
- Design decreases risk of injury to personnel.
- Standard on Integral design. Optional on NPST design.
- Optional on NPST design.

3. Integral and NPST designs

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

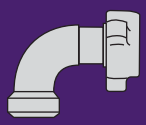
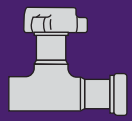
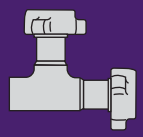
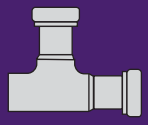
Optimized forged fittings

TechnipFMC 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.



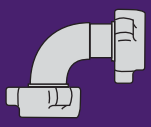
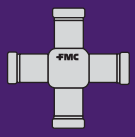
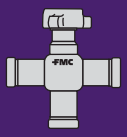
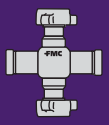
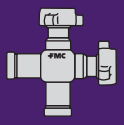
Weco® integral fittings specifications

Dimensional data

Nom. size in.	Weco wing union	CWP psi bar	Longsweep elbow		Elbows							
												
			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	–	–	**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*	–	–
2	602	**6,000** 414	**3262554**	**24** 11	**P506050** P506050-LT	**30** 14	–	–	**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*	–	–
3	602	**6,000** 414	**3259683** 3259683-LT	**54** 24.5	**3267335** 3267335-LT	**101** 45.6	–	–	–	–	–	–
	1502	**15,000** 1034	**3259845** 3259845-LT	**50** 23	**3265950** 3265950-LT	**102** 46.3	**P506059** P506059-LT	**121** 54.9	**P506067** P506067-LT	**87** 39.5	**3268575** 3268575-LT	**114** 51.7
	1505	**15,000** 1034	–	–	CF*		CF*		CF*		CF*	
	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	**76** 35	**P506052** P506052-LT	CF*	**P506060** P506060-LT	CF*	**P506068** P506068-LT	CF*	–	–
	1002	**10,000** 690	**3261102** 3261102-LT	**77** 35	**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*	–	–

*Consult factory

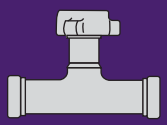
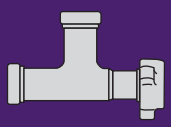
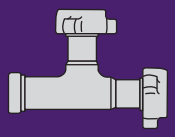
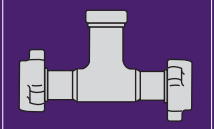
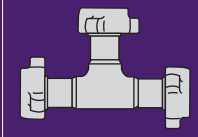
Dimensional data

Nom. size in.	Weco wing union	CWP psi bar	Longsweep elbow		Crosses							
												
			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	–	–	**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	**65** 30	**3269120** 3269120-LT	**77** 33	–	–	**P506130** P506130-LT	**83** 37.6
2	602	**6,000** 414	–	–	–	–	–	–	**3262655** 3262655-LT	**52** 24	**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	**69** 32	**3258450** 3258450-LT	**73** 33.1	**3258451** 3258451-LT	**76** 35
	2002	**20,000** 1380	CF*	CF*	**3267282** 3267282-LT	**80** 36.3	**P506115** P506115-LT	**69** 32	**P506120** P506120-LT	CF*	**P506132** P506132-LT	CF*
3	602	**6,000** 414	–	–	**P506109** P506109-LT	**157** 71.2	**P506116** P506116-LT	**134** 61	–	–	**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	**144** 80.7	**P506122** P506122-LT	**151** 68.5	**P506134** P506134-LT	**152** 69
	1505	**15,000** 1034	**P555280** P555280-LT	**81** 37	CF*		CF*		CF*		CF*	
	2002	**20,000** (1380)	–	–	–	–	–	–	–	–	–	–
4	602	**6,000** 414	**P506175** P506175-LT	CF*			**P504791** P504791-LT	**157** 71.2	–	–	–	–
	1002	**10,000** 690	**P506177** P506177-LT	CF*	**P506112** P506112-LT	**104** 47	**P506117** P506117-LT	**157** 71.2	–	–	–	–
	1502	**15,000** 1034	–	–	–	–	–	–	–	–	–	–

*Consult factory

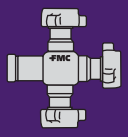
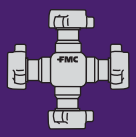
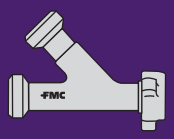
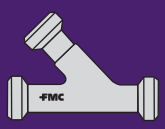
Weco® integral fittings specifications

Dimensional data

Nom. size in.	Weco wing union	CWP psi bar	Tees									
												
			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	**P506076** P506076-LT	**32** 14.4	**P506083** P506083-LT	**32** 14.4	**P506087** P506087-LT	**42** 19	**P506093** P506093-LT	**33** 15	**P506100** P506100-LT	**34** 15.4
1.5	1502	**15,000** 1034	–	–	**P505457** P505457-LT	**40** 18	**P506088** P506088-LT	**47** 21.1	**P506094** P506094-LT	**47** 21.1	–	–
2	602	**6,000** 414	–	–	**P506084** P506084-LT	**34** 16	**P506089** P506089-LT	**41** 19	**P506095** P506095-LT	**41** 19	–	–
	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	**46** 21	**P505584** P505584-LT	**42** 19	**P506080** P506080-LT	**52** 23.6	–	–	–	–
3	602	**6,000** 414	–	–	**P506085** P506085-LT	**124** 56.2	**P506091** P506091-LT	**126** 57.2	–	–	–	–
	1502	**15,000** 1034	**3263821** 3263821-LT	**128** 58	**3262298** 3262298-LT	**128** 58	**3265538** 3265538-LT	**135** 61	**3265947** 3265947-LT	**135** 61	**3268629** 3268629-LT	**142** 65
	1505	**15,000** 1034	CF*		**P556355**	**136** 62	**P556726**	**152** 69	CF*		CF*	
	2002	**20,000** (1380)	**P524673** P524673-LT	**253** 115	**P519451** P519451-LT	**253** 115	**P524674** P524674-LT	**274** 124	**P524675** P524675-LT	**274** 125	**P524676** P524676-LT	**295** 134
4	602	**6,000** 414	**P506082** P506082-LT	**107** 49	**P506086** P506086-LT	**141** 64	**P506092** P506092-LT	**127** 57.6	**P506098** P506098-LT	**124** 57	–	–
	1002	**10,000** 690	**P500633** P500633-LT	**114** 52	**3268031** 3268031-LT	**110** 50	**P500632** P500632-LT	**120** 54.5	–	–	**P506106** P506106-LT	**140** 64
	1502	**15,000** 1034	**P518756** P518756-LT	**229** 103.9	**P518790** P518790-LT	**228** 104	**P524680** P524680-LT	**251** 1 14	–	–	–	–

*Consult factory

Dimensional data

Nom. size in.	Weco wing union	CWP psi bar	Crosses				Laterals				Wyes	
												
			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	**P506137** P506137-LT	CF*	**P506146** P506146-LT	CF*	**P506154** P506154-LT	**58** 26.3	**P506160** P506160-LT	**57** 26	**P506164** P506164-LT	CF*
1.5	1502	**15,000** 1034	–	–	–	–	**P505434** P505434-LT	**64** 29	–	–	**P506166** P506166-LT	**30** 14
2	602	**6,000** 414	–	–	–	–	**3263029** 3263029-LT	**57** 26	–	–	**3262652** 3262652-LT	**26** 12
	1502	**15,000** 1034	**3257976** 3257976-LT	**83** 38	**3257975** 3257975-LT	**91** 42	**3261420** 3261420-LT	**61** 28	–	–	**3208846** 3208846-LT	**30** 14
	2002	**20,000** (1380)	**P506140** P506140-LT	CF*	**P506149** P506149-LT	CF*	**P506156** P506156-LT	CF*	–	–	**3254106** 3254106-LT	**32** 14.5
3	602	**6,000** 414	–	–	–	–	CF*	CF*	CF*	CF*	–	–
	1502	**15,000** 1034	**P506142** P506142-LT	**159** 72	**P506151** P506151-LT	**166** 76	**3266805** 3266805-LT	**95** 43	**P506161** P506161-LT	**82** 38	–	–
	1505	**15,000** 1034	CF*		CF*		**P555226**	**107** 49	**P506161**	**82** 38	–	–
	2002	**20,000** 1380	–	–	–	–	CF*	CF*	CF*	CF*	–	–
4	602	**6,000** 414	–	–	–	–	**P506158** P506158-LT	**168** 77	CF*	CF*	–	–
	1002	**10,000** 690	–	–	–	–	**P519459** P519459-LT	**174** 78.9	CF*	CF*	–	–
	1502	**15,000** 1034	–	–	–	–	**P518757** P518757-LT	**288** 130.6	CF*	CF*	–	–

*Consult factory

Weco® integral fittings specifications

Dimensional data

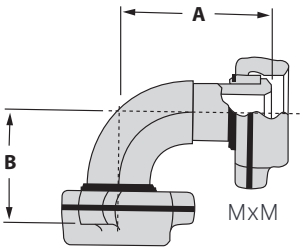
Nominal size in.	Longsweep elbow				Elbow
	M x M		M x F		
	A in. (mm)	B in. (mm)	C in. (mm)	D in. (mm)	A in. (mm)
1	–	–	–	–	6.06 (154)
1.5	–	–	–	–	6.06 (154)
2	7.16 (182)	5.13 (130)	7.16 (182)	5.5 (140)	6.06 (154)
3	10 (254)	7.59 (193)	10 (254)	7.94 (202)	8 (203)
4	12.62 (321)	9.69 (246)	12.62 (321)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

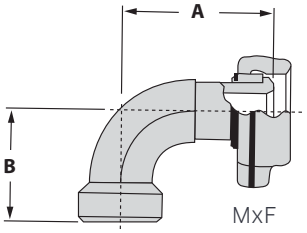
Dimensional data

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	–	–	8 (203)	16 (406)	8 (203)	16 (406)
4	–	–	8.20 (208)	16.40 (417)	8.20 (208)	16.40 (417)

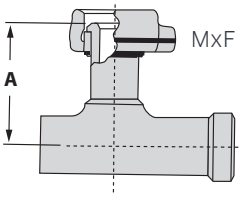
Dimensional data

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)	–	–	–
1.5	–	10.50 (267)	15.75 (400)	5.25 (133)	–	–	–
2	–	10.50 (267)	15.75 (400)	5.25 (133)	–	–	–
3	602	–	–	–	8.5 (216)	16 (406)	6.63 (168)
3	1502	–	–	–	8.5 (216)	16 (406)	6.63 (168)
3	2002	15 (381)	20.26 (515)	7.63 (194)	–	–	–
4	602	–	–	–	11.50 (292)	19.50 (495)	8 (203)
4	1002	–	–	–	11.50 (292)	19.50 (495)	8 (203)
4	1502	15 (381)	20.26 (515)	7.63 (194)	–	–	–

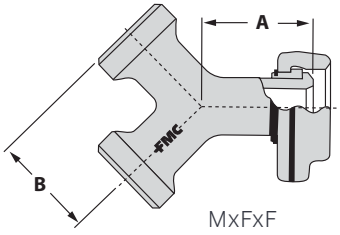




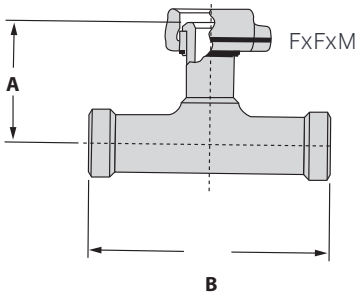
Longsweep elbows



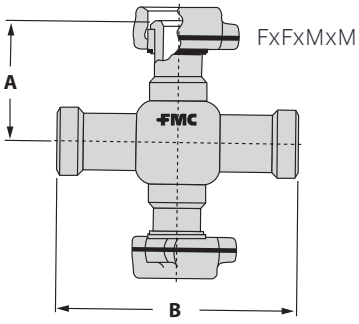
Elbow



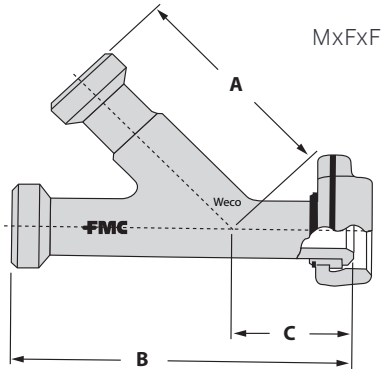
Wye



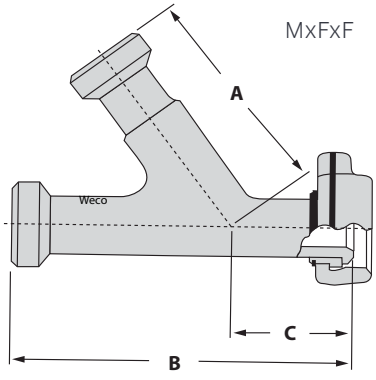
Tee



Cross



45° Lateral



60° Lateral

Weco® pup joints

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	48 21.8	3265600 3265600-LT	93 43
2”	602	6,000 414	CF*	–	P528321 P528321-LT	34 15	CF*	–	P528320 P528320-LT	48 22	3265733 3265733-LT	55 25
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	70 32	CF*	–	3251806 3251806-LT	95 43.1	6101173 6101173-LT	136 62	3251807 3251807-LT	157 71.2
4”	1502	10,000 690	3265769 3265769-LT	71 32	P506629 P506629-LT	94 43	3265771 3265771-LT	114 52	3265772 3265772-LT	133 60.3	3265773 3265773-LT	157 72

*Consult factory

NPS detachable nut (20 ft (6,096 mm) size: consult factory)

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	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	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	38 18	CF*	–	3267025 3267025-LT	84 38.1	3267026 3267026-LT	99 44.9
4”	602	6,000 414	CF*	–	CF*	–	CF*	–	P514712 P514712-LT	136 61.7

*Consult factory

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
3256612 3256612-LT	**35** 16	**3265583** 3265583-LT	**39** 18	**P504985** P504985-LT	**45** 20.4	CF*	**45** 20.4
3254969 3254969-LT	**68** 30.8	**3256062** 3256062-LT	**81** 36.7	CF*	–	CF*	–
CF*	–	**P528319** P528319-LT	**82** 38	**3265739**	**96** 44	CF*	**80** 36.3
3255326 3255326-LT	**73** 33.1	**3255325** 3255325-LT	**86** 39	**3255324** 3255324-LT	**100** 45.4	**3265728** 3265728-LT	**155** 70.3
P504506 P504506-LT	**135** 61.2	**3267338** 3267338-LT	**163** 73.9	**P501344** P501344-LT	**192** 87.1	CF*	**192** 87.1
3255320 3255320-LT	**141** 64	**3255423** 3255423-LT	**169** 76.7	**3255381** 3255381-LT	**198** 89.8	**3255427** 3255427-LT	**313** 142
P514350 P514350-LT	**200** 90.7	**3251808** 3251808-LT	**240** 109	CF*	–	CF*	–
3265775 3265775-LT	**198** 89.8	**3265777** 3265777-LT	**240** 109	CF*	–	CF*	–

*Consult factory

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
P511842 P511842-LT	**59** 26.8	**P512102** P512102-LT	**73** 33.1	**3265906** 3265906-LT	**86** 39	CF*	CF*
P513301 P513301-LT	**113** 51.3	CF*	–	**3267053** 3267053-LT	**170** 77.1	CF*	–
P514711 P514711-LT	**158** 71.7	**P514713** P514713-LT	**200** 90.7	**P514715** P514715-LT	**244** 111	**3265739** 3265739-LT	**96** 44

*Consult factory

Weco® pup joints

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	32 14.5	P508590	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	56 25.4	P508601	70 31.8	P508602	84 38.1	P508603 P508603-LT	997 44	P508604	113 51.3
4”	602	6,000 414	CF*	–	CF*	–	P510406	121 54.9	P510407 P510407-LT	118 53.5	P510408	164 174.4
4”	1002	10,000 690	P512866	76 35	P512867	98 45	P510400	119 54	P510401 P510401-LT	140 64	P510402	161 74
4”	1502	15,000 1034	P520514	125 57	P520515	155 70	P520520	185 84	P520521 P520521-LT	215 98	P520522	245 111

*Consult factory

Integral

In”	Weco union end	CWP psi bar	2 ft (610 mm)		3 ft (914 mm)		4 ft (1,219 mm)	
			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	3263200	24 10.9	P512501	25 11.3	3262915	31 14.1

Integral with retention shoulder

In”	Weco union end	CWP psi bar	3 ft (914 mm)		4 ft (1,219 mm)		5 ft (1,524 mm)	
			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	P516825	41 18.6	P516823 P516823-LT	50 22.7	P516821 P516821-LT	58 26.3
3”	1502	15,000 1034	P517538	73 33.1	P517582	91 41.3	P517664 P517664-LT	108 49
3”	2002	20,000 (1380)	P525539	197 90	P525541	197 90	P525543	295 134
3”	1505	15,000 1034	P556329	81 37	P555669	99 45	P556141	116 53
4”	1502	15,000 1034	CF*	–	P520516	210 95	P518458 P518458-LT	251 114

*Consult factory

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
P508594	**71** 32	**P508595** P508595-LT	**87** 39.5	**P508596**	**101** 45.8	**P508598**	**156** 70.8
P508605	**142** 64.4	**P508606**	**170** 77.1	**P508607**	**199** 90.3	**P508609**	**313** 142
P510409	**207** 93.9	**P510410**	**249** 112	**P510411**	**292** 132.4	**P512873**	**463** 210
P510403	**204** 93	**P510404**	**247** 113	**P510405**	**293** 133	**P512105**	**460** 209
P531126	**305** 138	**P513472**	**365** 166	CF*	–	**P520526**	**665** 302

*Consult factory

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
3261090	**37** 16.8	**3262229**	**64** 29	**3266745**	**55** 25	**3261496**	**67** 30.4

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
P516820	**67** 30.4	**P516810**	**84** 38.1	**P516485**	**101** 45.8	**P516817**	**118** 53.5
P517672	**127** 58	**P517674**	**160** 72.6	**P517111**	**195** 88.5	CF*	–
P519441	**344** 157	–	–	**P525905**	**542** 246	P525798	**642** 291
P556307	**133** 61	**P556310**	**168** 77	**P556322**	**202** 92	–	–
–	–	**P518450**	**371** 169.2	**P518437**	**453** 206	CF*	–

*Consult factory

Temporary Pipe Restraint (TPR)

TechnipFMC's Temporary Pipe Restraint (TPR) system is used on high pressure temporary flowlines. Properly applied, this system will provide an additional level of protection for personnel and physical assets by minimizing the amount of sudden movement in the event of an iron failure. The TPR system comes in two models: Standard and Premium.

Features

- TPR System is easy to install with only R-Links and C-Links made to the same specification
- Covers can be repaired in case of damage (PM)
- Patented fiber optic inspection of core yarn damage (PM)
- Patented over-load indicator allows instant detection of prior misuse or abuse (PM)
- Warning tag contains serial number and date of manufacture
- Inner cover with red color allows quick visual inspection for outer cover damage (PM)
- R-Links can be untied at any point along the flowline for quick re-installation after repair of leaking connections
- Lighter with higher strength to weight ratio than competitive systems
- Resistant to broad range chemical attack and extreme environmental conditions

Premuim

Model	Size (in)	Weight (lb/ft)	Max size @ CWP	Color	Temp range	Sizes and figure numbers
PM100	1.12	0.54	2" @ 20,000 psi; 6" @ 2,000 psi	Yellow	-75 to 250°F	2" Figure 2002 and 2202 2" (and under) Figure 1502, 1002 and 602 6" (and under) Figure 206
PM200	1.75	1.32	4" @ 10,000 psi, 3" @ 15,000 psi	Green	-75 to 250°F	3" Figure 1502, 1002 and 602 4" Figure 1002 and 602
PM300	2.12	1.93	4" @ 15,000 psi, 3" @ 20,000 psi	Blue	-75 to 250°F	3" Figure 2002 and 2202 4" Figure 1502 5" Figure 1002

Standard

Model	Size (in)	Weight (lb/ft)	Max size @ CWP	Color	Temp range	Sizes and figure numbers
S100	1.5	0.73	2" @ 20,000 psi; 4" @ 2,000 psi	Tan	-50 to 180°F	2" Figure 2002 2" (and under) Figure 1502, 1002 and 602 4" (and under) Figure 206
S200	2	1.46	3" @ 15,000 psi; 4" @ 6,000 psi; 6" @ 2,000 psi	Red	-50 to 180°F	3" Figure 1502, 1002 and 602 4" Figure 602 6" (and under) Figure 206
S300	4	2.4	4" @ 10,000 psi	Orange	-50 to 180°F	4" Figure 1002

Chemical compatibility

Chemical	Internal yarn		Cover
	Premium Synthetic	Standard Polyester	
Seawater	OK	OK	OK
Hot Water	OK	OK	OK
Saturated Steam	OK	NR	NR
Hydraulic Oil	OK	OK	OK
Kerosene	OK	OK	OK
Gasoline	OK	OK	OK
Ethylene Glycol	OK	OK	OK
Soap and Detergent Solutions (except bleach)	OK	OK	OK
Ethyl Alcohol	OK	OK	OK
Methyl Alcohol	OK	OK	OK
Hydrochloric Acid	OK	8 hours, maximum	8 hours, maximum
Hydrofluoric Acid (up to 10% solution)	OK	8 hours, maximum	8 hours, maximum
Sodium Hydroxide (up to 10% solution)	OK	OK	OK
Acetone	OK	OK	OK
Benzene	OK	OK	OK
Ethers	OK	OK	OK
Toluene	OK	OK	NR
Xylene	OK	OK	NR

Flow rates at maximum recommended velocity of 40 FPS

Size and Model	ID (IN)	FT^3/MIN	GPM	BBL/MIN	M^3/MIN
Swivel Joints:					
3/8" and 1/2" high pressure	0.547	4	29	0.70	0.11
3/4" and 1' low and high pressure	1.000	13	98	2.33	0.37
1-1/4" high pressure	1.375	25	185	4.41	0.70
1-1/4" and 1-1/2" low pressure and 1-1/2" high pressure	1.500	29	220	5.25	0.83
1-1/2" HP10	1.593	33	249	5.92	0.94
1-1/2" LS-15, 2" LSG-15 and LS-20	1.300	22	165	3.94	0.63
2" LS-15	1.875	46	344	8.20	1.30
2" low and high pressure	2.000	52	392	9.33	1.48
2-1/2" high pressure	2.500	82	612	14.6	2.32
3" LSG-10 and LS-15	2.750	99	741	17.6	2.80
3" high pressure	2.968	115	863	20.5	3.27
2-1/2" and 3" low pressure, 3" LS-20 LSG-15 TSi-20	3.000	118	881	21.0	3.34
3" TSi-15, 3" TSi-10, 3" TSi-6	2.750	99	741	17.6	2.80
4" HP6, FS-4	3.438	155	1,157	27.6	4.38
4" HPTL, 4" TSi-15	3.500	160	1,200	28.6	4.54
4" LS-10	3.875	197	1,470	35.0	5.57
4" TSi-10	3.750	184	1,377	32.8	5.21
4" high pressure	4.000	209	1,567	37.3	5.93
5" high pressure	5.188	352	2,636	62.8	9.98
6" low pressure	6.083	484	3,624	86.3	13.72
8" low pressure	8.000	838	6,267	149	23.72
Pup joints:					
1" 1502 integral pup joint	0.875	10	75	1.79	0.28
1.5" 1502 integral pup joint	1.300	22	165	3.94	0.63
2" 602, 1002, 1502 integral pup joint	1.750	40	300	7.14	1.14
2" 2002, 2202 integral pup joint	1.300	22	165	3.94	0.63
3" 602, 1002, 1502 integral pup joint	2.750	99	741	17.6	2.80
3" 2002, 2202 integral pup joint	3.000	118	881	21.0	3.34
4" 602, 1002 integral pup joint	3.875	197	1,470	35.0	5.57
4" 1502 integral pup joint	3.500	160	1,200	28.6	4.54
2" 602, 1002, 1502 NPST	1.750	40	300	7.14	1.14
3" 602, 1002, 1502 NPST	2.625	90	675	16.1	2.55
4" 602, 1002 NPST	3.500	160	1,200	28.6	4.54
4" 1502 NPST	3.000	118	881	21.0	3.34

Flow rates at maximum recommended velocity of 40 FPS

Size and Model	ID (IN)	FT^3/MIN	GPM	BBL/MIN	M^3/MIN
Plug valves:					
1" DR150, 1" ULT150	0.875	10	75	1.79	0.28
1-1/2" DR150	1.300	22	165	3.94	0.63
1" x 2" DR150, 1" x 2" ULT150	0.875	10	75	1.79	0.28
2" DR50 thru DR150	1.750	40	300	7.14	1.14
2" DR200	1.300	22	165	3.94	0.63
3" ULT150	2.750	99	741	17.6	2.80
3" ULT200	3.000	118	881	21.0	3.34
4" ULT100	3.875	197	1,470	35.0	5.57
4" ULT150	3.500	160	1,200	28.6	4.54
Swing check valves:					
1-1/2" 1502	1.300	22	165	3.94	0.63
2" 1502	1.750	40	300	7.14	1.14
2" 2002, 2202	1.300	22	165	3.94	0.63
3" 602, 1002, 1502	2.750	99	741	17.6	2.80
3" 2002, 2202	3.000	118	881	21.0	3.34
4" 1002	3.875	197	1,470	35.0	5.57
4" 1502	3.500	160	1,200	28.6	4.54

Sour gas

All TechnipFMC flowline equipment that is rated for sour gas service is acceptable for use in, or exposure to, hydrogen sulfide (H2S) environments. Acceptable flowline is marked and identified specifically for sour gas service, with the main body components and end connections identifiable with raised or stamped lettering. All sour gas products are painted with a green color to differentiate from standard service. Additionally, all products are labeled with the pressure rating and operating temperature range.

