



VALVES, FITTINGS & TUBING PRESSURE VESSELS & REACTORS



High Pressure Equipment
A GRACO Company



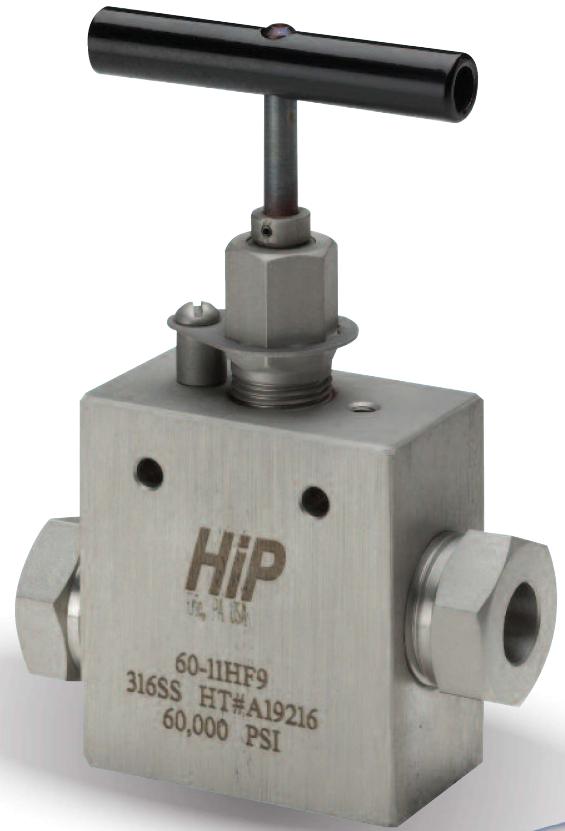
HiP... Our Name is High Pressure

High pressure valves, fittings and tubing manufactured to the highest quality standards, delivered with the shortest lead times, and priced to make you money... it's been the focus at HiP throughout our more than 65 year history. We offer a broad product portfolio capable of handling pressures up to 150,000 psi and carry an extensive inventory allowing us to offer same day shipping of many items. In addition to our high pressure valves, we offer a complete line of reactors and pressure vessels and an expanded family of pumping systems and instrument valves.

In addition to our standard products, we offer a complete line of valves and fittings for oil and gas industry use with sour gas (H₂S). For applications involving specialty gases, corrosive liquids, and extreme temperatures/conditions, we'll make our products using exotic alloys and temperature extensions, as well as design and build a solution to meet your exact requirements, such as our popular custom manifolds. This dedication to satisfying our loyal customers is the driving force behind our continued growth, including our passing the 4 million high pressure valves and fittings shipped milestone.

Commitment to Quality

As a company that exclusively deals in elevated pressure applications, we understand that our customers depend on our products to provide safe and reliable operation at pressures as high as 150,000 psi. Throughout our history we have been dedicated to continuous improvement in all aspects of our manufacturing operation and customer service. This commitment has only increased over time, including our joining the Graco family of companies and implementing their world class quality systems.



Markets

Our high standards for quality, service and value have enabled us to achieve preferred supplier status with a wide variety of market leaders in many different industries.

- **Waterjet Cutting and Blasting**
- **Oil and Gas**
- **Chemical and Petrochemical**
- **Research and Development**
- **Universities and Government**
- **General Industry**

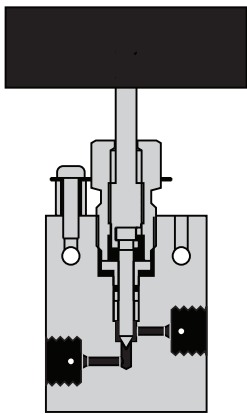
ISO 9001
CERTIFIED

Valve Design

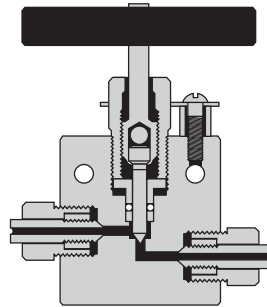
General

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- Valve bodies through 100,000 psi are high tensile Type 316 stainless steel, 150,000 psi valve bodies are 17-4 PH stainless steel.
- Stem assemblies have non-rotating tips to prevent galling with valve seats.
- Packing is located below the stem threads to prevent contact with media (liquid or gas).
- Packing glands are equipped with locking devices or lock nuts.
- Six valve patterns (see chart on page 7).
- Tubing connections are: $\frac{1}{16}$ " , $\frac{1}{8}$ " , $\frac{1}{4}$ " , $\frac{3}{8}$ " , $\frac{9}{16}$ " , $\frac{3}{4}$ " , 1" and $1\frac{1}{2}$ ".
Pipe connections include: $\frac{1}{8}$ " , $\frac{1}{4}$ " , $\frac{3}{8}$ " , $\frac{1}{2}$ " , $\frac{3}{4}$ " , and 1" NPT.
- Remote control air operators are available for most valves.



Slotted Stem



Rolled Style Stem

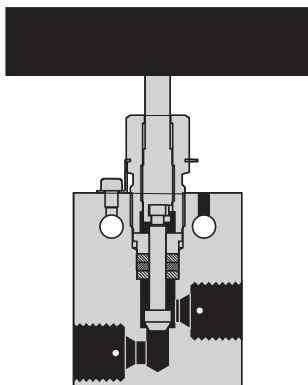
Slotted Stem: Non-rotating slotted stems are standard on AF4, AF6, LF4, LF6, LF9, HF6, HF4, and HF9 (30,000 psi) HF2, HF4, HF6, HF9 (60,000 psi) for on-off service and ensure long life on valve seats. Regulating tip stems are available for all valves at no additional cost, add -REG to part number.

Rolled Style Stem: This simple two-piece design is also non-rotating and is ideal for smaller valves and for valves made from exotic materials. The standard lower section stem is manufactured from hardened 17-4 PH stainless steel. It is affixed to a one-piece upper stem requiring no periodic adjustment. The two stem components are free to rotate independently of each other, thereby minimizing rotation of the lower stem against the valve seat.

The Rolled Style Stem is standard for all AF1, AF2, NFA, NFB, LF4, LF6 valves, 30,000 psi HF2, XF4, and XF6 valves, as well as most valves requiring stems made from exotic materials. It is optional for any valve normally supplied with a Positive Guide Stem.

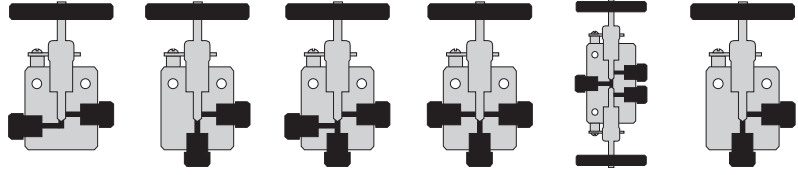
Pinned Stem Design: This variation on the Rolled Style Stem is a three-piece design in which the lower stem is pinned into a freely-rotating stem guide. It has all of the advantages of the rolled style stem, with the additional benefit of a replaceable lower section stem.

