



High Pressure Equipment
A **GRACO** Company

Valves, Fittings & Tubing for Hydrogen Applications

H₂



A World Leader in High Pressure Solutions for Hydrogen Applications

HiP has been in the forefront of providing high pressure valves, fittings and tubing to support our customers as they incorporate hydrogen in their zero-carbon energy strategies. The ongoing build-out of the hydrogen refueling infrastructure necessary to support the fuel cell powered trucks, buses, cars, forklifts and other equipment depends on products designed and built to meet the unique challenges of hydrogen. HiP is a worldwide leader in delivering safe and reliable products to handle the high pressures and extreme temperatures associated with handling hydrogen.

A Complete Line of Standard Hydrogen Products

Over the last 15 years, HiP has produced tens of thousands of valves and fittings for hydrogen applications. As demand has continued to increase, we have committed the resources to develop a complete line of standard products for use with hydrogen, all either in stock or available with short lead-times. We have engineered our high pressure valve stems, packing and associated soft goods to meet the unique requirements of hydrogen. The standard material for all HiP valve bodies and fittings is 316 stainless steel, which is hydrogen compatible.

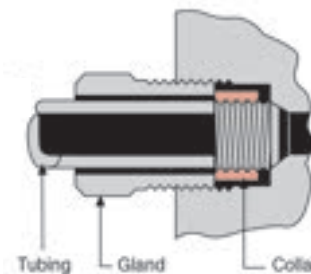
HiP Standard Hydrogen Products

- High pressure valves up to 20,000 psi
- Trunion style severe duty ball valves
- Soft seat relief valves
- Block and bleed needle and ball valves
- Air operated valves for remote operation
- Fittings, tubing and accessories



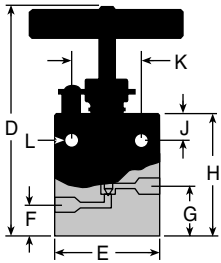
High Pressure Coned & Threaded Connections

HiP hydrogen products use a pressure coned and threaded connection which accommodates the low temperatures, high pressures and extreme conditions common in these applications.



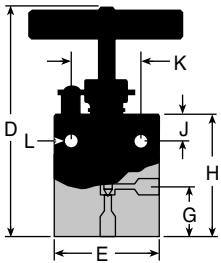
Medium Pressure Valves

20,000 psi Service - Two Way Straight Valves



Tubing	Catalog No.	psi	Conn.	Orifice	Cv	D	E	F	G	H	J	K	L	Thickness
1/4" O.D.	20-11LF4-HYD	20,000	LF4	1/8"	0.17	4-3/8"	2"	3/8"	13/16"	2"	3/8"	1-1/4"	7/32"	3/4"
3/8" O.D.	20-11LF6-HYD	20,000	LF6	13/64"	0.45	4-3/8"	2"	3/8"	13/16"	2"	3/8"	1-1/4"	7/32"	3/4"
9/16" O.D.	20-11LF9-HYD	20,000	LF9	5/16"	1.12	6-1/8"	2-1/2"	1/2"	1-7/8"	2-7/8"	1/2"	1-3/8"	11/32"	1"
3/4" O.D.	20-11LF12-HYD	20,000	LF12	7/16"	2.29	7"	3"	3/4"	1-1/2"	3-3/4"	5/8"	1-3/4"	7/16"	1-3/8"
1" O.D.	20-11LF16-HYD	20,000	LF16	9/16"	3.86	8-27/64"	4-1/8"	7/8"	1-13/16"	4-5/8"	1-1/8"	2-1/2"	9/16"	1-3/4"