The body components are made from alloy steel that meets the requirements of NACE MR-01-75. These materials have a maximum hardness limitation of 22 HRC and are Charpy Impacted test to -50°F (-46°C).

All equipment should be inspected at regularly scheduled intervals to ensure it meets specific criteria validating it is safe for continued use.

Weco® and Chiksan® low temperature equipment

TechnipFMC offers standard service low temperature equipment for use to -40°F (-40°C). The part numbers have a "-LT" suffix added to the standard temperature part number. These assemblies have pressure containing metallic components charpy tested to -40°F and use low temperature seals.

Typical Weco and Chicksan recommended temperature ranges

Elastomer selection	Product line and materials of construction					Temperature ranges
	Wing unions, Swivel joints		Wing unions, Swivel joints, Plug valves, Check valves, Fittings, Pup joints, Adapters		Butterfly valves	
	Ductile iron	Carbon steel	Alloy steel standard service	Alloy steel sour gas service		
No Seal (Wing Union)	X					20°F (-7°C) to 300°F (149°C)
No Seal (Wing Union)		X				0°F (-18°C) to 300°F (149°C)
Nitrile	X					20°F (-7°C) to 240°F (116°C)
Nitrile		X				0°F (-18°C) to 240°F (116°C)
Nitrile			X			-20°F (-29°C) to 240°F (116°C)
Winterized Nitrile				X		-50°F (-46°C) to 240°F (116°C)
HNBR	X					20°F (-7°C) to 300°F (149°C)
HNBR		X	X	X		10°F (-12°C) to 300°F (149°C)
Viton®	X	X	X	X		20°F (-7°C) to 300°F (149°C)
Natural Rubber Seat					X	-20°F (-29°C) to 150°F (66°C)
Nitrile Seat					X	-20°F (-29°C) to 200°F (93°C)
EPDM, Hypalon, or PTFE Seat					X	-20°F (-29°C) to 250°F (121°C)
Silicone Rubber Seat					X	-20°F (-29°C) to 300°F (149°C)
Fluoroelestomer Seat					X	-10°F (-23°C) to 300°F (149°C)
Neoprene Seat					X	0°F (-18°C) to 200°F (93°C)

TechnipFMC offers standard service low temperature equipment for use to -40°F (-40°C). The part numbers have a "-LT" suffix added to the standard temperature part number. These assemblies have pressure containing metallic components charpy tested to -40°F and use low temperature seals.

Weco® and Chiksan® low temperature ranges

PGVL - Plug valve

P/N	Description	STD/CF
P516114-LT	ULTA010 150U 1502 FXM .88B W/PLG CAP BNO	STD
P516108-LT	ULTA010 150U 2IN 1502 FXM .88B W/PLG CAP	STD
P516146-LT	ULTA010 150U 2IN 1502 FXM .38B BNO	STD
P516113-LT	ULTA010 150U 1.5IN 1502 FXM .88B W/PLG C	STD
P539257-LT	ULTA020 15K 1502 FXM 1.75B BRC012	STD
P537789-LT	ULTA020 15K 1502 FXM 1.75B BNO	STD
3265904-LT	ULTA030 15K 1502 FXM 2.75B W/PLG CAP BNO	STD
3265123-LT	ULTA030 15KU 1502 FXM 2.75B BRC032 BNO	STD
3265122-LT	ULTA030 15K 1502 FXM 2.75B DT-36 POS II	STD

P/N	Description	STD/CF
P519087-LT	ULTA030 20K 2002 FXM BRC052	CF
P537338-LT	ULTA030 20K 2002 FXM 3.00B BRC052 BNO	CF
P519453-LT	ULTA030 20K 2002 FXM DT-140	CF
P537339-LT	ULTA030 20K 2002 FXM 3.00B DT-140 36IN W	CF
3265125-LT	ULTA030 15K 1502 FXM 2.75B F/OP BNO	STD
P518352-LT	ULTA040 10K 1002 FXM 3.875B BRC052 BNO	CF
P518356-LT	ULTA040 10K 1002 FXM 3.875B DT-90 36" HW	CF
P516015-LT	ULTA040 15K 1502 FXM 3.50B BRC052 BNO	CF
P518749-LT	ULTA040 15K 1502 FXM 3.50B DT-140 BNO	CF

C&C hose

P/N	Description	STD/CF
3264538-LT	HA015 LS10 55T1 120.00 1502 000 B	CF
3254780-LT	HA015 LS10 55T1 144.00 1002 000 E	CF
3144394-LT	HA020 LS10 55T1 120.00 1502 000 B	STD
3144001-LT	HA020 LS10 55T1 144.00 1502 000 B	STD
6102805-LT	HA020 LS15 51L1 120.00 1502 000 B	STD

CV - Check valve

P/N	Description	STD/CF
P530589-LT	CVA020 TE 15K 1502 MXF BNO	CF
P537198-LT	CVA020 TE 15K 1502 MXF BNO REVERSE FLOW	CF
P537131-LT	CVA020 TE 15K 1502 MXF BNO VENT CAP	CF
P537196-LT	CVG020 TE 10K 1502 MXF DN HNO	CF
P521623-LT	CVA030 TE 15K 1502 MXF BNO	CF
P524440-LT	CVA030 TE 15K 1502 MXF BNO REVERSE FLOW	CF
P537132-LT	CVA030 TE 15K 1502 MXF BNO VENT CAP	CF
P537225-LT	CVG030 TE 10K 1502 MXF DN VIO	CF
P537202-LT	CVA030 TE 6K 0602 MXF BNO	CF
P527120-LT	CVA030 TE 6K 0602 FXM BNO REVERSE FLOW	CF
P524760-LT	CVA040 TE 15K 1502 MXF BNO	CF
P527699-LT	CVA040 TE 15K 1502MXF BNO REVERSE FLOW	CF

P/N	Description	STD/CF
P525809-LT	CVA040 TE 10K 1002 MXF BNO	CF
P527018-LT	CVA040 TE 10K 1002 MXF BNO REVERSE FLOW	CF
P527592-LT	CVA040 TE 6K 0602 MXF BNO	CF
P524738-LT	CVA010 15K 1502 MXF BNO	CF
P519734-LT	CVA015 15K 1502 FXM BNO REVERSE FLOW	CF
3269158-LT	CVA020 20K 2002 MXF 2002 BNO	CF
P520099-LT	CVA030 20K 2002 MXF DN BNO STD	CF
P536118-LT	CVA010 DART 15K 1502 MXF BNO	CF
P523811-LT	CVA015 15K DART 1502 FXM BNO DN REVERSE	CF
P525269-LT	CVA015 DART 15K 1502 MXF BNO CO2/N2	CF
P510771-LT	CVA020 DART 15K 1502 MXF BNO CO2/N2	CF
P510773-LT	CVA030 DART 15K 1502 MXF BNO CO2/N2	CF

STD = Standard Product CF= Consult Factory

Weco® and Chiksan® low temperature ranges

BFV - Butterfly valve

P/N	Description	STD/CF
3227485-LT	BA020 0120 D*D*H BNO	CF
3227486-LT	BA025 0120 D*D*H BNO	CF
3227487-LT	BA030 0120 D*D*H BNO	CF
3245819-LT	BA040 0120 D*D*H BNO	CF
3227493-LT	BA060 0120 D*D*H BNO	CF
3232417-LT	BA080 0120 D*D*H BNO	CF
3227495-LT	BA100 0120 D*D*H BNO	CF
3227496-LT	BA120 0120 D*D*H BNO	CF
3255865-LT	BA140 0120 D*D*H BNO	CF
3255869-LT	BA160 0120 D*D*H BNO	CF
3229885-LT	BA020 012N D*D*H BNO	CF
3230052-LT	BA030 012N D*D*H BNO	CF
3229886-LT	BA040 012N D*D*H BNO	CF
3229887-LT	BA050 012N D*D*H BNO	CF
3229888-LT	BA060 012N D*D*H BNO	CF
3225730-LT	BA020 0220 D*D*H BNO	CF
3225731-LT	BA025 0220 D*D*H BNO	CF
3225732-LT	BA030 0220 D*D*H BNO	CF
3225733-LT	BA040 0220 D*D*H BNO	CF

P/N	Description	STD/CF
3225734-LT	BA050 0220 D*D*H BNO	CF
3225735-LT	BA060 0220 D*D*H BNO	CF
3225736-LT	BA080 0220 D*D*H BNO	CF
3225737-LT	BA100 0220 D*D*H BNO	CF
3225738-LT	BA120 0220 D*D*H BNO	CF
3225748-LT	BA020 022L D*D*H BNO	CF
3225749-LT	BA025 022L D*D*H BNO	CF
3225750-LT	BA030 022L D*D*H BNO	CF
3222751-LT	BA040 022L D*D*H BNO	CF
3225752-LT	BA050 022L D*D*H BNO	CF
3225753-LT	BA060 022L D*D*H BNO	CF
3225754-LT	BA080 022L D*D*H BNO	CF
3225755-LT	BA100 022L D*D*H BNO	CF
3225756-LT	BA120 022L D*D*H BNO	CF
3255867-LT	BA140 022L D*D*H BNO	CF
3255870-LT	BA160 022L D*D*H BNO	CF
3255871-LT	BA180 022L D*D*H BNO	CF
3255872-LT	BA200 022L D*D*H BNO	CF
3255873-LT	BA240 022L D*D*H BNO	CF

STD = Standard Product CF= Consult Factory

Weco® and Chiksan® low temperature ranges

LS/TSI - Swivel joint

P/N	Description	STD/CF
6101537-LT	LA010 LS10 30T 000 B LPT	STD
3139546-LT	LA010 LS10 50T 000 B LPT	STD
3259291-LT	LA010 LS15 30U 000 B MXF BNO	STD
3139547-LT	LA010 LS15 50U 000 B FXM BNO	STD
P506047-LT	LA015 LS10 20T 000 B LPT	CF
3139779-LT	LA015 LS10 10T 000 E LPT	CF
P510860-LT	LA015 LS10 20U 000 B FXM BNO	CF
3139778-LT	LA015 LS15 50U 000 E MXF BNO	CF
3139888-LT	LA020 LS10 20T 000 B FLPT X FLPT	STD
3139890-LT	LA020 LS10 40T 000 B	STD
3139904-LT	LA020 LS10 50T 000 B FLPT X FLPT	STD
3144545-LT	LA020 LS10 60T 000 B FLPT X FLPT	STD
3144126-LT	LA020 LS15 20U 000 B MXF BNO	STD
3139475-LT	LA020 LS15 50U 000 B MXF BNO	STD
3144630-LT	LA020 LS15 60U 000 B MXF BNO	STD
3267203-LT	LA020 LS15 50U 000 B MXM	STD
6101559-LT	LA020 LS15 60U 000 B MXM HALLIBURTON	STD
P509888-LT	LA020 LS15 50U 000 B FXF BNO	STD
P504952-LT	LA020 LS15 60U 000 B FXF BNO	STD
3144569-LT	LA020 LS20 50U 000 E MXF BNO	CF
P524579-LT	LA020 LS20 20U 000 E 2002 MXM DN	CF
P512325-LT	LA020 LS20 60U 000 E 2002 MXM DN	CF
P505417-LT	TSIA030 TSI15 20U 1502 FXM BNO	STD
P505416-LT	TSIA030 TSI15 30U 1502 MXF BNO	STD
P505327-LT	TSIA030 TSI15 50U 1502 MXF BNO	STD
P505420-LT	TSIA030 TSI15 60U 1502 MXF BNO	STD
P527340-LT	TSIA030 TSI20 50U 2002 MXF BNO	CF
P516092-LT	TSIA040 TSI10 20U 1002 MXF BNO	CF
P517487-LT	TSIA040 TSI10 30U 1002 MXF BNO	CF
P516091-LT	TSIA040 TSI10 50U 1002 MXF BNO	CF
P530256-LT	TSIA040 TSI15 20U 1502 MXF BNO	CF
P527331-LT	TSIA040 TSI15 50U 1502 MXF BNO	CF

P/N	Description	STD/CF
3141454-LT	LA010 LS10 10T 000 B FLPT X FLPT	STD
P516135-LT	LA010 LS15 80U 000 B 1502 MXF	STD
3139550-LT	LA010 LS15 10U 000 B FXM BNO	STD
3145886-LT	LA010 LS15 10X 000 B MXM	STD
P501542-LT	LA015 LS10 10T 000 B LPT	CF
P502504-LT	LA015 LS15 80U 000 E 1502 MXF BNO	CF
3139781-LT	LA015 LS15 10U 000 E FXM BNO	CF
3139780-LT	LA015 LS15 10U 000 E MXM	CF
3139891-LT	LA020 LS10 70T 000 B LPT	STD
3139892-LT	LA020 LS10 80T 000 B LPT	STD
3139476-LT	LA020 LS10 10T 000 B FLPT X FLPT	STD
P505482-LT	LA020 LS15 70U 000 B FXM	STD
3139901-LT	LA020 LS15 80U 000 B FXM BNO	STD
3139905-LT	LA020 LS15 10U 000 B 2MX2F BNO	STD
3144094-LT	LA020 LS15 100U 000 B FXM BNO	STD
P527697-LT	LA020 LS15 80U 000 B MXM	STD
3139477-LT	LA020 LS15 10U 000 B 2MX2M	STD
3139903-LT	LA020 LS15 100U 000 B MXM	STD
P518960-LT	LA020 LS15 10U 000 B FXF BNO BNO	STD
3144570-LT	LA020 LS20 10U 000 E MXF BNO	CF
3144571-LT	LA020 LS20 10U 000 E MXM	CF
3144572-LT	LA020 LS20 100U 000 E MXM	CF
P524218-LT	TSIA030 TSI07 10T LPT 7.5K	STD
P505409-LT	TSIA030 TSI15 80U 1502 MXF BNO	STD
P505325-LT	TSIA030 TSI15 10U 1502 MXF BNO	STD
P505410-LT	TSIA030 TSI15 100U 1502 MXF BNO DN	STD
P505326-LT	TSIA030 TSI15 10U 1502 MXM DN	STD
P505411-LT	TSIA030 TSI15 100U 1502 MXM DN	STD
P527339-LT	TSIA030 TSI20 10U 2002 MXF BNO	CF
P516094-LT	TSIA040 TSI10 10U 1002 MXF BNO	CF
P516093-LT	TSIA040 TSI10 10U 1002 MXM DN	CF
P527329-LT	TSIA040 TSI15 10U 1502 MXF BNO	CF

STD = Standard Product CF= Consult Factory

Weco® and Chiksan® low temperature ranges

Fittings

P/N	Description	STD/CF
P506048-LT	YA010 1502 ELB MXF BNO 6.06	STD
P506053-LT	YA010 1502 ELB MXM 6.06	STD
P506061-LT	YA010 1502 ELB FXF BNO 6.06	STD
P506069-LT	YA010 1502 TEE FXFXF BNO 12.12	STD
P506049-LT	YA015 1502 ELB MXF BNO 6.06	STD
P506054-LT	YA015 1502 ELB MXM 6.06	STD
P506062-LT	YA015 1502 ELB FXF BNO 6.06	STD
P506070-LT	YA015 1502 TEE FXFXF BNO 12.12	STD
P506050-LT	YA020 0602 ELB MXF BNO 6.06	STD
P506055-LT	YA020 0602 ELB MXM 6.06	STD
P506063-LT	YA020 0602 ELB FXF BNO 6.06	STD
P506071-LT	YA020 0602 TEE FXFXF BNO 12.12	STD
P503846-LT	YA020 1502 ELB MXF BNO 6.06	STD
P506056-LT	YA020 1502 ELB MXM 6.06	STD
P506064-LT	YA020 1502 ELB FXF BNO 6.06	STD
P503842-LT	YA020 1502 TEE FXFXF BNO 12.12	STD
P506051-LT	YA020 2002 ELB MXF BNO 6.06 OAL	STD
P506057-LT	YA020 2002 ELB MXM 6.06 OAL	STD
P506065-LT	YA020 2002 ELB FXF BNO 6.06 OAL	STD
P506072-LT	YA020 2002 TEE FXFXF BNO 12.12	STD
3259683-LT	LA030 0602 00U ELB 90 MXF BNO	STD
3267335-LT	YA030 0602 ELB MXF BNO	CF
P506058-LT	YA030 0602 ELB MXM	CF
P506066-LT	YA030 0602 ELB FXF BNO	CF
P506073-LT	YA030 0602 TEE FXFXF BNO	CF
3259845-LT	LA030 1502 00U ELB 90 MXF BNO	STD
3265950-LT	YA030 1502 ELB MXF BNO	CF
P506059-LT	YA030 1502 ELB MXM 15K	CF
P506067-LT	YA030 1502 ELB FXF 15K	CF
3268575-LT	YA030 1502 TEE FXFXF BNO	CF
P519448-LT	YA030 2002 ELB FXM BNO	STD
P524672-LT	YA030 2002 TEE FXFXF BNO	STD
P506172-LT	LA040 0602 OOU ELB 90 MXF BNO	STD
P506052-LT	YA040 0602 ELB MXF BNO	CF
P506060-LT	YA040 0602 ELB MXM	CF
P506068-LT	YA040 0602 ELB FXF BNO	CF
P506075-LT	YA040 0602 TEE FXFXF BNO	CF
3261102-LT	LA040 1002 00U ELB 90 MXF BNO	STD
3268033-LT	YA040 1002 ELB MXF BNO	CF
3268115-LT	YA040 1002 ELB MXM	CF
3268113-LT	YA040 1002 ELB FXF BNO	CF
P500631-LT	YA040 1002 TEE FXFXF BNO	CF
P524677-LT	YA040 1502 TEE FXFXF BNO	STD
P506076-LT	YA010 1502 TEE FXFXM BNO 12.12	STD
P506083-LT	YA010 1502 TEE FXMXF BNO 12.12	STD
P506087-LT	YA010 1502 TEE FXMXM BNO 12.12LG	STD
P506093-LT	YA010 1502 TEE MXMXF BNO 12.12"LG	STD
P506100-LT	YA010 1502 TEE MXMXM 12.12	STD
P506077-LT	YA015 1502 TEE FXFXM BNO 12.12	STD
P505457-LT	YA015 1502 TEE FXMXF BNO 12.12	STD
P506088-LT	YA015 1502 TEE FXMXM BNO 12.12	STD

P/N	Description	STD/CF
P506094-LT	YA015 1502 TEE MXMXF BNO 12.12	STD
P506101-LT	YA015 1502 TEE MXMXM 12.12	STD
P506078-LT	YA020 0602 TEE FXFXM BNO 12.12	STD
P506084-LT	YA020 0602 TEE FXMXF BNO 12.12	STD
P506089-LT	YA020 0602 TEE FXMXM BNO 12.12	STD
P506095-LT	YA020 0602 TEE MXMXF BNO 12.12	STD
P506102-LT	YA020 0602 TEE MXMXM 12.12	STD
P503850-LT	YA020 1502 TEE FXFXM BNO 12.12	STD
P503840-LT	YA020 1502 TEE FXMXF BNO 12.12	STD
P503848-LT	YA020 1502 TEE FXMXM BNO 12.12	STD
P505362-LT	YA020 1502 TEE MXMXF BNO 12.12	STD
P505364-LT	YA020 1502 TEE MXMXM 12.12	STD
P506090-LT	YA020 2002 TEE FXFXM BNO 12.12	STD
P505584-LT	YA020 2002 TEE FXMXF BNO 12.12	STD
P506080-LT	YA020 2002 TEE FXMXM BNO 12.12	STD
P506096-LT	YA020 2002 TEE MXMXF BNO 12.12	STD
P506103-LT	YA020 2002 TEE MXMXM 12.12	STD
P506081-LT	YA030 0602 TEE FXFXM BNO	CF
P506085-LT	YA030 0602 TEE FXMXF BNO	CF
P506091-LT	YA030 0602 TEE FXMXM BNO	CF
P506097-LT	YA030 0602 TEE MXMXF BNO	CF
P506104-LT	YA030 0602 TEE MXMXM	CF
3263821-LT	YA030 1502 TEE FXFXM BNO	CF
3262298-LT	YA030 1502 TEE MXFXF BNO	CF
3265538-LT	YA030 1502 TEE MXFXM BNO	CF
3265947-LT	YA030 1502 TEE MXMXF BNO	CF
3268629-LT	YA030 1502 TEE MXMXM	CF
P524673-LT	YA030 2002 TEE FXFXM BNO	STD
P519451-LT	YA030 2002 TEE MXFXF BNO	STD
P524674-LT	YA030 2002 TEE FXMXM BNO	STD
P524675-LT	YA030 2002 TEE MXMXF BNO	STD
P524676-LT	YA030 2002 TEE MXMXM	STD
P506082-LT	YA040 0602 TEE FXFXM BNO 16.40"	CF
P506086-LT	YA040 0602 TEE MXFXF BNO 16.40"	CF
P506092-LT	YA040 0602 TEE FXMXM BNO 16.40"	CF
P506098-LT	YA040 0602 ELB FXF BNO	CF
P506105-LT	YA040 0602 TEE MXMXM	CF
P500633-LT	YA040 1002 TEE FXFXM BNO	CF
3268031-LT	YA040 1002 TEE MXFXF BNO	CF
P500632-LT	YA040 1002 TEE MXFXM BNO	CF
P506099-LT	YA040 1002 TEE MXMXF BNO	CF
P506106-LT	YA040 1002 TEE MXMXM	CF
P518756-LT	YA040 1502 TEE FXFXM BNO	STD
P518790-LT	YA040 1502 TEE MXFXF BNO	STD
P524680-LT	YA040 1502 TEE FXMXM BNO	STD
P524681-LT	YA040 1502 TEE MXMXF BNO	STD
P524682-LT	YA040 1502 TEE MXMXM	STD
P506107-LT	YA010 1502 CROSS FXFXFXF BNO	STD
P506113-LT	YA010 1502 CROSS FXFXMXF BNO	STD
P506118-LT	YA010 1502 CROSS FXFXMXM BNO	STD
P506129-LT	YA010 1502 CROSS FXMXMXF BNO	STD

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Weco® and Chiksan® low temperature ranges