The Pinned Stem Design is standard for all NFC, NFD, NFF, NFH, LF9, LF12, LF16, and HF16 valves.



Pinned Stem

Quick Selector Guide to Standard Valves



1

Taper Seal Valves

NPT Valves

Medium Pressure Valves

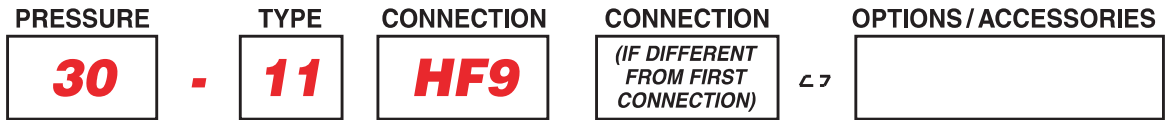
High Pressure Valves

Ultra High Pressure Valves

	10,000 psi	15,000 psi	10,000 psi	15,000 psi	10,000 psi	15,000 psi	20,000 psi	30,000 psi	60,000 psi	100,000 psi	150,000 psi		
Pressure	10,000 psi	15,000 psi	10,000 psi	15,000 psi	10,000 psi	15,000 psi	20,000 psi	30,000 psi	60,000 psi	100,000 psi	150,000 psi		
Valve Type	Two Way Straight	Two Way Angle	Three Way Two Press	Three Way One Press	Three Way Two Stem	Replaceable Seat	Two Way Straight	Two Way Angle	Three Way Two Press	Three Way One Press	Three Way Two Stem	Replaceable Seat	
Tube Size	1/4" O.D. / 1/8" I.D.	3/8" O.D. / 1/4" I.D.	1/16" O.D. / .030" I.D.	1/8" O.D. / 1/16" I.D.	3/8" O.D. / 1/4" I.D.	1/2" O.D. / 3/4" I.D.	1" O.D. / 1 1/16" I.D.	1 1/2" O.D. / 1 5/16" I.D.	1/4" O.D. / 7/64" I.D.	3/8" O.D. / 13/64" I.D.	9/16" O.D. / 5/16" I.D.	3/4" O.D. / 33/64" I.D.	1" O.D. / 1 1/16" I.D.
10,000 psi	10-11AF4	10-12AF4	10-13AF4	10-14AF4	10-15AF4	10-12AF4-R							
10,000 psi	10-11AF6	10-12AF6	10-13AF6	10-14AF6	10-15AF6	10-12AF6-R							
15,000 psi	15-11AF1	15-12AF1	15-13AF1	15-14AF1	15-15AF1	NA							
15,000 psi	15-11AF2	15-12AF2	15-13AF2	15-14AF2	15-15AF2	NA							
10,000 psi	10-11NFA	10-12NFA	10-13NFA	10-14NFA	10-15NFA	10-12NFA-R							
10,000 psi	10-11NFB	10-12NFB	10-13NFB	10-14NFB	10-15NFB	10-12NFB-R							
10,000 psi	10-11NFC	10-12NFC	10-13NFC	10-14NFC	10-15NFC	10-12NFC-R							
10,000 psi	10-11NFD	10-12NFD	10-13NFD	10-14NFD	10-15NFD	10-12NFD-R							
10,000 psi	10F-11NFF	10F-12NFF	10F-13NFF	10F-14NFF	10F-15NFF	10F-12NFF-R							
10,000 psi	10F-11NFH	10F-12NFH	10F-13NFH	10F-14NFH	10F-15NFH	10F-12NFH-R							
15,000 psi	15F-11NFA	15F-12NFA	15F-13NFA	15F-14NFA	15F-15NFA	15F-12NFA-R							
15,000 psi	15F-11NFB	15F-12NFB	15F-13NFB	15F-14NFB	15F-15NFB	15F-12NFB-R							
15,000 psi	15F-11NFC	15F-12NFC	15F-13NFC	15F-14NFC	15F-15NFC	15F-12NFC-R							
15,000 psi	15F-11NFD	15F-12NFD	15F-13NFD	15F-14NFD	15F-15NFD	15F-12NFD-R							
10,000 psi	10-11LF12	10-12LF12	10-13LF12	10-14LF12	10-15LF12	10-12LF12-R							
10,000 psi	10-11LF16	10-12LF16	10-13LF16	10-14LF16	10-15LF16	10-12LF16-R							
15,000 psi	15-11LF24	15-12LF24	15-13LF24	15-14LF24	15-15LF24	15-12LF24-R							
20,000 psi	20-11LF4	20-12LF4	20-13LF4	20-14LF4	20-15LF4	20-12LF4R							
20,000 psi	20-11LF6	20-12LF6	20-13LF6	20-14LF6	20-15LF6	20-12LF6R							
20,000 psi	20-11LF9	20-12LF9	20-13LF9	20-14LF9	20-15LF9	20-12LF9R							
20,000 psi	20-11LF12	20-12LF12	20-13LF12	20-14LF12	20-15LF12	20-12LF12R							
20,000 psi	20-11LF16	20-12LF16	20-13LF16	20-14LF16	20-15LF16	20-12LF16R							
30,000 psi	30-11HF2	30-12HF2	30-13HF2	30-14HF2	30-15HF2	30-12HF2R							
30,000 psi	30-11HF4	30-12HF4	30-13HF4	30-14HF4	30-15HF4	30-12HF4R							
30,000 psi	30-11HF6	30-12HF6	30-13HF6	30-14HF6	30-15HF6	30-12HF6R							
30,000 psi	30-11HF9	30-12HF9	30-13HF9	30-14HF9	30-15HF9	30-12HF9R							
30,000 psi	30-11HF16	30-12HF16	30-13HF16	30-14HF16	30-15HF16	30-12HF16R							
60,000 psi	60-11HF2	60-12HF2	60-13HF2	60-14HF2	60-15HF2	60-12HF2R							
60,000 psi	60-11HF4	60-12HF4	60-13HF4	60-14HF4	60-15HF4	60-12HF4R							
60,000 psi	60-11HF6	60-12HF6	60-13HF6	60-14HF6	60-15HF6	60-12HF6R							
60,000 psi	60-11HF9	60-12HF9	60-13HF9	60-14HF9	60-15HF9	60-12HF9R							
100,000 psi	100-11XF4	100-12XF4	100-13XF4	100-14XF4	NA	100-12XF4R							
150,000 psi	150-11XF6	150-12XF6	150-13XF6	150-14XF6	NA	150-12XF6R							

Catalog Numbering System

1



Pressure Series

- 10 = 10,000 psi
- 15 = 15,000 psi
- 20 = 20,000 psi
- 30 = 30,000 psi
- 40 = 40,000 psi
- 60 = 60,000 psi
- 100 = 100,000 psi
- 150 = 150,000 psi

Catalog part numbers for some components (NPT fittings, special alloy parts) have been maintained for historical consideration.

