We are an engineering and manufacturing company aimed at redefining the operations of the pressure pumping industry. Our unwavering goal is to deliver best-in-class equipment with true, lowest total cost of ownership.

The designs of our solutions are not merely supplementary. Detailed equipment definition and full ground-up equipment design are essential for making frac sites as efficient and safe as possible. Each new product is designed from the bottom up to ensure that nothing is over-looked. Small changes require multiple layers of technology to match and support the design change. Our approach details each of those layers for fully synergistic development.

The solutions come with a **Total Life Cycle Management System** to assure your investment pays you dividends well into the future.

High Pressure Iron Products

FLOWCELL™ **Suite of Products**

Contents

QMS REGISTERED

Certificate of Registration

APIQR® REGISTRATION NUMBER
0452

This certifies that the quality management system of

TECH-SEAL INTERNATIONAL
3131 West Little York
Houston, TX

has been assessed by the American Petroleum Institute Quality Registrar (APIQR®) and found it to be in conformance with the following standard:

ISO 9001:2015

The scope of this registration and the approved quality management system applies to the

Design and Manufacture of Chokes, Tees and Crosses, Adapter and Spacer Spools, Flanged Connectors, Threaded Connectors, Bullplugs, Valve Removal Plugs and Other End Connectors

APIQR® approves the organization's justification for excluding

No Exclusions Identified as Applicable

Effective Date: JUNE 16, 2017
Expiration Date: JULY 1, 2020
Registered Since: JULY 1, 2011

Vice President, API Global Industry Services

QUALITY REGISTRAR

API

REGISTRATION NO. Q1-0168

Certificate of Registration

The American Petroleum Institute certifies that the quality management system of

TECH-SEAL INTERNATIONAL
3131 West Little York
Houston, TX

has been assessed by the American Petroleum Institute and found to be in conformance with the following:

API Specification Q1

The scope of this registration and the approved quality management system applies to the:

Design and Manufacture of Chokes, Tees and Crosses, Adapter and Spacer Spools, Flanged Connectors, Threaded Connectors, Bullplugs, Valve Removal Plugs and Other End Connectors

API approves the organization's justification for excluding:

No Exclusions Identified as Applicable

Effective Date: JULY 1, 2017
Expiration Date: JULY 1, 2020
Registered Since: DECEMBER 6, 2004

Q1
API Spec Q1
Registered

Vice President, API Global Industry Services

About Us

Tech-Seal International

TSI is a Houston, Texas based business which began as a machine shop providing high pressure components to the major suppliers of API 6A gate valves around the globe. This knowledge, global experience and expertise developed over years, has been the basis of TSI's expansion into high pressure flow control products.

TSI products are based on field proven designs and manufactured from the highest quality materials with stringent quality control checks and statistical process control. TSI is an API 6A Q1 and ISO 9001 licensed facility. TSI facilities cover over 1.2 million square feet of under-roof manufacturing, assembly and testing facilities. TSI is a vertically integrated company from forge shop to test and assembly operation. Over the last twenty years, TSI has invested significant capital into key processes, including but not limited to:

- Forging presses (minimizing risks due to welded joints)
- Heat treatment and stress relieving operations
- Computer numerical control (CNC) for high performance and precision machine tools with the ability to provide six sigma levels of repeatable and reliable product quality
- Assembly and testing facilities
- Qualify and audit steel mills and raw material providers
- Maintain certified Mill Test Reports (MTRs) and drive the procurement process for raw materials

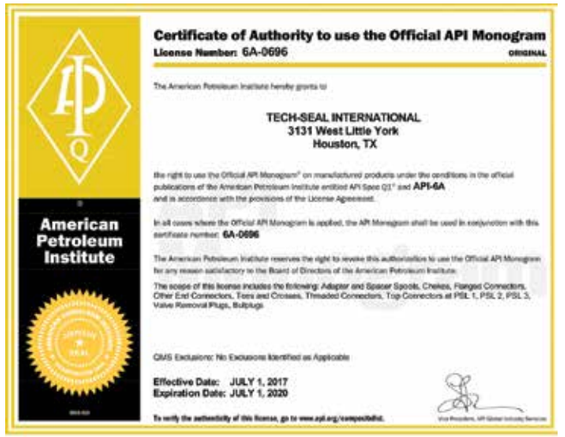
The ability to forge, machine, treat and test products in house has resulted in maintaining leading edge:

- Product reliability
- System integrity (matching, testing, maintenance)
- Supply chain management (on time delivery according to specs)
- Quality control – customer acceptance
- Cost effectiveness

TSI has Houston-based metallurgical and quality teams that create and control material specifications. TSI also qualifies and audits steel mills and raw material providers as well as maintain MTRs and inspect documents. Our procurement team helps drive all purchases of raw material in the supply chain.

TSI prides itself on the ability to forge, machine, treat and test their products in house. All these processes are performed by employees who are fully trained, knowledgeable and skilled to understand current product and quality requirements. This investment in state of the art technologies, precision machine tools and the continuous development of TSI's skilled workforce ensures that our customers receive unparalleled quality and value for our high pressure control products.

By controlling the manufacturing process from beginning to end, customers can have the peace of mind that they will be able to work directly with TSI to resolve any issues. TSI prides themselves on being able to accommodate all our customer's requirements.



Certificate of Authority to use the Official API Monogram

License Number: 6A-0696 ORIGINAL

The American Petroleum Institute hereby grants to

TECH-SEAL INTERNATIONAL
3131 West Little York
Houston, TX

the right to use the Official API Monogram® on manufactured products under the conditions in the official publications of the American Petroleum Institute entitled API Spec Q1® and **API-6A** and in accordance with the provisions of the License Agreement.

In all cases where the Official API Monogram is applied, the API Monogram shall be used in conjunction with this certificate number: **6A-0696**

The American Petroleum Institute reserves the right to revoke this authorization to use the Official API Monogram for any reason satisfactory to the Board of Directors of the American Petroleum Institute.

The scope of this license includes the following: Adapter and Spacer Spools, Chokes, Flanged Connectors, Other End Connectors, Tees and Crosses, Threaded Connectors, Top Connectors at PSL 1, PSL 2, PSL 3, Valve Removal Plugs, Bullplugs

QMS Exclusions: No Exclusions Identified as Applicable

Effective Date: JULY 1, 2017
Expiration Date: JULY 1, 2020

To verify the authenticity of this license, go to www.api.org/compositelist.

American Petroleum Institute

TSI Tech-Seal International

NACE

NACE was established in 1943 as the National Association of Corrosion Engineers. NACE publishes standard practice, test method, and material requirement standards for use by industry and other corrosion societies. The NACE Coating Inspector Program has set the standard for inspections in the protective coatings industry and is the world's most recognized coating inspector certification program. Building on the momentum of the last 30 years and over 26,000 certified inspectors, NACE has recently enhanced the CIP learning experience with more hands-on time with new inspection methods and equipment, better graphics and video presentation as well as additional emphasis on international standards. Industry data show that NACE specifications have resulted in savings of billions of dollars in costly mistakes. MGB offers both NACE and non-NACE parts so the operator can choose the best option for each application.

Computer Numerical Control

Computer numerical control (CNC) is the automation of machine tools by means of computers executing pre-programmed sequences of machine control commands. In modern CNC systems, the design of a mechanical part and its manufacturing program is highly automated. The part's mechanical dimensions are defined using computer-aided design (CAD) software, and then translated into manufacturing directives by computer-aided manufacturing (CAM) software. A number of different machines might be used with an external controller and human or robotic operators that move the component from machine to machine. In either case, the series of steps needed to produce any part is highly automated and produces a part that closely matches the original CAD. By using CNC, TSI assures that each part is manufactured precisely and consistently creating confidence in the reliability of each part.

Forging

Forging is a manufacturing process involving the shaping of metal using localized compressive forces. Forging can produce a piece that is stronger than an equivalent cast or machined part. As the metal is shaped during the forging process, its internal grain texture deforms to follow the general shape of the part. As a result, the texture variation is continuous throughout the part, giving rise to a piece with improved strength characteristics.

Additionally, forgings can result in a lower total cost when compared to a casting or fabrication. Considering all the costs that are involved in a product's lifecycle from procurement to lead time to rework, and factoring in the costs of scrap, downtime and further quality issues, the long-term benefits of forgings can outweigh the short-term cost-savings that castings or fabrications might offer.

Hot forging prevents the work hardening that would result from cold forging, which increases the difficulty of performing secondary machining operations on the piece. Also, while work hardening may be desirable in some circumstances, other methods of hardening the piece, such as heat treating, are generally more economical and more controllable. Alloys that are amenable to precipitation hardening, such as most aluminium alloys and titanium, can be hot forged, followed by hardening.

Production forging involves significant capital expenditure for machinery, tooling, facilities and personnel. In the case of hot forging, a high-temperature furnace (sometimes referred to as the forge) is required to heat ingots or billets. Owing to the size of the massive forging hammers and presses and the parts they can produce, as well as the dangers inherent in working with hot metal, a special building is frequently required to house the operation. Most forging operations use metal-forming dies, which must be precisely machined and carefully heat-treated to correctly shape the workpiece, as well as to withstand the tremendous forces involved. TSI uses the latest forging technology coupled with manufacturing processes to assure quality parts over time.

Mill Test Report

TSI integrates the importance of quality assurance. A Mill Test Report (MTR) is a quality assurance document that records the chemical and physical properties of the stainless steel (or other alloys) used in the fabrication of hygienic process components and equipment. When steel is generated at the mill, it is assayed. The results of that assay are recorded and an MTR is generated. The accompanying MTR is tracked throughout the manufacturing process. At TSI, it is our receiving and quality control groups' responsibility to inspect and match received goods to their corresponding MTR to ensure that the components received meet the purchase specifications.

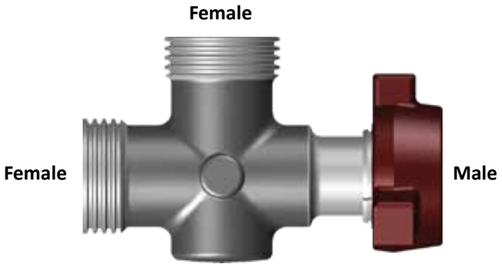
The MTR provides the specific material grade of a material (316 or 316L) and will also certify that parts meet appropriate ASTM and ASME specifications. Compliance with ASME guidelines is especially important when fabrication pressure vessels are to receive an ASME stamp. TSI maintains MTR records of virtually every piece of traceable material that they supply.

Non-Pressure Seal Thread

Non-pressure seal thread union (NPST) is especially engineered for high-pressure (15,000 psi), abrasive surfaces where welded connections are not desired. The design provides a strong, permanent end connection without butt welding. An epoxy thread-locking compound secures the connection. Since all threads are isolated from the fluid line, the resulting smooth bore assures minimum turbulence, decreased washout and reduced buildup around pipe ends of acid, sand, cement, or chemicals.