Two Way Angle Valves

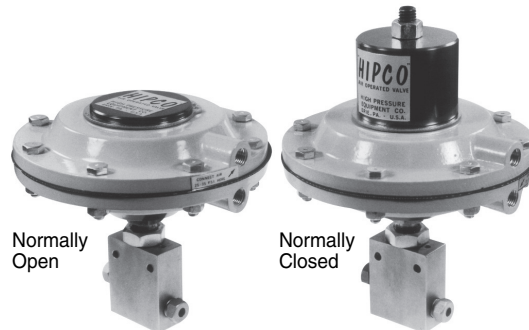


Tubing	Catalog No.	psi	Conn.	Orifice	Cv	D	E	F	G	H	J	K	L	Thickness
1/4" O.D.	20-12LF4-HYD	20,000	LF4	1/8"	0.255	4-13/16"	2"	—	1-1/4"	2-7/16"	3/8"	1-1/4"	7/32"	3/4"
3/8" O.D.	20-12LF6-HYD	20,000	LF6	13/64"	0.675	4-13/16"	2"	—	1-1/4"	2-7/16"	3/8"	1-1/4"	7/32"	3/4"
9/16" O.D.	20-12LF9-HYD	20,000	LF9	5/16"	1.68	6-5/8"	2-1/2"	—	1-5/8"	3-3/8"	1/2"	1-3/8"	11/32"	1"
3/4" O.D.	20-12LF12-HYD	20,000	LF12	7/16"	3.435	7-1/2"	3"	—	2"	4-1/4"	5/8"	1-3/4"	7/16"	1-3/8"
1" O.D.	20-12LF16-HYD	20,000	LF16	9/16"	5.79	9-3/8"	4-1/8"	—	2-9/16"	5-7/16"	1-1/8"	2-1/2"	9/16"	1-3/4"

Air Operated Valves

Hipco Diaphragm Air Operators For Remote Operation

To 20,000 psi



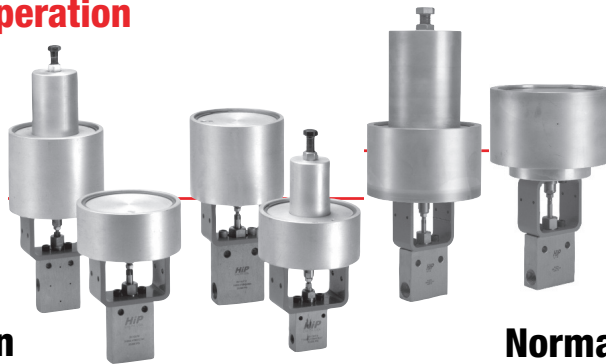
Normally Open (Spring To Open/Air To Close)

Valve Series	Maximum Operating Pressure	Approximate Air Pressure to Seat Valve
20-11LF4-NO-HYD 20-12LF4-NO-HYD	20,000 psi	60 psi
20-11LF6-NO-HYD 20-12LF6-NO-HYD	20,000 psi	85 psi
20-11LF9-NO-HYD 20-12LF9-NO-HYD	10,000 psi	100 psi

Normally Closed (Air To Open/Spring To Close)

Valve Series	Maximum Operating Pressure	Min. Adjusting Screw Torque	Approx. Air Pressure to Unseat Valve	Approx. Air Pressure to Fully Open Valve
20-11LF4-NC-HYD 20-12LF4-NC-HYD	20,000 psi	40 in. lb.	55 psi	90 psi
20-11LF6-NC-HYD 20-12LF6-NC-HYD	15,000 psi	60 in. lb.	80 psi	100 psi
20-11LF9-NC-HYD 20-12LF9-NC-HYD	10,000 psi	75 in. lb.	95 psi	100 psi

Hippo Piston Air Operators For Remote Operation To 20,000 psi



Normally Open (Spring To Open/Air To Close) Medium Duty

Valve Series	Maximum Operating Pressure	Orifice Size	Approx. Air Pressure to Seat Valve
20-11LF4-MPO-NO-HYD 20-12LF4-MPO-NO-HYD	20,000 psi	1/8"	95 psi
20-11LF6-MPO-NO-HYD 20-12LF6-MPO-NO-HYD	20,000 psi	13/64"	100 psi
20-11LF9-MPO-NO-HYD 20-12LF9-MPO-NO-HYD	10,000 psi	5/16"	100 psi

Normally Closed (Air To Open/Spring To Close) Medium Duty

Valve Series	Maximum Operating Pressure	Orifice Size	Minimum Adjusting Screw Torque	Approx. Air Pressure to Unseat Valve	Approx. Air Pressure to Fully Open Valve
20-11LF4-MPO-NC-HYD 20-12LF4-MPO-NC-HYD	20,000 psi	1/8"	50 in.lb.	70 psi	95 psi
20-11LF6-MPO-NC-HYD 20-12LF6-MPO-NC-HYD	20,000 psi	13/64"	55 in.lb.	70 psi	95 psi
20-11LF9-MPO-NC-HYD 20-12LF9-MPO-NC-HYD	10,000 psi	5/16"	55 in.lb.	70 psi	95 psi

