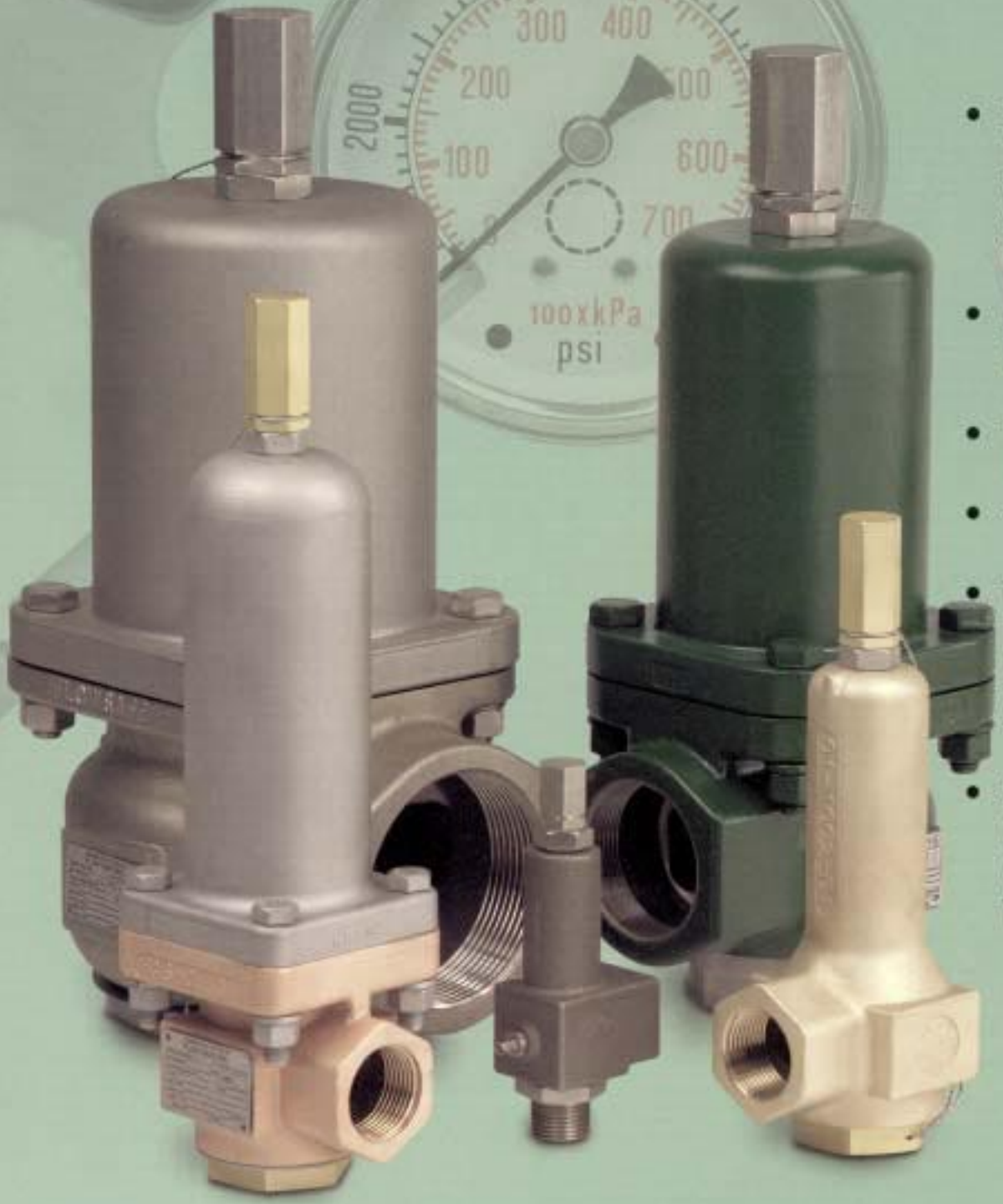
FLOW SAFE, Inc.

"Environmental Performance for Industry"

F80 Series

"Enhanced Performance"

Conventional-Style Safety Relief Valves



- REPEATABLE BUBBLE TIGHT SEATING, DUE TO SOFT SEAT DESIGN
- ADJUSTABLE BLOWDOWN
- 15 TO 9612 PSIG
- -423°F TO +525°F
- VARIETY OF MATERIALS AND END CONNECTIONS AVAILABLE
- SUPERIOR FLOW CAPACITIES - *INDEPENDENTLY* VERIFIED

U.S. Patent 5,341,838
CATALOG # FS80498

CONTENTS

INTRODUCTION

Today's industrial needs are being driven by requirements for leak tight valves to reduce fugitive emissions and to save product. **FLOW SAFE** F80 Series "Enhanced Performance" Safety Valves have accurate operational characteristics, engineered to provide superior performance for today's industry.

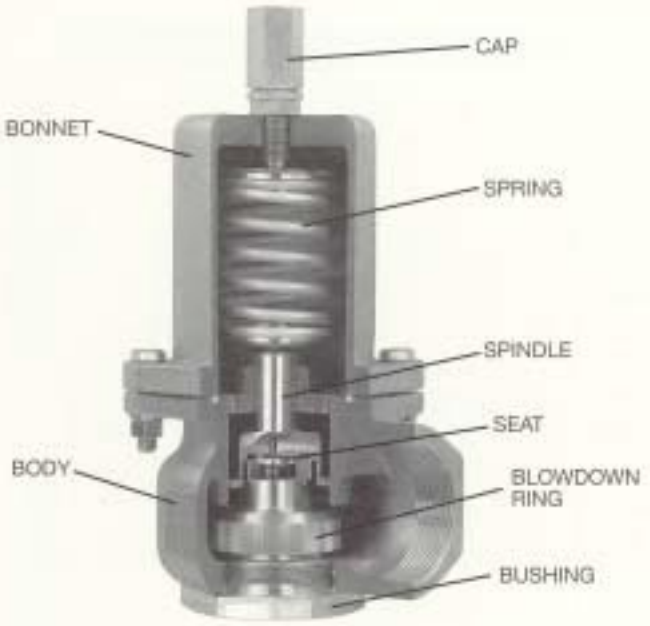
The F80 Series design features include:

- Bubble tight seating
- Bubble tight, repeatable reseating
- Adjustable blowdown
- High capacities through overbored nozzle (bushing)
- Integral nozzle (bushing)
- All valves bear ASME "UV" stamp at 15 psig and above
- Full lift at set pressure
- Full open until reseat
- Adjustments are heavy duty stainless steel safety wired
- Set pressures to 9612 psig
- -423°F to +525°F temperature range
- A variety of materials and end connections available
- Locked inlet bushing
- One Piece Sealed Bonnet
- For Your Safety... All Lift Lever Kits are Packed!

The policy of **FLOW SAFE** and its authorized assemblers is a commitment to value through:

- Environmentally Compatible Products
- Cost Efficient Design with Minimal Parts
- Quality Products, Readily Available
- "No Hassle" Service

OPERATION •



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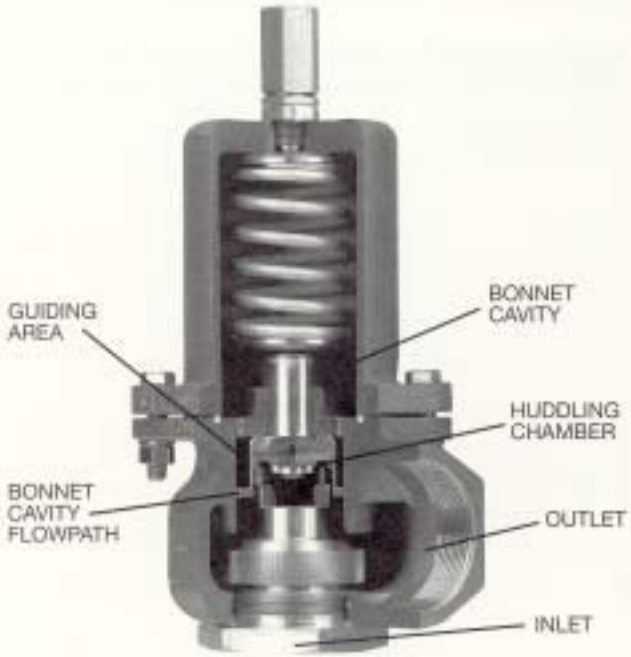


FULL OPEN AT SET PRESSURE

In any pressurized system, there is the potential for a pressure rise that could damage the piping or vessel. Safety Relief Valves are recognized as an acceptable means of restricting this rise by venting excess pressure from the system.