Fittings

P/N	Description	STD/CF
P503531-LT	YA015 1502 CROSS FXFXFXF BNO 15.00"	CF
3269120-LT	YA015 1502 CROSS FXMXFXF BNO	CF
P506119-LT	YA015 1502 CROSS FXFXMXM BNO	CF
P506130-LT	YA015 1502 CROSS FXMXMXF BNO	CF
P506171-LT	LA020 0602 00U ELB 90 MXM	STD
P506108-LT	YA020 0602 CROSS FXFXFXF BNO	CF
P506114-LT	YA020 0602 CROSS FXFXFXM BNO	CF
3262655-LT	YA020 0602 CROSS MXMXFXF BNO	CF
P506131-LT	YA020 0602 CROSS FXMXMXF BNO	CF
3261768-LT	LA020 1502 00U ELB 90 MXM	STD
3257972-LT	YA020 1502 CROSS FXFXFXF BNO	CF
3257973-LT	YA020 1502 CROSS FXFXFXM BNO	CF
3258450-LT	YA020 1502 CROSS FXFXMXM BNO	CF
3258451-LT	YA020 1502 CROSS MXFXMXF BNO	CF
3267282-LT	YA020 2002 CROSS FXFXFXF BNO	CF
P506115-LT	YA020 2002 CROSS FXFXMXF BNO	CF
P506120-LT	YA020 2002 CROSS FXFXMXM BNO	CF
P506132-LT	YA020 2002 CROSS FXMXMXF BNO	CF
P506174-LT	LA030 0602 00U ELB 90 DEG MXM	STD
P506109-LT	YA030 0602 CROSS FXFXFXF BNO 16.00"	CF
P506116-LT	YA030 0602 CROSS FXFXFXM BNO	CF
P506121-LT	YA030 0602 CROSS FXFXMXM BNO	CF
P506133-LT	YA030 0602 CROSS FXMXMXF BNO	CF
P506110-LT	YA030 1502 CROSS FXFXFXF BNO	CF
P517401-LT	YA030 1502 CROSS MXFXFXF BNO 16.00	CF
P506122-LT	YA030 1502 CROSS FXFXMXM BNO	CF
P506134-LT	YA030 1502 CROSS FXMXMXF BNO	CF
P506175-LT	LA030 1502 00U ELB 90 DEG MXM	STD
P506111-LT	YA040 0602 CROSS FXFXFXF BNO	CF
P504791-LT	YA040 0602 CROSS MXFXFXF BNO	CF
P506123-LT	YA040 0602 CROSS FXFXMXM BNO	CF
P506135-LT	YA040 0602 CROSS FXMXMXF BNO	CF
P506177-LT	LA040 1002 00U ELB 90 DEG MXM	STD
P506112-LT	YA040 1002 CROSS FXFXFXF BNO	CF
P506117-LT	YA040 1002 CROSS FXMXFXF BNO	CF
P206124-LT	YA040 1002 CROSS FXFXMXM BNO	CF

P/N	Description	STD/CF
P506136-LT	YA040 1002 CROSS FXMXMXF BNO	CF
P506137-LT	YA010 1502 CROSS FXMXMXM BNO	STD
P506146-LT	YA010 1502 CROSS MXMXMXM	STD
P506154-LT	YA010 1502 LAT MXFXF BNO 45DEG	STD
P506160-LT	YA010 1502 LAT FXFXF BNO 60DEG	STD
P506164-LT	YA010 1502 WYE MXFXF BNO 90DEG	STD
P506138-LT	YA015 1502 CROSS FXMXMXM BNO	CF
P506147-LT	YA015 1502 CROSS MXMXMXM	CF
P505434-LT	YA015 1502 LAT MXFXF BNO 45DEG	STD
P506166-LT	YA015 1502 WYE MXFXF BNO 90DEG	CF
P506139-LT	YA020 0602 CROSS FXMXMXM BNO	CF
P506148-LT	YA020 0602 CROSS MXMXMXM	CF
3263029-LT	YA020 0602 LAT MXFXF BNO 45DEG	STD
3262652-LT	YA020 0602 WYE MXFXF BNO 90DEG	CF
3257976-LT	YA020 1502 CROSS FXMXMXM BNO	CF
3257975-LT	YA020 1502 CROSS MXMXMXM	CF
3261420-LT	YA020 1502 LAT FXMXF BNO 45DEG	STD
3208846-LT	YA020 1502 WYE FXFXM BNO 90DEG	CF
P506140-LT	YA020 2002 CROSS FXMXMXM BNO	CF
P506149-LT	YA020 2002 CROSS MXMXMXM	CF
P506156-LT	YA020 2002 LAT MXFXF BNO 45DEG	CF
3254106-LT	YA020 2002 WYE MXFXF VIO 90DEG	CF
P506141-LT	YA030 0602 CROSS FXMXMXM BNO	CF
P506150-LT	YA030 0602 CROSS MXMXMXM	CF
P506142-LT	YA030 1502 CROSS MXMXMXF BNO	CF
P506151-LT	YA030 1502 CROSS MXMXMXM	CF
3266805-LT	YA030 1502 LAT MXFXF BNO 60DEG	STD
P506161-LT	YA030 1502 LAT FXFXF BNO 60DEG	STD
P506144-LT	YA040 0602 CROSS FXMXMXM BNO	CF
P506152-LT	YA040 0602 CROSS MXMXMXM	CF
P506158-LT	YA040 0602 LAT MXFXF BNO 19.50 60DEG	STD
P506145-LT	YA040 1002 CROSS FXMXMXM BNO	CF
P506153-LT	YA040 1002 CROSS MXMXMXM	CF
P519459-LT	YA040 1002 LAT MXFXF BNO 19.50 60DEG	STD
P518757-LT	YA040 1502 LAT MXFXF BNO 45 DEG	STD

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Weco® and Chiksan® low temperature ranges

Pup joints

P/N	Description	STD/CF
3263200-LT	HA010 1502 024.00 INT MXF BNO	CF
P512501-LT	HA010 1502 036.00 INT MXF BNO	CF
3262915-LT	HA010 1502 048.00 INT MXF RET NUT BNO	CF
3261090-LT	HA010 1502 060.00 INT MXF RET NUT BNO	CF
3262229-LT	HA010 1502 072.00 INT 4140 BNO	CF
3266745-LT	HA010 1502 096.00 INT 4140 BNO	CF
3261496-LT	HA010 1502 120.00 INT 4140 BNO	CF
P516825-LT	HA020 1502 036.00 INT MXF RN BNO	STD
P516823-LT	HA020 1502 048.00 INT MXF RN BNO	STD
P516821-LT	HA020 1502 060.00 INT MXF RN BNO	STD
P516820-LT	HA020 1502 072.00 INT MXF RN BNO	STD
P516810-LT	HA020 1502 096.00 INT MXF RN BNO	STD
P516485-LT	HA020 1502 120.00 INT MXF RET NUT BNO	STD
P516817-LT	HA020 1502 144.00 INT MXF RN BNO	STD
P517538-LT	HA030 1502 036.00 INT MXF RET NUT BNO	STD
P517582-LT	HA030 1502 048.00 INT MXF RET NUT BNO	STD
P517664-LT	HA030 1502 060.00 INT MXF RN BNO	STD
P517672-LT	HA030 1502 072.00 INT MXF RN BNO	STD
P517674-LT	HA030 1502 096.00 INT MXF RN BNO	STD
P517111-LT	HA030 1502 120.00 INT MXF RET NUT BNO	STD
P525538-LT	HA030 2002 024.00 INT MXF RET NUT BNO	CF
P525539-LT	HA030 2002 036.00 INT MXF RET NUT BNO	CF
P525541-LT	HA030 2002 048.00 INT MXF RET NUT BNO	CF
P525543-LT	HA030 2002 060.00 INT MXF RET NUT BNO	CF
P519441-LT	HA030 2002 072.00 INT MXF RN BNO	CF
P525905-LT	HA030 2002 120.00 INT MXF RN BNO	CF
P520516-LT	HA040 1502 048.00 INT MXF RN BNO	CF
P518458-LT	HA040 1502 060.00 INT MXF RN BNO	CF
P518450-LT	HA040 1502 096.00 INT MXF RN BNO	CF
P518437-LT	HA040 1502 120.00 INT MXF RN BNO	CF
P508589-LT	HA020 1502 024.00 NPST MXF RET NUT BNO	STD
P508590-LT	HA020 1502 036.00 NPST MXF RET NUT BNO	STD
P508591-LT	HA020 1502 048.00 NPST MXF RET NUT BNO	STD
P508592-LT	HA020 1502 060.00 NPST MXF RET NUT BNO	STD
P508593-LT	HA020 1502 072.00 NPST MXF RET NUT BNO	STD
P508600-LT	HA030 1502 024.00 NPST MXF RET NUT BNO	STD
P508601-LT	HA030 1502 036.00 NPST MXF RET NUT BNO	STD
P508602-LT	HA030 1502 048.00 NPST MXF RET NUT BNO	STD
P508603-LT	HA030 1502 060.00 NPST MXF RET NUT BNO	STD
P508604-LT	HA030 1502 072.00 NPST MXF RET NUT BNO	STD
P510406-LT	HA040 0602 048.00 NPST MXF RET NUT BNO	CF
P510407-LT	HA040 0602 060.00 NPST MXF RET NUT BNO	CF
P510408-LT	HA040 0602 072.00 NPST MXF RET NUT BNO	CF
P512866-LT	HA040 1002 024.00 NPST MXF RET NUT BNO	CF
P512867-LT	HA040 1002 036.00 NPST MXF RET NUT BNO	CF
P510400-LT	HA040 1002 048.00 NPST MXF RET NUT BNO	CF
P510401-LT	HA040 1002 060.00 NPST MXF RET NUT BNO	CF
P510402-LT	HA040 1002 072.00 NPST MXF RET NUT BNO	CF
P520514-LT	HA040 1502 024.00 NPST MXF RET NUT BNO	CF
P520515-LT	HA040 1502 036.00 NPST MXF RET NUT BNO	CF
P520520-LT	HA040 1502 048.00 NPST MXF RET NUT BNO	CF

P/N	Description	STD/CF
P520521-LT	HA040 1502 060.00 NPST MXF RET NUT BNO	CF
P520522-LT	HA040 1502 072.00 NPST MXF RET NUT BNO	CF
P508594-LT	HA020 1502 096.00 NPST MXF RET NUT BNO	STD
P508595-LT	HA020 1502 120.00 NPST MXF RET NUT BNO	STD
P508596-LT	HA020 1502 144.00 NPST MXF RET NUT BNO	STD
P508598-LT	HA020 1502 240.00 NPST MXF RET NUT BNO	STD
P508605-LT	HA030 1502 096.00 NPST MXF RET NUT BNO	STD
P508606-LT	HA030 1502 120.00 NPST MXF RET NUT BNO	STD
P508607-LT	HA030 1502 144.00 NPST MXF BNO RET NUT	STD
P508609-LT	HA030 1502 240.00 NPST MXF RET NUT BNO	STD
P510409-LT	HA040 0602 096.00 NPST MXF RET NUT BNO	CF
P510410-LT	HA040 0602 120.00 NPST MXF RET NUT BNO	CF
P510411-LT	HA040 0602 144.00 NPST MXF RET NUT BNO	CF
P512873-LT	HA040 0602 240.00 NPST MXF RET NUT BNO	CF
P510403-LT	HA040 1002 096.00 NPST MXF RET NUT BNO	CF
P510404-LT	HA040 1002 120.00 NPST MXF RET NUT BNO	CF
P510405-LT	HA040 1002 144.00 NPST MXF RET NUT BNO	CF
P512105-LT	HA040 1002 240.00 NPST MXF RET NUT BNO	CF
P531126-LT	HA040 1502 096.00 NPST MXF RET NUT BNO	CF
P513472-LT	HA040 1502 120.00 NPST MXF RET NUT BNO	CF
P520526-LT	HA040 1502 240.00 NPST MXF RET NUT BNO	CF
P515014-LT	HA010 1502 024.00 NPST MXF BNO	CF
3265578-LT	HA010 1502 036.00 NPST MXF BNO	CF
3265579-LT	HA010 1502 048.00 NPST MXF BNO	CF
3265580-LT	HA010 1502 060.00 NPST MXF BNO	CF
3262631-LT	HA010 1502 072.00 NPST MXF BNO	CF
3256224-LT	HA015 1502 024.00 NPST MXF BNO	CF
3265598-LT	HA015 1502 036.00 NPST 4130	CF
3254968-LT	HA015 1502 048.00 NPST MXF BNO	CF
3265599-LT	HA015 1502 060.00 NPST 4130	CF
3265600-LT	HA015 1502 072.00 NPST 4130	CF
P528321-LT	HA020 0602 036.00 NPST MXF BNO	CF
P528320-LT	HA020 0602 060.00 NPST MXF BNO	CF
3265733-LT	HA020 0602 072.00 NPST MXF BNO	CF
3255329-LT	HA020 1502 024.00 NPST MXF BNO	STD
3255328-LT	HA020 1502 036.00 NPST MXF BNO	STD
3255522-LT	HA020 1502 048.00 NPST MXF BNO	STD
3255327-LT	HA020 1502 060.00 NPST MXF BNO	STD
3255524-LT	HA020 1502 072.00 NPST MXF BNO	STD
3268620-LT	HA030 0602 024.00 4130 NPST	CF
3267340-LT	HA030 0602 036.00 4130 NPST	CF
3267722-LT	HA030 0602 048.00 4130 NPST	CF
3267339-LT	HA030 0602 060.00 4130 NPST	CF
P501345-LT	HA030 0602 072.00 4130 NPST	CF
3255323-LT	HA030 1502 024.00 NPST MXF BNO	STD
3255322-LT	HA030 1502 036.00 NPST MXF BNO	STD
3255380-LT	HA030 1502 048.00 NPST MXF BNO	STD
3255321-LT	HA030 1502 060.00 NPST MXF BNO	STD
3255379-LT	HA030 1502 072.00 NPST MXF BNO	STD
P507216-LT	HA040 0602 024.00 NPST MXF BNO	CF
3251806-LT	HA040 0602 048.00 NPST 4130	CF

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Weco® and Chiksan® low temperature ranges

Pup joints

P/N	Description	STD/CF
6101173-LT	HA040 0602 060.00 NPST 4130	CF
3251807-LT	HA040 0602 072.00 NPST 4130	CF
3265769-LT	HA040 1002 024.00 NPST MXF BNO	CF
P506629-LT	HA040 1002 036.00 NPST MXF BNO	CF
3265771-LT	HA040 1002 048.00 NPST MXF BNO	CF
3265772-LT	HA040 1002 060.00 NPST MXF BNO	CF
3265773-LT	HA040 1002 072.00 NPST MXF BNO	CF
3256612-LT	HA010 1502 096.00 NPST MXF BNO	CF
3265583-LT	HA010 1502 120.00 NPST MXF BNO	CF
P504985-LT	HA010 1502 144.00 NPST MXF BNO	CF
3254969-LT	HA015 1502 096.00 NPST MXF BNO	CF
3256062-LT	HA015 1502 120.00 NPST MXF BNO	CF
P528319-LT	HA020 0602 120.00 NPST MXF BNO	CF
3265739-LT	HA020 0602 144.00 NPST MXF BNO	CF
3255326-LT	HA020 1502 096.00 NPST MXF BNO	STD
3255325-LT	HA020 1502 120.00 NPST MXF BNO	STD
3255324-LT	HA020 1502 144.00 NPST MXF BNO	STD
3265728-LT	HA020 1502 240.00 NPST MXF BNO	STD
P504506-LT	HA030 0602 096.00 NPST MXF BNO	CF
3267338-LT	HA030 0602 120.00 NPST MXF BNO	CF
P501344-LT	HA030 0602 144.00 NPST MXF BNO	CF
3255320-LT	HA030 1502 096.00 NPST MXF BNO	STD

P/N	Description	STD/CF
3255423-LT	HA030 1502 120.00 NPST MXF BNO	STD
3255381-LT	HA030 1502 144.00 NPST MXF BNO	STD
3255427-LT	HA030 1502 240.00 NPST MXF BNO	STD
P514350-LT	HA040 0602 096.00 NPST 4130	CF
3251808-LT	HA040 0602 120.00 NPST 4130	CF
3265775-LT	HA040 1002 096.00 NPST MXF BNO	CF
3265777-LT	HA040 1002 120.00 NPST MXF BNO	CF
P513374-LT	HA020 1502 036.00 NPST MXF DN BNO	STD
3265908-LT	HA020 1502 048.00 NPST MXF DN BNO	STD
3265909-LT	HA020 1502 060.00 NPST MXF DN BNO	STD
P511842-LT	HA020 1502 072.00 NPST MXF DN BNO	STD
P512102-LT	HA020 1502 096.00 NPST MXF DN BNO	STD
3265906-LT	HA020 1502 120.00 NPST MXF DN BNO	STD
3267024-LT	HA030 1502 024.00 NPST MXF DN BNO	STD
3267025-LT	HA030 1502 048.00 NPST MXF DN BNO	STD
3267026-LT	HA030 1502 060.00 NPST MXF DN BNO	STD
P513301-LT	HA030 1502 072.00 NPST MXF DN BNO	STD
3267053-LT	HA030 1502 120.00 NPST MXF DN BNO	STD
P514712-LT	HA040 0602 060.00 NPST 4130 W/DET NUT	CF
P514711-LT	HA040 0602 072.00 NPST 4130 W/DET NUT	CF
P514713-LT	HA040 0602 096.00 NPST 4130 W/DET NUT	CF
P514715-LT	HA040 0602 120.00 NPST MXF W/DET NUT BNO	CF

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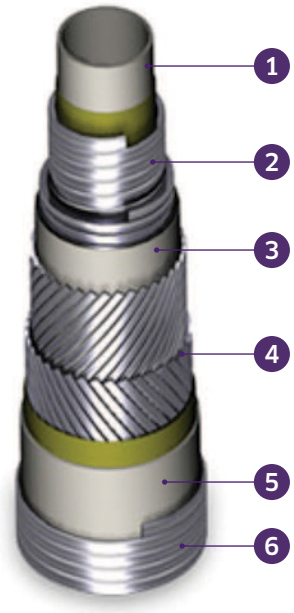
Coflexip® flexible pipe



1. The thermoplastic inner tube makes the pipe leak-tight.
2. The carcass, with interlocked zeta and flat steel spiral pressure, resists internal pressure and external crunching loads.
3. The intermediate thermoplastic sheath is an anti-friction layer.
4. The double crosswound steel armors resist axial loads and protect the pipe from torsional strain resulting from handling and working conditions.
5. The thermoplastic outer jacket protects the armors from external corrosion.
6. The stainless steel outer wrap (SSOW) protects the pipe from mechanical impact, abrasion, weathering, and accidental mishandling.

Features

- Structural stability due to the distinct functions of each component layer.
- High crush resistance
- Integral end-fittings
- Supplied with any standard connector
- No maintenance (no intermediate seals to be replaced)
- Nikaflex treated end-fittings mean no corrosion
- Smaller OD and lower weight compared with conventional hoses of same ID and working pressure
- Available in any length
- Proven reliability: the industry's confidence in TechnipFMC quality is confirmed on hundreds of rigs worldwide
- All drilling and service application lines are pressure tested at full test pressure for a minimum of 24 hours before leaving our plant
- Allows for easier and more timely rigging up and rigging down of equipment
- Hydrogen sulfide (H2S) and carbon dioxide (CO2) limits:

Pressure Rating - PSI	Temperature - F (C)	Rating
10,000 (690)	236 (110)	CO2 + H2S < 50%
10,000 (690)	266 (130)	CO2 + H2S < 30%
15,000 (1,034)	266 (130)	CO2 + H2S < 10%

- Compatible with a number of fluids. Refer to OEM guidelines for additional information.

Applications

- Exploration and appraisal well testing
- Cleanup and flowback
- Production and in-line testing (including multiphase flow metering)
- Extended well testing
- Early production facilities

Equipment specifications

Nominal ID size	Part No.	Working pressure psi (bar)	Design temperature °F (°C)	Dimensions		Liner type	Weight lb (kg)	Connections
				Length ft (m)	OD in (cm)			
2 in. (50.8 mm)	102079794	15,000 (1034)	–4 to 266 (–20 to 130)	25 (7.6)	4.9 (12.4)	Coflon®	737.5 (334.5)	2-1/16-in., 15,000-psi API 6AType 6BX flanges
	102107829	15,000 (1034)	–4 to 266 (–20 to 130)	30 (9.1)	4.9 (12.4)	Coflon®	885 (401.4)	2-1/16 in., 15,000 psi API 6AType 6BX flanges
	102284390	15,000 (1034)	–4 to 266 (–20 to 130)	55 (16.8)	4.9 (12.4)	Coflon®	3404 (1544)	2-in., Fig. 2202 MALE (W) x FEMALE (T)
	102058509	15,000 (1034)	–4 to 266 (–20 to 130)	55 (16.8)	4.9 (12.4)	Coflon®	1925 (873)	2-1/16 in., 15,000 psi API 6AType 6BX flanges
	102136919	15,000 (1034)	–4 to 266 (–20 to 130)	85 (25.9 m)	4.9 (12.4)	Coflon®	2900 (1315)	2-1/16-in., 15,000-psi API 6AType 6BX flanges
3 in. (76.2 mm)	101754846	15,000 (1034)	–4 to 266 (–20 to 130)	55 (16.8)	6.5 (16.5)	Coflon®	3404 (1544)	3-1/16-in., API 6A hubs (BX–154)
	102284391	15,000 (1034)	–4 to 266 (–20 to 130)	55 (16.8)	6.5 (16.5)	Coflon®	3200 (1451)	3-in., Grayloc® D27 connections
	102107821	15,000 (1034)	–4 to 266 (–20 to 130)	60 (18.3)	6.5 (16.5)	Coflon®	3468 (1573)	3-1/16-in., API 6A hubs (BX–154)
	102107820	15,000 (1034)	–4 to 266 (–20 to 130)	65 (19.8)	6.5 (16.5)	Coflon®	3732 (1693)	3-1/16-in., API 6A hubs (BX–154)
	102107819	15,000 (1034)	–4 to 266 (–20 to 130)	70 (21.3)	6.5 (16.5)	Coflon®	3404 (1544)	3-1/16-in., API 6A hubs (BX–154)
	102130108	15,000 (1034)	–4 to 266 (–20 to 130)	85 (25.9)	6.5 (16.5)	Coflon®	4133 (2279)	3-1/16-in., API 6A hubs (BX–154)
4 in. (101.6 mm)	102144706	10,000 (690)	–4 to 266 (–20 to 130)	60 (18.3)	7.2 (18.3)	Coflon®	3730 (1692)	4-1/16-in., API 6A flange (BX–155)
	102272862	10,000 (690)	–4 to 266 (–20 to 130)	60 (18.3)	7.2 (18.3)	Coflon®	3730 (1692)	4-1/16-in., API 6A hubs (BX–155)

Notes:

Equipment is designed to API - 16C, NACE MR0175, and NORSOK standards, as applicable and documented on individual datasheets.

These ratings are guidelines only. contact your TechnipFMC representative for further information.

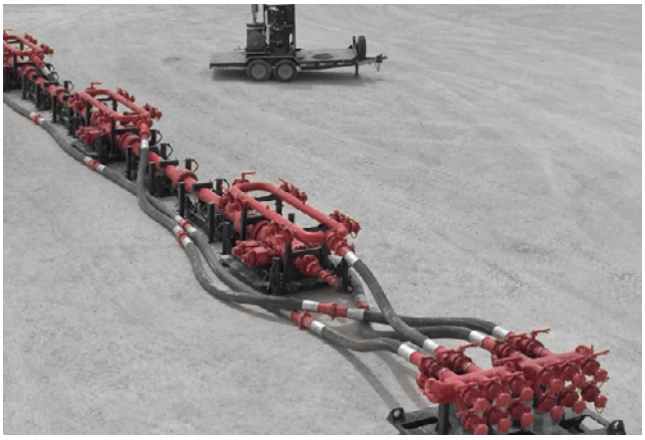
Manifold trailers and skids

Ten or twelve station Articulating Frac Arm Manifold (AFAM) trailer

Features

- High pressure system is separated from the chassis through isolators, providing vibration resistance and reducing fatigue on high pressure lines.
- Meets DOT rules and regulations.
- Dual hydraulic power unit ensures functioning arms.
- Patented Chiksan® Longsweep™ TripleStep™ Swivel Joints used in each arm providing longer life.
- Rated for pressures up to 15,000 psi standard service and flow up to 107 BPM
- Reduces weight of pump truck by carrying iron on AFAM.
- Has all of the necessary degrees of freedom to allow for correct connection to the pump truck anywhere in a 12 foot radius every time.
- Self balancing arm requires less lifting by only one man.
- Isolation valves at each station allow flow to be re-routed allowing the job to continue in the event of an issue.
- High pressure lines are fully integral/No welded ends.
- Traditional manifold requires 20 man hours to hook up vs. AFAM requires only 1 man hour.