Normally Open (Spring To Open/Air To Close) Heavy Duty

20-11LF4-HPO-NO-HYD 20-12LF4-HPO-NO-HYD	20,000 psi	1/8"	55 psi
20-11LF6-HPO-NO-HYD 20-12LF6-HPO-NO-HYD	20,000 psi	13/64"	55 psi
20-11LF9-HPO-NO-HYD 20-12LF9-HPO-NO-HYD	20,000 psi	5/16"	95 psi

Normally Closed (Air To Open/Spring To Close) Heavy Duty

20-11LF4-HPO-NC-HYD 20-12LF4-HPO-NC-HYD	20,000 psi	1/8"	55 in.lb.	35 psi	50 psi
20-11LF6-HPO-NC-HYD 20-12LF6-HPO-NC-HYD	20,000 psi	13/64"	60 in.lb.	35 psi	50 psi
20-11LF9-HPO-NC-HYD 20-12LF9-HPO-NC-HYD	16,000 psi	5/16"	85 in.lb.	60 psi	75 psi

Extra Heavy Duty

20-11LF12-EHPO-NO-HYD 20-12LF12-EHPO-NO-HYD	20,000 psi	7/16"	55 psi
20-11LF16-EHPO-NO-HYD 20-12LF16-EHPO-NO-HYD	20,000 psi	9/16"	55 psi

Extra Heavy Duty

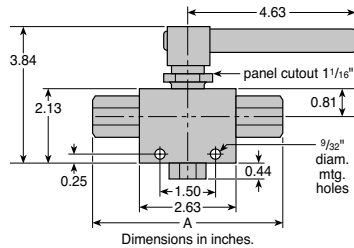
20-11LF12-EHPO-NC-HYD 20-12LF12-EHPO-NC-HYD	20,000 psi	7/16"	60 ft.lb.	35 psi	60 psi
20-11LF16-EHPO-NC-HYD 20-12LF16-EHPO-NC-HYD	20,000 psi	9/16"	95 ft.lb.	55 psi	95 psi

Trunion Style Ball Valves

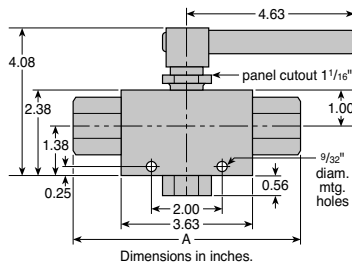
10,000, 15,000 and 20,000 psi Service

Two-Way Trunion Ball Valves - 90°

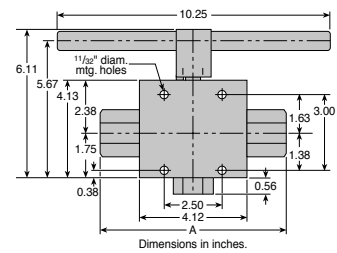
Orifice	Tube Size	Connection	Pressure Rating	Minimum Orifice	Cv	A	Catalog No.
.187	1/4"	LF4	20,000 psi	.109	0.31	4.63	20-71LF4-HYD
	3/8"	LF6	20,000 psi	.187	1.45	4.63	20-71LF6-HYD
	9/16"	LF9	20,000 psi	.187	1.45	5.13	20-71LF9-HYD
	1/4"	NPT	15,000 psi	.187	1.45	4.63	15-71NFB-HYD
.375	3/8"	LF6	15,000 psi	.203	2.1	5.81	15-74LF6-HYD
	9/16"	LF9	15,000 psi	.312	4.22	6.25	15-74LF9-HYD
	3/4"	LF12	15,000 psi	.375	6.08	6.67	15-74LF12-HYD
	1/4"	NPT	15,000 psi	.250	2.70	5.63	15-74NFB-HYD
	3/8"	NPT	15,000 psi	.375	6.08	5.63	15-74NFC-HYD
	1/2"	NPT	15,000 psi	.375	6.08	5.63	15-74NFD-HYD
.500	3/4"	LF12	10,000 psi	.500	10.2	6.56	10-80LF12-HYD