The referred pressure series may not reflect the actual pressure rating. Please refer to applicable catalog page for pressure rating, or consult the factory.

Type of Components

- 2 = Gland, Collar or Sleeve
- 3 = Anti-Vibration Assembly
- 7 = Plug
- 11 = 2-Way Straight Valve
- 12 = 2-Way Angle Valve
- 13 = 3-Way Valve with Two Pressure Connections
- 14 = 3-Way Valve with One Pressure Connections
- 15 = 3-Way, 2-Stem Valve
- 16 = Ball Valve (Floating)
- 21 = Coupling or Adapter
- 22 = Elbow
- 23 = Tee
- 24 = Cross
- 41 = Check Valve
- 51 = Line Filter
- 61 = Safety Head (Straight)
- 63 = Safety Head (Tee Type)
- 71 = 2-Way Ball Valve *
- 72 = 3-Way Ball Valve 180° *
- 73 = 3-Way Ball Valve Diverter *
- 74 = 2-Way Ball Valve *
- 75 = 3-Way Ball Valve 180° *
- 76 = 3-Way Ball Valve Diverter *
- 77 = 3-Way Mini Ball Valve 1/4" NPT
- 80 = 2-Way Ball Valve *
- 81 = 3-Way Ball Valve 180° *
- 82 = 3-Way Ball Valve Diverter *

* (Trunion)

Connection(s) Size and Type

Female	Male	
AF1	AM1	1/16" Taper Seal
AF2	AM2	1/8" Taper Seal
AF4	AM4	1/4" Taper Seal
AF6	AM6	3/8" Taper Seal
LF4	LM4	1/4" Medium Pressure
LF6	LM6	3/8" Medium Pressure
LF9	LM9	9/16" Medium Pressure
LF12	LM12	3/4" Medium Pressure
LF16	LM16	1" Medium Pressure
LF24	LM24	1 1/2" Medium Pressure
HF2	HM2	1/8" High Pressure
HF4	HM4	1/4" High Pressure
HF6	HM6	3/8" High Pressure
HF9	HM9	9/16" High Pressure
HF16	HM16	1" High Pressure
XF4	XM4	1/4" Ultra High Pressure
XF6	XM6	3/8" Ultra High Pressure
NFA	NMA	1/8" NPT Pipe
NFB	NMB	1/4" NPT Pipe
NFC	NMC	3/8" NPT Pipe
NFD	NMD	1/2" NPT Pipe
NFF	NMF	3/4" NPT Pipe
NFH	NMH	1" NPT Pipe
—	HA9	9/16" Hose
—	HA12	3/4" Hose
—	HA16	1" Hose
—	HA21	1 5/16" Hose

Options

- V = Micro Control Metering Assembly
- HT = High Temperature Stem Extension (Up to 1,000° F)
- SGS = Sour Gas (H₂S) Service
- N/O = Normally Open
- N/C = Normally Closed
- K = With Antivibration Collars and Glands
- REG = Regulating Tip
- TSR8 = Ball Valve Actuator
- TDA8 = Ball Valve Actuator Double Acting
- W/O = Without Collars and Glands
- LT = Low Temperature Stem Extension (to -320°F)
- MPO-NO = Medium Duty Piston Operator Normally Open
- MPO-NC = Medium Duty Piston Operator Normally Closed
- HPO-NO = Heavy Duty Piston Operator Normally Open
- HPO-NC = Heavy Duty Piston Operator Normally Closed
- EHPO-NO = Extra Heavy Piston Operator Normally Open
- EHPO-NC = Extra Heavy Piston Operator Normally Closed
- OC = Oxygen Cleaning
- HL = Handle Lock (Ball Valve Only)
- MHNO = Mini Hippo Normally Open
- MHNC = Mini Hippo Normally Closed
- LS = Limit Switch

How to Order Valves and Fittings

Simply indicate catalog number and specify option or special requirement.

Examples:

30-11HF4 = 30,000 psi Straight Valve for 1/4" O.D. tubing

60-23HF4 = 60,000 psi Tee for 1/4" O.D. tubing

15-21AF2 = 15,000 psi Straight Coupling for 1/8" O.D. tubing, Taper Seal connections

15-21AF2NMB = 15,000 psi Adapter with one end 1/8" O.D. Female Taper Seal and opposite end Male 1/4" NPT Pipe

30-11HF6-HT = 30,000 psi Straight Valve for 3/8" O.D. tubing with High Temperature Extension

"HIPCO" 10-12NFB (N/C) = 10,000 psi Angle Valve for 1/4" NPT Pipe with "Hipco" Air Operator, Normally Closed

"HIPPO" 15-11A4F (N/C) = 10,000 psi Angle Valve for 1/4" Taper Seal with "Hippo" Piston Operator, Normally Closed

60-21HF4 (Hastelloy C-276) = 60,000 psi Straight Coupling for 1/4" O.D. tubing, made from Hastelloy C-276 material