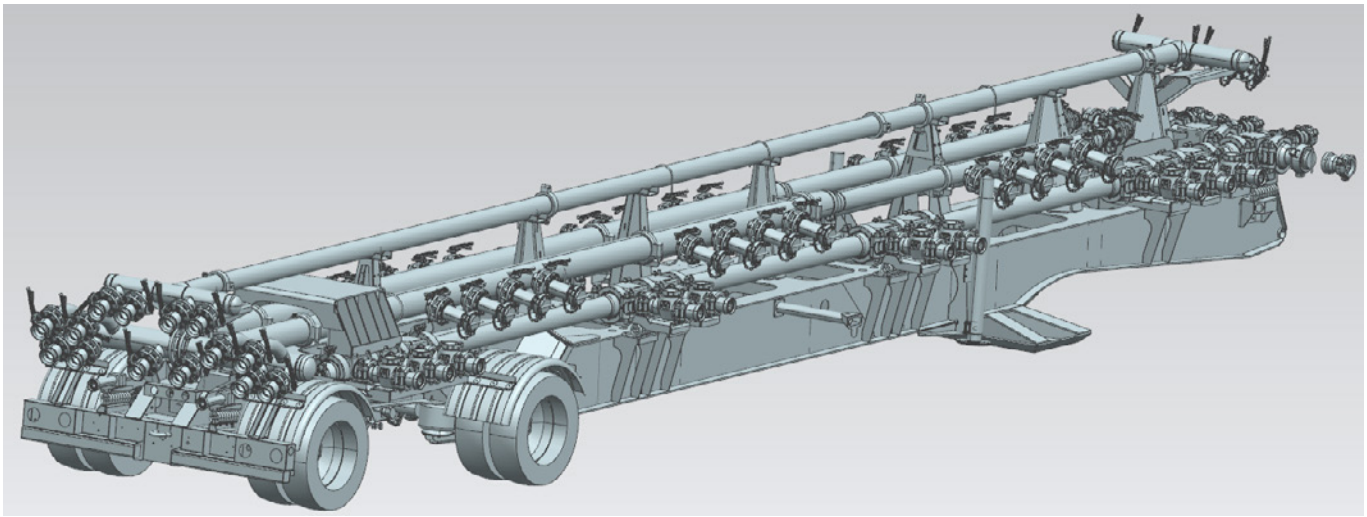
Ground level frac missile



Features

- 16-24 Pump Inlets
- Full Missile and transition flow iron (with check valves, plug valves and tees) mobilized
- Modular Pod Design 4 Pump Trucks/Pod
- 80% reduction in hammer union flowiron
- Single high pressure outlet line
- Dedicated low pressure fluid delivery
- 7” API 6A flanged connections
- 15,000 psi working pressure
- Capable of 120 BPM flow rate

Standard manifold trailer

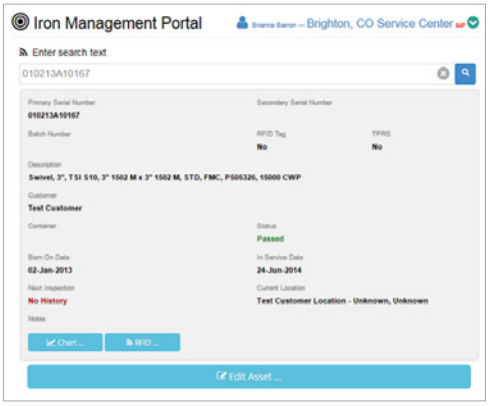


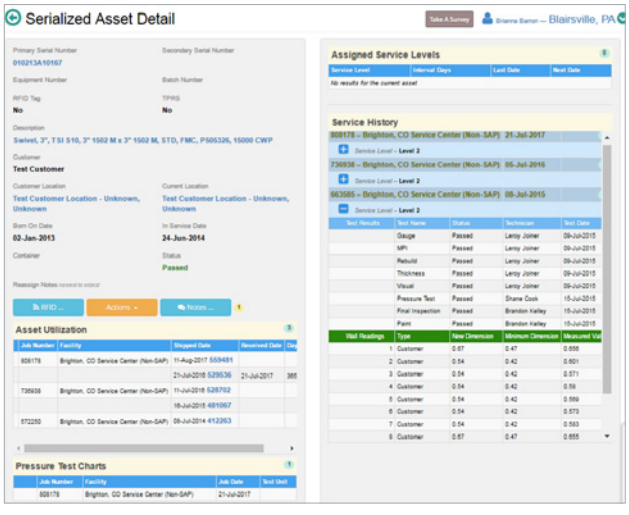
Features

- Fewer serialized HP iron components
- Eliminates erosion in center mainline/crossover section
- High pressure hub end connections utilize Grayloc clamps with TechnipFMC proprietary seals.
- Non-permit load trailer
- High pressure system is separated from the chassis through coiled cable suspension mounts, providing vibration resistance and reducing fatigue on high pressure lines.
- Meets DOT rules and regulations.
- Rated for pressures up to 15,000 psi standard service and flow up to 107 BPM.
- Plug Valves or Check Valves isolate each station from pumping unit.
- High pressure lines are fully integral. No welded ends.
- Butterfly Valves between the left and right side of the low pressure

Inspection services

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 diverse challenges that operators and well-servicing companies face today. TechnipFMC 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 flowline equipment is helping flowline customers worldwide realize the maximum value and service life from their fluid control assets.





Asset management

Tracking and maintaining the volume of flowline equipment used in flowline services is a major undertaking. Asset management is a cooperative program where specially trained TechnipFMC personnel inventory, track, and maintain a customer's flowline assets at their facility or in a designated TechnipFMC 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

TechnipFMC 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, TechnipFMC offers factory rebuild services from strategic locations worldwide. TechnipFMC is aggressively working to expand its in-house refurbishment services to meet growing demand, including butterfly valve and cement head inspection and repair.

Spare parts management

Chiksan and Weco® products are manufactured to precise dimensioal 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 TechnipFMC spare parts.

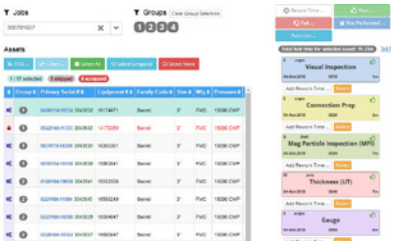
InteServ

TechnipFMC's propriety database, InteServ, is a web-based global asset tracking database that tracks customer property, asset lifecycles, and inspection history for customer owned property as well as internal TechnipFMC property. InteServ offers a desktop version, a mobile application, a disconnected version, and customer branded sites. InteServ is also integrated with other applications, such as ultrasonic thickness testing software, automated pressure testing software, and RFID. Moreover, through the use of application programming Interfaces and webservices, InteServ is able to communicate with other databases successfully. The combination of these applications offers high-value solutions to customers through traceability and data-analysis. Lastly, through continuing development, InteServ is constantly adapting to meet customer evolving needs.

Desktop platform

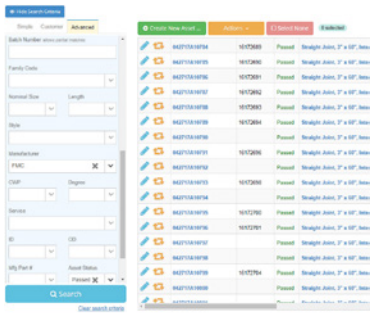
The desktop version of InteServ is completely customer facing, with active customer accounts through daily logins. All users, including customers have the ability to search and pull reports for self-service data analysis. Additional features include:

- RFID compatibility
- APT (Automated Pressure Testing Software) Compatibility
- Ultrasonic thickness testing software compatibility
- Branded sites
- Sales order compatibility
- Offline / Disconnected functionality



Mobile platform

Mobile InteServ is a revolutionary, cutting-edge mobile application that tracks: customer asset receiving, inspection, throughput, output, and real-time shipping. With an easy and beautiful user-friendly UI (User Interface), InteServ can move freely through a shop, base, or facility for the most accurate tracking throughout the inspection process. Mobile InteServ is RFID capable and can be accessed on tablets and even smart phones. Additional features include:



- RFID compatibility
- APT (Automated Pressure Testing Software) Compatibility
- Time tracking on inspection tests
- Elimination of paper through digital processes
- Sales order and service order compatibility
- Seamless user experience with a focus on limiting the number of required clicks
- Documentation upload

Warnings and cautions

TechnipFMC cannot anticipate all of the situations a user may encounter while installing and using TechnipFMC products. Therefore, the user of TechnipFMC 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 TechnipFMC product catalogs, product brochures, and installation, operating, and maintenance manuals, which can be accessed at **www.technipfmc.com**, or contact TechnipFMC at **800-772-8582**.

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

- Never mix or assemble components, parts, or end connections with different pressure ratings. Mismatched components may fail under pressure.
- Never use or substitute non-TechnipFMC components or parts in TechnipFMC products or assemblies.
- Never modify or repair TechnipFMC products in a manner not specifically directed in instructions published by TechnipFMC.
- 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 use care when handling, inspect, and be attentive to threaded components before, during and after make-up.
- Never use severely worn, eroded, or corroded products. Contact TechnipFMC 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 may fall.
  - Never exceed the load rating of lifting devices on products or lifting equipment.
  - Use of TechnipFMC 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.
- 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, remove part from service.
- Do not subject TechnipFMC 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.

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

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TechnipFMC.com

SP015

TechnipFMC

Separation Systems

Innovative field proven solutions for all separation challenges

TechnipFMC Surface

TechnipFMC Surface is a market leader in the design and delivery of systems, products and services to the oil and gas industry. We are defined by technological innovation, reliability, product quality and integrated services, making us the partner of choice.

Improve your economics

In the world of production systems, solutions are traditionally designed case by case to adapt to the specific field requirements. This usually generates extended lead times and constant re-engineering.

TechnipFMC presents a unique way to avoid bespoke designs by using pre-engineered, field-proven building blocks that will improve the economics of your production systems.

We have developed a structured portfolio of standard and compact production system modules and products that minimize project costs and meets our clients' highest demands.

Our commitment

Environmental

Lean Engineering & Design

Integrated Solution

- 4,000+/projects delivered

Separation

Our separation systems provide industry leading technology for the separation of oil, gas, sand and water. These innovative solutions are used in challenging environments worldwide, including onshore, offshore and subsea, for greenfield and brownfield projects.

Our 30 years of experience combined with the world-class knowledge of the Flow Technologies Development Center (FTDC) guarantees state-of-the-art technology for your application. We have a long established presence in the design, manufacturing and delivery of separation solutions with an installed base of more than 4,000 projects, including some of the most challenging separation applications. Our separation solutions boost efficiency, maximize throughput, minimize footprint and the weight of your processing facilities. We work with our clients from the start to develop integrated solutions with superior performance that maximizes your project lifecycle economics.

Benefits:

- Innovative separation solutions for oil and gas production
- Proven technology with successful operational experience for faster production
- Only company with proven InLine Separation track record
- Subsea experience from the industry's most challenging projects

Modular production systems

Our modular production systems are unlike any other in industry due to our unique range of products, services, know-how and experience.

We provide standard, modular and bespoke package systems within the following domains:

- Primary Separation
- Produced Water Treatment
- Sand Management

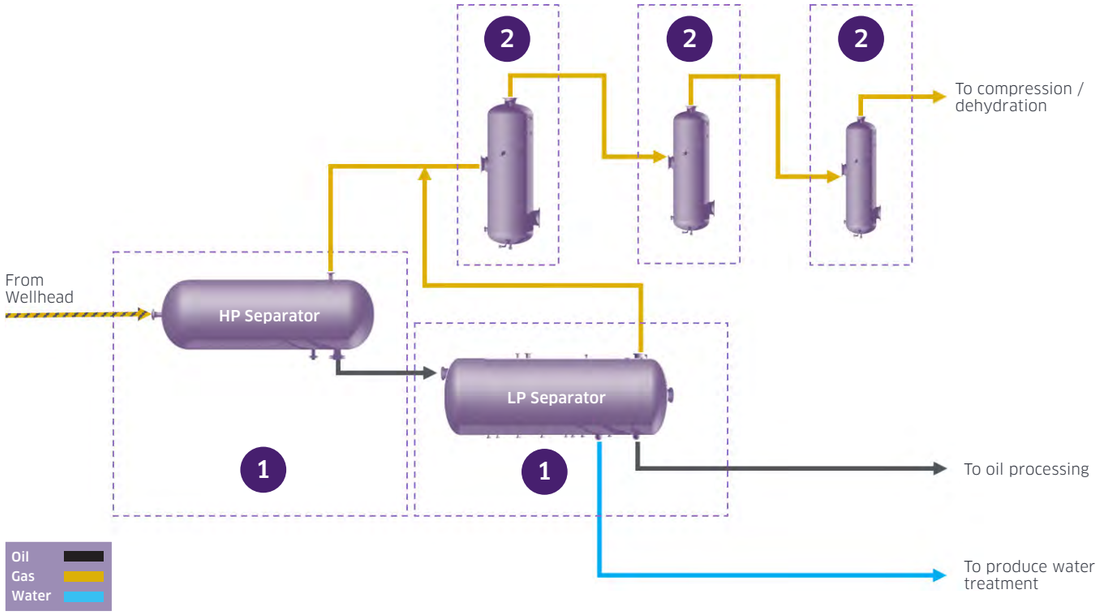
Primary Separation

▸ Vessel based

Our industry leading separation systems for vessel-based separation of oil, gas, sand and water can be used on greenfield and brownfield projects in challenging environments onshore, offshore and subsea.

Our process know-how and highly efficient internals enable increased efficiencies, maximum throughput and a lower footprint for horizontal and vertical vessel-based separators.

Vessel-based separators are gravity based and normally consist of inlet, gravity and demisting sections. Our optimized internals facilitate better flow distribution and overall performance and limit the size of the separation module.



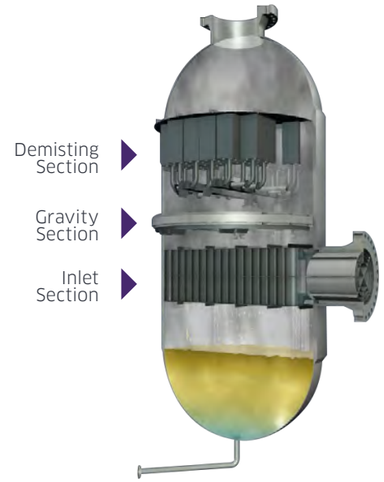
Vessel internals portfolio	
Inlet section	▸ CDS Inlet Cyclone™ ▸ Evenflow HE ▸ CDS Non-submerged inlet Cyclone
Gravity section	▸ CDS Drained Meshpad Agglomerator ▸ Vane Pack Agglomerator ▸ Distribution / Motion Damping Baffles ▸ Plate Pack Coalescers
Demisting section	▸ Mesh Pad Demister ▸ Vane Pack Demister ▸ CDS Spiralflow™
Solids	▸ Vessel Desander

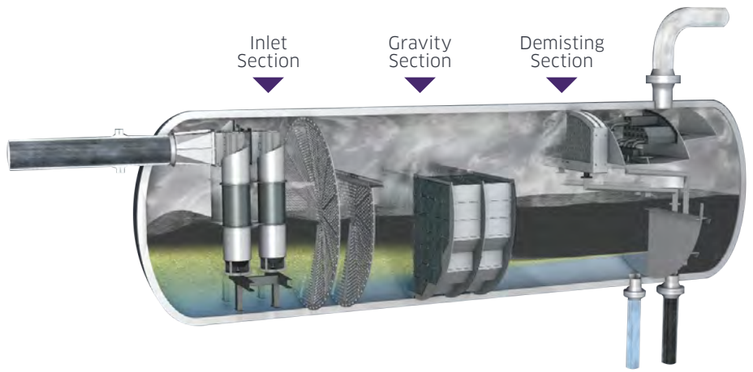
1 Horizontal

Horizontal separators are best suited for liquid-liquid separation as well as degassing, due to the larger liquid surface area. The horizontal vessels are typically sized by the droplet settling theory or retention time for the liquid phases to separate. Installation of vessel internals will maximize the separation efficiency and help limit the size of the separation module.

2 Vertical

Vertical separators are typically used for gas dominant flow, removing liquid mist from gas. The vessel is characterized by higher separation efficiency and a smaller flow footprint than horizontal vessels. Vessel size and internals selection are optimized to fit the operating conditions and separation efficiency for the separation module.



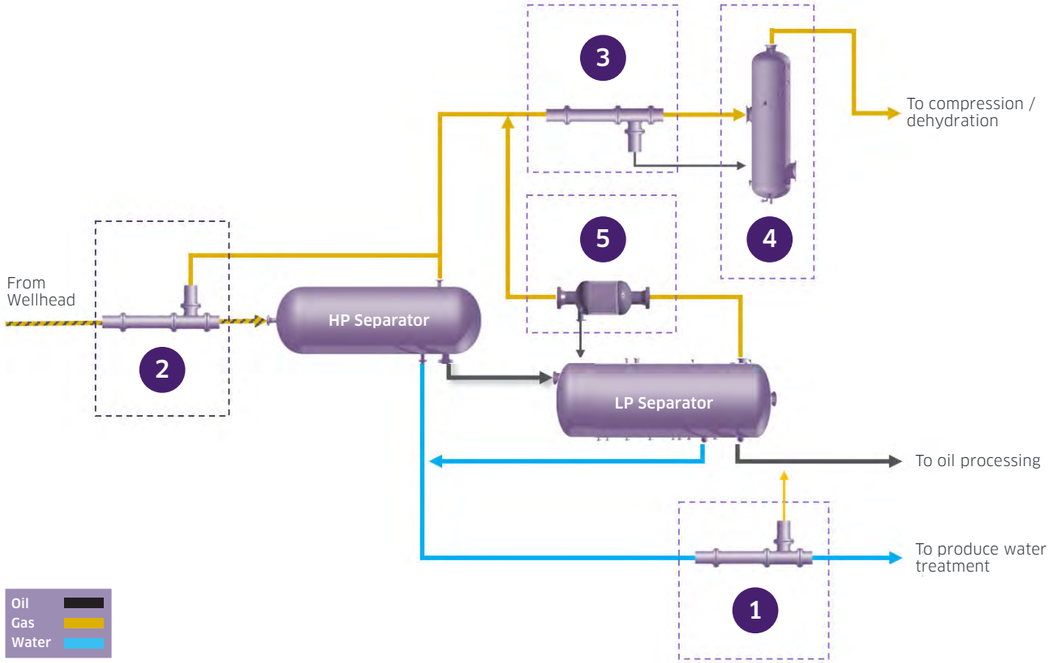


Primary Separation
Compact and inline

TechnipFMC has developed highly efficiency, compact separation equipment based on cyclonic technologies, that covers all phases of separation: gas, oil, water and sand. The compact equipment can be combined with vessel-based systems to achieve complete phase separation by using pipe segments that can be easily retrofitted into existing process trains with minimum installation time. This technology offers significant savings up to a reduction of 8 times in area and 5 times in weight.

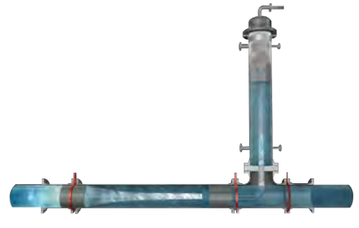
Benefits

- Highly efficient separation
- Ultra-compact separation in pipe segments
- Effective debottlenecking tool to increase production capacity
- Compact separation systems for new-build production systems



1 InLine DeGasser

The InLine DeGasser is applied for the removal of gas from a liquid stream. The unit is designed to handle up to 60 percent of gas by volume and achieves two clean phases. It consists of a separation section that employs centrifugal force to drive gas from liquid separation and a compact gas scrubber that uses density difference between phases to drive liquid from gas removal.



2 InLine PhaseSplitter

The InLine PhaseSplitter is a bulk separator for the separation of gas and liquid. The inlet gas volume fractions typically ranging from 10 to 90 percent. The separation is carried out by centrifugal forces generated by a swirl element. The liquid forms an annular film allowing the gas to be extracted from the center. The InLine PhaseSplitter can be operated in “clean mode,” in order to achieve one clean phase. The other phase is typically processed in downstream separation equipment.

3 InLine DeLiquidiser

The InLine DeLiquidiser consists of a gas separation section that employs centrifugal force to drive liquid from gas separation and a compact liquid boot that uses the density difference between phases to drive gas from liquid removal. The design makes it possible to achieve two clean phases. The unit is typically designed to handle up to 10 percent liquids by volume.

4 CDS Gasunie

The CDS Gasunie is generally used for gas demisting. Liquids are removed from gas for the protection of downstream equipment (compressors, gas turbines, flow meters, etc.) and for the purpose of metering. The unit is typically designed to handle up to 10 percent liquids by volume. Solid particles will also be removed, making the scrubber suitable for use as a gas wellhead separator.

5 InLine DeMister

The InLine DeMister is a compact separation unit used for gas polishing where liquid loading is low. It can be installed vertically or horizontally. The internals are a bundle of Spiraflow demisting cyclones, ensuring maximum performance.

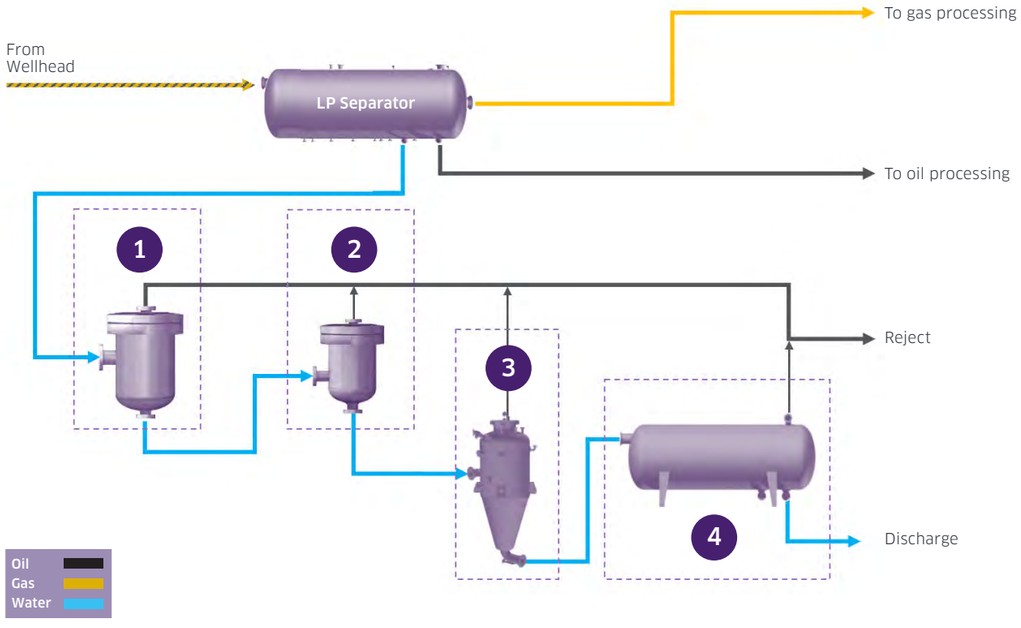
Produced Water Treatment

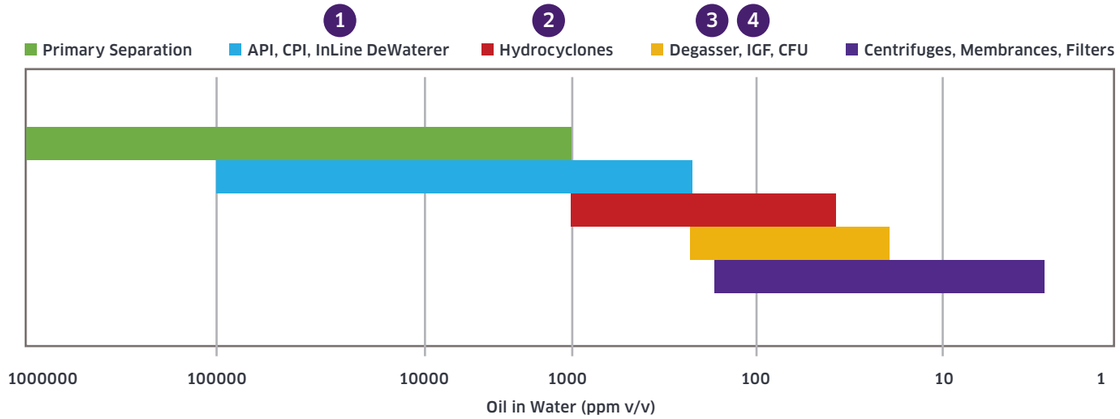
Produced water is an industry challenge that affects the entire production process. If discharge requirements are not met, significant environmental and economic impacts may result. And as water production increases during the life of field, oil production can bottleneck.