.187 Orifice



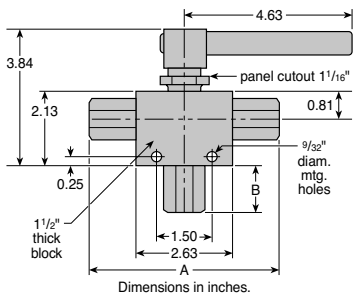
.375 Orifice



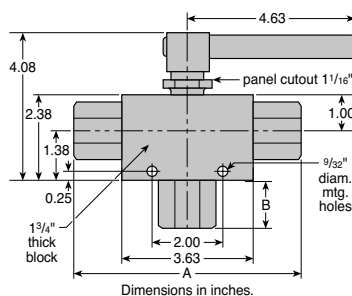
.500 Orifice

Three-Way Trunion Ball Valves

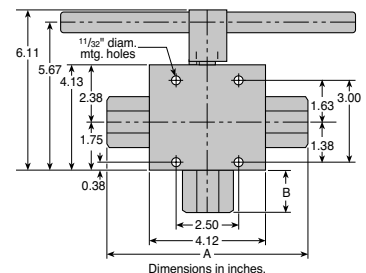
Orifice	Tube Size	Connection	Pressure Rating	Minimum Orifice	Cv	A	B	3-Way 90° Catalog No.	3-Way 180° Catalog No.
.187	1/4"	LF4	20,000 psi	.109	0.15	4.63	1.00	20-73LF4-HYD	20-72LF4-HYD
	3/8"	LF6	20,000 psi	.187	0.71	4.63	1.00	20-73LF6-HYD	20-72LF6-HYD
	9/16"	LF9	20,000 psi	.187	0.71	5.13	1.25	20-73LF9-HYD	20-72LF9-HYD
.375	3/8"	LF6	15,000 psi	.203	1.6	5.81	1.06	15-76LF6-HYD	15-75LF6-HYD
	9/16"	LF9	15,000 psi	.312	1.67	6.25	1.06	15-76LF9-HYD	15-75LF9-HYD
	3/4"	LF12	15,000 psi	.375	2.40	6.67	1.18	15-76LF12-HYD	15-75LF12-HYD
.500	3/4"	LF12	10,000 psi	.500	7.43	6.56	1.30	10-82LF12-HYD	10-81LF12-HYD



.187 Orifice



.375 Orifice



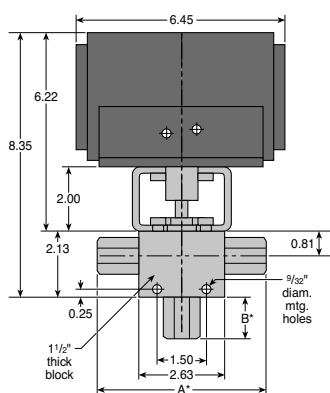
.500 Orifice

Ball Valve Actuators

High Pressure Equipment Company offers air operated actuators to accommodate remote operation.

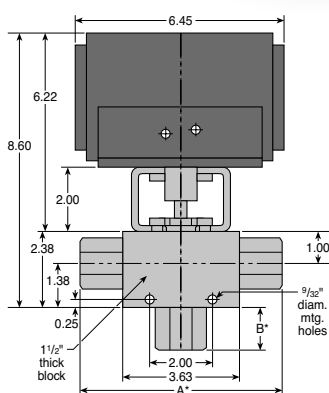
NOTE: These air operators are only for use with two-way and three-way diverter style valves.

To order: simply specify the appropriate ball valve catalog number and add the suffix “-TSR8-HYD” for air to open/spring to close, or “-TDA8-HYD” for air to open and close (double acting) or TSR20-HYD” for 0.500 orifice. For trunion only.



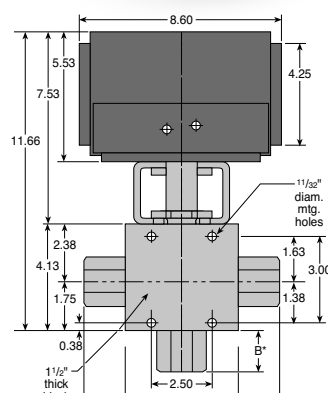
* Dimensions found within charts on pages 6.3-6.4