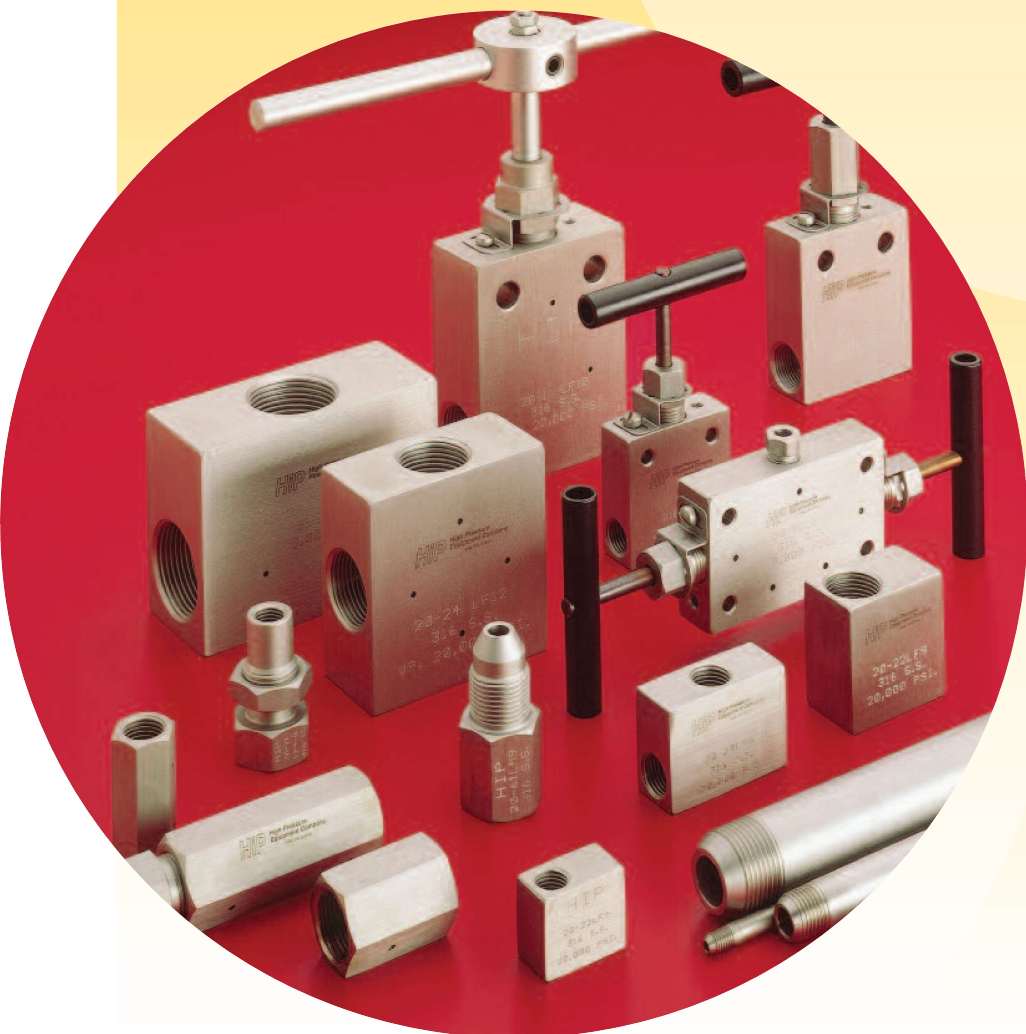
High Pressure Equipment

NPT Valves, Fittings and Tubing **10,000 and 15,000 psi service**

High Pressure Equipment Company has developed line of NPT valves and fittings designed to assure safe and easy plumbing through 15,000 psi. These pipe connection valves, fittings, line filters, check valves, safety heads and rupture discs, tubing and nipples are engineered to the highest standards of repeatable quality. The reliable performance of these products has made HiP one of the world's leading suppliers of elevated pressure components.

NPT valves are available in both two-way straight and two-way angle body configurations, and for sizes including 1/8", 1/4", 3/8", 1/2", 3/4" and 1" pipe connections. A line of fittings is available to facilitate adapting to Taper Seal, Medium or High Pressure pipe systems.

3



Index

Valves	20-21
Valve Options	22
Fittings	23
Couplings, Bulkheads & Caps	24
Line Filters & Check Valves	25
Safety Heads	26
Rupture Discs	27

NPT Valves

Pipe Connection Valves

Female NPT/10,000 psi

1/8" • 1/4" • 3/8" • 1/2" NPT

Non-rotating slotted stems are standard for on-off service and insure long life on valve seats. Regulating tip stems are available for all valves at no additional cost.

Materials include high tensile Type 316 stainless steel for valve bodies, and hardened 17-4PH stainless steel for lower section stems.

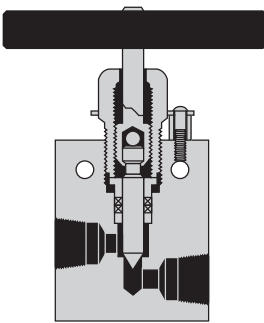
Packing is Teflon (450°F) standard with optional Viton (350°F), BUNA-N (200°F) and Grafoil (650°F) available at no additional cost.

Air operators for remote control operation are available for all valves. (See Air Operator section of catalog).

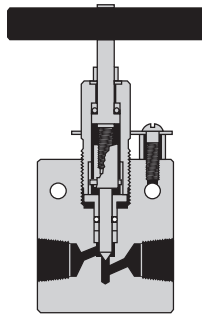
Extreme temperatures can be accommodated by using extended stuffing boxes (See Valve Options, page 22).



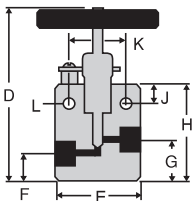
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NFD (1/2")

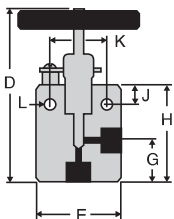


NFA (1/8"), NFB (1/4") and NFC (3/8")



Two Way Straight Valves

Pipe Size	Catalog No.*	psi	Conn.	Orifice	Cv	D	E	F	G	H	J	K	L	Thickness
1/8" NPT	10-11NFA	10,000	NFA	1/8"	0.15	4 3/4"	2"	7/8"	7/8"	2 7/16"	1/2"	1 3/8"	7/32"	1"
1/4" NPT	10-11NFB	10,000	NFB	1/8"	0.15	4 3/4"	2"	7/8"	7/8"	2 7/16"	1/2"	1 3/8"	7/32"	1"
3/8" NPT	10-11NFC	10,000	NFC	1/8"	0.15	4 3/4"	2"	7/8"	7/8"	2 7/16"	1/2"	1 3/8"	7/32"	1"
1/2" NPT	10-11NFD	10,000	NFD	5/16"	1.12	5 5/8"	2 5/8"	3/4"	1 3/8"	3 1/8"	1/2"	1 5/8"	5/16"	1 1/2"



Two Way Angle Valves

Pipe Size	Catalog No.*	psi	Conn.	Orifice	Cv	D	E	F	G	H	J	K	L	Thickness
1/8" NPT	10-12NFA	10,000	NFA	1/8"	0.225	4 3/4"	2"	—	1"	2 7/16"	1/2"	1 3/8"	7/32"	1"
1/4" NPT	10-12NFB	10,000	NFB	1/8"	0.225	4 3/4"	2"	—	1"	2 7/16"	1/2"	1 3/8"	7/32"	1"
3/8" NPT	10-12NFC	10,000	NFC	1/8"	0.225	4 3/4"	2"	—	1"	2 7/16"	1/2"	1 3/8"	7/32"	1"
1/2" NPT	10-12NFD	10,000	NFD	5/16"	0.18	5 3/4"	2 5/8"	—	1 1/2"	3 1/4"	1/2"	1 5/8"	5/16"	1 1/2"

* For valves requiring high temperature Grafoil packing in the 1/8" NPT, or 1/4" NPT or 3/8" NPT sizes, add suffix "-W" to catalog number. (Example 10-11NFB-W.)