We offer a complete range of separation technologies to handle produced water. Our equipment covers bulk separation of water from the well stream to the final water polishing to meet the most challenging regulations for discharge. This includes compact technologies for new-build and retrofit production processes.

Benefits

- Increased production
- Fever shutdowns
- Compact systems with highly efficient water removal with smaller footprint
- Treatable water for reinjection disposal or reuse





1 InLine DeWaterer

TechnipFMC's Inline DeWaterer is a compact cyclonic unit for ultra-compact separation of oil and water. This device combines high efficiency with low-pressure drop in a compact design.

2 InLine HydroCyclone

Our InLine HydroCyclones are the best fit for high performing produced water treatment systems. Our patented axial flow hydrocyclone enables high separation efficiency and low-pressure drop. It is an ideal tool for separation of oil from water to low levels.

3 Compact Gas Floation

Stauper Offshore's CFU is designed to meet the most stringent produced water discharge limits, achieving reductions in oil concentrations in produced water to zero PPM. Produced water treatment systems using our CFU require minimal operator interference and maintenance and have a low carbon footprint and weight.

4 Degasser

Normally the last step in the produced water treatment process. The primary function of a Degasser is to degas the produced water stream prior to atmospheric discharge. Their secondary function is recovering any residual oil. TechnipFMC degassers and unique internals are designed to make the best use of the flotation effect and ensure maximum oil recovery.

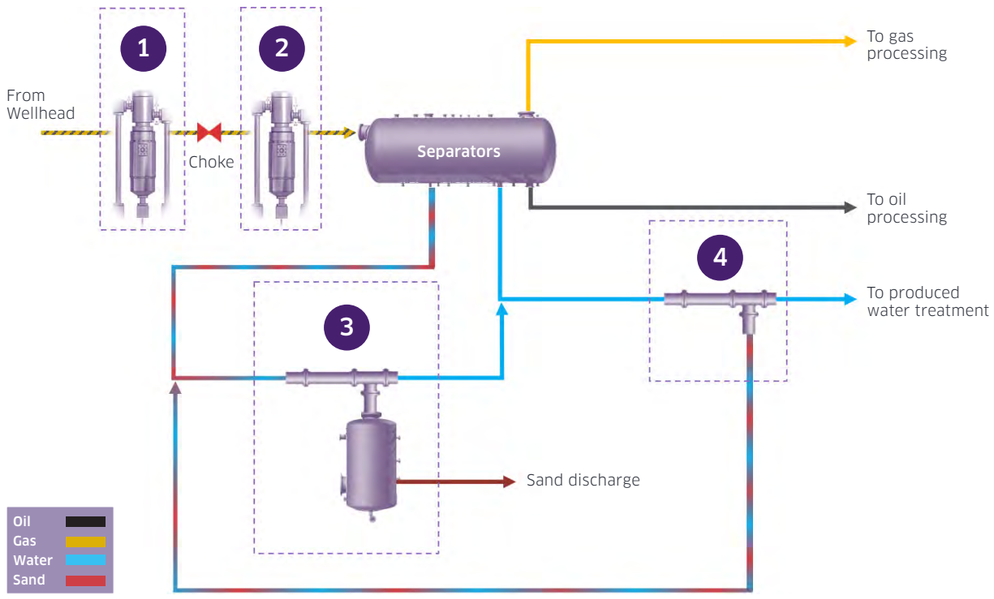
Sand Management

Solids in the production stream can cause wear, poor performance and blockages in your facility, which may lead to expensive shutdowns and maintenance interventions. These solids follow the well stream from the reservoir and must be managed throughout different points in the process system. After removal from the fluid streams, they may need treatment to be suitable for disposal.

TechnipFMC designs and supplies complete solutions for removing sand from the production streams and for further treatment and disposal. Our portfolio consist of efficient & compact sand cyclones, and other removal systems. Our unique to remove the sand from either single or multiphase streams, sand removal technology from separator vessels, as well as sand cleaning solutions. We are the only supplier of sand removal technologies with the experience of subsea applications.

Benefits

- Increased production reliability
- Fewer expensive shutdowns
- Minimal wear and tear to equipment
- Compact systems
- Highly efficient sand removal and handling with small footprints
- Reinjection or re-use of jetting water
- Low maintenance costs
- Extensive track record, including subsea application
- Qualified by major operators



1 Desander Pro

The Desander Pro has been specifically developed for shale applications. It offers field-proven cyclonic technology that can be used during drillout and cleanup operations. Qualification of the technology has shown 90-95 percent efficiencies in solids separation.

2 Wellstream Desander

TechnipFMC's Wellhead Desander is compact, mobile and can eliminate up to 99 percent of the incoming sand from a multiphase - flowback or production stream. The wellhead Desander has been proven to reduce downstream erosion and the necessary equipment downstream.

3 Slurry DeSander

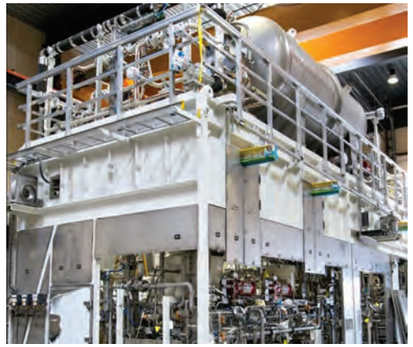
Our Slurry Desander (depicted on the left) is specifically designed to remove solids from concentrated sand-water or so called "slurry" streams . In particular, slurry streams at the outlet(s) of production separators - coming from conventional jetting systems. The Slurry Desander is normally operated

4 PWT DeSander

For the removal of fine solids in produced water streams, TechnipFMC have developed their PWT. Our unique PWT can removel particles down to 20 micorns, while achieving efficiencies over 98%.

Project References

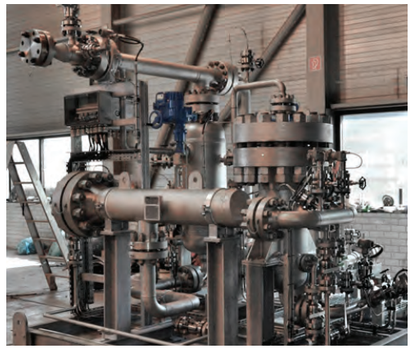
TechnipFMC's Worldwide Produced Water Projects



Customer: Equinor

Project : Aasta Hansteen SPAR FPSO

Designed for the maximum flow rate of 480 m3/d, produced water with oil-in-water content less than 200 ppmv is processed to reduce oil in water content to less than 10 mg/l for disposal to sea.
The produced water configuration includes a degasser as primary treatment and centrifuge technology as secondary treatment. The sand treatment part of the system includes Desanding hydrocyclones (InLine DeSander) and sand accumulator.



Customer: Alpha Petroleum

Project : Kilmar (NUI) Platform

Due to the space constraints on Kilmar, a compact solution is designed which incorporated TechnipFMC's proprietary cyclonic separation technologies featuring a skid for bulk removal of liquids from the gas stream and separation of the hydrocarbon condensate liquid from the water phase.
Critical to this project were the reliability and effectiveness of the package to meet the PW discharge quality within permitted < 30 mg/l.

Customer: INEOS

Project : Clipper South Platform

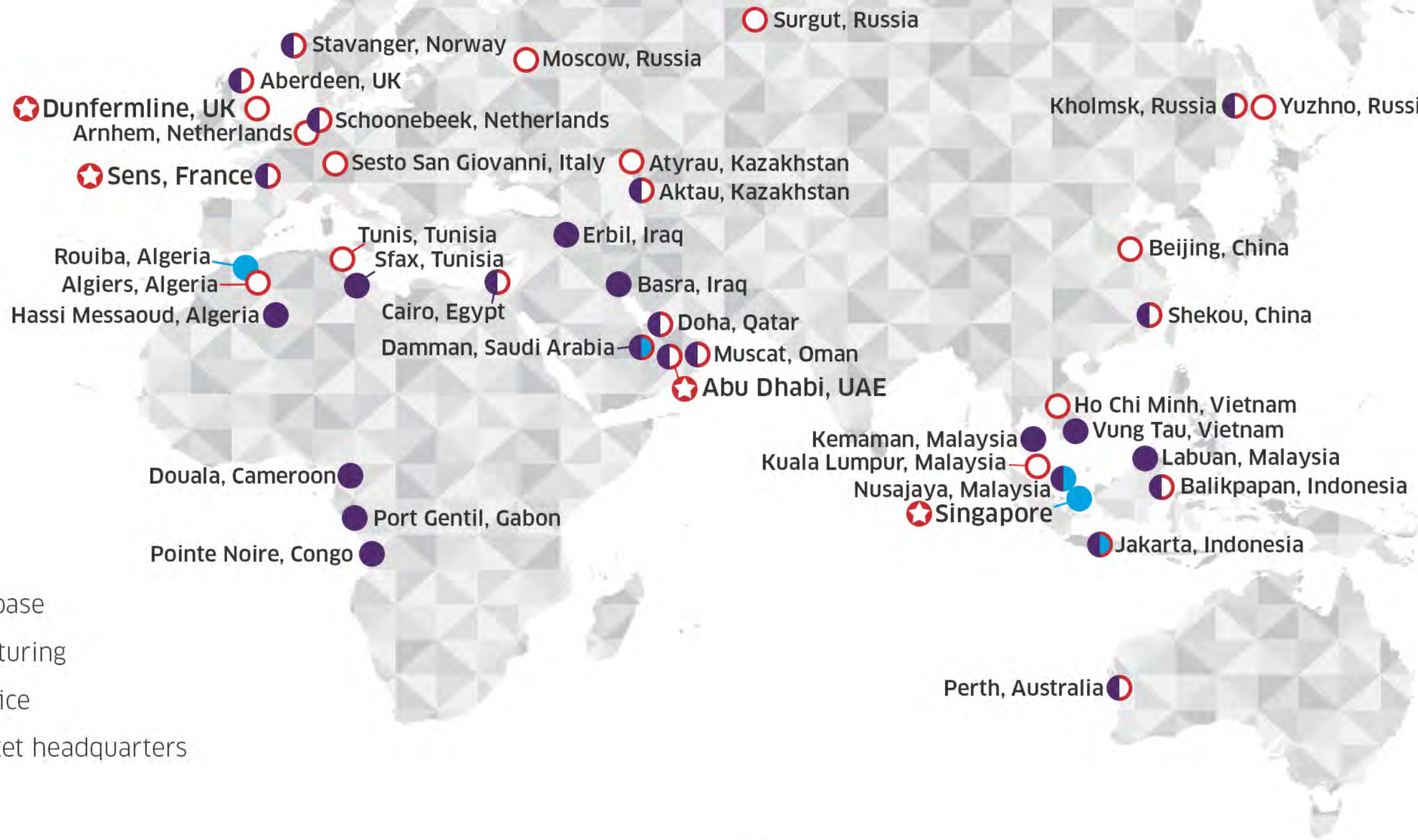
The package is designed for 120 MMSCFD of gas, 3000 BPD of water and 195 BPD of oil at operating pressure from 9 to 49 barg. Ease of installation with the modular design of this system which fits the existing space on the platform.

Global service and aftermarket support

Service has long been a key differentiator for TechnipFMC. We support our clients with a full range of services on a 24/7 basis worldwide.

TechnipFMC supports client operations from our strategically located field bases, providing responsive service, quality equipment and local expertise. Competent technicians deliver superior service from repair and maintenance to asset management. We offer extensive local inventories and rental options. Our commitment to QHSE, value and service excellence help our clients maximize their potential.

Surface international locations



Legend

- Service base
- Manufacturing
- Sales office
- Geomarket headquarters

USA
11740 Katy Freeway
Suite 100
Houston Texas 77079 USA

South Europe and Africa
Route des Clérimois – ZI des Clérimois
CS 10 705,
Sens France 89107

North Europe and CIS
Pitreavie Business Park
Dunfermline Scotland KY11 8UD

Asia Pacific
149 Gul Circle
Singapore 629605

Middle East
Guardian Tower
Sheikh Sultan bin Zayed First
and Dhafeer Street
PO BOX 7657
Abu Dhabi United Arab Emirates (UAE)

TechnipFMC MPS - Produced Water Solutions

Subsea

Optimizing subsea fields from concept to project delivery and beyond

We are setting new project economic standards with smarter design, industry-leading technologies, and seamless management, and execution.

Surface Technologies

Combining field-proven equipment, services, and integrated solutions

Our global product and service platform gives clients access to leading solutions in measurement and production solutions, surface wellhead systems, and integrated services.

Surface Technologies

Leading market positions in several niche product offerings

Delivering technology that extends asset life, improves returns

Integrated offering delivers up to $1m in savings per well, creates unique growth platform

Drilling	Completions	Production	Midstream/ Transportation
Surface Technologies		Measurement & Production Systems	

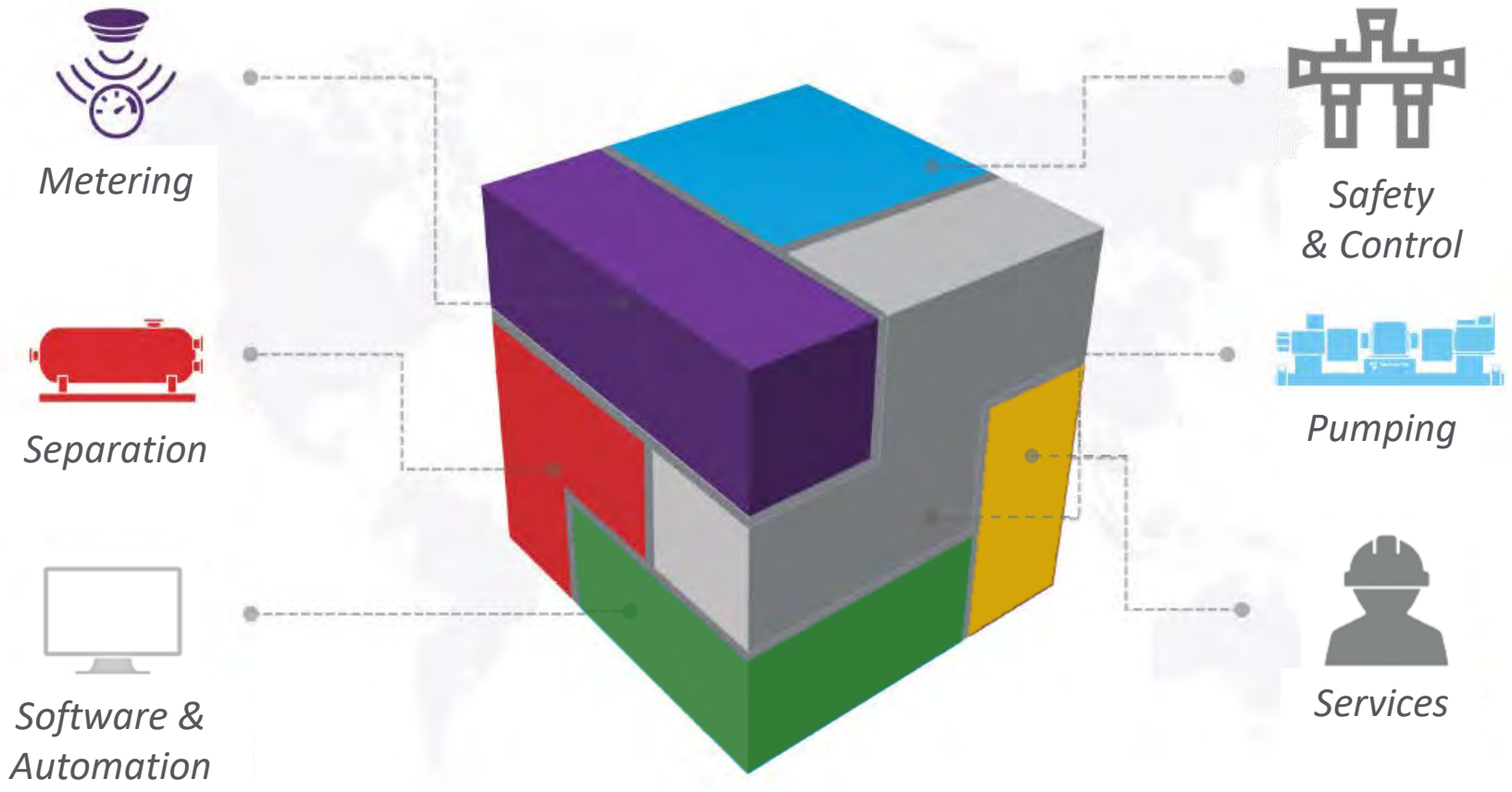
TechnipFMC

Delivering smarter modular integrated solutions

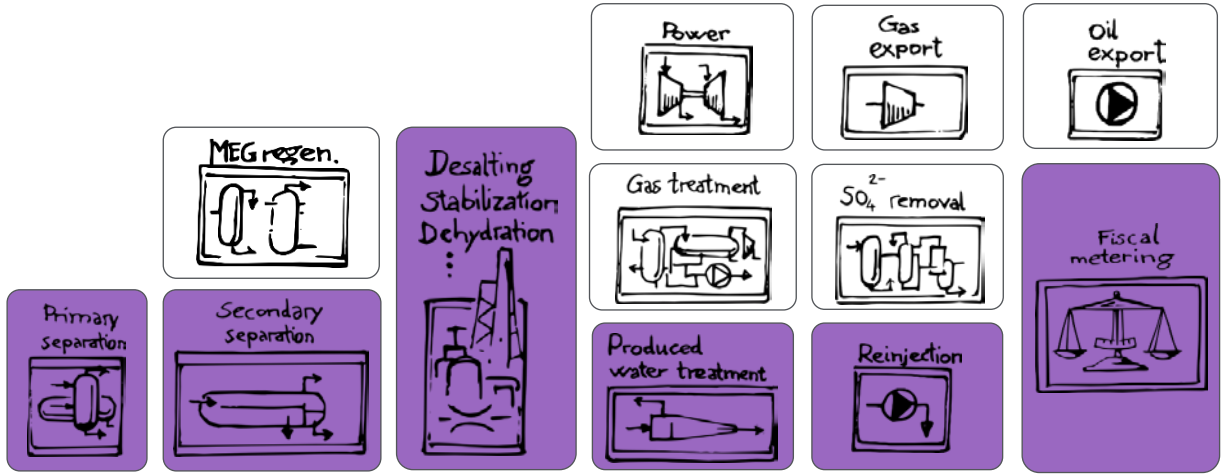
- Compact and vertically integrated solutions
- Smarter, leaner, easier to install
- Faster first oil

One vision. One purpose.

Measurement & Production Solutions

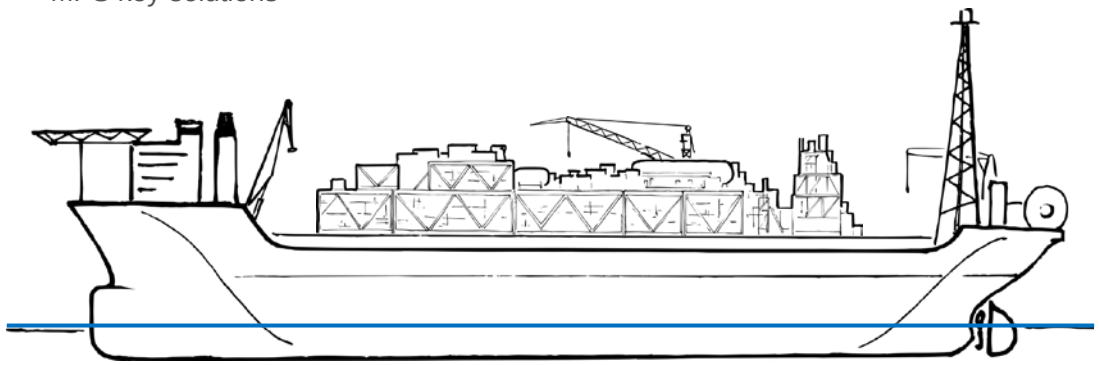


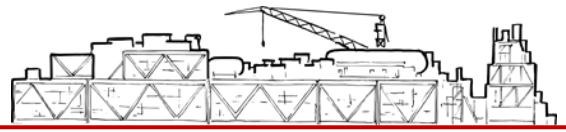
Typical MPS value chain



- Migrate from Products to Solutions
- Engineering, procurement and execution capacity
- Key technologies include PWT / Sand / oil treatment
- Leverage TFMC resource and key alliances
- Key focus on energy transition

MPS key solutions





Global Footprint

MPS Operational Hubs

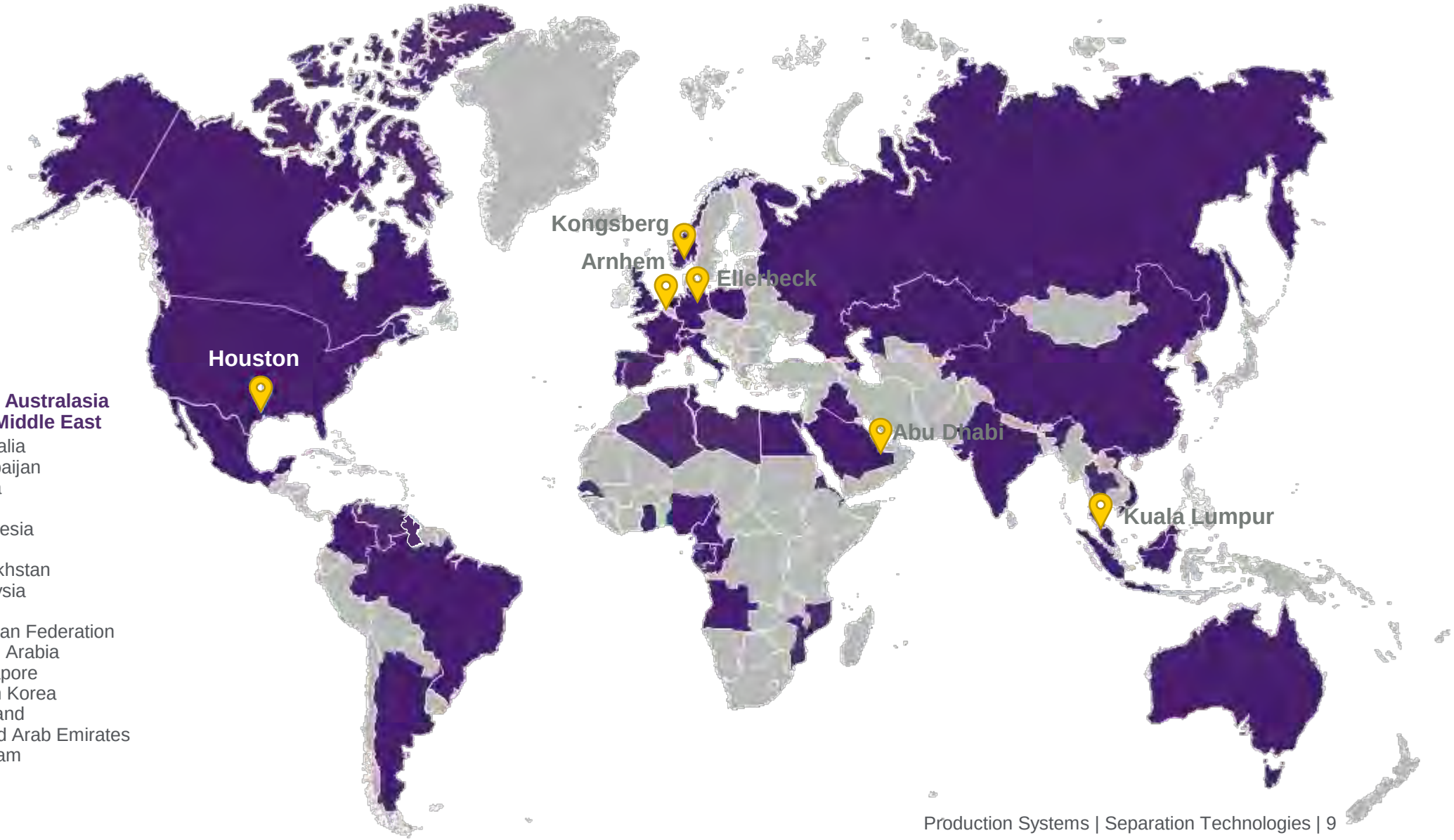
North America
Canada
Mexico
United States