The **F80 Series** safety relief valves are **state-of-the-art, cost efficient, high capacity, soft seated** valves, designed to meet the critical needs of today's industry. A **bubble tight** seal is achieved through the use of an elastomeric or plastic seat. The **F80 Series** uses a compression spring opposing the system inlet pressure acting on the valve's effective seat area to establish the set pressure. When system pressure overcomes the spring preload, an initial escape of fluid (simmer) occurs past the seat. Simmer continues as significant pressure develops within the huddling chamber, and forces the valve into **full lift**, at the "popping" pressure.

The blowdown ring acts, along with the body bore, to create an orificing effect in the flowpath to the valve outlet. Pressure also flows between the spindle and body into the bonnet cavity, to assist the spring to reseat the valve. The sliding fit between these two parts assures that the bonnet cavity pressurization lags the pressure buildup under the spindle, to assure full lift.

A **unique** design feature allows these pressures, coupled with the areas they act on, to move the spindle to, and remain at, full lift at set pressure.

As inlet pressure decays, the net lifting force is reduced to a point where the spindle begins to move downward. Again the restriction between the spindle and the body guide helps to increase the closing force on the spindle, accelerating the closure and causing a sharp reseat action. Extensive testing has verified that the spindle **opens fully** at set, **remains in full lift** during flow, and **closes sharply** on reseat.

Blowdown is readily controlled by adjusting the blowdown ring. Raising the ring increases the bonnet cavity pressure and shortens blowdown, i.e., reseating pressure closer to popping pressure. Lowering the ring lengthens blowdown. Set pressure is not affected by the blowdown ring position.

The **F80 Series** blowdown can be adjusted and set to a maximum twenty percent. Standard FLOWSAFE valves are shipped with seven percent blowdown. Other blowdown settings can be provided at the customer's request.

FLOWSAFE is **proud** to offer the **F80 Series** safety relief valves to industry. We are confident that these valves present a **cost effective** and **reliable** solution to your needs, for pressure relief and pollution control.

SERVICE ENVELOPE •

F84 AND F85 SERIES

ORIFICE			-1M	-2M	-3M	-4M	-4	-6(D)	-8(E)	F	G	H	J
ORIFICE DIA (in)			.060	.142	.213	.287	.287"	.430"	.574"	.718"	.919"	1.149"	1.471"
ORIFICE AREA (in²)			.003	.015	.033	.065	.065	.145	.259	.405	.664	1.036	1.699
MAX SET PRESSURE (PSIG)	M BODY	BRASS	5000	2606	890	350	—	—	—	—	—	—	—
		CS	6600	2606	890	350	—	—	—	—	—	—	—
		SS	6600	2606	890	350	—	—	—	—	—	—	—
		NACE	6600	2606	890	350	—	—	—	—	—	—	—
	MED BODY	BRASS	—	—	—	—	3100	2900	1150	—	—	—	—
		CS	—	—	—	—	4921	2900	1150	—	—	—	—
		SS	—	—	—	—	4921	2900	1150	—	—	—	—
		NACE	—	—	—	—	4921	2900	1150	—	—	—	—
	LARGE BODY	BRASS	—	—	—	—	5000	4500	2600	500	500	382	298
		CS	—	—	—	—	9612	5774	4292	839	668	382	298
		SS	—	—	—	—	9612	5774	4292	839	668	382	298
		NACE	—	—	—	—	9612	5774	4292	839	668	382	298
	X-LARGE BODY	BRASS	—	—	—	—	—	—	—	—	—	450	450
		CS	—	—	—	—	—	—	—	5000	3705	2750	2700
		SS	—	—	—	—	—	—	—	5000	3705	2750	2700
		NACE	—	—	—	—	—	—	—	5000	3705	2750	2700

SERVICE TEMP RANGE (°F)		
F84	BRASS	-325 TO 525
	CS	-20 TO 525
	SS	-423 TO 525
	NACE	-423 TO 525
F85	BRASS	-65 TO 500
	CS	-20 TO 500
	SS	-65 TO 500
	NACE	-65 TO 500

M – MICRO
MED – INTEGRAL BODY AND BONNET
LARGE – BOLTED BONNET FOR INTERMEDIATE PRESSURE SERVICE
X-LARGE – BOLTED BONNET FOR HIGH PRESSURE SERVICE

• *NACE TRIM AVAILABLE IN ACCORDANCE WITH MR-01-75.*

See Page 9 or 13 for flanged valve ratings

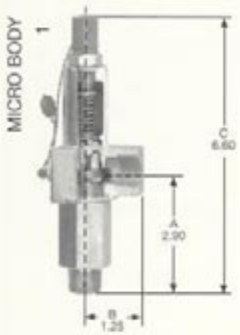
SEAT DATA •

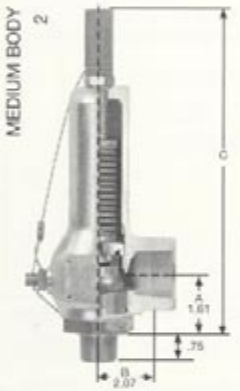
F84 AND F85 SERIES

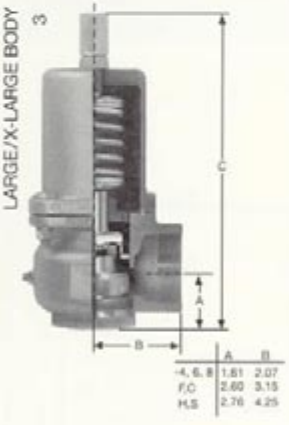
VALVE SERIES	MATERIAL	PROCESS TEMPERATURE (°F)		PRESSURE (PSIG)	
		MAX	MIN	MAX	MIN
F84 PLASTIC SEAT	VESPEL	400	-423	9612	4000
F84 PLASTIC SEAT	PEEK	525	0	9612	500
F84 PLASTIC SEAT	TEFLON®	400	-423	1000	15
F84 PLASTIC SEAT	KEL-F	400	-423	4000	900
F85 ELASTOMER SEAT	BUNA-N	275	-65	7500	15
F85 ELASTOMER SEAT	VITON®	400	-65	7500	15
F85 ELASTOMER SEAT	ETHYL PROP	325	-65	2500	15
F85 ELASTOMER SEAT	KALREZ®	500	0	2500	15

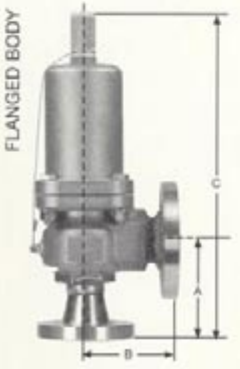
• *FOR LOWER PRESSURES, TEMPERATURES, AND CHEMICAL COMPATABILITY CONSULT **FLOW SAFE** ENGINEERING.*
• *TEFLON®, VITON®, AND KALREZ® ARE REGISTERED TRADEMARKS OF THE E.I. DUPONT DE NEMOURS COMPANY.*