NPST pup joints are made of high quality seamless pipeline with male and female detachable hammer unions. NPST has uniform bore for greater flow capacity. Pressure seal pipe threads (PST) are not recommended for pulsating service above 10,000 psi or where side loading or erosion are suspected. NPST threads or straight integral connections are better under these conditions. Power tight make up is required on threaded connections. MGB offers both NPST and integral connections in the pup joint connections.

Male and Female Hammer Union Fittings



- Male (M) – threaded end with wing nut
- Female (F) – Threaded frac fitting end

System Integrity

System integration is defined in engineering as the process of bringing together the component sub-systems into one system. That is, an aggregation of subsystems cooperating so that the system is able to deliver the overarching functionality, thereby ensuring that the subsystems function together as a system, to act as a coordinated whole.

The system integrator integrates discrete systems using a variety of techniques such as computer networking, enterprise application integration, business process management or manual programming. System integration focuses on increasing value to the customer (e.g., improved product quality and performance) while at the same time providing value (e.g., reducing operational costs and improving response time). The role of system integration engineers is important: more and more systems are designed to connect, both within the system under construction and to systems that are already deployed.

TSI integrates subsystems according to their functionality by creating functional entities. The benefit of this method is that the integration is engineered by a point contact, performed quickly and involves only the necessary vendors. Therefore vertical integration is cheaper in the short term and minimizes the risk of mismatched system components.

Integral fittings are designed and manufactured to be tough and long lasting. Integral fittings can be incorporated with a range of products to accommodate standard and sour gas services. Our integral fittings are offered in sizes starting at 2-inch up to 4-inch. These fittings are forged and precision machined in house. Rigorous testing goes into each and every fitting that leaves the warehouse to ensure maximum reliable performance and safety when in the field. We also offer a variety of crossovers and API flanged connections.

Tee Fittings (2 in. and 3 in. 1502 Connections)

Tees are available in multiple sizes and configurations. They are also available in custom configurations, NACE and non-NACE.

Material		
Service	**Body**	**Working Pressure**
Standard	Non-NACE	15,000 PSIG
Sour Service	NACE Standard MR0175 ISO15156	10,000 PSIG

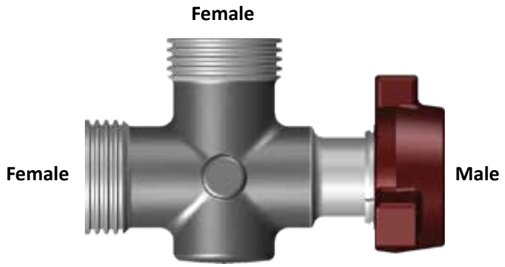
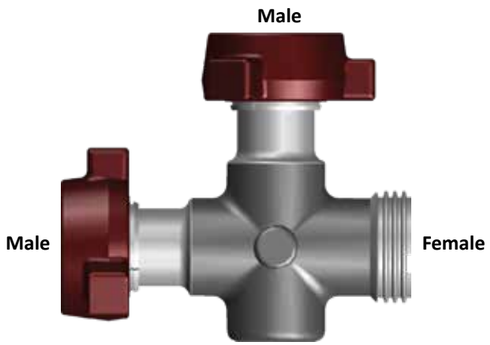


Figure A



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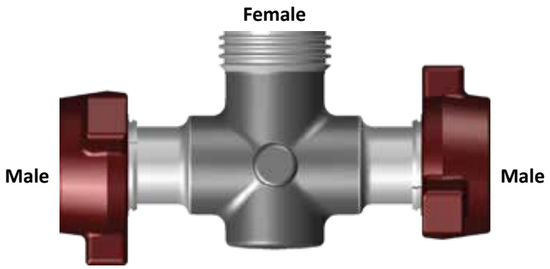

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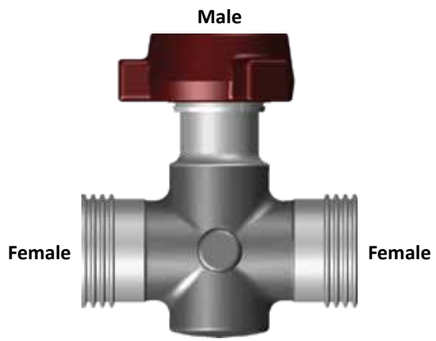


Figure D

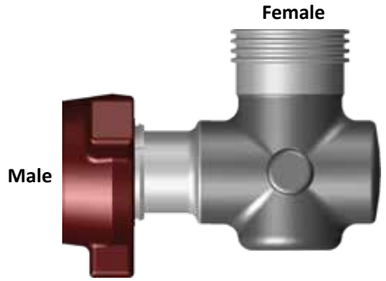


Figure E

2 in. and 3 in. Integral Fittings			
1502 Hammer Unions 15,000 MAWP		Part Number	
Figure	**Description**	**2 in.**	**3 in.**
A	F × F × M, NACE	FF-1502-424	FF-3102
A	F × F × M, non-NACE	FF-1502-423-1	FF-3120-1
B	M × M × F, NACE	FF-1502-420	FF-3104
B	M × M × F, non-NACE	FF-1502-422-1	FF-3140-1
C	M × F × M, NACE	FF-1502-425-3	FF-3150-N
C	M × F × M, non-NACE	FF-1502-425-1	FF-3150
D	F × M × F, NACE	FF-1502-427	FF-3160-N
D	F × M × F, non-NACE	FF-1502-426-1	FF-3160
E	M × F Elbow, NACE	FF-1502-201	FF-3103-1
E	M × F Elbow, non-NACE	FF-1502-301	FF-3100-1
F	Long radius ELL assembly (PSL-1), 2 in. EC, Non-NACE	FF-1502-305-A	
G	Cross F × M × M × M	FF-1502-401	FF-3180-1
H	Cross F × F × F × M	FF-1502-411	FF-3170-1
	Tee, 3 in. F × M × 2 in. F, Non-NACE		FF-3190-1

1502 Integral Fitting Flow Rates				
Size	**Bore (in.)**	**GPM**	**BBL/M**	**Cubic Meters/ Min.**
2 in.	1.75	314.87	7.5	1.19
3 in.	2.75	777.54	18.5	2.94

Tee Fittings (4 in. 1002 and 1502 Connections)

Tees are available in multiple sizes and configurations (please see figures for all configurations available for our 4 in. 1002 and 4 in. 1502 line of tee fittings). They are also available in custom configurations.

- 1002 fittings are only available in non-NACE at 10,000 MAWP
- 1502 fittings are available in NACE at 10,000 MAWP and non-NACE at 15,000 MAWP
- Tees are available in multiple sizes and custom configurations. The images are not all the configurations offered.

Material		
Service	**Body**	**Working Pressure**
Standard	Non-NACE	15,000 PSIG
Sour Service	NACE Standard MR0175 ISO15156	10,000 PSIG

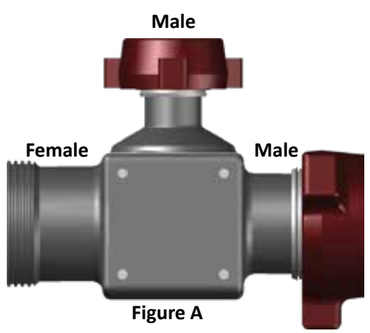


Figure A

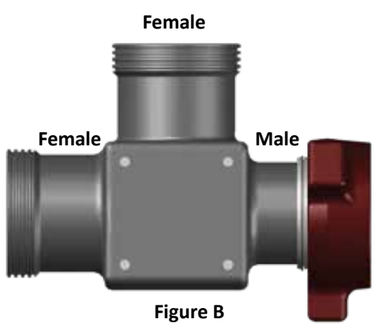
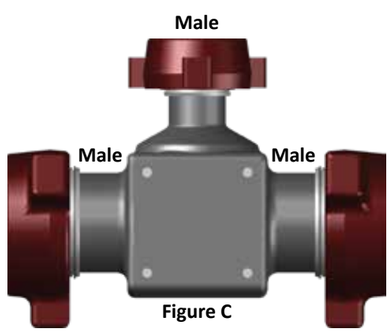


Figure B



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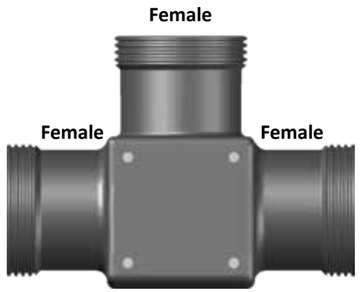


Figure D

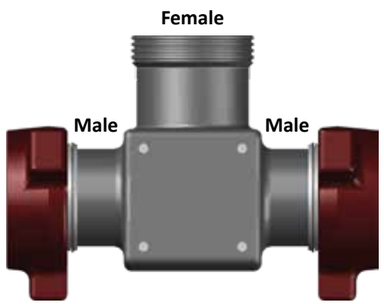
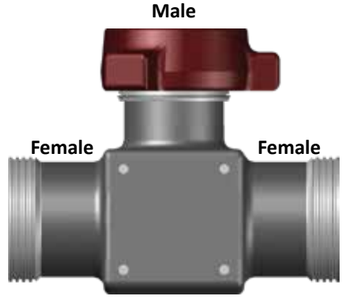


Figure E



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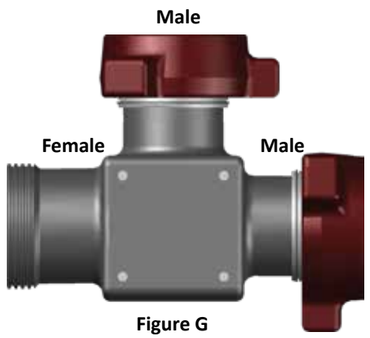

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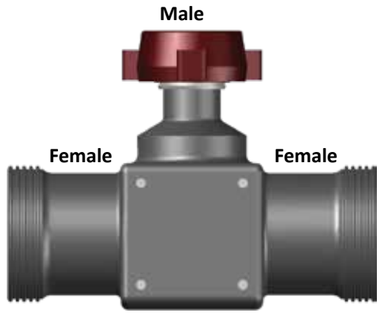