Pipe Connection Valves

Female NPT/10,000 and 15,000 psi

1/8" • 1/4" • 3/8" • 1/2" NPT • 3/4" NPT • 1" NPT

Non-rotating slotted stems are standard for on-off service and insure long life on valve seats. Regulating tip stems are available for all valves at no additional cost.

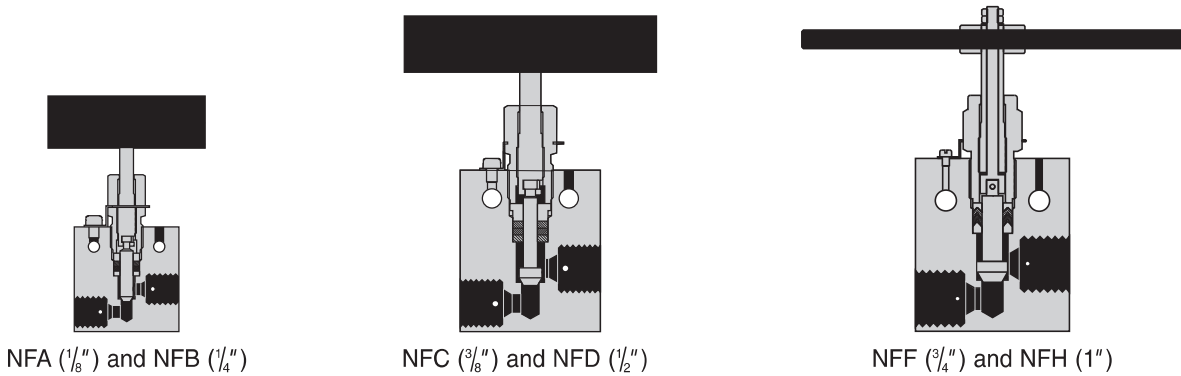
Materials include high tensile Type 316 stainless steel for valve bodies, and hardened 17-4PH stainless steel for lower section stems.

Packing is Teflon (450°F) standard with optional Viton (350°F), BUNA-N (200°F) and Grafoil (650°F) available at no additional cost.

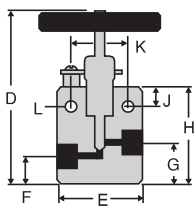
Air operators for remote control operation are available for all valves. (See Air Operator section of catalog).

Extreme temperatures can be accommodated by using extended stuffing boxes (See Valve Options, page 22).

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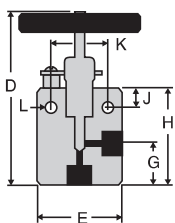


Two Way Straight Valves



Pipe Size	Catalog No.*	psi	Conn.	Orifice	Cv	D	E	F	G	H	J	K	L	Thickness
1/8" NPT	15F-11NFA	15,000	NFA	.203	0.45	4 ³ / ₈ "	2"	3/8"	13 ¹ / ₁₆ "	2"	3/8"	1 ¹ / ₄ "	7 ¹ / ₃₂ "	3/4"
1/4" NPT	15F-11NFB	15,000	NFB	.203	0.45	4 ³ / ₈ "	2"	3/8"	13 ¹ / ₁₆ "	2"	3/8"	1 ¹ / ₄ "	7 ¹ / ₃₂ "	3/4"
3/8" NPT	15F-11NFC	15,000	NFC	.312	1.12	6 ¹ / ₈ "	2 ¹ / ₂ "	1/2"	1 ¹ / ₈ "	2 ⁷ / ₈ "	1/2"	1 ³ / ₈ "	11 ¹ / ₃₂ "	1"
1/2" NPT	15F-11NFD	15,000	NFD	.312	1.12	6 ⁷ / ₈ "	2 ⁵ / ₈ "	3/4"	1 ³ / ₈ "	3 ¹ / ₈ "	1/2"	1 ³ / ₈ "	11 ¹ / ₃₂ "	1 ¹ / ₂ "
3/4" NPT	10F-11NFF	10,000	NFF	.687	5.91	8 ¹ / ₂ "	4 ¹ / ₈ "	7/8"	1 ¹³ / ₁₆ "	4 ⁵ / ₈ "	1 ¹ / ₈ "	2 ¹ / ₂ "	9 ¹ / ₁₆ "	1 ³ / ₄ "
1" NPT	10F-11NFH	10,000	NFH	.687	5.91	8 ¹ / ₂ "	4 ¹ / ₈ "	7/8"	1 ¹³ / ₁₆ "	4 ⁵ / ₈ "	1 ¹ / ₈ "	2 ¹ / ₂ "	9 ¹ / ₁₆ "	1 ³ / ₄ "

Two Way Angle Valves



Pipe Size	Catalog No.*	psi	Conn.	Orifice	Cv	D	E	F	G	H	J	K	L	Thickness
1/8" NPT	15F-12NFA	15,000	NFA	.203	0.675	4 ¹³ / ₁₆ "	2"	—	1 ¹ / ₄ "	2 ⁷ / ₁₆ "	3/8"	1 ¹ / ₄ "	7 ¹ / ₃₂ "	3/4"
1/4" NPT	15F-12NFB	15,000	NFB	.203	0.675	4 ¹³ / ₁₆ "	2"	—	1 ¹ / ₄ "	2 ⁷ / ₁₆ "	3/8"	1 ¹ / ₄ "	7 ¹ / ₃₂ "	3/4"
3/8" NPT	15F-12NFC	15,000	NFC	.312	1.68	6 ¹ / ₂ "	2 ¹ / ₂ "	—	1 ¹ / ₂ "	3 ¹ / ₄ "	1/2"	1 ³ / ₈ "	11 ¹ / ₃₂ "	1"
1/2" NPT	15F-12NFD	15,000	NFD	.312	1.68	6 ¹ / ₂ "	2 ⁵ / ₈ "	—	1 ¹ / ₂ "	3 ¹ / ₄ "	1/2"	1 ³ / ₈ "	11 ¹ / ₃₂ "	1 ¹ / ₂ "
3/4" NPT	10F-12NFF	10,000	NFF	.687	8.865	9"	4 ¹ / ₈ "	—	2 ⁵ / ₁₆ "	5 ¹ / ₈ "	1 ¹ / ₈ "	2 ¹ / ₂ "	9 ¹ / ₁₆ "	1 ³ / ₄ "
1" NPT	10F-12NFH	10,000	NFH	.687	8.865	9"	4 ¹ / ₈ "	—	2 ⁵ / ₁₆ "	5 ¹ / ₈ "	1 ¹ / ₈ "	2 ¹ / ₂ "	9 ¹ / ₁₆ "	1 ³ / ₄ "

* For valves requiring high temperature packing in the 1/8" NPT, or 1/4" NPT or 3/8" NPT sizes, add suffix "-W" to catalog number. (Example 10-11NFB-W.)