South America
Argentina
Brazil
Colombia
Guyana
Venezuela

Europe
France
Germany
Italy
Netherlands
Norway
Poland
Portugal
Spain
United Kingdom

Africa
Algeria
Angola
Cameroon
Congo
Egypt
Equatorial Guinea
Gabon
Ghana
Libya
Mozambique
Nigeria
Senegal
Tunisia

Asia, Australasia and Middle East
Australia
Azerbaijan
China
India
Indonesia
Iraq
Kazakhstan
Malaysia
Qatar
Russian Federation
Saudi Arabia
Singapore
South Korea
Thailand
United Arab Emirates
Vietnam



TechnipFMC

Separation Solutions

CDS Separation Systems

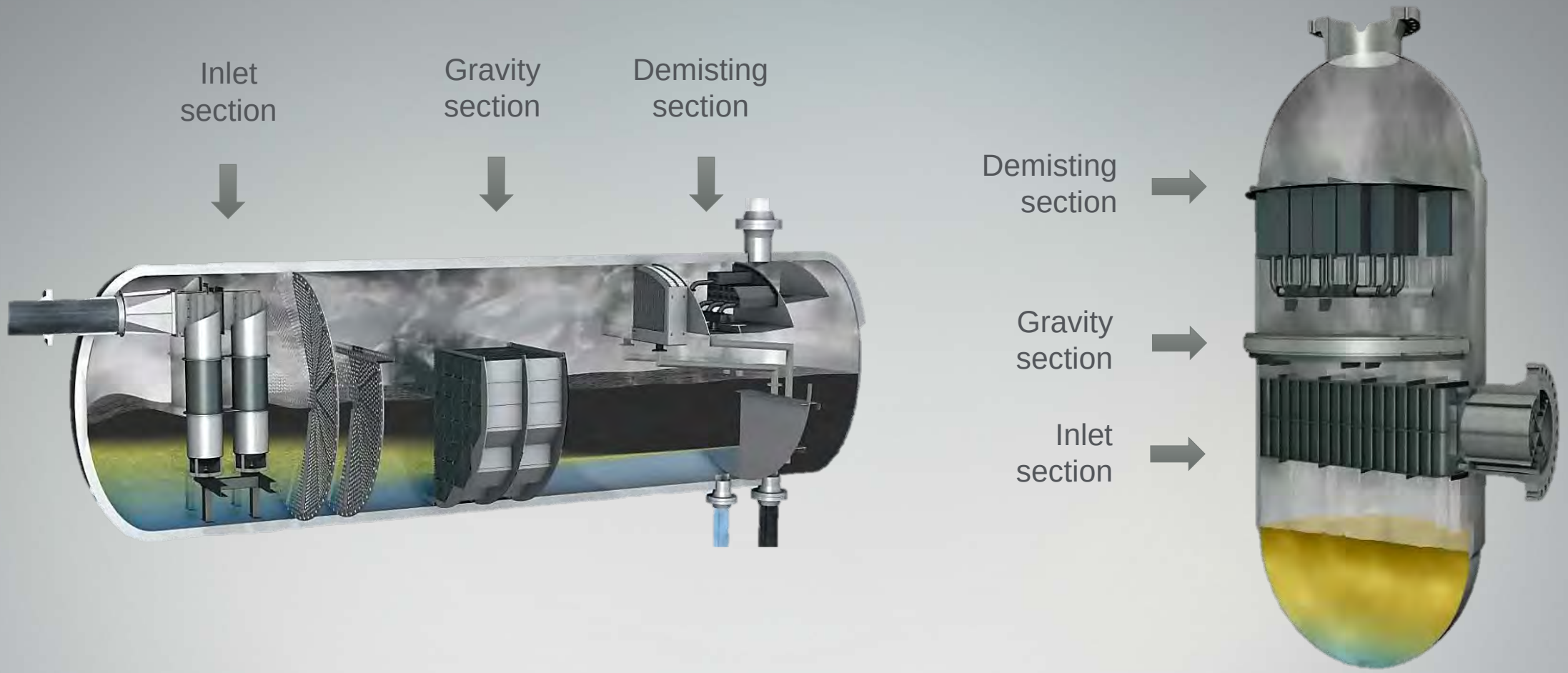
- Greenfield and Brownfield, proven technology
- Complete Integrated Solutions
- Conventional Separation
- InLine Compact Separation
- Subsea Separation
- Solids Handling
- Produced Water Treatment
- Debottlenecking and Retrofitting
- Computational Fluid Dynamics & Finite Element Analysis

Perenco Emeraude


Statoil Aasta Hansteen


Statoil Heidrun

Separation Internals



Horizontal Separations

Vertical Scrubbers

InLine & Compact Separation

TechnipFMC inhouse technology

InLine Degasser

> 90% Liquid

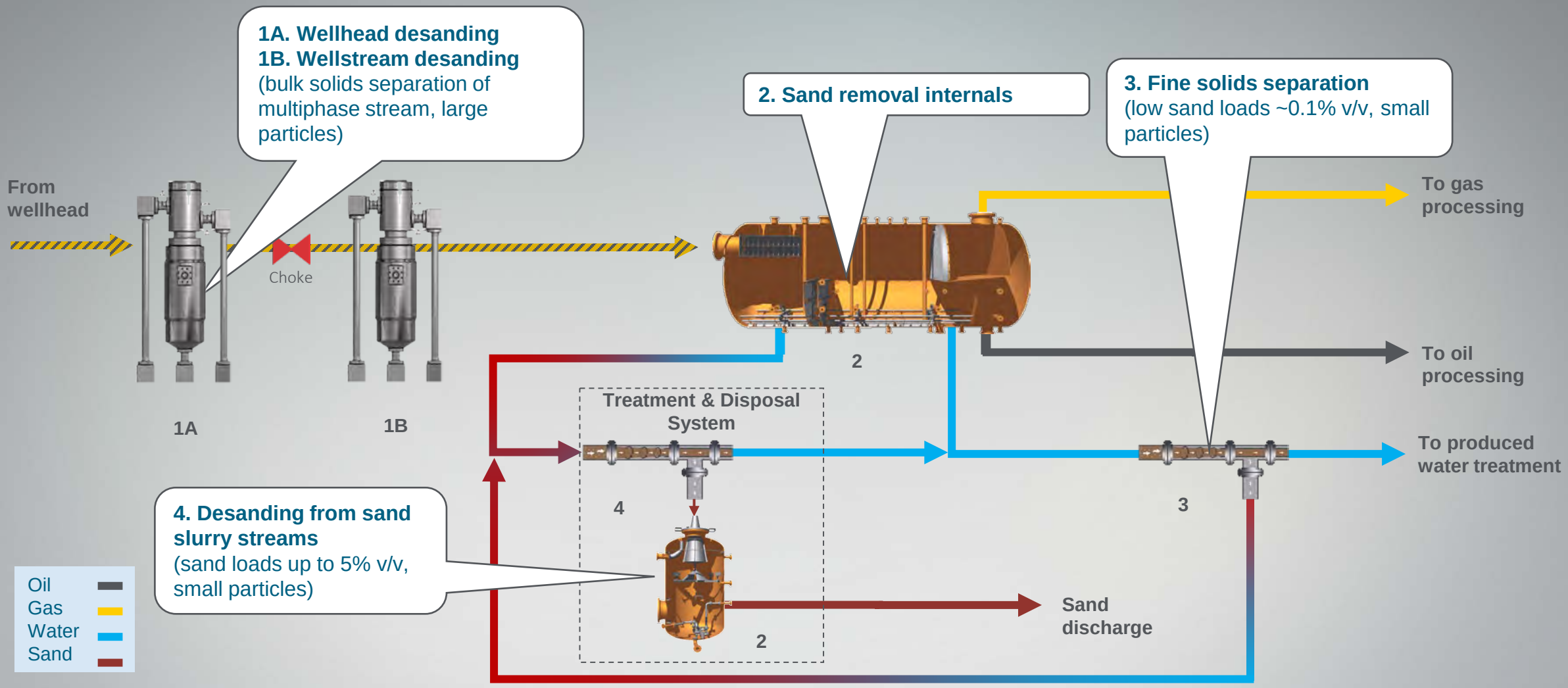
InLine PhaseSplitter

InLine DeLiquidiser

< 10% Liquid

GVF (%)

Sand Handling



Sand Handling

	1A	1B	2	3	4
Name	DeSander PRO	Wellhead DeSander	Vessel DeSander	Slurry DeSander	PWT DeSander
Treated stream	Gas+oil+water+sand	Gas+oil+water+sand	N/A	Water+sand	Water+sand
Product(s)	DeSander PRO	InLine DeSander (3-6”)		InLine DeSander (2”)	(InLine DeSander)* DeSanding Hydrocyclone
Description					
	Efficient “sand trap” developed for shale flowback operation (high solids volume). Could be deployed for well clean-up or equivalent.	*Large cyclonic desanding liners. Used for multiphase well stream desanding.*	*Sand removal system inside vessels. Accumulated sand is removed by jetting with water.*	*Smaller cyclonic desanding liners. Normally part of a sand disposal and treatment system (slurry desanding, washing and bagging).*	*Cyclonic desanding liner. Used for produced water desanding (to protect downstream equipment).*
Typical inlet particle size and load	Large particles and rocks, up to 50% v/v sand load	~500 microns and smaller, up to 1% v/v sand load	Whatever settles in separator, any sand load.	>100 microns, whatever settles in separator. Up to 10% v/v sand load.	Small particles, <100 microns. ~1000 ppm v/v sand load.
Typical separation performance	90-95% overall efficiency	90% of particles larger than 100 microns	80-90%, depending per application	90% of particles larger than 60 microns	98% of particles larger than 20 microns

**Historically, replaced by improved design*

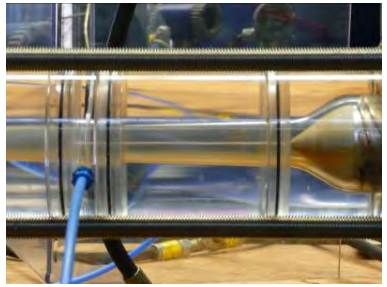
TechnipFMC’s integrated Produced Water Treatment solutions

- High-efficient primary separation
- High-efficient de-oiling technologies
- Separation of water at the seabed
- Reliable sand separation and treatment
- Solving special operational challenges

Inline three phase separation
Petrobras offshore test system

Tordis
Separation at the seabed

InLine HydroCyclone
High efficient oil removal



Offshore Testing Capabilities
InLine HydroCyclone test skid

InLine DeSander
First application at Statoil Heidrun

TechnipFMC’s integrated Produced Water Treatment solutions

- Deliver complete produced water solutions
- Single point supply contract and process warranty
- Exclusive global technology alliances / supply agreements with best available technology providers

STAUPER WATER TECHNOLOGIES

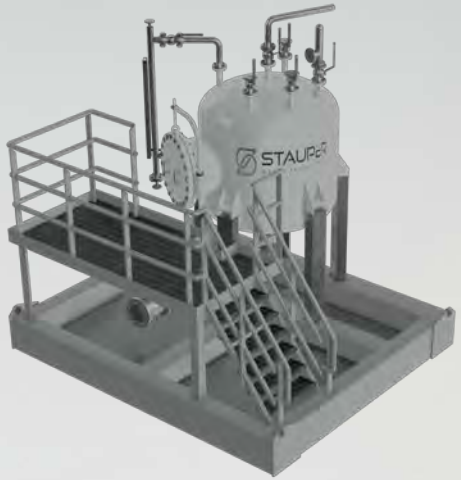
FILTRA SYSTEMS

Produced Water Treatment

TechnipFMC inhouse technology

Strategic Partners

InLine DeWaterer | **Hydrocyclones** | **Degassers, CFU's** | **Nutshell Filters**

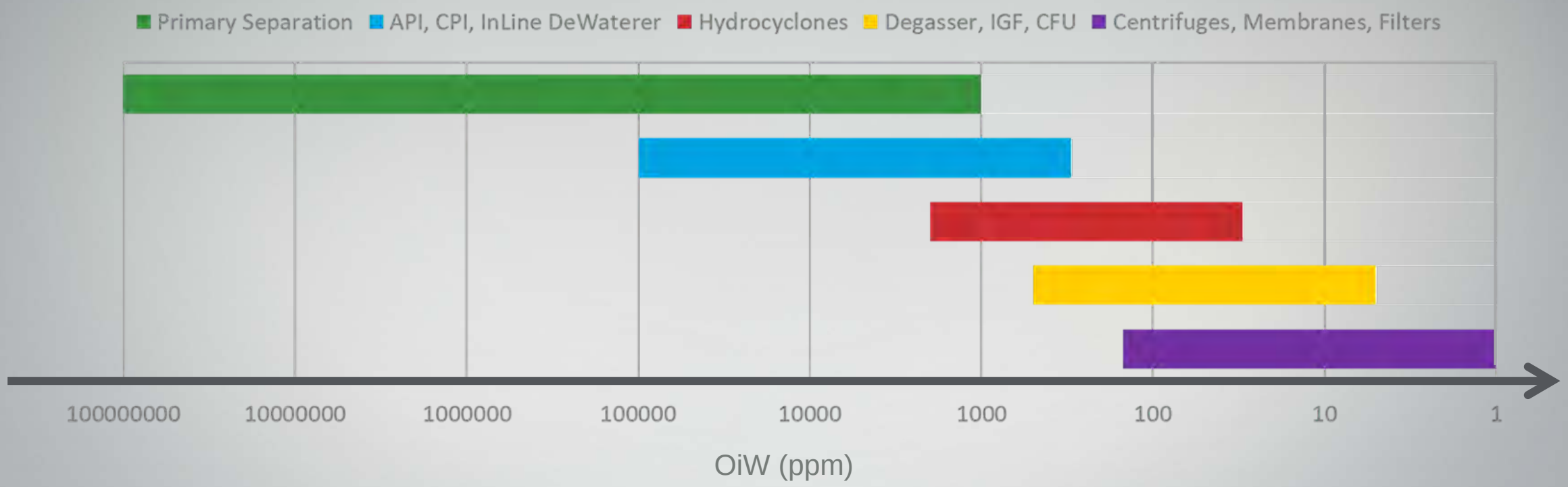


OiW (ppm)

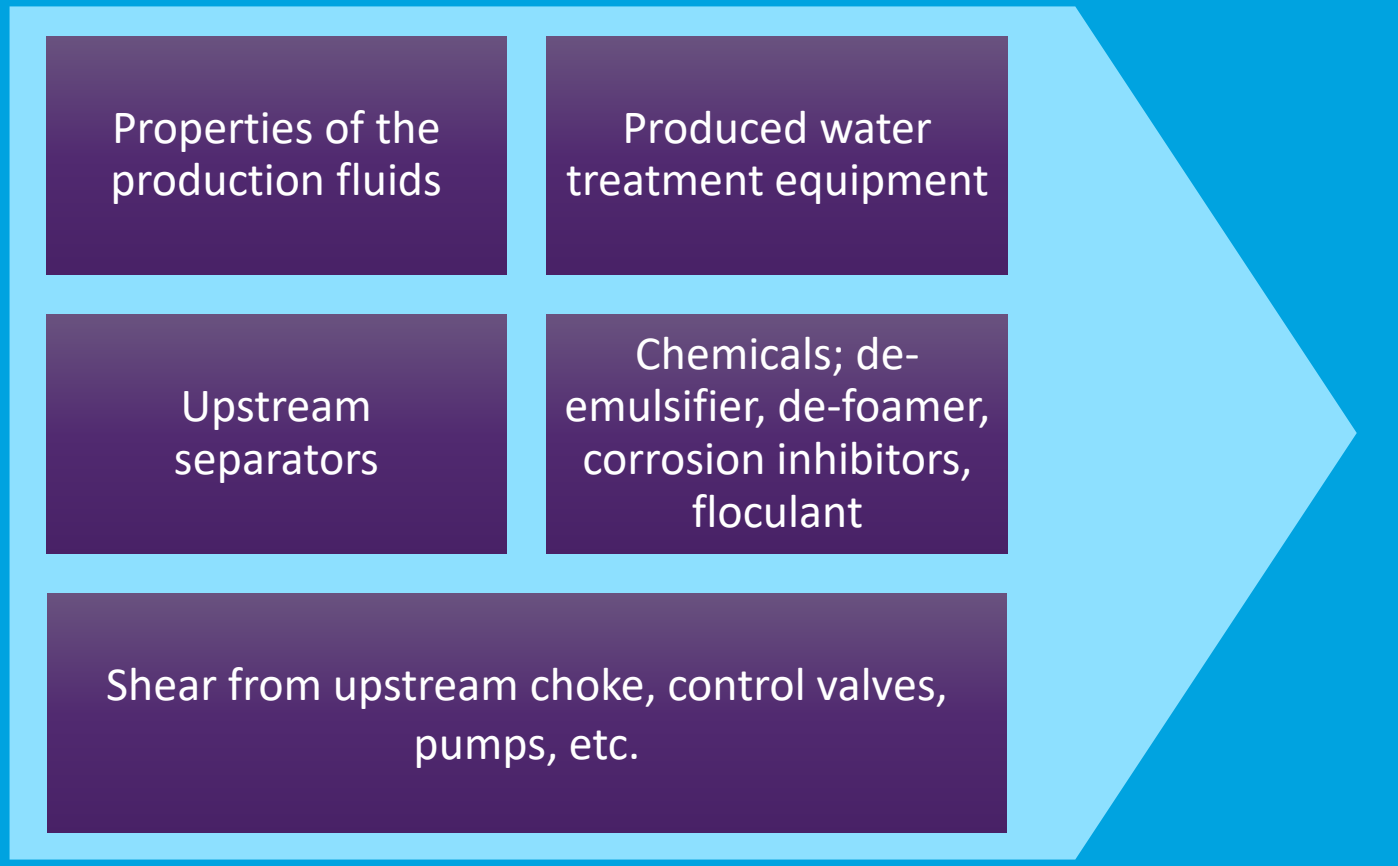
Produced Water Treatment

TechnipFMC inhouse technology *Strategic Partners*

InLine DeWaterer | **Hydrocyclones** | **Degassers, CFU's** | **Nutshell Filters**



What affects Produced Water quality?



In other words, the whole process

TechnipFMC's integrated Produced Water Treatment solutions

Environmental

Down to Single Digit ppm's
OPEX savings up to thousands of US$/yr

Meet and exceed discharge requirements

Enable zero discharge to sea through PWRI

Minimal to no requirement for chemicals

Lean Engineering & Design

Reduced Cost of Ownership
CAPEX savings up to 1 MM US$

Reduced footprint

Ease of operation

Increased uptime, performance and reliability

Reduced OPEX

Integrated Solution

Reduced Complexity
What is the cost of multiple interfaces?

One interface for entire PWT system delivery, services and process guarantee

Fully integrated and optimized ecosystem with best available technologies

Digital automation enabled

Enabled by early engagement & front-end engineering

TechnipFMC's integrated Produced Water Treatment solutions

Perenco Emeraud – compact flotation unit skid

- 3x30% compact floatation units, including on/off valves
- Oil in water < 15 ppm v/v

Equinor Aasta Hansteen – PW & sand treatment package

- Degassing drum and centrifuges; oil in water < 10 ppm v/v
- Sand removal and sand washing facilities

Equinor Heidrun – Dvalin DeSanding system

Degassing drum and centrifuges; oil in water < 10 ppm v/v

Sand removal and sand washing facilities

INEOS South Clipper – compact water removal system

- System for local water separation at normally unmanned platform
- Remotely operated, water discharged to sea < 15 ppm v/v

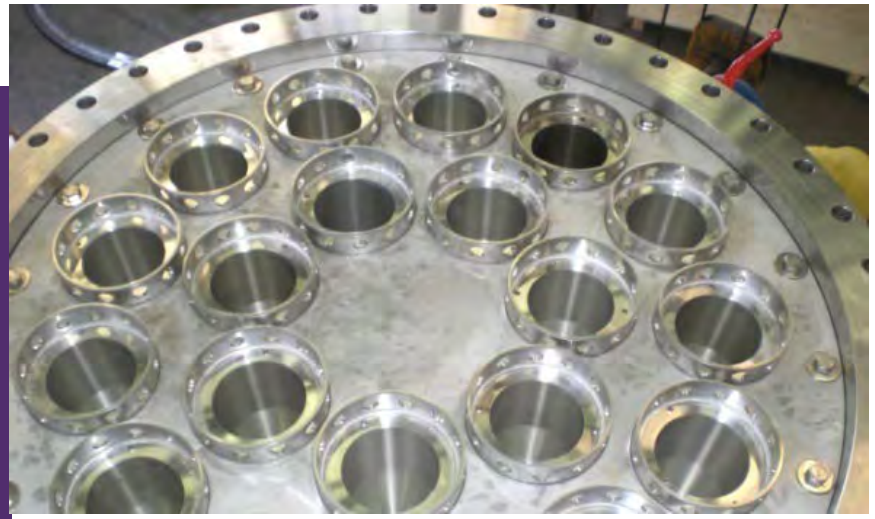
Selected references

Year	End-user	Field, Country	Comments / Description
2020	Saudi Aramco	N/A, KSA	Multiphase Well Tester System
2020	Shell	Sable, USA	Modular Production System
2020	Premiere Oil	Tolmount, UK	Produced Water Treatment Package
2020	Total Qatar	Al Khalij, Qatar	InLine DeWaterer System
2019	Petrobras	P50, Brazil	InLine HydroCyclone System
2019	Chevron	Agbami, Nigeria	Engineering Study
2019	Nordstream	Nordstream, Germany	Test Separator Skid
2018	Oxy	Willard, USA	Test Separator System
2018	TFMC	Permian, USA	Advanced Well Test Skid
2018	ONGC	R-series, India	Test Separator System
2018	TFMC	Permian, USA	Wellhead DeSander Skids
2017	INEOS	Clipper South, UK	Produced Water Treatment Package
2017	TFMC	Permian, USA	Wellhead DeSander Skids
2016	Oxy	Hobbs, USA	Hydrocyclone Skid
2016	Oxy	Hobbs, USA	InLine Phasesplitter Skid
2016	Equinor	Dvalin, Norway	Sand Treatment Package
2016	Kinder Morgan	Permian, USA	InLine Dewaterer Skid
2015	Petrobras	P75/76/77, Brazil	InLine HydroCyclone System
2015	Tullow	Jubilee, UK	InLine DeLiquidizer System
2015	Tullow	Jubilee, UK	InLine DeLiquidizer System

TechnipFMC InLine DeWaterer

TechnipFMC InLine DeWaterer

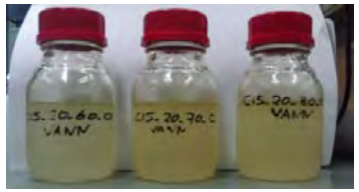
- Joint development by Equinor/Statoil and TechnipFMC
- Bulk oil removal
- Can be used as first step in produced water treatment system
- Gas tolerant (up to 30% GVF)
- Oil content in: < 50%
- Typical outlet quality: 500-5000 ppm
- Pressure drop water outlet typically ~2 bar



InLine DeWaterer Qualification (2007-2012)