.187 Orifice



* Dimensions found within charts on pages 6.3-6.4

.375 Orifice

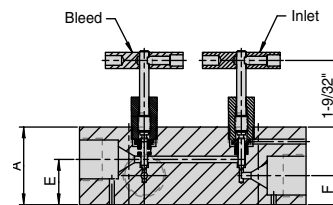
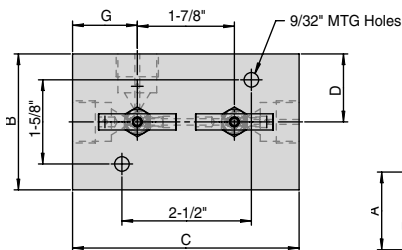


* Dimensions found within charts on pages 6.3-6.4

.500 Orifice

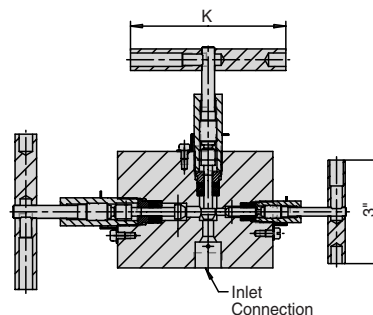
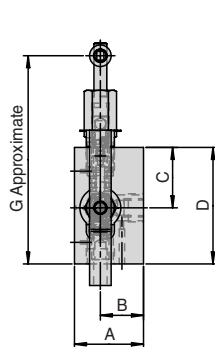
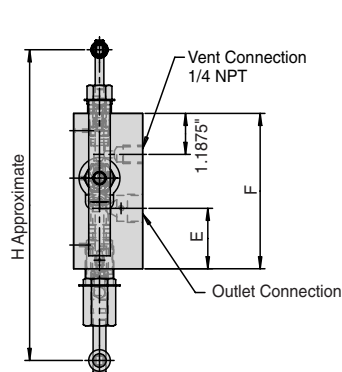
Block & Bleed Needle Valves

Catalog No.	Connector	A	B	C	D	E	F	G
15-SBB-NFB-HYD	1/4" NPT	1-1/2"	2-5/8"	3-7/8"	1-5/16"	7/8"	9/16"	1"
15-SBB-NFC-HYD	3/8" NPT	1-3/4"	3"	4-3/8"	1-1/2"	1-1/8"	13/16"	1-1/4"
15-SBB-NFD-HYD	1/2" NPT	1-3/4"	3"	4-3/8"	1-1/2"	1-1/8"	13/16"	1-1/4"
20-SBB-LF4-HYD	LF4	1-1/2"	2-5/8"	3-1/2"	1-5/16"	7/8"	9/16"	13/16"
20-SBB-LF6-HYD	LF6	1-1/2"	2-5/8"	3-3/4"	1-5/16"	7/8"	9/16"	15/16"
20-SBB-LF9-HYD	LF9	1-1/2"	2-5/8"	4-3/8"	1-5/16"	7/8"	9/16"	1-1/4"



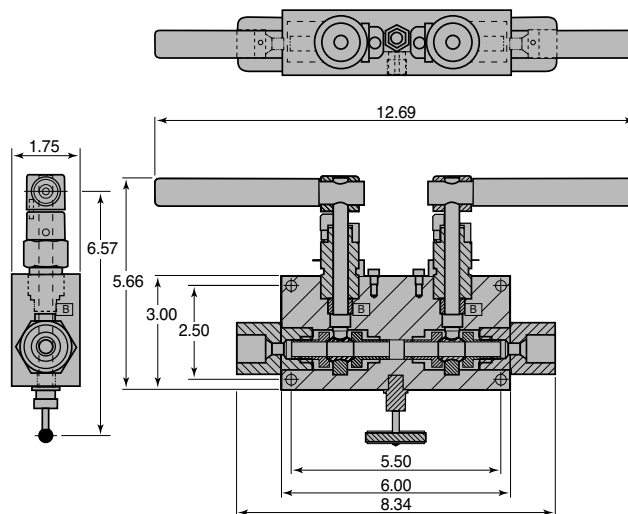
Double Block & Bleed Needle Valves

Catalog No.	Inlet Connector	Outlet Connector	A	B	C	D	E	F	G	H	K
20-DBB-LF4-HYD	LF4	LF4	2"	1-1/4"	1-3/16"	2-3/4"	1-3/16"	3-1/2"	4-5/8"	7-3/16"	3"
20-DBB-LF6-HYD	LF6	LF6	2"	1-1/4"	1-3/16"	2-3/4"	1-3/16"	3-1/2"	4-5/8"	7-3/16"	3"
20-DBB-LF9-HYD	LF9	LF9	2"	1-1/4"	1-3/4"	3-3/8"	1-3/4"	4-1/2"	6-1/16"	9"	4-1/2"
20-DBB-LF12-HYD	LF12	LF12	2-1/2"	1-3/4"	2-1/4"	4-1/4"	2-1/4"	5"	6-7/8"	9-1/2"	8-3/4"
20-DBB-LF16-HYD	LF16	LF16	3-1/2"	2-1/2"	2-13/16"	5-1/4"	2-13/16"	6"	8-7/16"	11"	10-1/4"