THREADED CONNECTIONS









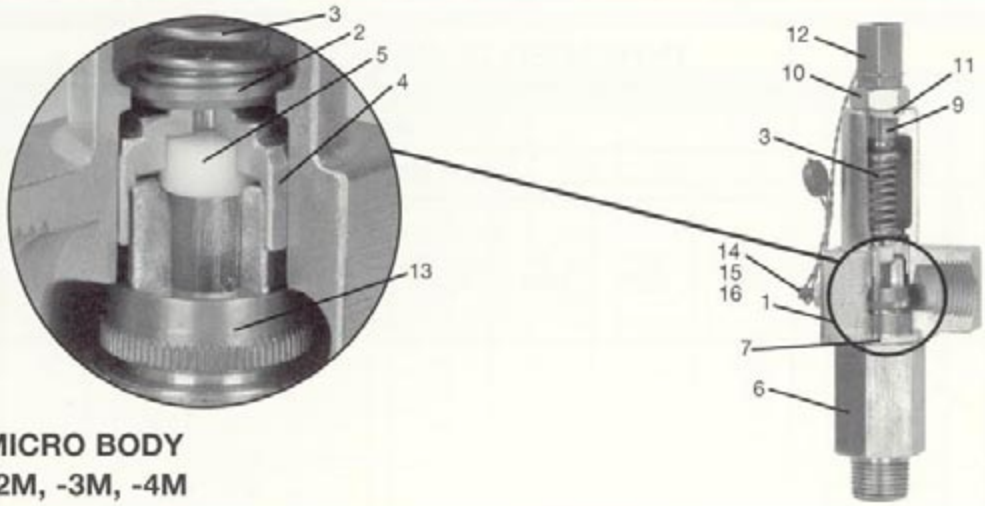
ORIFICE SIZE	BODY SIZE	SET PRESS. RANGE (PSIG)	W T. (lbs)	MAX "C" DIMENSION INLET CONNECTION 1/2" FNPT	3/4" FNPT	1" FNPT	1-1/2" FNPT	2" FNPT	1/2" MNPT	3/4" MNPT	1" MNPT	OUTLET CONN. FNPT
-1M	M	2500-6600	1.0	—	—	—	—	—	6.66	6.66	—	1/2"
-2M	M	15-2606	1.0	—	—	—	—	—	6.66	6.66	—	OR
-3M	M	15-890	1.0	—	—	—	—	—	6.66	6.66	—	3/4"
-4M	M	15-350	1.0	—	—	—	—	—	6.66	6.66	—	
-4	MED	15-4921	5.0	8.75	8.75	8.75	—	—	9.50	9.50	9.50	1"
-4	LARGE	4922-9612	12	—	12.19	12.19	—	—	—	—	—	
-6	MED	15-2900	5.0	—	8.75	8.75	—	—	—	9.50	9.50	1"
-6	LARGE	2901-5774	12	—	12.19	12.19	—	—	—	—	—	
-8	MED	15-1150	5.0	—	8.75	8.75	—	—	—	9.50	9.50	1"
-8	LARGE	1151-4292	12	—	12.19	12.19	—	—	—	—	—	
F	LARGE	15-839	29	—	—	—	14.42	—	—	—	—	2"
F	X-LARGE	1151-4292	33	—	—	—	17.80	—	—	—	—	
G	LARGE	15-668	29	—	—	—	14.42	—	—	—	—	2"
G	X-LARGE	669-3705	33	—	—	—	17.80	—	—	—	—	
H	LARGE	15-382	48	—	—	—	15.04	15.04	—	—	—	3"
H	X-LARGE	383-2750	55	—	—	—	22.25	22.25	—	—	—	
J	LARGE	15-298	48	—	—	—	—	15.04	—	—	—	3"
J	X-LARGE	299-2700	55	—	—	—	—	22.25	—	—	—	

PHOTO 1 DENOTES MICRO BODIES IN -1M, -2M, -3M, -4M ORIFICES.
PHOTO 2 DENOTES MEDIUM BODY IN SIZES -4, -6, -8, ORIFICES.
PHOTO 3 DENOTES LARGE AND X-LARGE BODY SIZES ON -4, -6, -8, F,G,H,J ORIFICES.

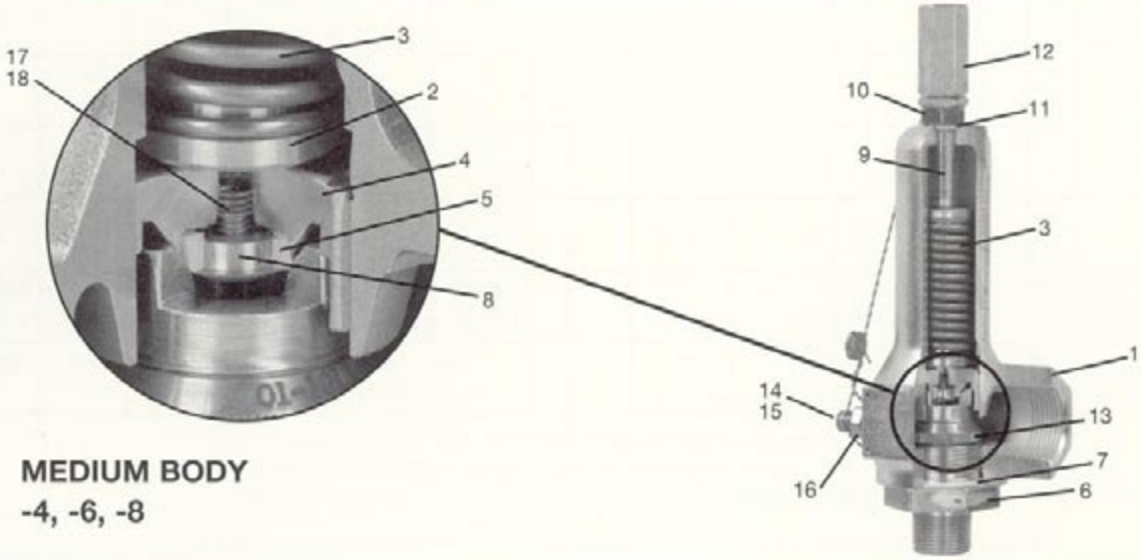
FLANGED CONNECTIONS

ORIFICE SIZE	MEDIUM BODY/LARGE BODY A	B	C	WT (lbs)	X-LARGE BODY A	B	C	WT (lbs)	OUTLET CONN
-4	5.72	6.75	12.80	22	—	—	—	—	1"
-6	5.72	6.75	12.80	18	—	—	—	—	1"
-8	5.72	6.75	11.80	15	—	—	—	—	1"
F	4.87	4.75	16.63	45	5.25	5.06	21.01	60	2"
G	4.87	4.75	16.63	40	5.25	5.06	21.01	60	2"
H	5.83	6.50	18.09	67	6.75	7.00	26.22	112	3"
J	5.37	6.50	17.63	67	6.56	7.00	26.03	94	3"