Figure H

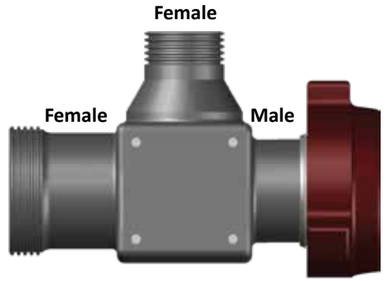


Figure I

4 in. Integral Fittings (Non-NACE) Hammer Unions 1002–10,000 MAWP Maximum Flow Rate 34 BBL/M		
Figure	**Description (Run × Run × Branch)**	**Part Number**
A	F × M × M (4 in. 1002 run, 2 in. 1502 branch)	FF-4121-1
B	F × M × F (4 in. 1002)	FF-4143-1
C	M × M × M (4 in. 1002 run, 2 in. 1502 branch)	FF-4124
D	F × F × F (4 in. 1002)	FF-4142-1
E	M × M × F (4 in. 1002)	FF-4141-1
F	F × F × M (1002 end connection)	FF-4120-1
G	F × M × M (4 in. 1002 end connection)	FF-4140-1
H	F × F × M (4 in. 1002 run, 2 in. 1502 branch)	FF-4125
I	F × M × F (4 in. 1002 run, 2 in. 1502 branch)	FF-4122-1
J	F × M × F (4 in. 1002 run, 3 in. 1502 branch)	FF-4123-1
K	F × M × F (4 in. 1002 run, 3 in. 1502 heavy duty branch)	FF-4126
L	Elbow F × M (4 in. 1002)	FF-4150-1

4 in. Integral Fittings (Non-NACE) Hammer Unions 1502–15,000 MAWP Maximum Flow Rate 30 BBL/M		
Figure	**Description (Run × Run × Branch)**	**Part Number**
A	F × M × M (4 in. 1502 run, 2 in. 1502 branch)	FF-4231-1
B	F × M × F (4 in. 1502)	FF-4226-1
D	F × F × F (4 in. 1502)	FF-4225
E	M × M × F (4 in. 1502)	FF-4227-1
F	F × F × M (1502 end connection)	FF-4220-1
G	F × M × M (4 in. 1502)	FF-4228-1
H	F × F × M (4 in. 1502 run, 2 in. 1502 branch)	FF-4229-1
I	F × M × F (4 in. 1502 run, 2 in. 1502 branch)	FF-4222-1
J	F × M × F (4 in. 1502 run, 3 in. 1502 branch)	FF-4224-1
K	F × M × F (4 in. 1502 run, 3 in. 1502 heavy duty branch)	FF-4223-1
L	Elbow F × M (4 in. 1502)	FF-4200-1
M	F × F × M (4 in. 1502 run, 3 in. 1502 branch)	FF-4230-1

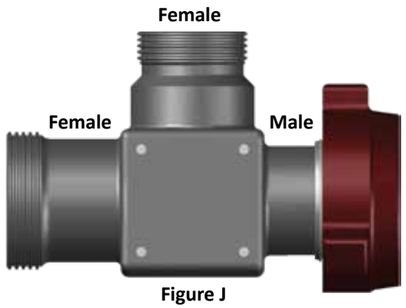


Figure J

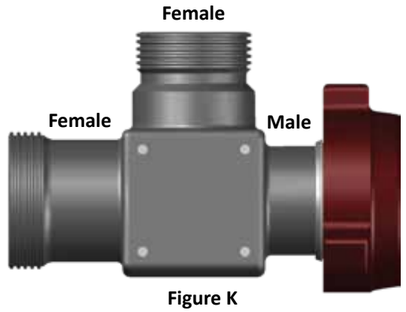


Figure K

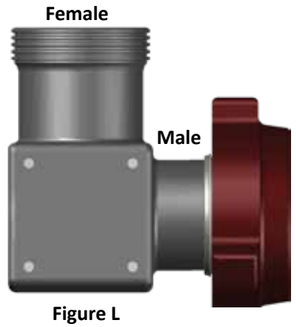


Figure L

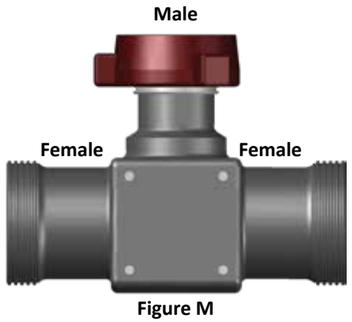


Figure M

Cross

Crosses are available in multiple sizes and configurations. They are also available in custom configurations.

Material		
Service	**Body**	**Working Pressure**
Standard	Non-NACE	15,000 PSIG
Sour Service	NACE Standard MR0175 ISO15156	10,000 PSIG

Figure	1502 Description	Part Number	
		2 in.	3 in.
A	F × M × M × M, non-NACE	FF-1502-401	FF-3180-1
A	F × M × M × M, NACE	FF-1502-401-N	FF-3108-N-1
B	M × F × F × F, non-NACE	FF-1502-411	FF-3170-1
B	M × F × F × F, NACE	FF-1502-411-N	FF-3107-1

1502 Integral Fitting Flow Rates				
Size	**Bore (in.)**	**GPM**	**BBL/M**	**Cubic Meters/ Min.**
2 in.	1.75	314.87	7.5	1.19
3 in.	2.75	777.54	18.5	2.94

Figure	4 in. 1002 Description	Part Number
C	F × M × M × M, non-NACE	FF-4146-1
D	M × F × F × F, non-NACE	FF-4144-1

1002 Integral Fitting Flow Rates				
Size	**Bore (in.)**	**GPM**	**BBL/M**	**Cubic Meters/ Min.**
4 in.	3.75	1445.85	34.4	5.47

Figure	4 in. 1502 Description	Part Number
C	F × M × M × M, non-NACE	FF-4246-1
D	M × F × F × F, non-NACE	FF-4244-1

1502 Integral Fitting Flow Rates				
Size	**Bore (in.)**	**GPM**	**BBL/M**	**Cubic Meters/ Min.**
4 in.	3.50	1259.49	30.0	4.77

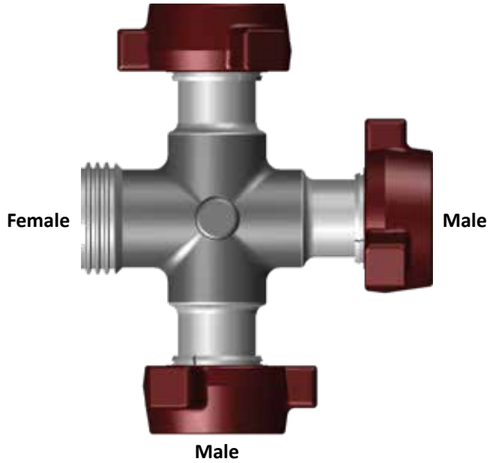


Figure A

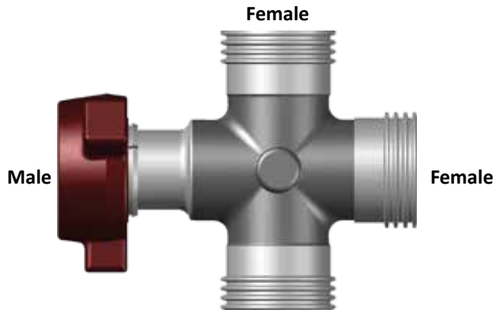


Figure B

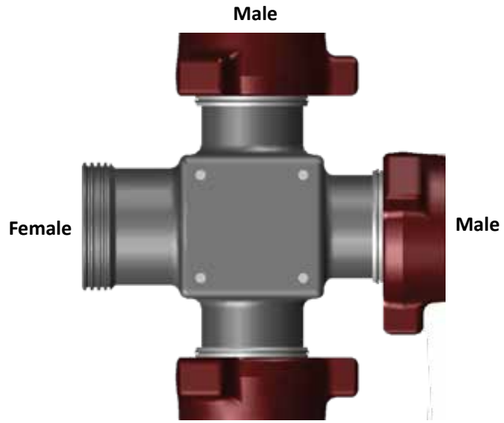


Figure C

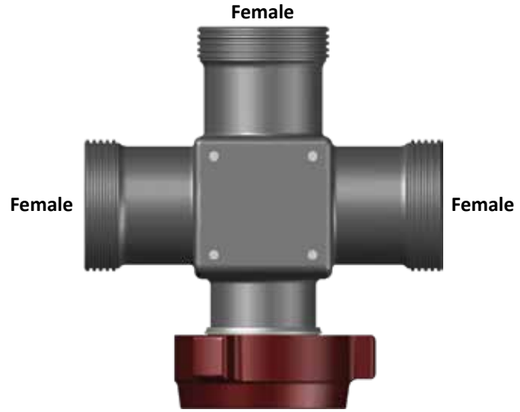


Figure D

Crossovers

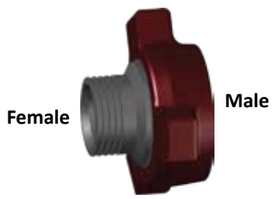
Crossovers are available in a multitude of configurations and sizes ranging from 1 in. to 4 in. Crossovers can rate up to a maximum of 15,000 PSIG working pressure depending on the configuration.

Material		
Service	**Body**	**Working Pressure**
Standard	Non-NACE	15,000 PSIG
Sour Service	NACE Standard MR0175 ISO15156	10,000 PSIG

2 in. 1502 Crossover Fittings 15,000 MAWP	
Description	**Part Number**
2 in. 1502 M × 2 in. LP M	FF-CR 1000-1
2 in. 1502 F × 2 in. LP M	FF-CR 1010
2 in. 1502 M × 2 3/8 in. EU pin	FF-CR 1100-1
2 in. 1502 F × 2 3/8 in. EU pin	FF-CR 1110
2 in. 1502 M × 2 7/8 in. EU pin	FF-CR 1200-1
2 in. 1502 F × 2 7/8 in. EU pin	FF-CR 1210
2 in. 1502 M × M (8 in. long)	FF-CR 1500
1 13/16 in., 15M flange × 2 in. 1502 M	FL25099461-A
1 13/16 in., 15M flange × 2 in. 1502 F	FL25099462
2 1/16 in., 15M flange × 2 in. 1502 M	FL25119461-A
2 1/16 in., 15M flange × 2 in. 1502 F	FL25119462
2 9/16 in., 15M flange × 2 in. 1502 M	FL25179461-A
2 9/16 in., 15M flange × 2 in. 1502 F	FL25179462
3 1/16 in., 15M flange × 2 in. 1502 M	FL25219461-A
3 1/16 in., 15M flange × 2 in. 1502 F	FL25219462
3 1/8 in., 5M flange × 2 in. 1502 F	FL25227462
4 1/8 in., 5M flange × 2 in. 1502 M	FL25228450-1
4 1/8 in., 5M flange × 2 in. 1502 F	FL25228454
4 1/16 in., 15M flange × 2 in. 1502 M	FL25279460-A
4 1/16 in., 15M flange × 2 in. 1502 F	FL25279462