Double Block & Bleed Ball Valves

Catalog No.	Tube Size	Connector	Pressure Rating	Minimum Orifice	Cv
15-DBB-BV-NFB-HYD	1/4" NPT	NFB	15,000	.250	2.70
15-DBB-BV-NFC-HYD	3/8" NPT	NFC	15,000	.375	6.08
15-DBB-BV-NFD-HYD	1/2" NPT	NFD	15,000	.375	6.08
15-DBB-BV-LF6-HYD	3/8"	LF6	15,000	.203	2.01
15-DBB-BV-LF9-HYD	9/16"	LF9	15,000	.313	4.22
15-DBB-BV-LF12-HYD	3/4"	LF12	15,000	.375	6.08



Fittings, Tubing & Accessories

To help you safely plumb your hydrogen system, HiP offers a complete range of fittings and accessories made from high tensile 316 stainless steel. Fittings include elbows, tees, and crosses for all tubing connection sizes, as well as union couplings, bulkhead couplings and tubing end caps. We also offer a family of adapters and couplings to help facilitate changes in tubing sizes.

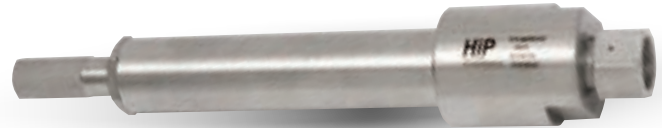
HiP's standard tubing family is cold drawn 316 stainless steel, seamless, and is supplied in the 1/8" hard condition (not annealed). Tensile strength is approximately 40 percent higher than that of annealed tubing. Coned and threaded nipples are available to help connect your system.



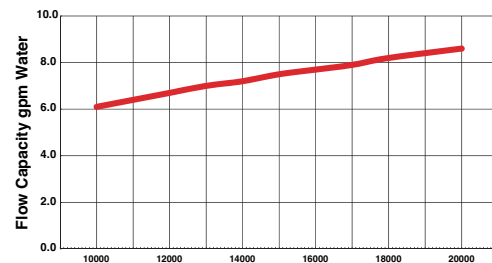
Relief Valves

Soft Seat Relief Valves (Factory Set)

Pressure Range	Orifice Size	Type of Service	Assembly Part No.	Max Flow Capacity H2O (GPM)
1,500 to 2,999 psi	3/16"	GAS OR LIQUID	602923-03-HYD	8
3,000 to 9,999 psi	3/16"	GAS OR LIQUID	602923-10-HYD	14
10,000 to 19,999 psi	1/8"	GAS OR LIQUID	602923-20-HYD	8
20,000 to 25,000 psi	1/8"	GAS OR LIQUID	602923-25-HYD	10



602923-20 Soft Seat Relief Valve (Factory Set)



Relief Valves (Field Adjustable)

Pressure Range	Orifice Size	Type of Service	Part Number	Cv
1,000 to 10,000 psi	0.070	GAS OR LIQUID	HIP-10RV-HYD	.12
10,001 - 20,000 psi	0.070	GAS OR LIQUID	HIP-20RV-HYD	.12

CE Marked Relief Valves

HiP relief valves are now available with CE marking. These products will proudly be marked with the CE symbol, signifying they comply with the stringent requirements of the Pressure Equipment Directive (PED). To order, add -CE to your relief valve part number.

Hydrogen Regulators

High Pressure, High Flow for H₂

HiP hydrogen regulators are designed to meet the high pressure, high flow performance requirements for stable system dispense at elevated flow rates.

Each hydrogen pressure regulator is rated for inlet pressures up to 15,000 psig (1034.2 bar) and is available to meet flow requirements of Cv 1.0 (HIP-15PR) or 0.5 (HIP-15PR-0.5).



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