NPT Valve Options

Extreme Temperature Valves

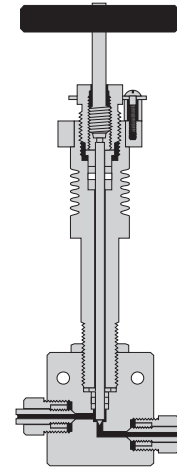
The Extreme Temperature Extension provides a means to move the packing area (stuffing box) away from the hot or cold zone of a valve. Fins are provided around the packing area to dissipate heat or cold with this option.

Size range. Extreme temperature extensions are available for all NPT valves.

Materials and features. Standard packing is Grafoil and Teflon. Nonrotating tip stems prevent galling at the seats and minimize torque requirements for positive shut off.

When ordering, simply add the suffix “-HT” or “-LT” to the standard valve catalog number (example: 15F-11NFA-HT).

Temperature ratings of valves with this option, for low temperature (-LT) is -423°F (-252°C) and for high temperature (-HT) is 1200°F (649°C)



Micro Control Metering Valves

The Micro Control Metering Valve assembly is available for 1/8", 1/4" NPT valves in this section. This unique stem design operates on the principle of a right-hand threaded component operating in an opposite direction of motion to a left-hand threaded component.

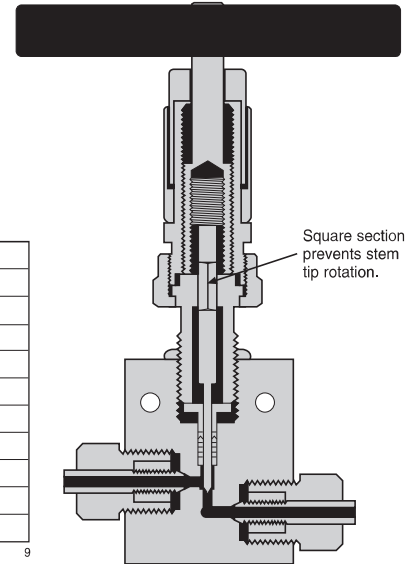
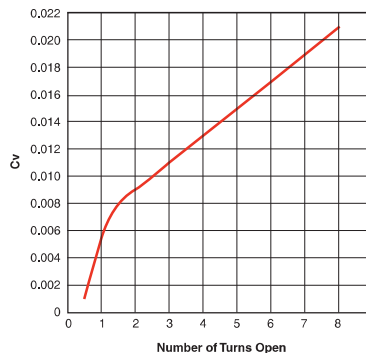
As the pitch sizes of these threads are different from each other, a very fine and precise stem travel is made possible. This provides exceptional control that is not possible with ordinary fine pitched stem designs.

Each complete revolution of the stem provides 0.005" stem travel. The vernier indicator allows readings in increments of one-tenth of a revolution (0.0005" stem travel).

The non-rotating lower section stem is ground to a 9 degree included angle to insure maximum control.

While this valve may be turned to the fully off (closed) position, it is always preferable to provide a separate on-off valve in the system to protect the precise control of the metering valve.

When ordering, simply specify the valve catalog number from the valve series and add the suffix “-V” (example: 15F-11NFB-V)



Special Materials

A large number of the valves and fittings shown within this catalog section are frequently furnished in special materials to meet the requirements of specific applications. One of the most commonly requested “special” materials is Hastelloy C-276.

Tubing collars and glands for High Pressure coned-and-threaded connections are “non-wetted” parts which do not normally come into contact with the fluid or gas. Thus these items are supplied in 316 stainless steel unless otherwise specified.

Packing material in all special material valves is Teflon unless otherwise specified.

Other materials. In addition to Hastelloy C-276, valves and fittings can be furnished in Monel, Inconel and titanium. Consult factory for price and delivery.

Packing Options NPT Hand Valves

10,000 psi Series

Material	Part Number		
	NFA/NFB/NFC	NFD	NFF - NFH
Teflon*	B-181	B-185	208741 Set
Grafoil	B-1417	B-1359	—
Buna-N	B-102	—	—
Viton	B-849	—	—
Silicone	B-147	—	—

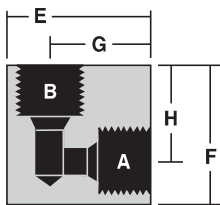
15,000 psi Series

Material	Part Number	
	NFA NFB	NFC NFD
Teflon*	B-1392 Set	207341 Set
Grafoil	B-1391 Set	B-1386 Set
Polypak	B-1388 (1)	B-1387 (1)

Elbows/Tees/Crosses

A complete range of elbows, tees, and crosses is available for all of the tubing connection sizes. Material is high tensile 316 stainless steel.

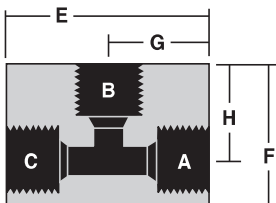
NPT Elbows



Catalog No.	Pressure Rating psi	Connections	A-B	E	F	G	H	Thickness
15-22NFA	15,000	1/8" FNPT	NFA	1 1/2"	1 1/2"	1"	1"	3/4"
15-22NFB	15,000	1/4" FNPT	NFB	1 1/2"	1 1/2"	1"	1"	1"
15-22NFC	15,000	3/8" FNPT	NFC	1 1/2"	1 1/2"	1"	1"	1"
15-22NFD	15,000	1/2" FNPT	NFD	2 5/8"	1 7/8"	1 7/8"	1 1/8"	1 1/2"
10-22NFF	10,000	3/4" FNPT	NFF	2 5/8"	2 5/16"	1 5/16"	1 3/8"	1 1/2"
10-22NFH	10,000	1" FNPT	NFH	3"	3"	2 1/16"	2 1/16"	1 3/4"

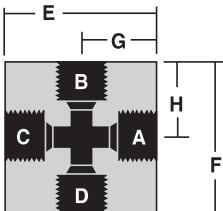
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NPT Tees



Catalog No.	Pressure Rating psi	Connections	A-B	E	F	G	H	Thickness
15-23NFA	15,000	1/8" FNPT	NFA	1 1/2"	1 1/4"	3/4"	3/4"	3/4"
15-23NFB	15,000	1/4" FNPT	NFB	2"	1 1/2"	1"	1"	1"
15-23NFC	15,000	3/8" FNPT	NFC	2"	1 1/2"	1"	1"	1"
15-23NFD	15,000	1/2" FNPT	NFD	2 5/8"	2 1/8"	1 5/16"	1 3/8"	1 1/2"
10-23NFF	10,000	3/4" FNPT	NFF	2 5/8"	2 1/8"	1 5/16"	1 3/8"	1 1/2"
10-23NFH	10,000	1" FNPT	NFH	4 1/8"	3"	2 1/16"	2 1/16"	1 3/4"