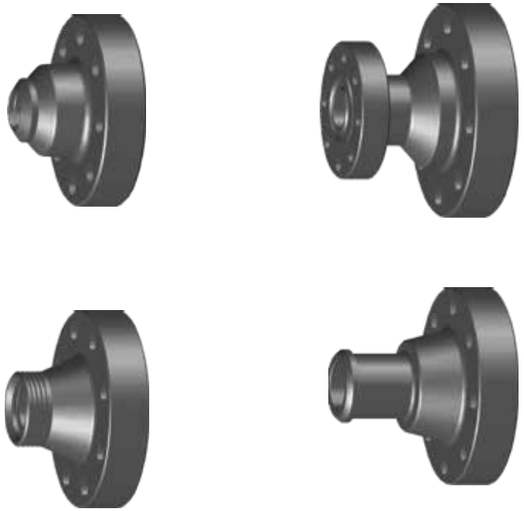
3 in. 1502 Crossover Fittings 15,000 MAWP	
Description	**Part Number**
3 in. 1502 M × M (8 in. long)	FF-CR 1580-1
3 in. 1502 M × 2 in. 1502 M	FF-CR 1591-1
3 in. 1502 M × 2 in. 1502 F	FF-CR 1592-1
3 in. 1502 F × 2 in. 1502 F (body only)	FF-CR 1598
3 in. 1502 F × 2 in. 1502 M (6.25 in. long)	FF-CR 1599-1
3 in. 1502 F × 2 in. 1502 M (12 in. long)	FF-CR 1600-1
2 9/16 in., 15M flange × 3 in. 1502 F (made in Houston	FL25179464
3 1/16 in., 15M flange × 3 in. 1502 M	FL25219561-1
3 1/16 in., 15M flange × 3 in. 1502 F	FL25219562
4 1/16 in., 15M flange × 3 in. 1502 M	FL25279470-1
4 1/16 in., 15M flange × 3 in. 1502 F	FL25279472

4 in. 1502 Crossover Fittings 15,000 MAWP	
Description	**Part Number**
4 in. 1502 M × 2 in. 1502 F	FF-CR 4101-1
4 in. 1502 M × 3 in. 1502 M	FF-CR 4102-1
4 in. 1502 M × 3 in. 1502 F	FF-CR 4103-1
4 in. 1502 F × 2 in. 1502 M	FF-CR 4104-1
4 in. 1502 F × 3 in. 1502 M	FF-CR 4106-1
4 in. 1502 M × 2 in. 1502 M	FF-CR 4107-1
4 in., 1502 F × F (7 in. long)	TSIDA0302
4 in., 1502 M × M (9 in. long)	FF-CR 4108-1
4 1/16 in., 5M flange × 4 in. 1502 M	FL25228458-1
4 1/16 in., 15M flange × 4 in. 1502 F	FL25279482
4 1/16 in., 15M flange × 4 in. 1502 M	FL25279488-1



API Flanges (Spools, Weldnecks, Weco)

API flanges are available in a multitude of configurations. They can be configured as spools, weldnecks, and weco flanges. Studded flanges are also available upon request. Below are some, not all, of the configurations we offer. Please contact MGB for custom configurations.



Elbows

Material		
Service	**Body**	**Working Pressure**
Standard	Non-NACE	15,000 PSIG
Sour Service	NACE Standard MR0175 ISO15156	10,000 PSIG

Connections	MAWP
4 in. 1002 F × 4 in. 1002 M	10,000 PSIG
4 in. 1502 F × 4 in. 1502 M	15,000 PSIG

Figure	Elbow Description	Part Number
A	2 in., M × F, non-NACE	FF-1502-301
A	2 in., M × F, NACE	FF-1502-201
A	3 in., M × F, non-NACE	FF-3100-1
A	3 in., M × F, NACE	FF-3103-1
B	4 in. 1002, M × F, non-NACE	FF-4150-1
B	4 in. 1502, M × F, non-NACE	FF-4200-1

Integral Fitting Elbows Flow Rates				
Size	**Bore (in.)**	**GPM**	**BBL/M**	**Cubic Meters/ Min.**
2 in. 1502	1.75	314.87	7.5	1.19
3 in. 1502	2.75	777.54	18.5	2.94
4 in. 1002	3.75	1445.85	34.4	5.47
4 in. 1502	3.50	1259.49	30.0	4.77

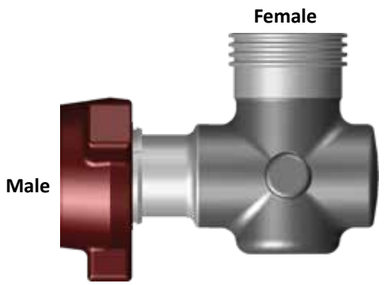


Figure A

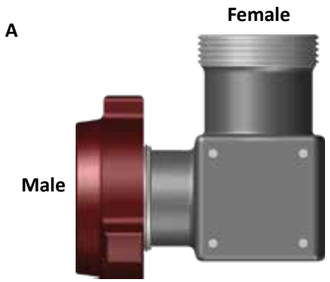


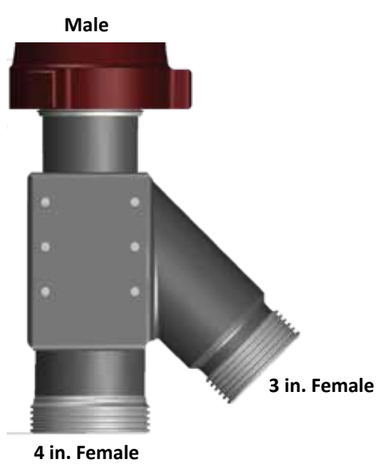
Figure B

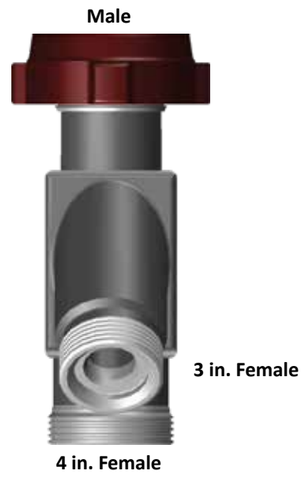
Laterals

Material		
Service	**Body**	**Working Pressure**
Standard	Non-NACE	15,000 PSIG
Sour Service	NACE Standard MR0175 ISO15156	10,000 PSIG

4 in. Laterals – 15,000 MAWP	
Connections (Run × Run × Branch)	**Part Number**
4 in. 1002 F × 4 in. 1002 M × 3 in. 1502 F	FFL-4110-1
4 in. 1502 F × 4 in. 1502 M × 3 in. 1502 F	FFL-4130-1

4 in. Laterals – 10,000 MAWP	
Connections (Run × Run × Branch)	**Part Number**
4 in. 1502 F × 4 in. 1502 M × 3 in. 1502 F	FFL-4100-1



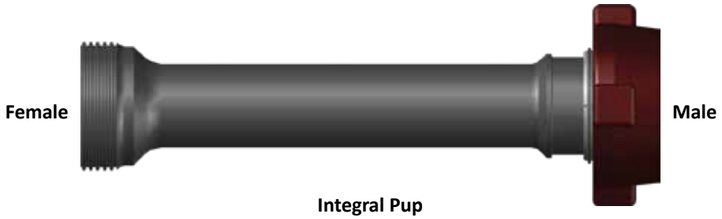


Pup

Joint connections include NPST pup joints, and integral pup joints. Our pup joints are designed to be tough and reliable under the most extreme conditions. Pups are precision machined and heat treated in house. Pups come in standard and custom lengths.

- Available in NACE and non-NACE
- NPST pipes are available in detachable and non-detachable
- Uniform bore
- Available up to 15,000 PSIG
- Available in a variety of lengths

Pup Joint Flow Rates				
Size	Bore (in.)	GPM	BBL/M	Cubic Meters/ Min.
2 in. 1502 NPST	1.69	293.65	7.0	1.11
2 in. 1502 Integral	1.75	314.87	7.5	1.19
3 in. 1502 NPST	2.43	607.12	14.5	2.30
3 in. 1502 Integral	2.43	607.12	14.5	2.30
4 in. 1002 NPST	3.60	1332.49	31.7	5.04
4 in. 1502 NPST	3.30	1119.66	26.7	4.24



Integral Pup

NPST Pup

Pup Joints 1502 Hammer Unions – 15,000 MAWP						
Length (ft.)	Part Number					
	2 in. Integral 7.5 BBL/m*	2 in. NPST 7.0 BBL/m*	3 in. NPST 14.5 BBL/m*	3 in. NPST With Detachable Nut 14.5 BBL/m*	4 in. NPST 26.7 BBL/m*	4 in. NPST With Detachable Nut 26.7 BBL/m*
1	FI-2A-01	FF-1502-011				
2	FI-2A-02	FF-1502-021	FF-3202	FF-3202-D	FF-4502	FF-4502-D
3	FI-2A-03	FF-1502-031	FF-3203	FF-3203-D	FF-4503	FF-4503-D
4	FI-2A-04	FF-1502-041	FF-3204	FF-3204-D	FF-4504	FF-4504-D
5	FI-2A-05	FF-1502-051	FF-3205	FF-3205-D	FF-4505	FF-4505-D
6	FI-2A-06	FF-1502-061	FF-3206	FF-3206-D	FF-4506	FF-4506-D
7		FF-1502-071				
8	FI-2A-08	FF-1502-081	FF-3208	FF-3208-D	FF-4508	FF-4508-D
9		FF-1502-091				
10	FI-2A-10	FF-1502-101	FF-3210	FF-3210-D	FF-4510	FF-4510-D
12		FF-1502-112			FF-4512	FF-4512-D
14		FF-1502-114				
15		FF-1502-151	FF-3200	FF-3200-D	FF-4515	
20		FF-1502-152	FF-3220	FF-3220-D	FF-4520	FF-4520-D

*Maximum flow rate

1002 Hammer Unions – 10,000 MAWP		
Length (ft.)	Part Number	
	4 in. NPST 31.7 BBL/m*	4 in. NPST With Detachable Nut 31.7 BBL/m*
2	FF-4400/.454-02	FF-4400/.454-02D
3	FF-4400/.454-03	FF-4400/.454-03D
4	FF-4400/.454-04	FF-4400/.454-04D
5	FF-4400/.454-05	FF-4400/.454-05D
6	FF-4400/.454-06	FF-4400/.454-06D
8	FF-4400/.454-08	FF-4400/.454-08D
10	FF-4400/.454-10	FF-4400/.454-10D
15	FF-4400/.454-15	
20	FF-4400/.454-20	