Multiple real field applications

Maturity



Laboratory tests
Model fluids

Statoil flow loop Porsgrunn
Simulated field conditions

Off-shore test Gullfaks C
Successful test at real conditions

Full scale test
Multiple liners with gas

Heavy oil testing
Porsgrunn, for Perigrino

Time

TechnipFMC InLine DeWaterer

BACK

NORMAL | CROSS SECTION | FLOW | LINER | LINER FLOW

TechnipFMC InLine DeWaterer

BACK

NORMAL | CROSS SECTION | FLOW | LINER | LINER FLOW

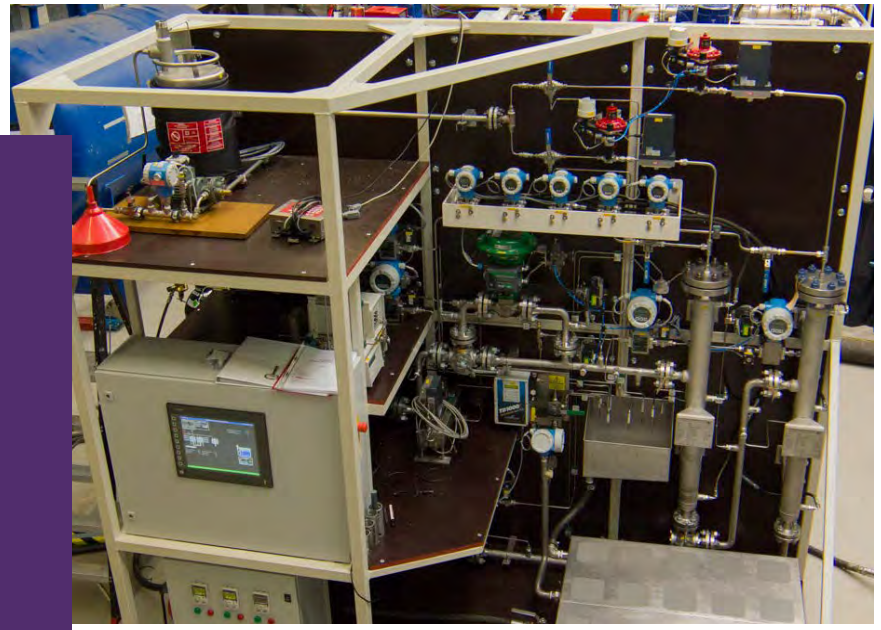
References

Year	End-user	Field, Country	Comments / Description	Number of liners
2010	Equinor	Gullfaks	DeWaterer Skid (Offshore qualification unit)	1x6”
2012	Alphapetroleum	Kilmar, UK	Water treatment skid containing G/L Separator, DeWaterer, Hydrocyclone and PW Degasser	1x6”
2012	Chevron	Erawan, Thailand	Water treatment skid containing DeWaterer and Desander	5x6”
2014	Various	Shale flow back, US	DeWaterer Rental Skids	1x6”
2015	Oxy	Hobbs, New Mexico, USA	Pilot water treatment skid containing G/L Separator, DeWaterer and Hydrocyclone	1x6”
2015	Kindermorgan	Shale flow back, USA	DeWaterer Skids	27x6”
2016	Oxy	Hobbs, New Mexico, USA	DeWaterer and Hydrocyclone liners	2x 7x6”
2017	Ineos	South Clipper, UK	Water treatment skid containing G/L Separator, DeWaterer, Hydrocyclone and PW Degasser	1x6”
2018	Total	Qatar DP1, Qatar	Water removal skid with DeWaterer	3x 10x6”

TechnipFMC InLine Hydrocyclone

TechnipFMC InLine Hydrocyclone

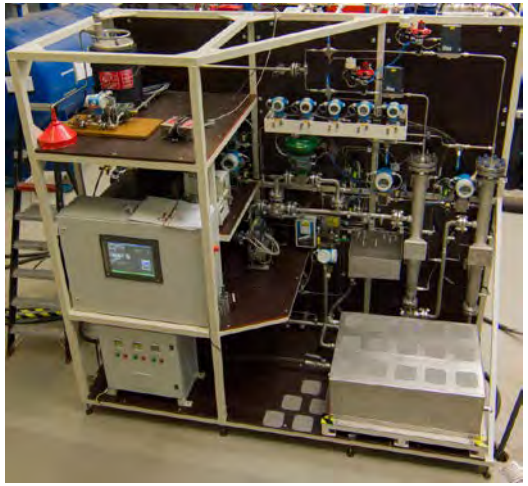
- Developed by CDS/TechnipFMC
- Dilute oil removal
- Cyclonic separation of oil and water
- Typical efficiency: 95-99%
- Oil content in: < 10,000 ppm
- Oil droplet cut-off size typically around 10-15 micron
- Typical outlet quality 30-100 ppm
- Pressure drop water outlet typically 3-5 bar
- TechnipFMC offer a high efficiency and high-capacity liner



Hydrocyclone Qualification (2003-2009, 2012, 2015)

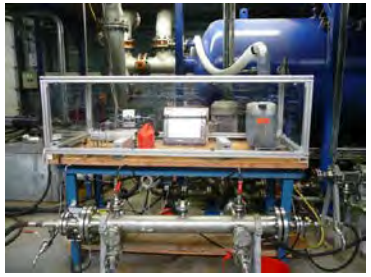
Multiple real field applications

Maturity



Laboratory tests (cont. improvements)
Model fluids

Snorre B
First supply to Equinor



Marlim TQP
Successful testing at extensive conditions

Marlim
First Subsea Hydrocyclone

Various field trails
BP, Saudi Aramco, Petrobras

Time

TechnipFMC InLine Hydrocyclone

BACK

NORMAL | CROSS SECTION | FLOW | LINER | LINER FLOW

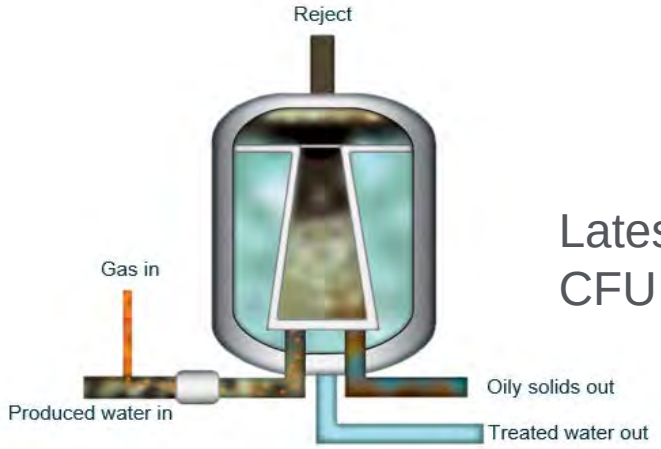
Recent references

Year	End-user	Field, Country	Comments / Description
2019	Perenco Gabon	Tchatamba	Sour & Sweet Vessel / Hydrocyclone liners
2019	Cuu Long Joint Operating Company	Su Tu Vang	Hydrocyclone liners
2019	Repsol	Bleo Holm FPSO	Hydrocyclone liners
2018	Talisman	Montrose	HydroCyclone Vessels
2017	NGL Tech	Ophir RSC Development	Crude Stabilization Unit / Hydrocyclone liners
2017	Cuu Long Joint Operating Company	Cuu long hydrocyclones	Hydrocyclone liners
2017	Oxy	Hobbs	HydroCyclone vessel
2016	Wintershall	Brage	HydroCyclone vessel
2015	TFMC Flow Treatment	Next gen. skid for Flowbak	HydroCyclone liners
2015	Petrobras	P76	HydroCyclone System
2015	Petrobras	P75/P77	HydroCyclone System
2015	TFMC Flow Treatment	Next gen. skid for Flowbak	HydroCyclone Liners
2015	Oxy	Pilot Water Treatment System	Inline Separator System
2015	Wintershall	RAVN tie-in HydroCyclones	Produced Water Treatment Package

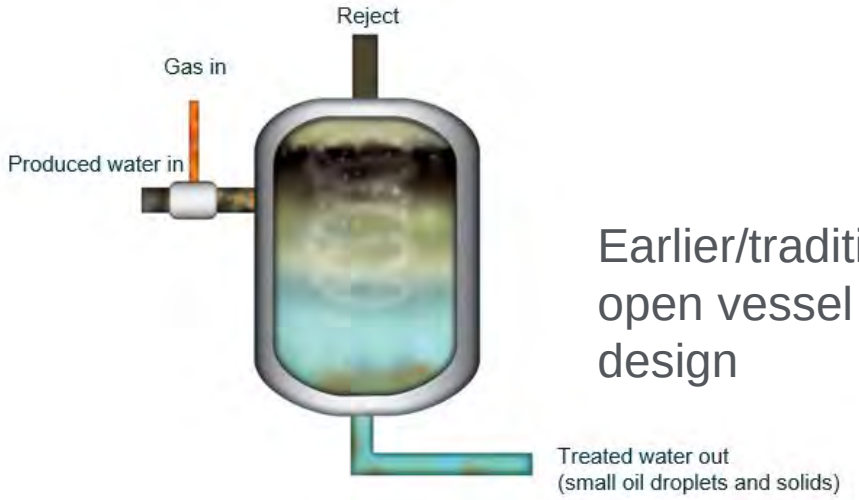
Stauper Compact Flotation Unit

TechnipFMC

Why the Stauper CFU?



Latest generation CFU design

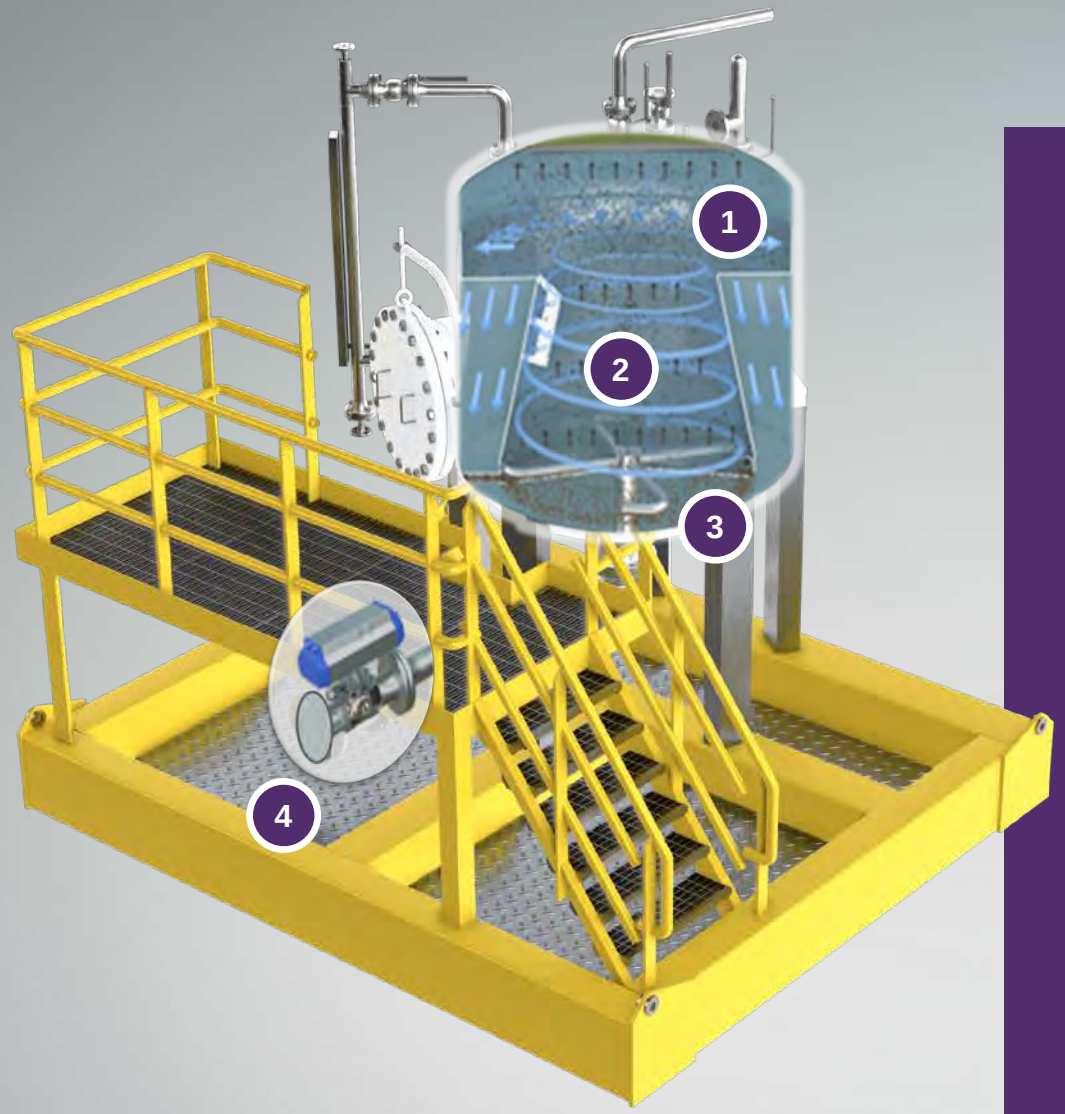


Earlier/traditional open vessel design

- ✓ **Higher efficiency**
  - Co-current flotation (flow direction bottom up)
    - ➢ less entrained oil droplets/gas bubbles to clean discharge
  - Separate inlet chamber
    - ➢ avoid polluting discharge water with inlet water
    - ➢ maximize oil droplet / gas bubble interaction
  - Calm separation zone
    - ➢ enhanced separation
  - Variable upstream mixer
- ✓ **Solids removal**
- ✓ **High robustness**
  - No small bore openings
    - ➢ No clogging

The Stauper CFU Design

The Stauper CFU Design



1. **Cyclonic fluid break mechanism**
   - Reduces velocity in top part of vessel
   - Ensures optimum oil/water separation
2. **Separate inlet coalescence chamber**
   - Prevents contamination of clean water discharge
   - Promotes coalescence of oil droplets and gas bubbles
3. **Non-moving distribution pipes**
   - Flow distribution creates cyclonic flow
   - Enhances gas bubble and oil droplet interaction
4. **Gas / liquid mixer (variable or static)**
   - Ensures sufficient mixing of flotation gas across full fluid flow

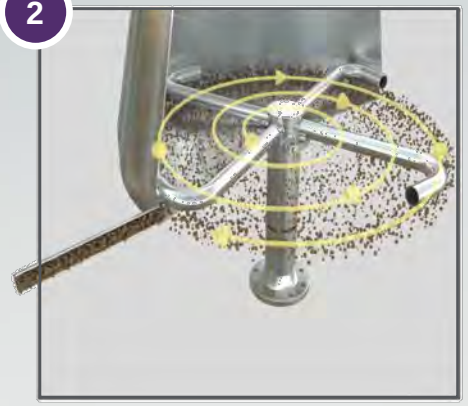
The Process

1 Oil contained water Inlet

Gas is injected into the contaminated water upstream the CFU

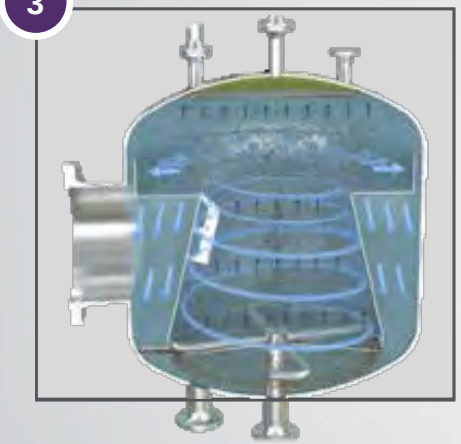
Water is lead into an inner chamber where small gas bubbles are coalescing with small oil droplets

2 Solids Reject



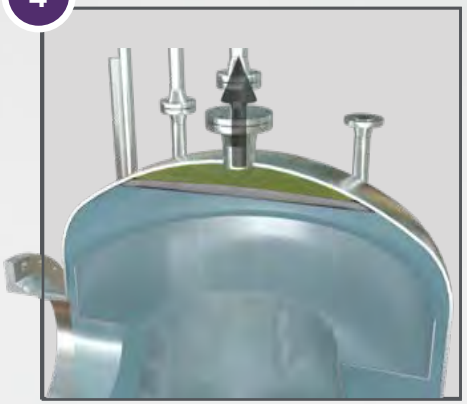
Solids are removed (manually or automatically)

3 Internal Flow



Water rises in a rapid centrifugal flow pattern, while the oil droplets and gas bubbles coalesce. At the top of the vessel, the rotation comes to a complete stop by Stauper's patented flow vanes

4 Oil and Gas Reject



Oil, gas and light solids are separated from the water in the low energy area in the upper part of the vessel and rejected over top

Clean water out

Clean water is descending in the outer chamber and discharged from the vessel at the bottom

References

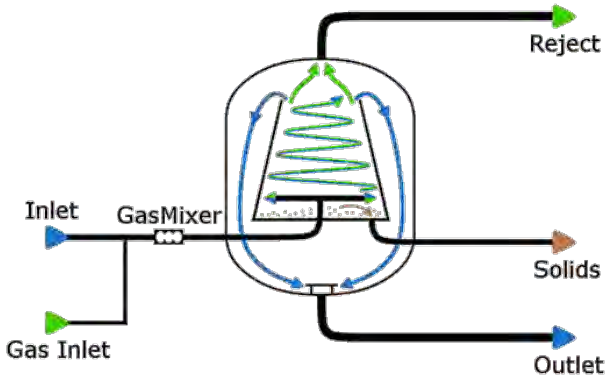
Operator	Field	m3/d	Configuration
Equinor	Martin Linge	13 920	2 serial
CNOOC	Wenchang 8-3 B	1 490	2 serial
CNOOC	Wenchang 19-1B	2 184	2 serial
CNOOC	Wenchang 19-1C	4 400	2 serial
CNOOC	HYSY 116 FPSO	6 790	2 serial
CNOOC	CFD 11-1	12 000	3 parallel
CNOOC	LD-21	1 920	2 serial
CNOOC	8-3A	4 512	2 serial
CNOOC	14-3A	3 192	2 serial
CNOOC	HZ25-8	7 200	Single
CNOOC	XJ24-3B	7 200	Single
CNOOC	Enping 24-2	12 000	Single
CNOOC	Enping 32-1	12 000	Single

Performance examples

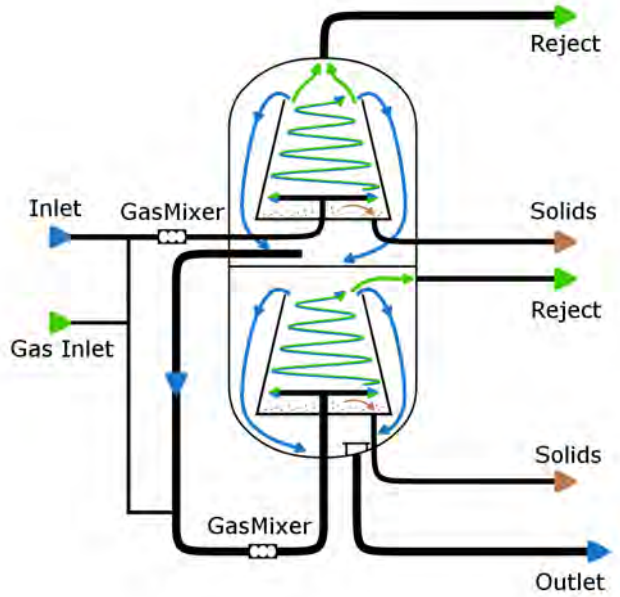
	Offshore NCS Equinor – Grane (1)	Offshore NCS Equinor – Grane (2)	Onshore Canada SAGD	Offshore Indonesia
Oil API (°)	19°	19°	11°	38°
Operating temp	55-90°C	55-90°C	80-90°C	50°C
Oil droplet Dv50	5 - 6 µm	5 – 6 µm	NA	NA
Flocculant added	0 ppm	10 ppm	0 ppm	YES
OiW (avg)				
Inlet	493 mg/l	551 mg/l	1685 ppm	200 ppm
Discharge CFU1	64 mg/l	12 mg/l	76 ppm	19 ppm
Discharge CFU2	18 mg/l	3 mg/l	21 ppm	9 ppm
Efficiency	**96 %**	**99.5%**	**99%**	**96%**

Multiple Cleaning Stages in One Vessel

Removing oil from water is a sequential process. In order to meet strict discharge targets, or to handle complex water mixture, the CFU process may have to be repeated. Competing technologies does this by having several vessels operating in serial operation (large footprint and weight). Stauper´s patented design allows for several treatment stages in one vessel.



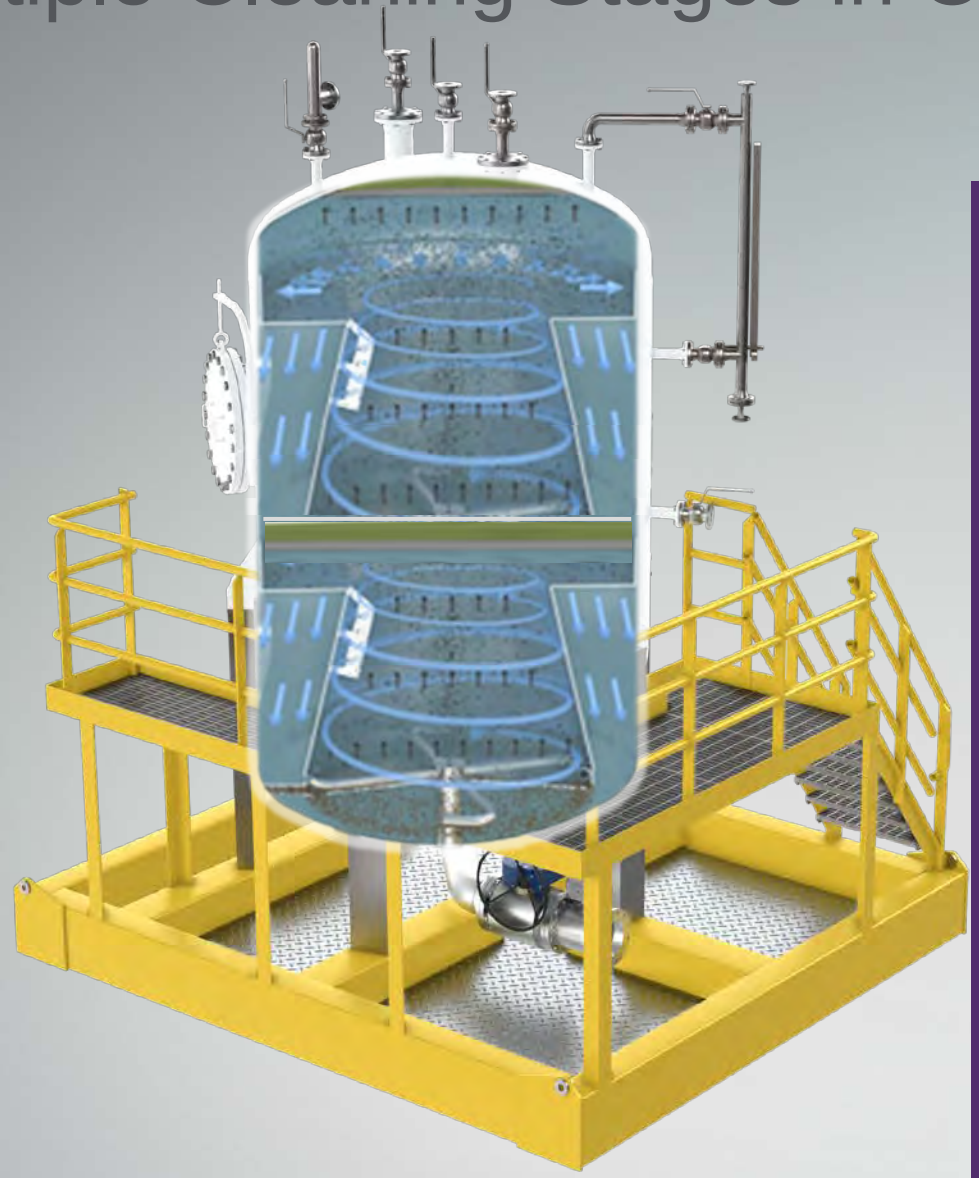
Stauper single stage vessel



Stauper two-stage vessel

Multiple Cleaning Stages in One Vessel

Multiple Cleaning Stages in One Vessel

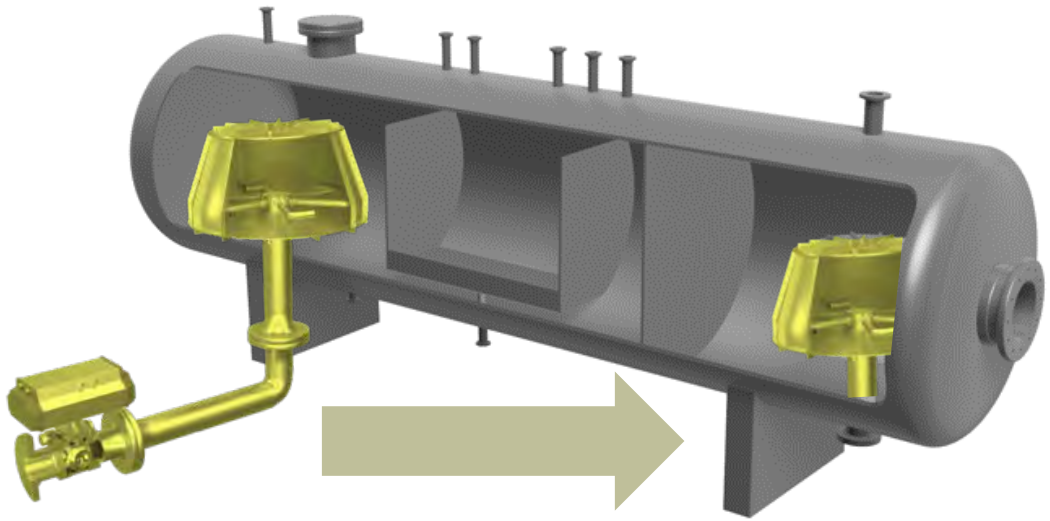


Removing oil from water is a sequential process. In order to meet strict discharge targets, or to handle complex water mixture, the CFU process may have to be repeated. Competing technologies does this by having several vessels in series (large footprint and weight). Stauper´s patented design allows for several stages in one vessel. With some key benefits vs two vessels in series:

- Significant savings in weight and footprint
- Less connections and instrumentation
- FULL 2 stage

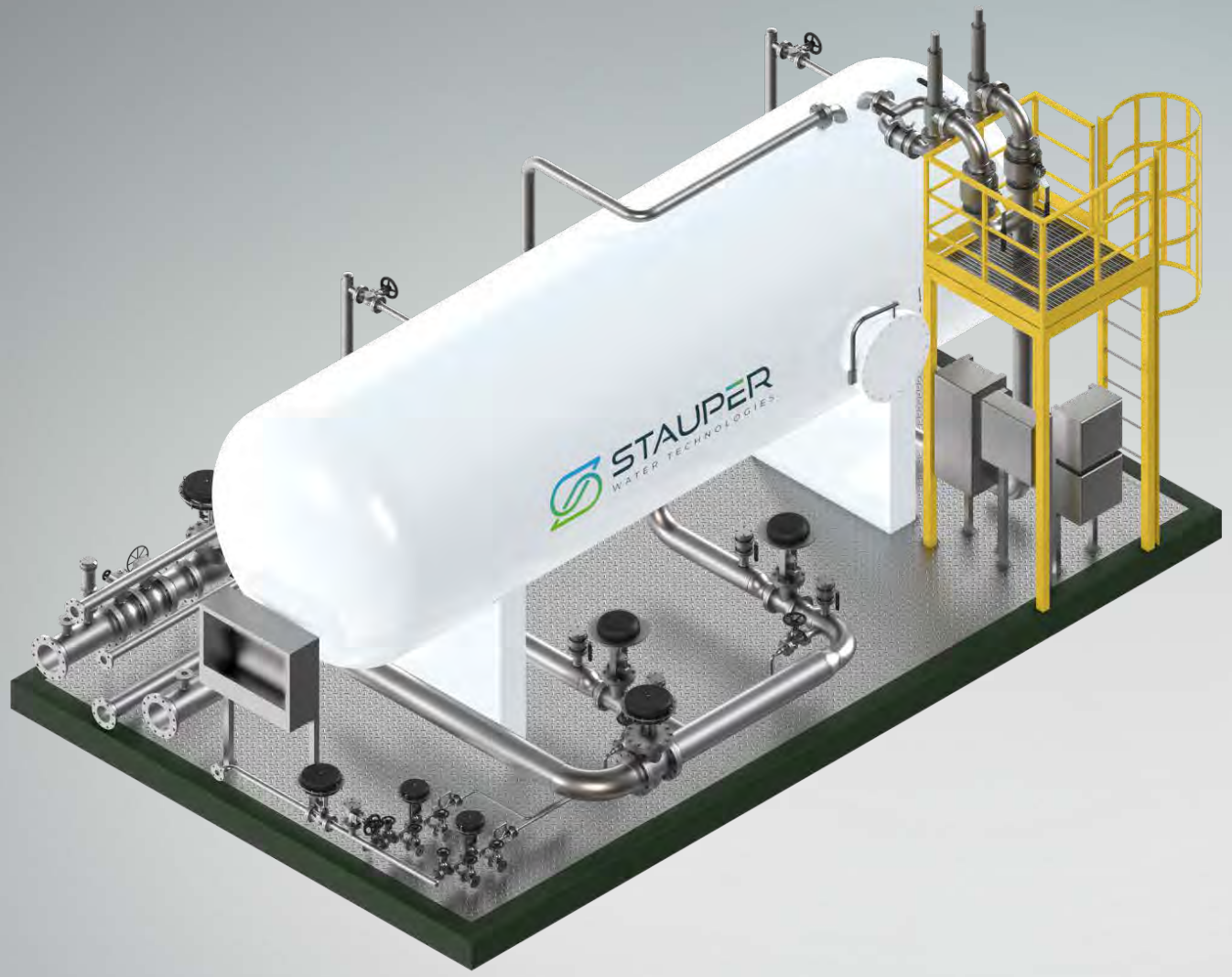
Retrofitting of existing equipment

- Retrofit approach can bring the proven and unique performance of the Stauper CFU technology into other produced water separation vessels.
- The upgrade can help the operators improve the separation efficiency and increase throughput while meeting discharge requirements.
- Designed for brownfield / debottlenecking projects, the retrofit approach carry several benefits:

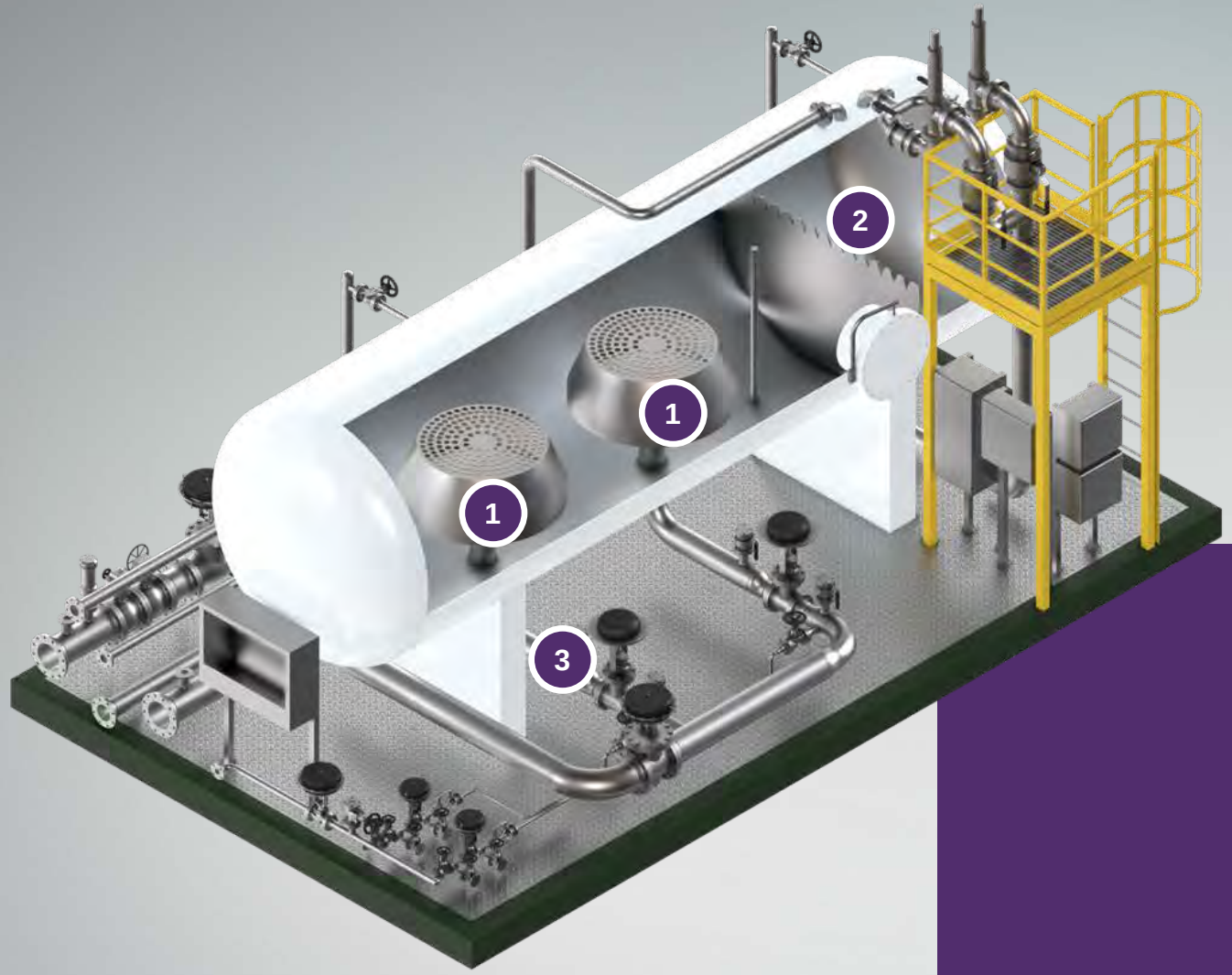


- ✓ Fast – significant time saving vs new process equipment
- ✓ Cost savings - significant savings vs new process equipment
- ✓ Utilize existing equipment – save vaulable footprint

Horizontal CFU



Horizontal CFU



1. Cyclonic fluid break mechanism
2. Separate inlet coalescence chamber
3. Non-moving distribution pipes
4. Gas / liquid mixer (variable or static)

FitraSystems Wallnut Shell Filters

TechnipFMC

FiltraSystems

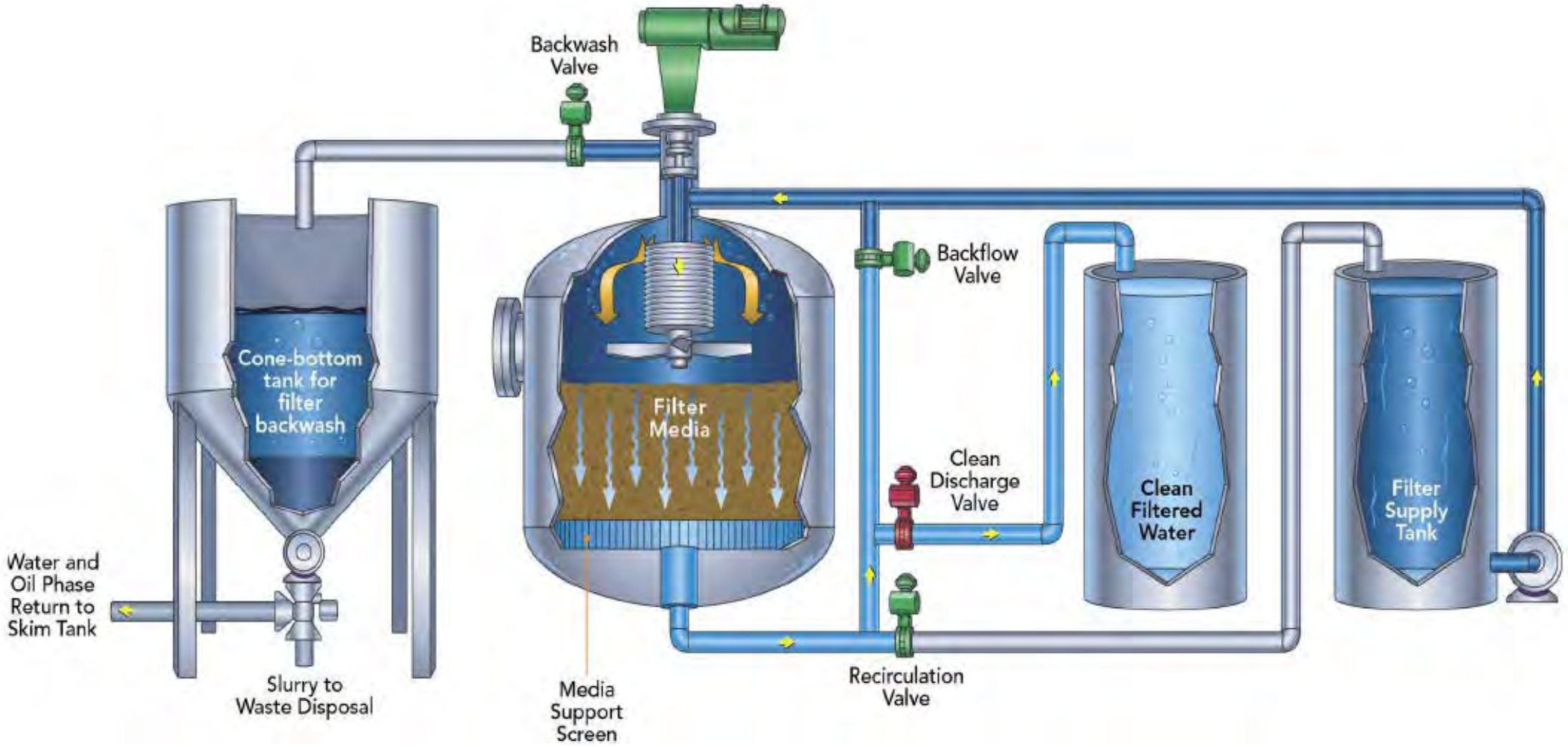
- Leading innovator of modern Walnut Shell filter technology
- Field tested and proven reliability, over 16,000 systems installed worldwide
- Vertical, Horizontal, Mobile and Modular Designs for fast cycle oil.
- Permanent crushed black walnut Shell media; 20 year life
- Removing up to 99% of suspended solids & oils

Vertical WNSF

Vertical WNSF

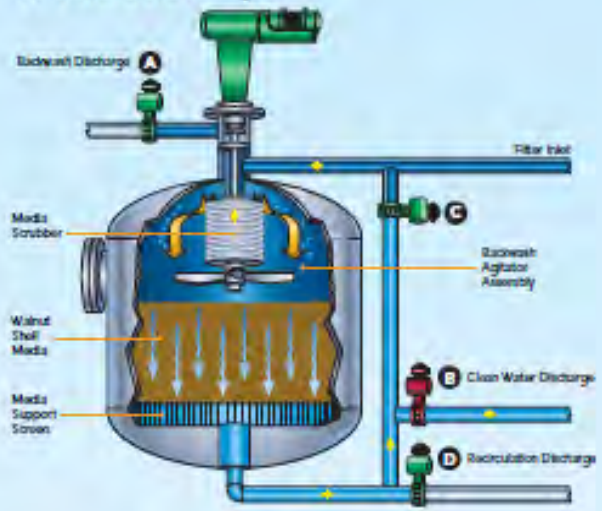
1. Bed type media filter
2. Highest flow rate 25 gpm/ft2
3. Mixer design regenerates every portion of the bed, every cycle. This provides the smallest backwash or waste volumes and most reliable cycle performance.
4. No need for fresh water, chemicals or other consumables for backwash cycle.

Basic system arrangement

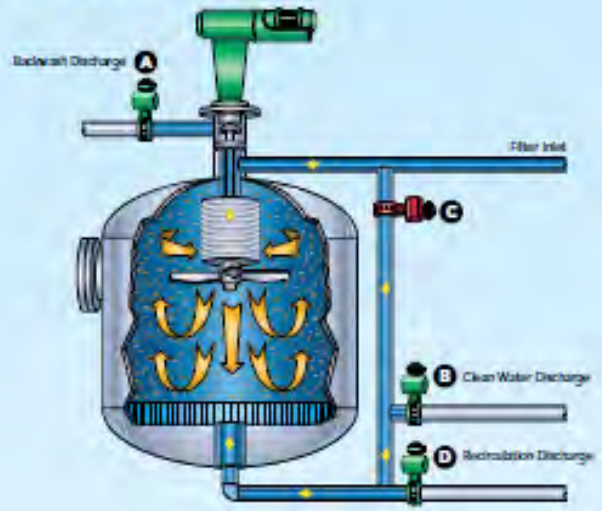


Operational Cycles

1. Filtration Cycle



2. Agitation Cycle



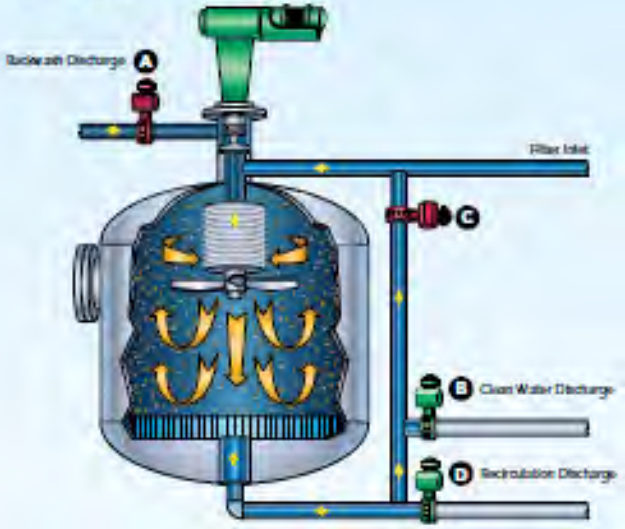
Filter Sequence of Operation and Valve Position

● indicates valve is open; all other valves are closed.

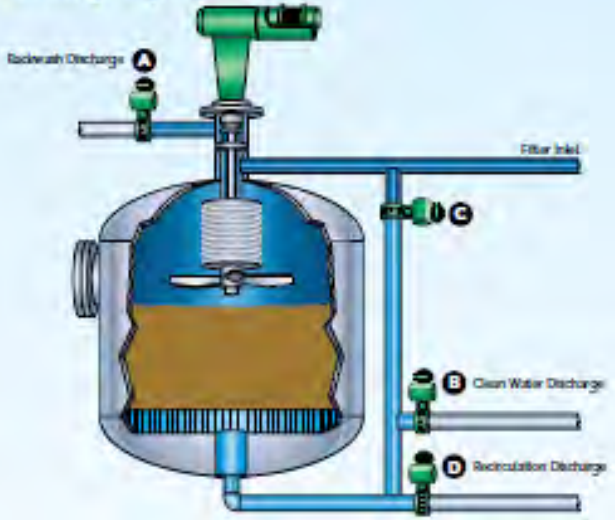
CYCLE	A	B	C	D	TIME
Filtration		●			"x" Hrs.
Agitation			●		30 Sec.
Backwash	●		●		8 Min.
Delay					15 Sec.
Recirculation				●	3 Min.

Clean Water
Dirty Water
Backwash Water (concentrated)
Walnut Shells

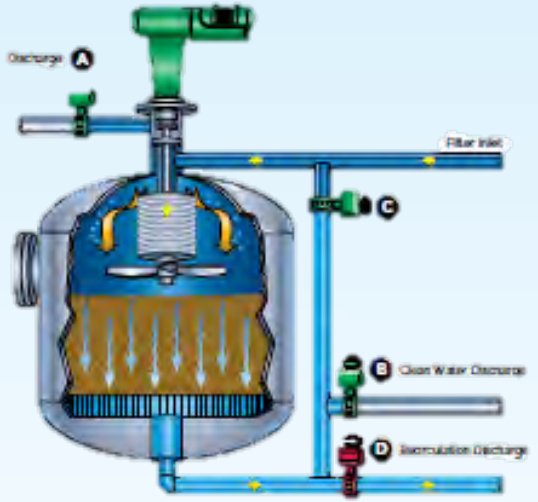
3. Backwash Cycle



4. Delay Cycle



5. Recirculation Cycle



Nutshell Filter

- Horizontal Flow Rates Up To 410,000 Bpd / 2700 m^3/hr
- Above 250 m3/hr Backwash Technology Typically Starts to Win on OPEX
- Maximum Filter Media Scrubbing During Backwash Cycle
- <0.5% Of Throughput Of Backwash Discharge Volume
- No Need For Clean Water, Chemicals Or Other Consumables For Backwash Cycle

Experience & Competence

TechnipFMC

INEOS – Compact Water Separation Package for Unmanned, Remote Operated Facility

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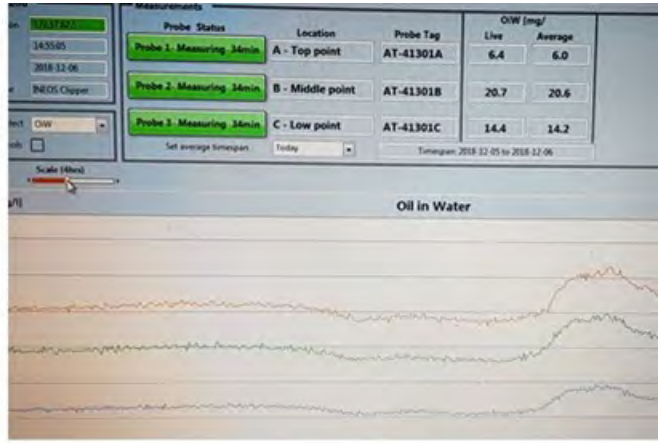
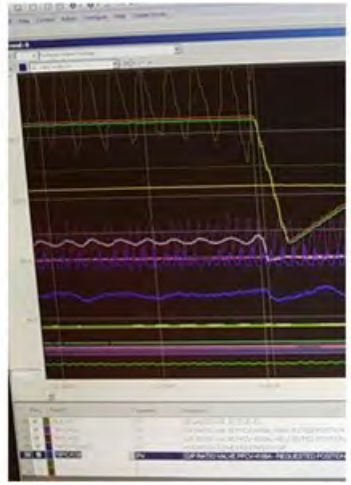
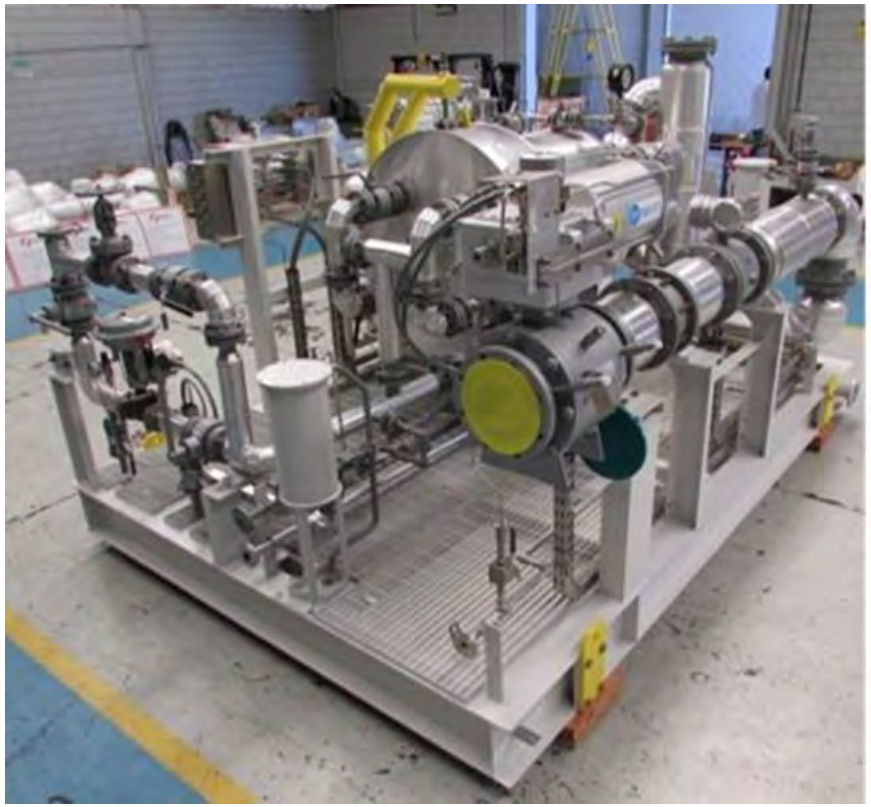




Total Energies – Compact Remote Water Removal for PWRI

Petrobras – P75, P76, P77 Hydrocyclone Packages



Perenco Emeraude Compact Flotation Package

Equinor - Aasta Hansteen Produced Water and Sand Treatment System

ATP Kilmar – Compact UWP Water Separation System

OXY – Compact System for Enhanced Oil Recovery

Equinor –Dvalin tie-in to Heidrun DeSanding System