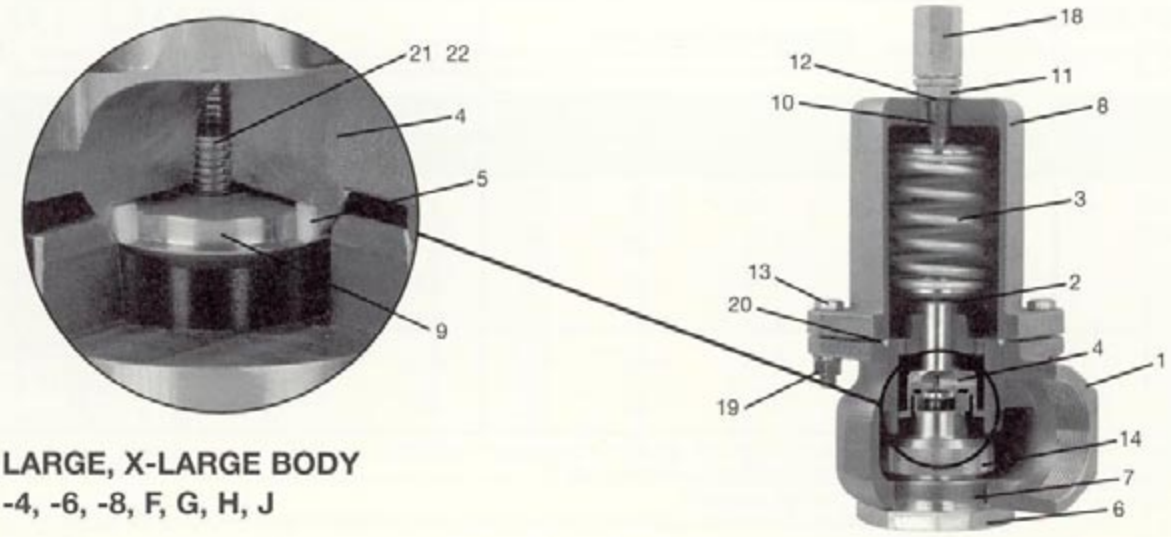
- *ALL DIMENSIONS AND WEIGHTS ARE FOR MAXIMUM FLANGE WEIGHT CONDITIONS.*
- *API 526 CONNECTION DIMENSIONS AVAILABLE ON REQUEST.*
- *RF AND RTJ ARE AVAILABLE AS STANDARD.*
- *ALL CONNECTION DIMENSIONS ARE FOR STANDARD FLOW SAFE VALVES. SEE PAGE 9 OR 13 (150 THROUGH 2500 POUND CLASS FLANGES).*
- *'MICRO' VALVES PROVIDED ONLY IN THREADED CONFIGURATIONS.*



MICRO BODY
-2M, -3M, -4M



MEDIUM BODY
-4, -6, -8



LARGE, X-LARGE BODY
-4, -6, -8, F, G, H, J

Note: Bushing cutout for display only

ITEM 15, 16, 17 NOT SHOWN

MICRO, MEDIUM BODY PLASTIC SEAT F84 -2M, -3M, -4M, -4, -6, -8 ORIFICES

MATERIALS

NO.	PART NAME	BRASS	CARBON STEEL	STAINLESS STEEL	NACE
1	BODY	SB-62	SA479-CF8M	SA351 CF8M	SA351 CF8M
2	SPRING WASHER	ASTM B16	1214	A479-316	A479-316
3	SPRING	STAINLESS STEEL	CARBON STEEL	STAINLESS STEEL	INCONEL
4	SPINDLE	ASTM B16	A479-316	A479-316	A479-316
5	SEAT (SEE P. 4)	PLASTIC	PLASTIC	PLASTIC	PLASTIC
6	BUSHING	ASTM B98H	SA479-316	SA479-316	SA479-316
7	BUSHING SEAL	TEFLON	TEFLON	TEFLON	TEFLON
8	RETAINER	ASTM B16	A479-316	A479-316	A479-316
9	PRESSURE ADJ. SCREW	A479-316	CARBON STEEL	A479-316	A479-316
10	LOCK NUT, PA SCREW	A479-316	A479-316	A479-316	A479-316
11	SEAL, PA SCREW	TEFLON	TEFLON	TEFLON	TEFLON
12	CAP	ASTM B16	A479-316	A479-316	A479-316
13	BLOWDOWN RING	ASTM B16	A479-316	A479-316	A479-316
14	LOCK SCREW, BD	ASTM B16	A479-316	A479-316	A479-316
15	SEAL, BD SCREW	TEFLON	TEFLON	TEFLON	TEFLON
16	LOCK NUT, BD SCREW	A479-316	A479-316	A479-316	A479-316
17	RETAINER SCREW	MONEL	STAINLESS STEEL	STAINLESS STEEL	A564-630
18	LOCKING INSERT	STAINLESS STEEL	STAINLESS STEEL	STAINLESS STEEL	INCONEL

LARGE, X-LARGE BODY PLASTIC SEAT F84 -4, -6, -8, F, G, H, J ORIFICES

MATERIALS

NO.	PART NAME	BRASS	CARBON STEEL	STAINLESS STEEL	NACE
1	BODY	SB-62	SA351 CF8M	SA351 CF8M	SA351 CF8M
2	SPRING WASHER	ASTM B16	1214	A479-316	SA479-316
3	SPRING	STAINLESS STEEL	CARBON STEEL	STAINLESS STEEL	INCONEL
4	SPINDLE	ASTM B16	A479-316	A479-316	A479-316
5	SEAT (SEE P. 4)	PLASTIC	PLASTIC	PLASTIC	PLASTIC
6	BUSHING	ASTM B98H	SA479-316	SA479-316	SA479-316
7	BUSHING SEAL	TEFLON	TEFLON	TEFLON	TEFLON
8	BONNET	SA351 CF8M	SA351 CF8M	SA351 CF8M	SA351 CF8M
9	RETAINER	ASTM B16	A479-316	A479-316	A479-316
10	PRESSURE ADJ. SCREW	A479-316	CARBON STEEL	A479-316	A479-316
11	LOCK NUT, PA SCREW	A479-316	A479-316	A479-316	A479-316
12	SEAL, PA SCREW	TEFLON	TEFLON	TEFLON	TEFLON
13	FASTENER	304SS	304SS	304SS	304SS
14	BLOWDOWN RING	ASTM B16	A479-316	A479-316	A479-316
15	LOCK SCREW, BD	ASTM B16	A479-316	A479-316	A479-316
16	SEAL, BD SCREW	TEFLON	TEFLON	TEFLON	TEFLON
17	LOCK NUT, BD SCREW	A479-316	CARBON STEEL	A479-316	A479-316
18	CAP	ASTM B16	A479-316	A479-316	A479-316
19	NUT	304SS	304SS	304SS	304SS
20	SEAL	TEFLON	TEFLON	TEFLON	TEFLON
21	RETAINER SCREW	BRASS	STAINLESS STEEL	STAINLESS STEEL	A564-630
22	LOCKING INSERT	STAINLESS STEEL	STAINLESS STEEL	STAINLESS STEEL	INCONEL