*Maximum flow rate

1502 Spacer Assemblies – 15,000 MAWP		
Length (in.)	Part Number	
	2 in. M × F 7.5 BBL/m*	3 in. 18.5 BBL/m*
6	FF-1002-1	
6.7		FF-3012-1
7.7		FF-3011-1
8.365	FF-1008-1	
9.19	FF-1000-1	
9.756	FF-1010-1	
10.33		FF-3014-1
10.471	FF-1009-1	
12	FF-1003-1	FF-3003-1
13.88	FF-1006-1	
14.1		FF-3004-1
24	FF-1004-1	FF-3010-1
36	FF-1007-1	FF-3008-1

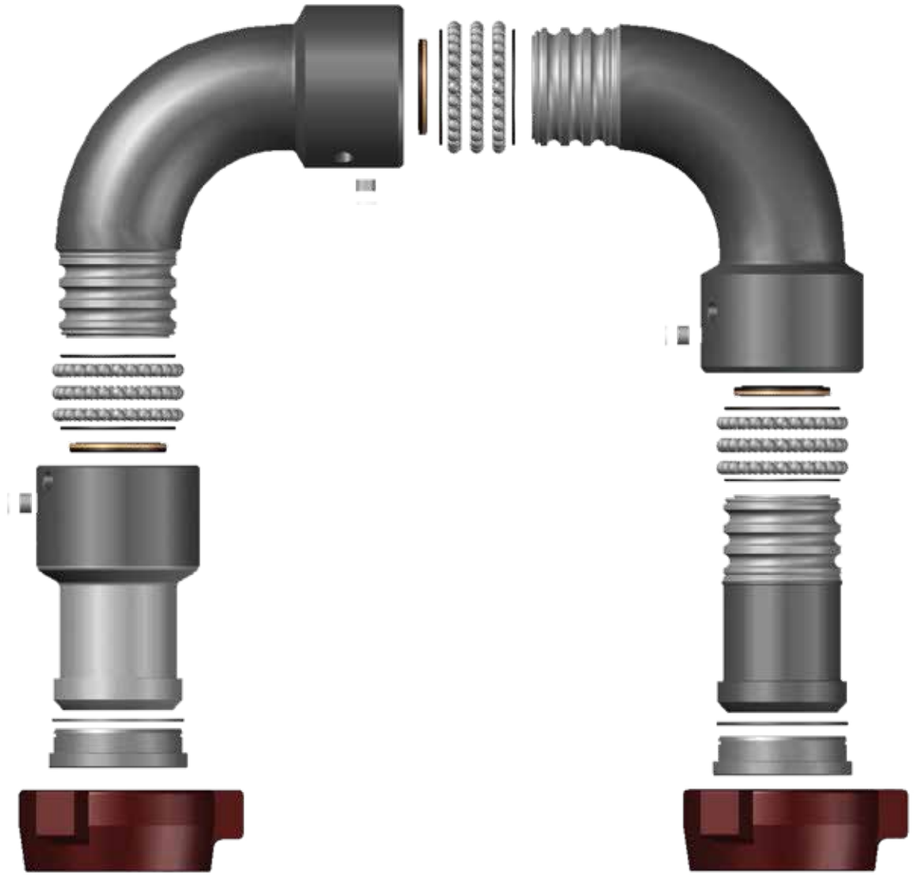
*Maximum flow rate

Swivel

Our swivel joints are capable of handling a broad spectrum of fluids. Swivels are available in 2 in., 3 in. and 4 in. sizes. We offer our swivels in a multitude of styles for 360 degree rotation in one through four planes. Our swivels feature three rows of bearings to maximize performance under heavy loads. All parts such as the packing, bearings, ball plugs and seals are easily replaceable. Uniform bore reduces erosion and allows for smooth flow of fluids. The heavy wall under the ball race extends the life of the swivel joint. Tight tolerance at the ball bearing results in longer service. The benefit of this tight tolerance is to reduce movement which would negatively impact the seal and ball race resulting in leaks. Some benefits of swivel joints is that piping can be easily maneuvered around fixed objects. They also provide storage convenience and eliminate the need for exact alignments. 360 degree rotation allows for numerous loop configurations.

- 15,000 PSI MAWP for all sizes
- Available in 2 in., 3 in. and 4 in. sizes
- Available in a multitude of styles for 360 degree rotation in one through four planes

Swivel Flow Rates				
Size	Bore (in.)	GPM	BBL/M	Cubic Meters/ Min.
2 in. 1502	1.75	314.87	7.5	1.19
3 in. 1502	2.63	711.17	16.9	2.69
4 in. 1002	3.63	1354.79	32.3	5.13
4 in. 1502	3.50	1259.49	30.0	4.77



Key Features

1. **Field proven packing**: Low friction packing with anti-extrusion ring improves seal ability and reliability.
2. **Environmental seal**: O-ring protects the ball bearing housing from the service environment.
3. **Advanced machining and bending process**: Swivels are manufactured from the highest CNC performance and machining tools with the ability to provide six sigma levels of reliable quality repeatedly. Uniform bore throughout the entire swivel reduces damage from erosion.
4. **Precision ball bearing design**: Minimizes stress of ball races and maximizes load capacity.
5. **Heavy wall thickness under ball races**: Thicker wall at high erosion area provides allowance for the wall thickness under the male ball races without reducing the flow bore.

Swivel Joints 1502 Hammer Unions 15,000 MAWP				
Fig.	Description	Part Number		
		2 in. 7.5 BBL/M*	3 in. 16.9 BBL/M*	4 in. 30 BBL/M*
A	Style 10 M × F	SJA32201047	SJA48201047	SJA64201047
B	Style 10 M × M	SJA32201048	SJA48201048	SJA64201048
C	Style 20 M × F	SJA32202047	SJA48202047	SJA64202047
D	Style 30 M × F	SJA32203047	SJA48203047	SJA64203047
E	Style 50 M × F	SJA32205047	SJA48205047	SJA64205047
F	Style 60 M × F	SJA32206047	SJA48206047	SJA64206047
G	Style 60 M × M	SJA32206048	SJA48206048	SJA64206048
H	Style 80 M × F	SJA32208047	SJA48208047	SJA64208047
I	Style 100 M × F	SJA32210047	SJA48210047	SJA64210047
	Repair Kits	SJA322030R	SJA482030R	SJA642030R
	8 ft. hose loop M × F (NPST)	SJA32211049		
	9 ft. hose loop M × F (Integral)	SJA32211047		
	10 ft. hose loop M × F (NPST)	SJA32211048	SJA48211048	

*Maximum flow rate

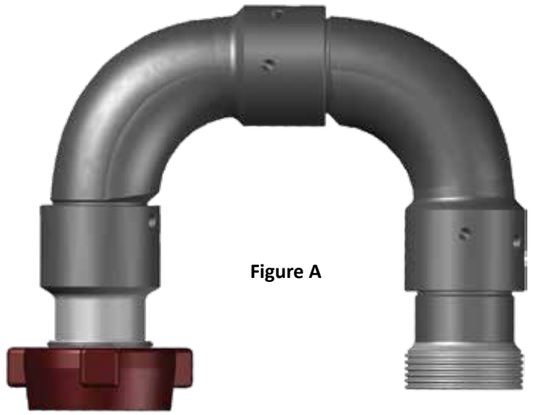


Figure A

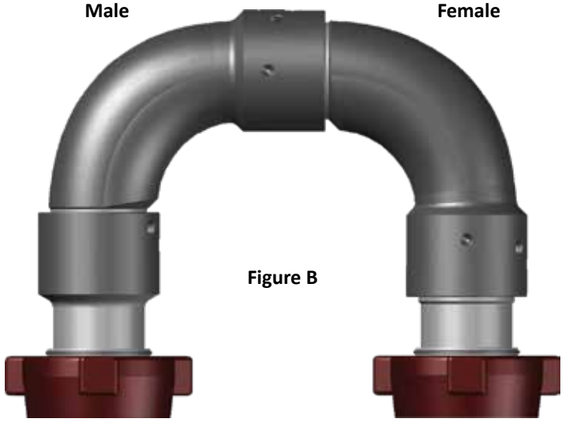


Figure B

Swivel Joints 1002 Hammer Unions 10,000 MAWP		
Fig.	Description	Part Number
		4 in. 32.3 BBL/M*
A	Style 10 M × F	SJA64101047
B	Style 10 M × M	SJA64101048
C	Style 20 M × F	SJA64102047
D	Style 30 M × F	SJA64103047
E	Style 50 M × F	SJA64105047
F	Style 60 M × F	SJA64106047
G	Style 60 M × M	SJA64106048
H	Style 80 M × F	SJA64108047
I	Style 100 M × F	SJA64110047
	Repair Kits	SJA641030R