NPT Crosses

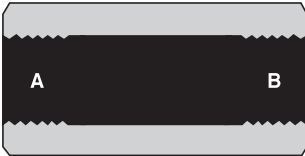


Catalog No.	Pressure Rating psi	Connections	A-B	E	F	G	H	Thickness
15-24NFA	15,000	1/8" FNPT	NFA	1 1/2"	1 1/2"	3/4"	3/4"	3/4"
15-24NFB	15,000	1/4" FNPT	NFB	2"	2"	1"	1"	1"
15-24NFC	15,000	3/8" FNPT	NFC	2"	2"	1"	1"	1"
15-24NFD	15,000	1/2" FNPT	NFD	2 5/8"	2 3/4"	1 5/16"	1 3/8"	1 1/2"
10-24NFF	10,000	3/4" FNPT	NFF	2 5/8"	2 3/4"	1 5/16"	1 3/8"	1 1/2"
10-24NFH	10,000	1" FNPT	NFH	4 1/8"	4 1/8"	2 1/16"	2 1/16"	1 3/4"

NPT Valves

NPT Straight Couplings

Standard material is high tensile 316 stainless steel.

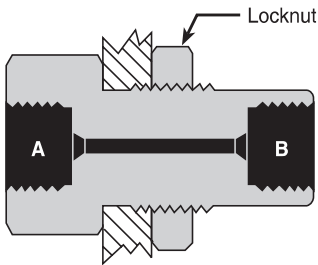


Catalog No.	Pressure Rating psi	Connections	A-B	Length	Hex
15-21NFA	15,000	1/8" FNPT	NFA	1 1/4"	3/4"
15-21NFB	15,000	1/4" FNPT	NFB	1 3/4"	1"
15-21NFC	15,000	3/8" FNPT	NFC	1 3/8"	1"
15-21NFD	15,000	1/2" FNPT	NFD	1 7/8"	1 3/8"
10-21NFF	10,000	3/4" FNPT	NFF	2 1/2"	1 3/8"
10-21NFH	10,000	1" FNPT	NFH	2 1/2"	1 3/4"

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NPT Bulkhead Couplings

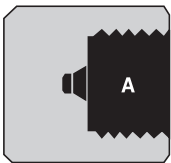
Bulkhead couplings are designed specifically for passing a tubing connection through a panel or steel barricade. These couplings include a locknut as shown. Material is high tensile 316 stainless steel.



Catalog No.	Pressure Rating psi	Connections	Panel Hole	A-B	Length	Hex	Outside Thread	Max Panel Thickness
15-21NFA-B	15,000	1/8" FNPT	15/16"	NFA	2 1/8"	1"	7/8" - 14	7/16"
15-21NFB-B	15,000	1/4" FNPT	15/16"	NFB	2 1/8"	1"	7/8" - 14	1 3/8"
15-21NFC-B	15,000	3/8" FNPT	1 1/8"	NFC	2 3/8"	1 3/8"	1 1/16" - 12	17/32"
15-21NFD-B	15,000	1/2" FNPT	1 7/16"	NFD	2 3/8"	1 1/2"	1 3/8" - 12	1 5/8"
10-21NFF-B	10,000	3/4" FNPT	1 11/16"	NFF	2 5/8"	1 7/8"	1 5/8" - 12	1 11/16"
10-21NFH-B	10,000	1" FNPT	1 15/16"	NFH	3 1/2"	2 1/8"	1 7/8" - 12	1 15/16"

NPT Caps

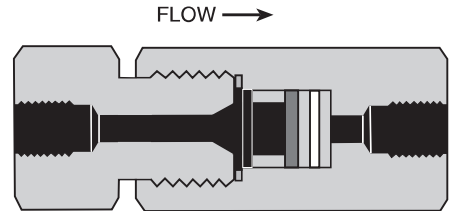
Tubing end caps are offered for use in sealing off tubing ends either for temporary use or permanent use such as on small volume reservoirs. Standard material is high tensile 316 stainless steel.



Catalog No.	Pressure Rating psi	Pipe Size	A	Length	Hex
15-21NFA-C	15,000	1/8"	NFA	3/4"	3/4"
15-21NFB-C	15,000	1/4"	NFB	1"	1"
15-21NFC-C	15,000	3/8"	NFC	1 1/4"	1"
15-21NFD-C	15,000	1/2"	NFD	1 1/2"	1 3/8"
10-21NFF-C	10,000	3/4"	NFF	1 3/4"	1 3/8"
10-21NFH-C	10,000	1"	NFH	1 3/4"	1 3/4"

NPT Line Filters

The line filters as shown utilize sintered stainless steel filter discs 4 pc./set. Porosities are available as per the chart to the right. If not otherwise specified, 100 micron filter discs are supplied. (One micron = 0.001 millimeters). Material of body, caps and cover is hightensile 316 stainless steel.

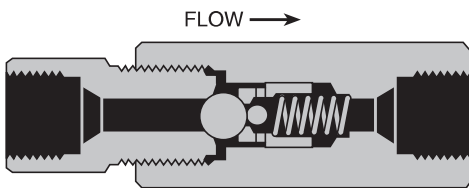


Catalog No.	Pressure Rating psi	Connections	A-B	Length	Hex	Micron Size Filter Available					
						0.5	2	5	10	40	100
15-51NFA	15,000	1/8" FNPT	NFA	3 3/16"	1 3/8"	●	●	●	●	●	●
15-51NFB	15,000	1/4" FNPT	NFB	4 3/16"	1 3/8"	●	●	●	●	●	●
15-51NFC	15,000	3/8" FNPT	NFC	4 3/16"	1 3/8"	●	●	●	●	●	●
15-51NFD	15,000	1/2" FNPT	NFD	4 3/16"	1 3/8"	●	●	●	●	●	●

3

NPT Ball Check Valves

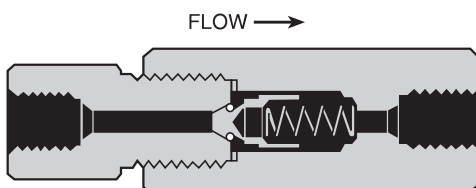
Ball type check valves insure flow in one direction only. Material for body, caps and cover is high tensile 316 stainless steel.