INLET/OUTLET SELECTIONS •

THREADED F84 SERIES

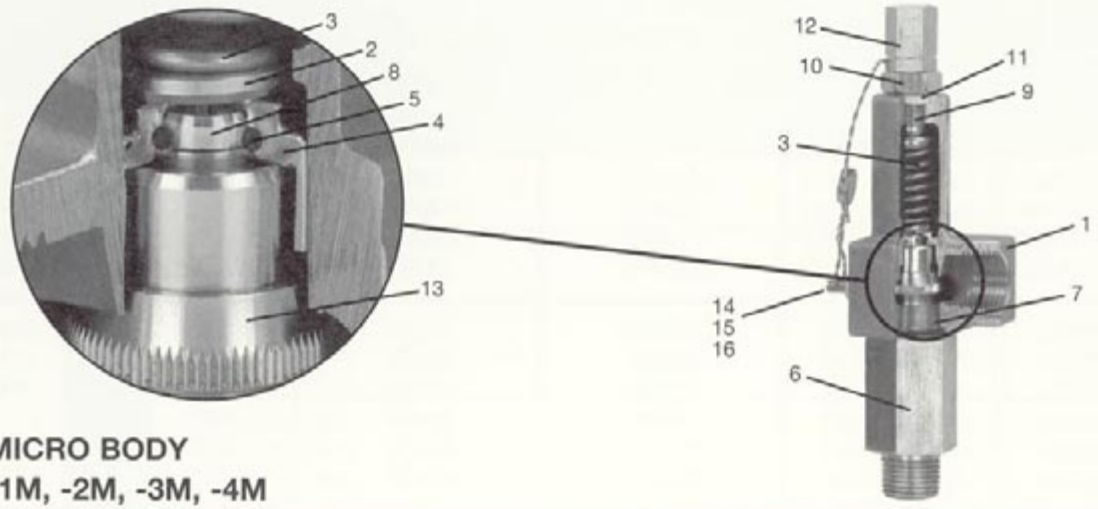
ORIFICE	BODY SIZE	ASSEMBLY NUMBER	ORIFICE SIZE		CONNECTIONS	
			DESIGNATION	AREA (IN^2)	INLET	OUTLET
-2M	MICRO	01-2188M-10X 01-2188M-11X 01-2188M-21X	-2	.015	1/2MNPT 1/2MNPT 1/2MNPT	1/2MNPT 3/4MNPT 3/4MNPT
-3M	MICRO	01-2189M-10X 01-2189M-11X 01-2189M-21X	-3	.033	1/2MNPT 1/2MNPT 1/2MNPT	1/2MNPT 3/4MNPT 3/4MNPT
-4M	MICRO	01-2190M-10X 01-2190M-11X 01-2190M-21X	-4	.065	1/2MNPT 1/2MNPT 1/2MNPT	1/2MNPT 3/4MNPT 3/4MNPT
-4	MEDIUM	01-1155F-10X 01-1155F-20X 01-1155F-30X 01-1155M-10X 01-1155M-20X 01-1155M-30X	-4	.065	1/2 FNPT 3/4 FNPT 1 FNPT 1/2MNPT 3/4 MNPT 1 MNPT	1FNPT
	LARGE	01-1158F-20X 01-1158F-30X	-4	.065	3/4 FNPT 1 FNPT	1 FNPT
-6 (D)	MEDIUM	01-1156F-20X 01-1156F-30X 01-1156M-20X 01-1156M-30X	-6	.145	3/4 FNPT 1FNPT 3/4MNPT 1 MNPT	1FNPT
	LARGE	01-1159F-20X 01-1159F-30X	-6	.145	3/4FNPT 1 FNPT	1 FNPT
-8 (E)	MEDIUM	01-1157F-20X 01-1157F-30X 01-1157M-20X 01-1157M-30X	-8	.259	3/4 FNPT 1 FNPT 3/4 MNPT 1 MNPT	1 FNPT
	LARGE	01-1160F-20X 01-1160F-30X	-8	.259	3/4 FNPT 1 FNPT	1FNPT
F	LARGE	01-1161F-40X	F	.405	1-1/2 FNPT	2 FNPT
	X-LARGE	01-1161F-41X	F	.405	1-1/2 FNPT	2 FNPT
G	LARGE	01-1162F-40X	G	.664	1-1/2 FNPT	2 FNPT
	XLARGE	01-1162F-41X	G	.664	1-1/2 FNPT	2 FNPT
H	LARGE	01-1163F-40X 01-1163F-50X	H	1.036	1-1/2 FNPT 2 FNPT	3 FNPT
	X-LARGE	01-1163F-41X 01-1163F-51X	H	1.036	1-1/2 FNPT 2 FNPT	3 FNPT
J	LARGE	01-1164F-50X	J	1.699	2 FNPT	3 FNPT
	X-LARGE	01-1164F-51X	J	1.699	2 FNPT	3 FNPT

• *THE "X" IN THE PART NUMBER REPRESENTS THE MATERIAL CONFIGURATIONS AVAILABLE (REF PG. 22). THE SUBMITTAL DRAWING, AVAILABLE FROM YOUR AREA REP, LISTS ALL MATERIALS AND THEIR ASSOCIATED SPECIFICATIONS IN DETAIL FOR CUSTOMER REVIEW. PAGE 22 ALSO SHOWS HOW TO PROPERLY INCORPORATE THE MATERIAL CALLOUT INTO THE PART NUMBERING SYSTEM.*

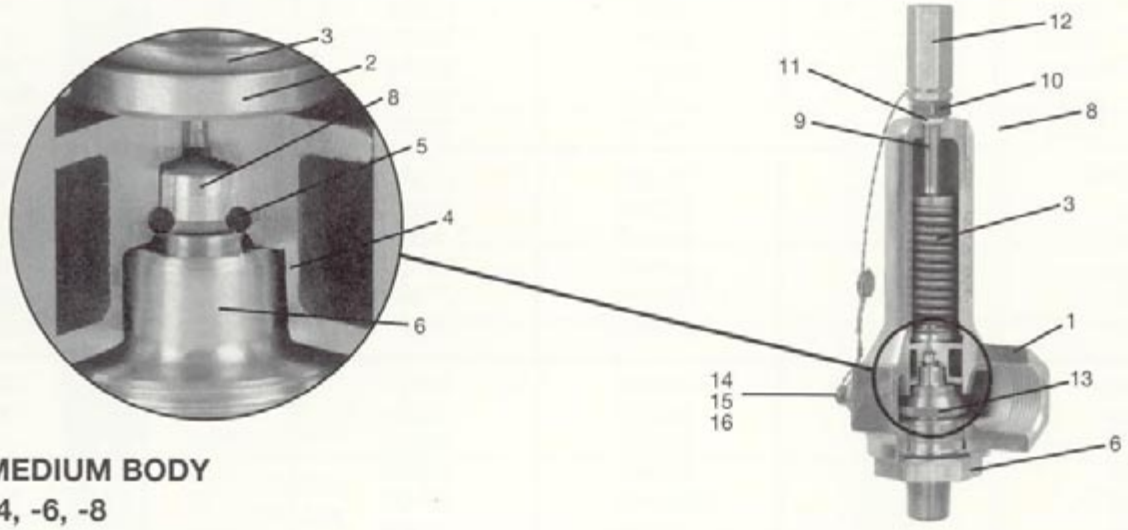
INLET/OUTLET SELECTIONS •

ORIFICE	CONNECTION NUMBER	VALVE SIZE	INLET FLANGE	OUTLET FLANGE	CS MAX SET PRESSURE (PSIG)	SS MAX SET PRESSURE (PSIG)
-4	054011 054021 054031	.5x1 .75x1 1X1	150#RF	150#RF	285	275
	104011 104021 104031	.5x1 .75x1 1X1	300#RF	150#RF	740	720
	124011 124021 124031	.5x1 .75x1 1X1	600#RF	150#RF	1480	1440
	144011 144021 144031	.5x1 .75x1 1X1	900#RF	300#RF	2220	2160
	164011 164021 164031	.5x1 .75x1 1X1	1500#RF	300#RF	3705	3600
	184011 184021 184031	.5x1 .75x1 1X1	2500#RF	300#RF	6170	5985
-6 (D)	056021 056031	.75x1 1x1	150#RF	150#RF	285	275
	106021 106031	.75x1 1x1	300#RF	150#RF	740	720
	126021 126031	.75x1 1x1	600#RF	150#RF	1480	1440
	146021 146031	.75x1 1x1	900#RF	300#RF	2220	2160
	166021 166031	.75x1 1x1	1500#RF	300#RF	3705	3600
	186021 186031	.75x1 1x1	2500#RF	300#RF	5774	5774
-8 (E)	058021 058031	.75x1 1x1	150#RF	150#RF	285	275
	108021 108031	.75x1 1x1	300#RF	150#RF	740	720
	128021 128031	.75x1 1x1	600#RF	150#RF	1480	1440
	148021 148031	.75x1 1x1	900#RF	300#RF	2220	2160
	168021 168031	.75x1 1x1	1500#RF	300#RF	3705	3600
	188021 188031	.75x1 1x1	2500#RF	300#RF	4292	4292
F	05F042	1.5x2	150#RF	150#RF	285	275
	10F042	1.5x2	300#RF	150#RF	740	720
	12F042	1.5x2	600#RF	150#RF	1480	1440
	14F042	1.5x2	900#RF	300#RF	2220	2160
	16F042	1.5x2	1500#RF	300#RF	3705	3600
	18F042	1.5x2	2500#RF	300#RF	5000	5000
G	05G042	1.5x2	150#RF	150#RF	285	275
	10G042	1.5x2	300#RF	150#RF	740	720
	12G042	1.5x2	600#RF	150#RF	1480	1440
	14G042	1.5x2	900#RF	300#RF	2220	2160
	16G042	1.5x2	1500#RF	300#RF	3705	3705
	18G042	1.5x2	2500#RF	300#RF	3705	3705
H	05H043 05H053	1.5x3 2x3	150#RF	150#RF	285	275
	10H043 10H053	1.5x3 2x3	300#RF	150#RF	740	720
	12H043 12H053	1.5x3 2x3	600#RF	150#RF	1480	1440
	14H043 14H053	1.5x3 2x3	900#RF	300#RF	2220	2160
	16H043 16H053	1.5x3 2x3	1500#RF	300#RF	2750	2750
	18H043 18H053	1.5x3 2x3	2500#RF	300#RF	2750	2750
J	05J053	2x3	150#RF	150#RF	285	275
	10J053	2x3	300#RF	150#RF	740	720
	12J053	2x3	600#RF	150#RF	1480	1440
	14J053	2x3	900#RF	300#RF	2220	2160
	16J053	2x3	1500#RF	300#RF	2700	2700