*Maximum flow rate

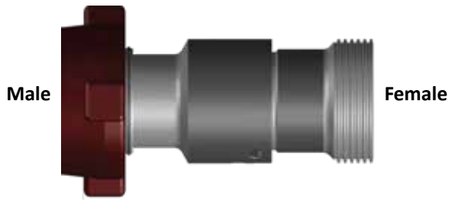


Figure C

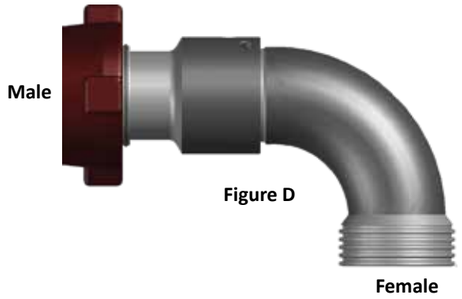


Figure D

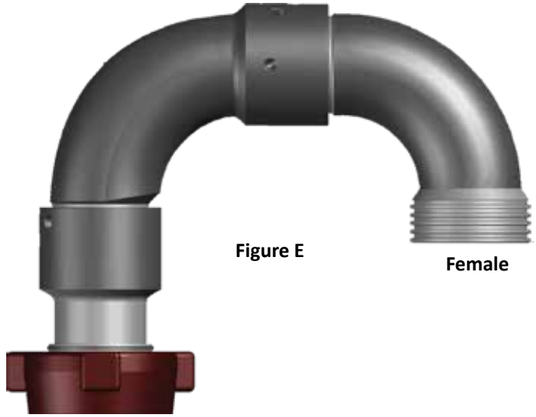


Figure E

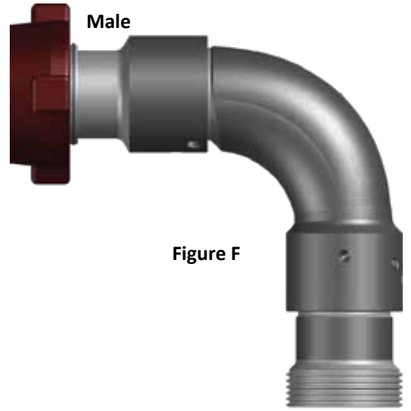


Figure F

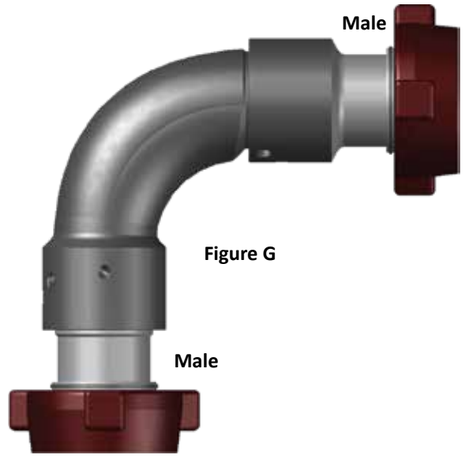


Figure G

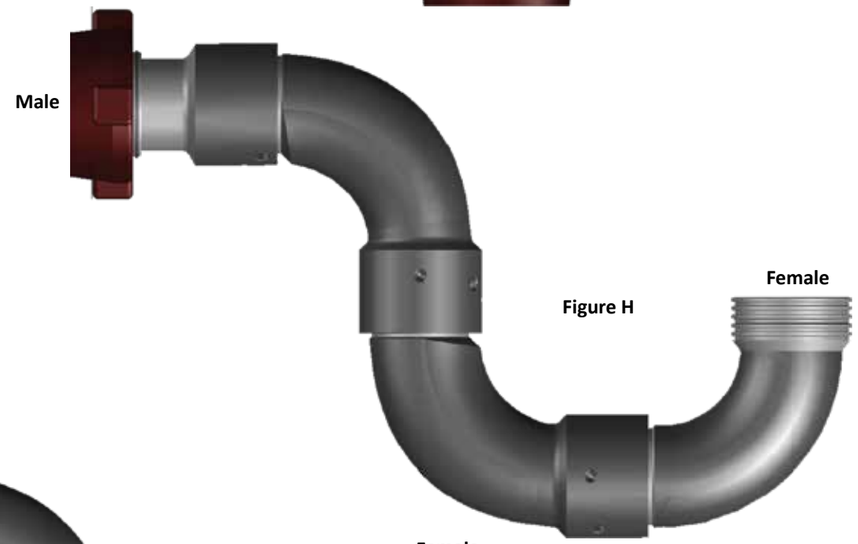


Figure H

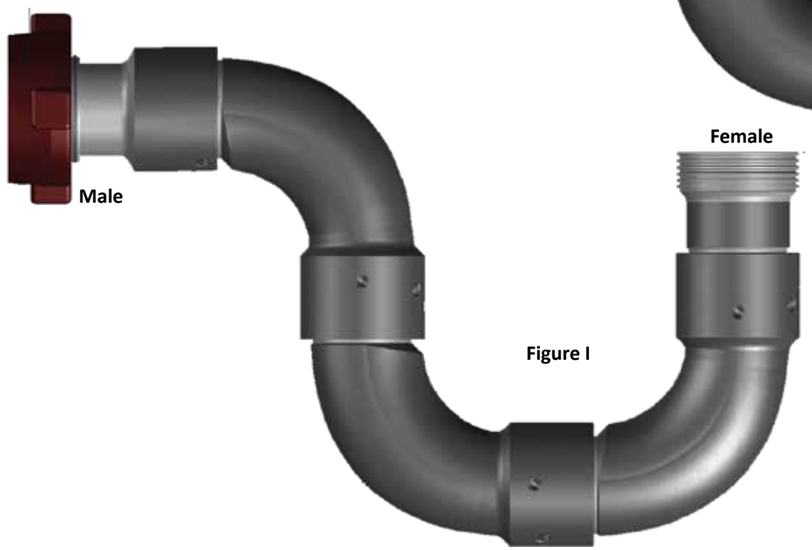


Figure I

Manual Plug

Plug valves offer long and reliable service life. Our valves require low operating torque and are machined from tough forging bodies that offer reliability under pressure. We offer multiple configurations for our valves which include hydraulic, pneumatic and gear operated mounting as well as cost effective repair kits. Customers also have increased flexibility with plug valve options using 1502 hammer union connections and API flanged connections.

1502 Hammer Union Manual Plug Valves, Non-NACE 15,000 MAWP

Figure	Size	Connections	BBL/M	Part Number	
				Plug Valve	Repair Kit
A	1 in.	2 in. F × M	2.50	FP-10151	FPR-10151
A	2 in.	2 in. F × M	7.50	FP-20130	FPR-20151
A	3 in.	3 in. F × M	18.50	FP-30130	FPR-30151
A	4 in.	4 in. F × M	30.0	FP-40151	FPR-40151

1502 Hammer Union Manual Plug Valves, NACE 10,000 MAWP

Figure	Size	Connections	BBL/M	Part Number	
				Plug Valve	Repair Kit
A	1 in.	2 in. F × M	2.50	FP-10152	FPR-10151-N
A	2 in.	2 in. F × M	7.50	FP-20140	FPR-20151-N
A	3 in.	3 in. F × M	18.50	FP-30140	FPR-30151-N

1002 Hammer Union Manual Plug Valves, Non-NACE 10,000 MAWP

Fig.	Size	Connections	BBL/M	Part Number	
				Plug Valve	Repair Kit
A	4 in.	4 in. F × M	34.4	FP-40101	FPR-40151

Plug Valve Assembly

Connections	2 in. Non-NACE Part Number
2 1/16 in., 10M, FE × FE	FP-20135-10
2 1/16 in., 15M, FE × FE	FP-20135-115

LP Union Manual Plug Valves, Non-NACE 10,000 MAWP

Fig.	Size	Connections	BBL/M	Part Number	
				Plug Valve	Repair Kit
B	1 in.	2 in. M × M	2.50	FP-10155	FPR-10151
C	2 in.	2 in. F × F	6.50	FP-20153	FPR-20151

Flange Union Manual Plug Valves, Non-NACE 10,000 MAWP

Figure	Size	Connections	BBL/M	Part Number	
				Plug Valve	Repair Kit
D	2 in.	2 1/16 in., FL × FL	7.5	FP-20135-10	FPR-20151

Flange Union Manual Plug Valve, Non-NACE 15,000 MAWP

Figure	Size	Connections	BBL/M	2 in. Non-NACE Part Number	
				Plug Valve	Repair Kit
D	2 in.	2 1/16 in. FL × FL	7.5	FP-20135-15	FPR-30151-N

Figure A

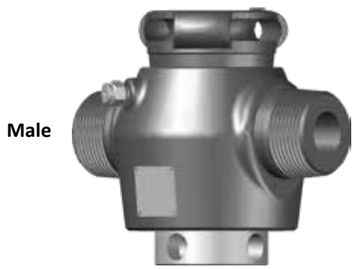


Figure B

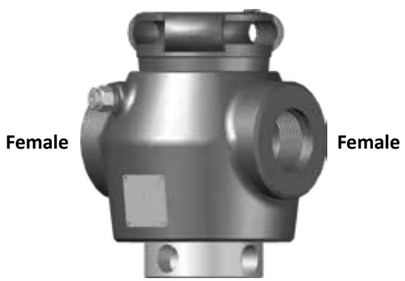


Figure C


Figure D

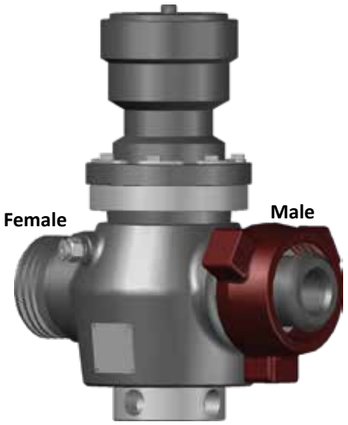


Figure A

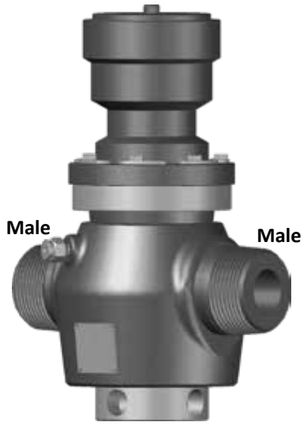


Figure B

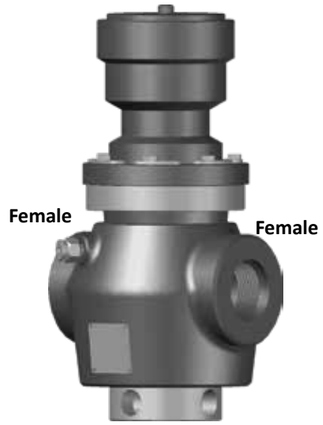


Figure C


Figure D

Hydraulic Plug

- Compact and reliable
- Available in sizes 1, 2, 3 and 4 in.
- Available in NACE and Non-NACE
- Components have an API temperature rating of P - U (-20° to 250° F)
- Available in 2, 3, 4 in. and API flange connections
- API flanges are available in a multitude of configurations. They can be configured as spools, weldnecks and Weco flanges. Studded flanges are also available upon request. Please contact MGB for custom configurations.

1502 Hammer Union Hydraulic Plug Valves, Non-NACE 15,000 MAWP

Figure	Size	Connections	BBL/M	Part Number	
				Plug Valve	Repair Kit
A	1 in.	2 in. F × M	2.5	FP-10156	FPR-10151
A	2 in.	2 in. F × M	7.5	FP-20132	FPR-20151
A	3 in.	3 in. F × M	18.5	FP-30132	FPR-30151
A	4 in.	4 in. F × M	30	FP-40152	FPR-40151

1502 Hammer Union Hydraulic Plug Valves, NACE 10,000 MAWP

Figure	Size	Connections	BBL/M	Part Number	
				Plug Valve	Repair Kit
A	1 in.	2 in. F × M	2.5	FP-10157	FPR-10151-N
A	2 in.	2 in. F × M	7.5	FP-20142	FPR-20151-N
A	3 in.	3 in. F × M	18.5	FP-30142	FPR-30151-N

1002 Hammer Union Hydraulic Plug Valves, Non-NACE 10,000 MAWP

Figure	Size	Connections	BBL/M	Part Number	
				Plug Valve	Repair Kit
A	4 in.	4 in. F × M	34.4	FP-40102	FPR-40151

LP Union Hydraulic Plug Valves, Non-NACE 10,000 MAWP

Figure	Size	Connections	BBL/M	Part Number	
				Plug Valve	Repair Kit
B	1 in.	2 in. M × M	2.5	N/A	FPR-10151
C	2 in.	2 in. F × F	6.5	N/A	FPR-20151

Flange Union Hydraulic Plug Valves, Non-NACE 10,000 MAWP

Figure	Size	Connections	BBL/M	Part Number	
				Plug Valve	Repair Kit
D	2 in.	2 1/16 in. FL × FL	7.5	FP-20135-10-H	FPR-20151