Catalog No.	Pressure Rating psi	Connections	A-B	Length	Hex
15-41NFA	15,000	1/8" FNPT	NFA	4 5/32"	1"
15-41NFB	15,000	1/4" FNPT	NFB	4 5/32"	1"
15-41NFC	15,000	3/8" FNPT	NFC	4 5/32"	1"
15-41NFD	15,000	1/2" FNPT	NFD	4 9/16"	1 3/8"
10-41NFF	10,000	3/4" FNPT	NFF	5 5/16"	1 3/8"
10-41NFH	10,000	1" FNPT	NFH	7 1/8"	2 1/2"

NPT Softseat Check Valves

Soft seat check valves insure flow in one direction only and can be mounted in any position. These are highly reliable for both gas and liquid service. Standard O-ring (soft seat) material for the sealing surface is Buna-N (nitrile) for 1/8" - 1/2" size with other materials including Teflon and Viton available on request. Temperature is limited by the choice of O-ring material. Material of all other parts is high tensile 316 stainless steel.

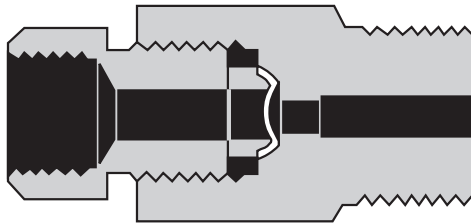


Catalog No.	Pressure Rating psi	Connections	A-B	Length	Hex
15-41NFA-T	15,000	1/8" FNPT	NFA	4 5/32"	1"
15-41NFB-T	15,000	1/4" FNPT	NFB	4 5/32"	1"
15-41NFC-T	15,000	3/8" FNPT	NFC	4 5/32"	1"
15-41NFD-T	15,000	1/2" FNPT	NFD	4 9/16"	1 3/8"
10-41NFF-T	10,000	3/4" FNPT	NFF	5 5/16"	1 3/8"
10-41NFH-T	10,000	1" FNPT	NFH	7 1/8"	2 1/2"

NPT Valves

NPT Safety Heads

3



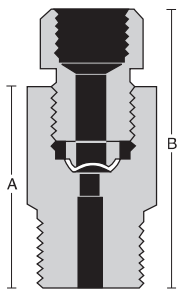
The male inlet design can be inserted directly into the tubing connections of valves and various fittings such as tees and crosses, or located in pressure vessels.

Outlet connections are $\frac{3}{8}$ " pipe (NPT). This outlet may be connected to a suitable discharge line to vent pressure to a safe location in the event of bursting of the rupture disc. Torque required for sealing rupture discs will range from 40 to 90 foot pounds, depending upon pressure and media being used.

Material of body and hold down nut is high tensile 316 stainless steel.

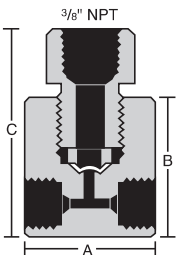
Note: Rupture discs are **not** included and must be ordered as a separate item.

CE marked safety heads are now available, add -CE to end of standard part number. Consult factory for pricing.



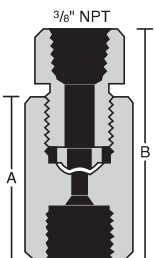
Male Inlet Safety Heads

Catalog No.	Pressure Rating psi	Male Inlet Connection	A	B	Hex Size
15-61NMA	15,000	$\frac{1}{8}$ " Pipe	$1\frac{7}{8}$ "	$2\frac{7}{8}$ "	1"
15-61NMB	15,000	$\frac{1}{4}$ " Pipe	2"	3"	1"
15-61NMC	15,000	$\frac{3}{8}$ " Pipe	2"	3"	1"
15-61NMD	15,000	$\frac{1}{2}$ " Pipe	2"	3"	1"



Tee Type Safety Heads

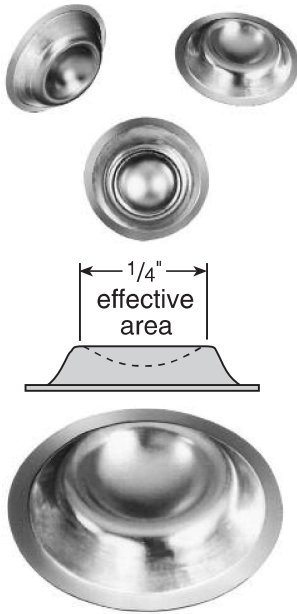
Catalog No.	Pressure Rating psi	Inlet Connection	A	B	Thickness
15-63NFA	15,000	$\frac{1}{8}$ " Pipe	2"	$1\frac{3}{4}$ "	$2\frac{3}{4}$ "
15-63NFB	15,000	$\frac{1}{4}$ " Pipe	2"	$1\frac{3}{4}$ "	$2\frac{3}{4}$ "
15-63NFC	15,000	$\frac{3}{8}$ " Pipe	$2\frac{5}{8}$ "	2"	3"
15-63NFD	15,000	$\frac{1}{2}$ " Pipe	$2\frac{5}{8}$ "	$2\frac{5}{8}$ "	$3\frac{5}{8}$ "



Female Inlet (Straight) Safety Heads

Catalog No.	Pressure Rating psi	Inlet Connection	A	B	Hex Size
15-61NFA	15,000	$\frac{1}{8}$ " Pipe	2"	3"	1"
15-61NFB	15,000	$\frac{1}{4}$ " Pipe	2"	3"	1"
15-61NFC	15,000	$\frac{3}{8}$ " Pipe	$2\frac{5}{16}$ "	$3\frac{7}{16}$ "	$1\frac{1}{8}$ "
15-61NFD	15,000	$\frac{1}{2}$ " Pipe	$2\frac{5}{16}$ "	$3\frac{7}{16}$ "	$1\frac{1}{8}$ "

Rupture Discs 1/4" Angled Seat



SPECIAL DISCS are available on special order for pressure ranges not shown below and in numerous materials and coatings. Consult factory for price and delivery.

Standard rupture discs are available from stock in burst pressures as listed in the chart below. All pressures through 15,000 psi are shaded. These discs are 316 stainless steel (except for 1,000 psi which are inconel) and may be used with any of the safety heads shown. Note that these rupture discs are supplied with a range of plus 6% and minus 3% of specified burst pressure. Samples of each batch are then tested and typically the actual average burst pressure is stamped on an accompanying metal tag. There is a +/- 5% burst tolerance applied after the burst pressure has been established. Factors influencing rupture = disc life include corrosion, metal fatigue, and cyclic effects. Periodic replacement is recommended to prevent premature failure.

3

Standard Burst Pressures (in psi at 72°F)

1,000	3,000	5,000	7,000	9,000	11,000	17,500	25,000	37,500	55,000
1,500	3,500	5,500	7,500	9,500	11,500	18,000	27,000	40,000	60,000
2,000	4,000	6,000	8,000	10,000	12,500	20,000	30,000	45,000	65,000
2,500	4,500	6,500	8,500	10,500	15,000	22,500	35,000	50,000	