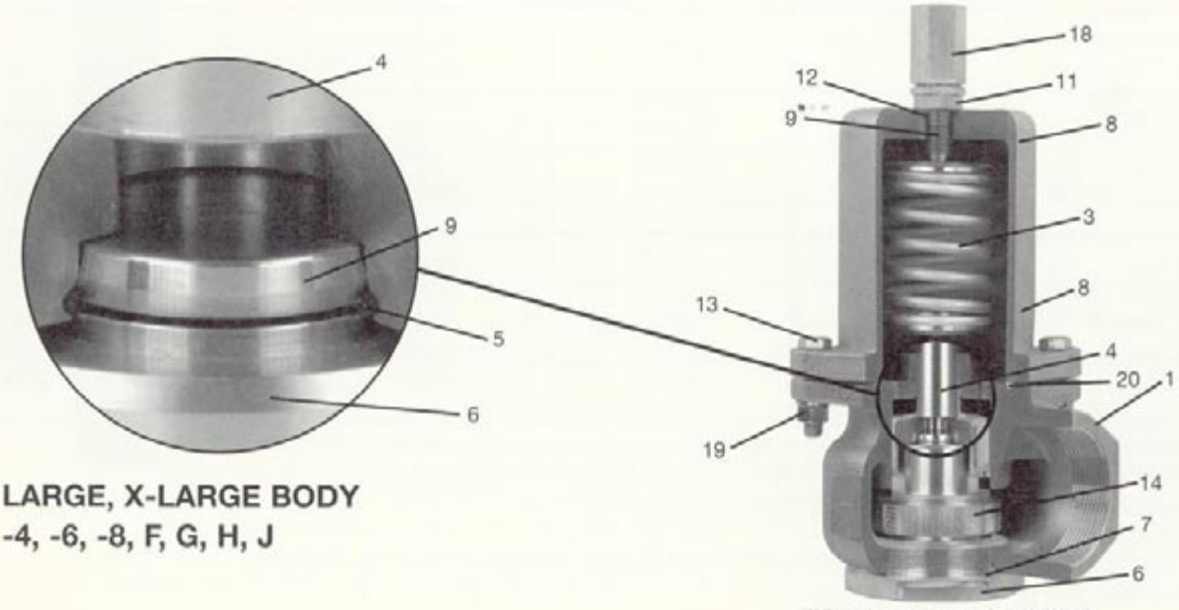
- *FOR 316 SS CONSTRUCTION ADD "S" TO THE END OF THE CONNECTION NUMBER AND LIST IT UNDER INLET/ OUTLET CONNECTIONS ON THE ORDER FORM. PARTIALS SHOULD BE LISTED LIKEWISE WITH A MODIFICATION NOTED. STANDARD CONNECTIONS ARE CARBON STEEL.*
- *SPECIALS CONNECTIONS ARE AVAILABLE THROUGH **FLOW SAFE** ENGINEERING.*
- *RTJ OR RF FLANGE STYLES ARE AVAILABLE.*
- *SET PRESSURES REFERENCED ARE AT -20 TO 100°F. CONSULT API STANDARD 526-1984 FOR ELEVATED TEMPERATURES.*
- *MICRO VALVES AVAILABLE ONLY IN THREADED CONFIGURATION.*



MICRO BODY
-1M, -2M, -3M, -4M



MEDIUM BODY
-4, -6, -8



LARGE, X-LARGE BODY
-4, -6, -8, F, G, H, J

ITEM 15, 16, 17 NOT SHOWN

MICRO, MEDIUM BODY, ELASTOMER SEAT F85 -1M, -2M, -3M, -4M, -4, -6, -8 ORIFICES

MATERIALS

NO.	PART NAME	BRASS	CARBON STEEL	STAINLESS STEEL	NACE
1	BODY	SB-62	SA351 CF8M	SA351 CF8M	SA351 CF8M
2	SPRING WASHER	ASTM B16	1214	A479-316	A479-316
3	SPRING	STAINLESS STEEL	CARBON STEEL	STAINLESS STEEL	INCONEL
4	SPINDLE	ASTM B16	A479-316	A479-316	A479-316
5	SEAT	ELASTOMER	ELASTOMER	ELASTOMER	ELASTOMER
6	BUSHING	ASTM B98H	SA479-316	SA479-316	SA479-316
7	BUSHING SEAL	ELASTOMER	ELASTOMER	ELASTOMER	ELASTOMER
8	RETAINER	ASTM B16	A479-316	A479-316	A479-316
9	PRESSURE ADJ. SCREW	A479-316	CARBON STEEL	A479-316	A479-316
10	LOCK NUT, PA SCREW	A479-316	A479-316	A479-316	A479-316
11	SEAL, PA SCREW	TEFLON	TEFLON	TEFLON	TEFLON
12	CAP	ASTM B16	A479-316	A479-316	A479-316
13	BLOWDOWN RING	ASTM B16	SA479-316	A479-316	A479-316
14	LOCK SCREW, BD	SA479-316	SA479-316	A479-316	A479-316
15	SEAL, BD SCREW	TEFLON	TEFLON	TEFLON	TEFLON
16	LOCK NUT, BD SCREW	SA479-316	A479-316	A479-316	A479-316

LARGE, X-LARGE BODY, ELASTOMER SEAT F85 -4, -6, -8, F, G, H, J ORIFICES

MATERIALS

NO.	PART NAME	BRASS	CARBON STEEL	STAINLESS STEEL	NACE
1	BODY	SB-62	SA351 CF8M	SA351 CF8M	SA351 CF8M
2	SPRING WASHER	ASTM B16	1214	A479-316	A479-316
3	SPRING	STAINLESS STEEL	CARBON STEEL	STAINLESS STEEL	INCONEL
4	SPINDLE	ASTM B16	A479-316	A479-316	A479-316
5	SEAT	ELASTOMER	ELASTOMER	ELASTOMER	ELASTOMER
6	BUSHING	ASTM B98H	SA479-316	SA479-316	SA479-316
7	BUSHING SEAL	ELASTOMER	ELASTOMER	ELASTOMER	ELASTOMER
8	BONNET	SA351 CF8M	SA351 CF8M	SA351 CF8M	SA351 CF8M
9	RETAINER	ASTM B16	A479-316	ASTM B16	ASTM B16
10	PRESSURE ADJ. SCREW	A479-316	CARBON STEEL	A479-316	A479-316
11	LOCK NUT, PA SCREW	A479-316	A479-316	A479-316	A479-316
12	SEAL, PA SCREW	TEFLON	TEFLON	TEFLON	TEFLON
13	FASTENER	304SS	304SS	304SS	304SS
14	BLOWDOWN RING	ASTM B16	A479-316	A479-316	A479-316
15	LOCK SCREW, BD	A479-316	A479-316	A479-316	A479-316
16	SEAL, BD SCREW	TEFLON	TEFLON	TEFLON	TEFLON
17	LOCK NUT, BD SCREW	A479-316	A479-316	A479-316	A479-316
18	CAP	ASTM B16	A479-316	A479-316	A479-316
19	NUT	304SS	304SS	304SS	304SS
20	SEAL	ELASTOMER	ELASTOMER	ELASTOMER	ELASTOMER