Flange Union Hydraulic Plug Valves, Non-NACE 15,000 MAWP

Figure	Size	Connections	BBL/M	Part Number	
				Plug Valve	Repair Kit
D	2 in.	2 1/16 in. FL × FL	7.5	FP-20135-15-H	FPR-20151

Gear Operated Plug

1502 Hammer Union Gear-Operated Plug Valves, NACE 10,000 MAWP

Figure	Size	Connections	BBL/M	Part Number	
				Plug Valve	Repair Kit
E	3 in.	3 in. F × M	18.5	FP-30140-G	FPR-30151-N

1002 Hammer Union Gear-Operated Plug Valves, Non-NACE 10,000 MAWP

Figure	Size	Connections	BBL/M	Part Number	
				Plug Valve	Repair Kit
E	4 in.	4 in. F × M	34.4	FP-40101-G	FPR-40151

1502 Hammer Union Gear-Operated Plug Valves, Non-NACE 15,000 MAWP

Figure	Size	Connections	BBL/M	Part Number	
				Plug Valve	Repair Kit
E	3 in.	3 in. F × M	18.5	FP-30130-G	FPR-30151
E	4 in.	4 in. F × M	30.0	FP-40151-G	FPR-40151

Figure E

Pneumatic Plug

1502 Hammer Union Pneumatic Plug Valves, NACE 10,000 MAWP

Figure	Size	Connections	BBL/M	Part Number	
				Plug Valve	Repair Kit
B	2 in.	2 in. F × M	7.5	FP-20143-S3	FPR-20151-N
B	3 in.	3 in. F × M	18.5	FP-30140-A	FPR-30151-N
B	4 in.	4 in. F × M	30.0	N/A	FPR-40151

1502 Hammer Union Pneumatic Plug Valves, Non-NACE 15,000 MAWP

Figure	Size	Connections	BBL/M	Part Number	
				Plug Valve	Repair Kit
B	2 in.	2 in. F × M	7.5	FP-20133-S3	FPR-20151
B	3 in.	3 in. F × M	18.5	FP-30130-A	FPR-30151

1002 Hammer Union Pneumatic Plug Valves, Non-NACE 10,000 MAWP

Figure	Size	Connections	BBL/M	Part Number	
				Plug Valve	Repair Kit
B	4 in.	4 in. F × M	34.4	N/A	FPR-40151

LP Union Pneumatic Plug Valves, Non-NACE 10,000 MAWP

Figure	Size	Connections	BBL/M	Part Number	
				Plug Valve	Repair Kit
C	1 in.	2 in. M × M	2.5	N/A	FPR-10151
D	2 in.	2 in. F × F	6.5	N/A	FPR-20151

Flange Union Pneumatic Plug Valves 10,000 MAWP

Figure	Size	Connections	BBL/M	Part Number	
				Plug Valve	Repair Kit
E	2 in.	2 1/16 in. FL × FL, Non-NACE	7.5	FP-20135-10-H	FPR-20151

Flange Union Pneumatic Plug Valves 15,000 MAWP

Figure	Size	Connections	BBL/M	Part Number	
				Plug Valve	Repair Kit
E	2 in.	2 1/16 in. FL × FL, Non-NACE	7.5	FP-20135-15-H	FPR-30151-N

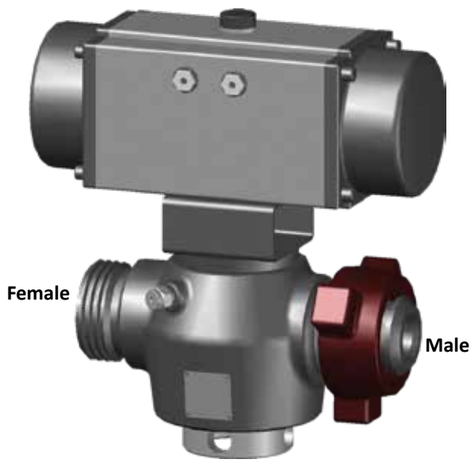


Figure B

Figure C

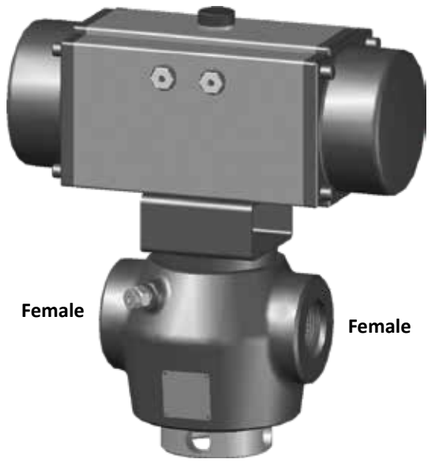


Figure D


Figure E

Dart and Flapper Check Valves

Check valves provide quality flow control in one direction while at the same time preventing flow in the opposite direction. We offer check valves in 2 configurations: dart and flapper. Check valves are mainly used to assure that pressure and fluid do not back up into the manifold area or into the pumps. Our patented flapper check valve design is unique for our easily replaceable seat, improved internal geometry and covered pin design. Our dart check valves are generally used in well service applications to allow flow to the well but isolate any back flow up stream of the valve. This provides a safety device at various locations in the flow line and assures that pressure and fluid cannot back up into the manifold area or into the pumps. Our check valves are designed to be reliable during service with long service life. They are also designed for easy maintenance and repair.

Dart Check Valve

- Elastomer seals are low cost and easy to service
- Low friction dart
- Dart requires minimal pressure to open
- Alignment insert helps reduce friction
- Alignment insert increases dart and body life while providing a positive seal
- Weep hole serves as a leak indicator and safety relief hole

1502 Dart Check Valve			
Size	Type	Part Number	
		2 in. Non-NACE 7.5 BBL/M*	3 in. Non-NACE 15.3 BBL/M*
2 in.	1502 Dart F × M	FFC-2100-1	FFC-3100-1
	Repair kit	FFC-2100-R	FFC-3100-R

*Maximum flow rate

Flapper Check Valve

- Improved internal flow reduces turbulence
- Improved internal geometry reduces erosion damages
- Covered pin design reduces erosion/corrosion damage
- Increases service life of the valve significantly
- Minor repair kit can be replaced inline
- Patented design eliminates all special tooling for installation reducing downtime of the equipment
- Hand removable seat design
- Self-aligning flapper-bracket design

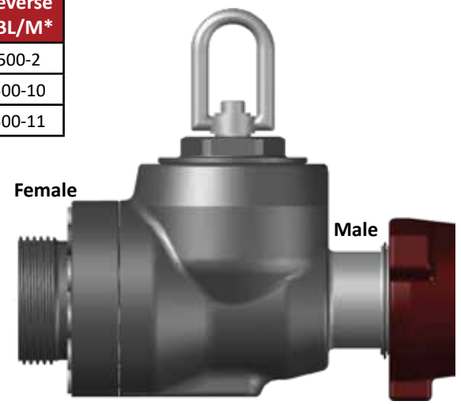
Flapper Check Valve, Non-NACE 1502 Hammer Unions – 15,000 MAWP				
Type	Part Number			
	2 in. 7.5 BBL/M*	3 in. 17.0 BBL/M*	4 in. 32.5 BBL/M*	4 in. Reverse 32.5 BBL/M*
F × M	FFC-2500-1	FFC-3300-1	FFC-4500-1	FFC-4500-2
Minor repair kit	FFC-2500-10	FFC-3300-10	FFC-4500-10	FFC-4500-10
Major repair kit	FFC-2500-11	FFC-3300-11	FFC-4500-11	FFC-4500-11

*Maximum flow rate

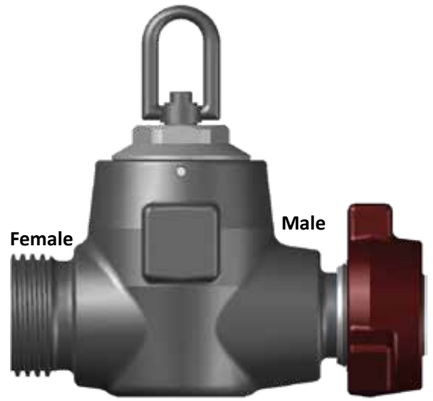
Flapper Check Valve 1002 Hammer Unions – 10,000 MAWP		
Type	Part Number	
	4 in. Non-NACE 32.5 BBL/M*	4 in. Non-NACE 32.5 BBL/M*
F × M	FFC-4500-5	FFC-4500-6
Minor repair kit	FFC-4500-10	FFC-4500-10
Major repair kit	FFC-4500-11	FFC-4500-11

*Maximum flow rate

Flapper Check Valve Parts		
Type	Part Number	
	2 in.	3 in.
Adjusting nut	FFC-2502	FFC-3502-1
Seat	FFC-2503	FFC-3503-1
Bracket	FFC-2504	FFC-3504-1
Pin	FFC-2505	FFC-3505-1
Flapper	FFC-2506	FFC-3506-1



FFC-3300 Flapper



Standard Flapper

Pressure Relief

Pressure relief valves specialize in smooth fluid control under extreme pressure. We offer many different styles of pressure relief valves which include spring loaded, hydraulic, and nitrogen configurations. Our spring loaded relief valves use a clockwise and counterclockwise adjustment mechanism to decrease and increase pressure. Our nitrogen relief valves are designed for repeatability, long life and accurate relief of pressure. Our hydraulic relief valves use low and high pressure pumps with a user friendly control which offers simple operation for full bore opening. This protects the pump and manifold from pressure spike. Improved deflection helps extend the life of the valve.

Two Inch

- Improved opening discharge area reduces erosion damage
- Minimized side loads improve repeatability
- Improved accuracy
- Significant increase in service life
- Spring loaded relief valve
- Reliable and cost effective repair kit
- Low adjustable pressure torque
- Compact
- Reliable seal
- High-deflection stroke

Pressure Relief Valve
1502 Hammer Union, 15,000 MAWP
Maximum Flow Rate 4 BBL/M

Size	Type	Part Nmbers	
		NACE	Non-NACE
2 in.	1502 Spring Loaded M × F	FR-1900-1	FR-1900
2 in.	1502 spring loaded M × 2 in. F LP		FR-2000
2 in.	1502 minor relief valve repair kit	FR-1900-10	FR-1900-10
2 in.	1502 major relief valve repair kit	FR-1900-11	FR-1900-11
2 in.	1502 relief valve seal kit	FR-1900-SKIT	FR-1900-SKIT

M750

- Minimized side loads improve repeatability
- Improved accuracy
- Significant increase in service life
- Spring loaded relief valve
- Reliable and cost effective repair kit
- Low adjustable pressure torque
- Compact
- Reliable seal
- High-deflection stroke

Pressure Relief Valve
3 in. M750 1502 Hammer Union 15,000 MAWP
Maximum Flow Rate 10 BBL/M

Size	Type	Part Number Non-NACE
3 in.	1502 spring loaded M × F (M750)	FR-3300-1
3 in.	M750 relief valve minor repair kit	FR-3300-10
3 in.	M750 relief valve major repair kit	FR-3300-11
3 in.	1502 relief valve ball, 1 3/8 in., f/2 in. (ceramic)	180010
3 in.	1502 relief valve seat, .750 bore (ceramic)	202096
3 in.	M750 TIP-PRV	FR-3302-1
3 in.	M750 cage	FR-3303-1
3 in.	M750 stem	FR-3304-1
3 in.	M750 guide ring	FR-3305-1
3 in.	M750 bonnet	FR-3306-1
3 in.	M750 bore adapter	FR-3307-1
3 in.	Disc spring, OD 70 mm, ID 40.5 mm	180083

M1125

- Improved opening discharge area reduces erosion damage
- Minimized size loads improve repeatability
- Improved accuracy
- Significant increase in service life
- Engineered spring control for maximum stroke length and effective discharge orifice
- Precision controlled tolerances
- Friction control
- Improved internal geometry
- Simple, reliable and cost effective

Pressure Relief Valve
3 in. M1125 1502 Hammer Union 15,000 MAWP
Maximum Flow Rate 15 BBL/M

Size	Type	Non-NACE
3 in.	1502 Spring Loaded M × F (M1125)	FR-3200-1
3 in.	M1125 relief valve minor repair kit	FR-3200-10
3 in.	M1125 relief valve major repair kit	FR-3200-11
3 in.	1502 relief valve ball, 1 11/16 in., f/3 in. (ceramic)	180012
3 in.	1502 relief valve seat, 1.125in. bore (ceramic)	201676
3 in.	M1125 stem guide	FR-3203-1
3 in.	M1125 ball carrier	FR-3205-1
3 in.	M1125 PRV cage	FR-3208-1
3 in.	Disc spring 125.0 × 51.0 × 6.0 × 9.4	180126

Nitrogen (N2)

- Nitrogen emergency relief valve
- Reliable and cost effective repair kit
- Compact design
- Reliable seal
- Precision machined internal components
- Requires nitrogen bottle and control

Pressure Relief Valve
3 in. Nitrogen (N2) 1502 Hammer Union 15,000 MAWP
Maximum Flow Rate 15 BBL/M

Size	Type	Non-NACE
3 in.	1502 Nitrogen (N-200) F × M	FRN-3000-1
3 in.	1002 Nitrogen (N-450) F × M	FRN-3450-1
3 in.	N2 emergency relief valve repair kit	FRN-3000-1/RK
3 in.	N2 emergency relief valve regulator manifold	FRN-3000-1/RM

2 in. 1502 Pressure Relief Valve

M750 Pressure Relief Valve

M1125 Pressure Relief Valve

N2 Pressure Relief Valve

BV15 Bleeder

BV15 bleeder valve specializes in high pressure bleed off applications where the 1 × 2 plug valve would normally be used. However, 1 × 2 plug valves are not designed for high pressure bleed off. The BV15 gradually relieves pressure. Special design on the plug and insert assist in controlling the fluid flow to prolong the valve life. The internal design helps throttle high velocity erosive fluids without degrading performance of the valve. Opening and closing of the BV15 uses a single handle at the top of the valve. Simply turn clockwise to open and counterclockwise to close. Pin design under the handle indicates whether the valve is in open or closed position. Disassembly and assembly of the BV15 is very simple which reduces the time the valve is out of operation during maintenance. Cost effective design.

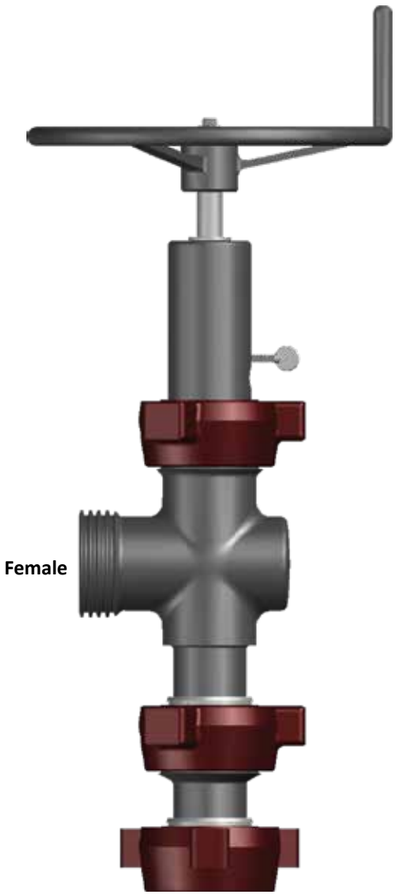
- Specializes in high pressure bleed off applications
- Special plug–insert design helps throttle high velocity erosive fluid without degrading the performance of the valve in only ¼ turn
- Simple, single handle clockwise/counterclockwise operation
- Simple, reliable and cost effective

BV15 Bleeder Valve				
Size	Connections	Working Pressure	Part Nmbers	
			Non-NACE	Repair Kit
2 in.	1502 M × F	15,000 psig	FBV-2000-1	FBV-2000-11

BV15 Bleeder Valve

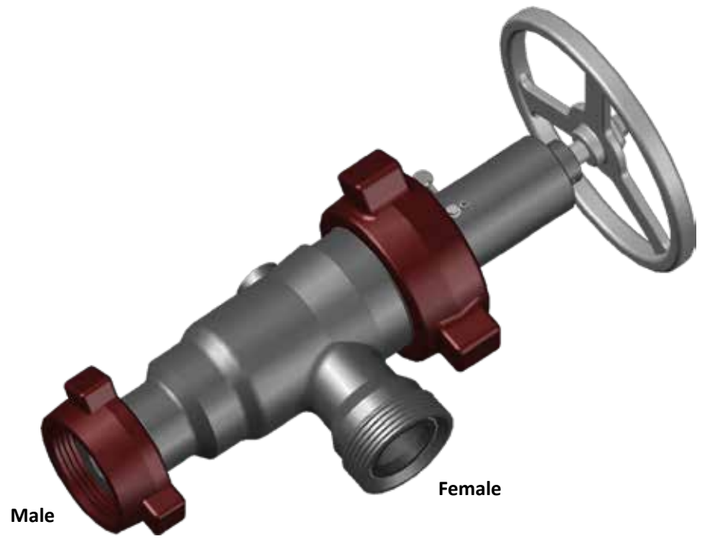
Adjustable and Positive Chokes

Our chokes are field-proven designed and are manufactured from high quality materials. We offer both positive and adjustable chokes depending on customer requirements. Chokes conform to current API requirements both functionally and in terms of calculated stresses. Chokes are used to control flow rate; it is an important part of controlling downstream pressure and flow rates during the flow-back process. Our adjustable chokes are also available in different orifice sizes to best suit your flow control needs. We use a clockwise and counterclockwise adjustment system to obtain a specified downstream pressure or desired flow rate. Position indicators provided with our chokes help users accurately analyze the orifice diameter.



2 in. 1502 Adjustable Choke

Chokes 1502 Hammer Unions – 15,000 MAWP	
Description	Part Nmbers
Adjustable choke, 2 in. end connections (EC) with 3/4 in. SS/TC stem and seat	FCM-9900
Adjustable choke, 2 in. EC with 1 in. SS/TC stem and seat	FCM-9900-1
Positive choke, 2 in. EC	FCM-9901
Body, 2 in. F × F × M, Non-NACE	FCM-9902
Bonnet, 2 in. adjustable choke with 3/4 in. SS/TC stem	FCM-9903
Bonnet, 2 in. adjustable choke with 1 in. SS/TC stem	FCM-9903-1
Choke saver, 2 in. (choke nipple)	FCM-9991
Adjustable choke repair kit, 2 in. 1502 choke with 3/4 in. orifice	FCMRK-9900-3
Adjustable choke, 3 in. 1502, 2 in. max. type E-H2 choke, SS/TC stem and seat	FCH-9900
Adjustable choke (NACE), 3 in. 1502, 2 in. max. type E-H2 choke, SS/TC stem and seat	FCH-9900-N
Adjustable choke (NACE), 3 in. 1502, 2 in. max. type E-H2 choke, SS/TC stem and seat, target tap 9/16 in. A/C	FCH-9900-N-A
Adjustable choke (NACE), 3 in. 1502, 1 in. max. type E-H2 choke, SS/TC stem and seat, target tap 1/2 in. NPT	FCH-9900-N-T
Adjustable choke (NACE), 3 in. 1502, 2 in. max. type E-H2 choke, SS/TC stem and seat, target tap 1/2 in. NPT	FCH-9900-N-T1
Max. orifice SS/TC stem, 3 in. 1502, 2 in. max. type E-H2	FCH-9901
Max. orifice (NACE) SS/TC stem, 3 in. 1502, 2 in. max type E-H2	FCH-9901-N
Bonnet (H2), 3 in. adjustable choke with 2 in. max. orifice SS/TC stem	FCH-9903
Bonnet (H2), 3 in. adjustable choke with 1 in. max. orifice SS/TC stem	FCH-9903-1



3 in. 1502 Adjustable Choke

Pressure Debooster	
Description	**2 in. Part Number**
2 in. debooster assembly	FD-2000-1
2 in. debooster assembly repair kit	FD-2000-10

Blanking Caps 1502 Hammer Unions – 15,000 MAWP		
Description	**Part Number**	
	3 in.	**4 in.**
3 in. (M) blanking cap assembly, solid	BL-3AMS-1	BL-4AMS-1
3 in. (M) blanking cap assembly, 1/2 in. NPT	BL-3AMN-1	BL-4AMN-1
3 in. (M) blanking cap assembly, 9/16 in. A/C	BL-3AMA-1	BL-4AMA-1
4 in. (F) blanking cap assembly, solid		BL-4AFS
4 in. (F) blanking cap assembly, 1/2 in. NPT		BL-4AFN
4 in. (F) blanking cap assembly, 9/16 in. A/C		BL-4AFA

Blanking Caps 1002 Hammer Unions – 10,000 MAWP	
Description	**4 in. Part Number**
4 in. (M) blanking cap assembly, solid	BL-2AMS-1
4 in. (M) blanking cap assembly, 1/2 in. NPT	BL-2AMN-1
4 in. (M) blanking cap assembly, 9/16 in. A/C	BL-2AMA-1
4 in. (F) blanking cap assembly, solid	BL-2AFS
4 in. (F) blanking cap assembly, 1/2 in. NPT	BL-2AFN
4 in. (F) blanking cap assembly, 9/16 in. A/C	BL-2AFA