INLET/OUTLET SELECTIONS •

THREADED F85 SERIES

ORIFICE	BODY SIZE	ASSEMBLY NUMBER	ORIFICE SIZE		CONNECTIONS	
			DESIGNATION	AREA (IN ^{2})	INLET	OUTLET
-1M	MICRO	01-2184M-10X 01-2184M-11X 01-2184M-21X	-1	.003	1/2MNPT 1/2MNPT 3/4MNPT	1/2MNPT 3/4MNPT 3/4MNPT
-2M	MICRO	01-2185M-10X 01-2195M-11X 01-2185M-21X	-2	.015	1/2MNPT 1/2MNPT 3/4MNPT	1/2MNPT 3/4MNPT 3/4MNPT
-3M	MICRO	01-2186M-10X 01-2186M-11X 01-2186M-21X	-3	.033	1/2MNPT 1/2MNPT 3/4MNPT	1/2MNPT 3/4MNPT 3/4MNPT
-4M	MICRO	01-2187M-10X 01-2187M-11X 01-2187M-21X	-4	.065	1/2MNPT 1/2MNPT 3/4MNPT	1/2MNPT 3/4MNPT 3/4MNPT
-4	MEDIUM	01-1165F-10X 01-1165F-20X 01-1165F-30X 01-1165M-10X 01-1165M-20X 01-1165M-30X	-4	.065	1/2 FNPT 3/4 FNPT 1 FNPT 1/2 MNPT 3/4 MNPT 1 MNPT	1 FNPT
	LARGE	01-1168F-20X 01-1168F-30X	-4	.065	3/4 FNPT 1 FNPT	1 FNPT
-6 (D)	MEDIUM	01-1166F-20X 01-1166F-30X 01-1166M-20X 01-1166M-30X	-6	.145	3/4 FNPT 1 FNPT 3/4 MNPT 1 MNPT	1 FNPT
	LARGE	01-1169F-20X 01-1169F-30X	-6	.145	3/4 FNPT 1 FNPT	1 FNPT
-8 (E)	MEDIUM	01-1167F-20X 01-1167F-30X 01-1167M-20X 01-1167M-30X	-8	.259	3/4 FNPT 1 FNPT 3/4 MNPT 1 MNPT	1 FNPT
	LARGE	01-1170F-20X 01-1170F-30X	-8	.259	3/4 FNPT 1 FNPT	1 FNPT
F	LARGE	01-1171F-40X	F	.405	1-1/2 FNPT	2 FNPT
	X-LARGE	01-1171F-41X	F	.405	1-1/2 FNPT	2 FNPT
G	LARGE	01-1172F-40X	G	.664	1-1/2 FNPT	2 FNPT
	XLARGE	01-1172F-41X	G	.664	1-1/2 FNPT	2 FNPT
H	LARGE	01-1173F-40X 01-1173F-50X	H	1.036	1-1/2 FNPT 2 FNPT	3 FNPT
	X-LARGE	01-1173F-41X 01-1173F-51X	H	1.036	1-1/2 FNPT 2 FNPT	3 FNPT
J	LARGE	01-1174F-50X	J	1.699	2 FNPT	3 FNPT
	X-LARGE	01-1174F-51X	J	1.699	2 FNPT	3 FNPT

• *THE "X" IN THE PART NUMBER REPRESENTS THE MATERIAL CONFIGURATIONS AVAILABLE. THE SUBMITTAL DRAWING, AVAILABLE UPON REQUEST, LISTS ALL MATERIALS AND THEIR ASSOCIATED SPECIFICATIONS IN DETAIL FOR CUSTOMER REVIEW. PAGE 22 ALSO SHOWS HOW TO PROPERLY INCORPORATE THE MATERIAL CALLOUT INTO THE PART NUMBERING SYSTEM.*

INLET/OUTLET SELECTIONS •

ORIFICE	CONNECTION NUMBER	VALVE SIZE	INLET FLANGE	OUTLET FLANGE	CS MAX SET PRESSURE (PSIG)	SS MAX SET PRESSURE (PSIG)
-4	054011 054021 054031	.5x1 .75x1 1X1	150#RF	150#RF	285	275
	104011 104021 104031	.5x1 .75x1 1X1	300#RF	150#RF	740	720
	124011 124021 124031	.5x1 .75x1 1X1	600#RF	150#RF	1480	1440
	144011 144021 144031	.5x1 .75x1 1X1	900#RF	300#RF	2220	2160
	164011 164021 164031	.5x1 .75x1 1X1	1500#RF	300#RF	3705	3600
	184011 184021 184031	.5x1 .75x1 1X1	2500#RF	300#RF	6170	5985
-6 (D)	056021 056031	.75x1 1x1	150#RF	150#RF	285	275
	106021 106031	.75x1 1x1	300#RF	150#RF	740	720
	126021 126031	.75x1 1x1	600#RF	150#RF	1480	1440
	146021 146031	.75x1 1x1	900#RF	300#RF	2220	2160
	166021 166031	.75x1 1x1	1500#RF	300#RF	3705	3600
	186021 186031	.75x1 1x1	2500#RF	300#RF	5774	5774
-8 (E)	058021 058031	.75x1 1x1	150#RF	150#RF	285	275
	108021 108031	.75x1 1x1	300#RF	150#RF	740	720
	128021 128031	.75x1 1x1	600#RF	150#RF	1480	1440
	148021 148031	.75x1 1x1	900#RF	300#RF	2220	2160
	168021 168031	.75x1 1x1	1500#RF	300#RF	3705	3600
	188021 188031	.75x1 1x1	2500#RF	300#RF	4292	4292
F	05F042	1.5x2	150#RF	150#RF	285	275
	10F042	1.5x2	300#RF	150#RF	740	720
	12F042	1.5x2	600#RF	150#RF	1480	1440
	14F042	1.5x2	900#RF	300#RF	2220	2160
	16F042	1.5x2	1500#RF	300#RF	3705	3600
	18F042	1.5x2	2500#RF	300#RF	5000	5000
G	05G042	1.5x2	150#RF	150#RF	285	275
	10G042	1.5x2	300#RF	150#RF	740	720
	12G042	1.5x2	600#RF	150#RF	1480	1440
	14G042	1.5x2	900#RF	300#RF	2220	2160
	16G042	1.5x2	1500#RF	300#RF	3705	3705
	18G042	1.5x2	2500#RF	300#RF	3705	3705
H	05H043 05H053	1.5x3 2x3	150#RF	150#RF	285	275
	10H043 10H053	1.5x3 2x3	300#RF	150#RF	740	720
	12H043 12H053	1.5x3 2x3	600#RF	150#RF	1480	1440
	14H043 14H053	1.5x3 2x3	900#RF	150#RF	2220	2160
	16H043 16H053	1.5x3 2x3	1500#RF	300#RF	2750	2750
	18H043 18H053	1.5x3 2x3	2500#RF	300#RF	2750	2750
J	05J053	2x3	150#RF	150#RF	285	275
	10J053	2x3	300#RF	150#RF	740	720
	12J053	2x3	600#RF	150#RF	1480	1440
	14J053	2x3	900#RF	150#RF	2220	2160
	16J053	2x3	1500#RF	300#RF	2700	2700

- *FOR 316 SS CONSTRUCTION ADD "S" TO THE END OF THE CONNECTION NUMBER AND LIST IT UNDER INLET/ OUTLET CONNECTIONS ON THE ORDER FORM. PARTIALS SHOULD BE LISTED LIKEWISE WITH A MODIFICATION NOTED. STANDARD CONNECTIONS ARE CARBON STEEL.*
- *SPECIALS CONNECTIONS ARE AVAILABLE THROUGH **FLOW SAFE** ENGINEERING.*
- *RTJ OR RF FLANGE STYLES ARE AVAILABLE.*
- *SET PRESSURES REFERENCED ARE AT -20 TO 100°F. CONSULT API STANDARD 526-1984 FOR ELEVATED TEMPERATURES.*
- *MICRO VALVES AVAILABLE ONLY IN THREADED CONFIGURATIONS.*

ENGINEERING DATA

On the following pages are published capacity charts for some of the common gases, such as air, oxygen, nitrogen, helium, hydrogen, carbon dioxide and typical natural gas. The following charts can be used for direct selection of the Safety Relief Valve orifice required without calculations. (Charts are based on gas at temperature of 60°F). ***FLOWSIZE - The FLOWSAFE Relief Valve Sizing Program may also be used to quickly and accurately size valves.***

MOLECULAR WEIGHTS AND "C" FACTORS: Listed below are the molecular weights, specific heat ratios, and "C" factors for many common gases. This "C" factor is used in both formulas for sizing valves for gas or vapor service.

TABLE 1

Gas	Mol. Wt. (M)	Specific Heat Ratio (Cp/Cv)	C
Acetylene	26	1.28	345
Air	29	1.40	356
Ammonia	17	1.33	351
Argon	40	1.66	377
Benzene	78	1.10	327
Carbon Disulphide	76	1.21	338
Carbon Dioxide	44	1.28	345
Carbon Monoxide	28	1.40	356
Chlorine	71	1.36	352
Cyclohexane	84	1.08	324
Ethane	30	1.22	339
Ethylene	28	1.20	337
Helium	4	1.66	377
Hexane	86	1.08	324
Hydrochloric Acid	36.5	1.40	356
Hydrogen	2	1.40	356
Hydrogen Sulphide	34	1.32	348
Iso Butane	58	1.11	328
Methane	16	1.30	346
Methyl Alcohol	32	1.20	337
Methyl Chloride	50.5	1.20	337
N-Butane	58	1.11	328
Natural Gas	19	1.27	345
Nitrogen	28	1.40	356
Oxygen	32	1.40	356
Pentane	72	1.09	325
Propane	44	1.14	331
Sulphur Dioxide	64	1.26	342
Water Vapor/Steam	18	1.30	347

Specific Heat Ratio (Cp/Cv)	C	Specific Heat Ratio (Cp/Cv)	C
1.00	315	1.52	366
1.02	318	1.54	368
1.04	320	1.56	369
1.06	322	1.58	371
1.08	324	1.60	372
1.10	327	1.62	374
1.12	329	1.64	376
1.14	331	1.66	377
1.16	333	1.68	379
1.18	335	1.70	380
1.20	337	1.72	382
1.22	339	1.74	383
1.24	341	1.76	384
1.26	343	1.78	386
1.28	345	1.80	387
1.30	347	1.82	388
1.32	349	1.84	390
1.34	351	1.86	391
1.36	352	1.88	392
1.38	354	1.90	394
1.40	356	1.92	395
1.42	358	1.94	397
1.44	359	1.96	398
1.46	361	1.98	399
1.48	363	2.00	400
1.50	364	2.20	412

• *NOTE: FOR CORROSION COMPATIBILITY WITH THESE GASES, CONSULT* ***FLOW SAFE*** *ENGINEERING.*

CAPACITIES • STANDARD CU.FT. PER MINUTE, 10% OVERPRESSURE, AT 60°F, Z = 1.0

AIR #/HR=4.59 x SCFM M=29; C=356 **F80 SERIES**

ORIFICE SIZE	-1M	-2M	-3M	-4M	-4	-6	-8	F	G	H	J
AREA (in²)	0.003	0.015	0.033	0.065	0.065	0.145	0.259	0.405	0.664	1.036	1.699
K(.90*K_d)	0.878	0.878	0.878	0.878	0.878	0.878	0.878	0.878	0.878	0.878	0.878
SET PRESSURE	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM
15	2	8	17	34	34	78	137	213	349	545	894
20	2	9	19	38	38	88	154	239	392	612	1003
25	2	10	22	44	44	101	177	275	451	703	1153
30	2	12	25	50	50	114	200	311	510	795	1304
35	3	13	28	56	56	128	223	347	568	887	1454
40	3	14	31	61	61	141	246	382	627	978	1604
50	3	17	37	73	73	167	293	454	744	1162	1905
60	4	19	43	84	84	193	339	526	862	1345	2206
66	4	21	46	91	91	209	367	569	932	1455	2386
70	4	22	49	96	96	220	385	597	979	1528	2506
80	5	25	55	107	107	246	431	669	1097	1712	2807
90	5	27	60	119	119	273	477	741	1214	1895	3108
100	6	30	66	130	130	299	524	812	1332	2078	3408
120	7	35	78	153	153	352	616	956	1567	2445	4009
140	8	41	90	176	176	404	708	1099	1802	2811	4611
160	9	46	101	199	199	457	801	1242	2037	3178	5212
180	10	51	113	222	222	510	893	1386	2272	3545	5813
200	11	57	125	245	245	563	985	1529	2507	3911	6415
220	12	62	136	268	268	615	1078	1672	2742	4278	7016
240	13	67	148	291	291	668	1170	1816	2977	4645	7617
260	15	73	160	314	314	721	1263	1959	3212	5011	8218
280	16	78	171	337	337	773	1355	2102	3447	5378	8820
300	17	83	183	360	360	826	1447	2246	3682	5745	9421
320	18	88	195	383	383	879	1540	2389	3917	6111	10022
340	19	94	206	406	406	932	1632	2532	4152	6478	10624
350	19	96	212	418	418	958	1678	2604	4269	6661	10924
380	21	104	230		452	1037	1817	2819	4622	7211	11826
400	22	110	241		475	1090	1909	2962	4857	7578	12427
420	23	115	253		498	1143	2001	3106	5092	7944	13029
440	24	120	265		521	1195	2094	3249	5327	8311	13630
460	25	126	276		544	1248	2186	3392	5562	8678	14231
480	26	131	288		567	1301	2279	3536	5797	9044	14832
500	27	136	300		590	1354	2371	3679	6032	9411	15434
600	33	163	358		705	1617	2833	4396	7207	11244	18440
668	36	181	398		784	1796	3147	4883	8006	12491	20485
700	38	189	417		820	1881	3295	5112	8382	13077	21447
800	43	216	475		936	2144	3756	5829	9557	14911	24453
839	45	226	498		980	2247	3937	6108	10015	15626	25625
890	48	240	528		1039	2382	4172	6474	10614	16561	27159
1000	54	269			1166	2672	4680	7262	11907	18577	30466
1125	60	302			1309	3001	5257	8158	13375	20869	34224
1500	80	402			1741	3990	6989	10846	17781	27743	45498
2000	107	534			2316	5308	9299	14429	23656	36909	60530
2500	133	667			2891	6627	11608	18012	29531	46075	75562
2606	133	667			2891	6627	11608	18012	29531	46075	78749
2700	139				3013	6906	12097	18772	30776	48019	81575
2750	144				3121	7154	12531	19445	31881	49742	
3000	160				3466	7945	13917	21595	35406		
3500	187				4041	9263	16226	25179	41280		
3705	197				4277	9804	17173	26648	43689		
3750	200				4329	9922	17381	26970			
4292	229				4952	11351	19884	30854			
4500	240				5191	11900		32345			
5000	266				5766	13218		35928			
5500	293				6341	14536					
5774	307				6657	15259					
6000	319				6916						
6600	351				7607						
8000					9217						
9000					10367						
9500					10942						
9612					11071						

CAPACITIES • STANDARD CU.FT. PER MINUTE, 10% OVERPRESSURE, AT 60°F, Z = 1.0

NITROGEN #HR=4.43 x SCFM M=28; C=356 F80 SERIES

ORIFICE SIZE AREA (in²) K(.90*K_d)	-1M 0.003 0.878	-2M 0.015 0.878	-3M 0.033 0.878	-4M 0.065 0.878	-4 0.065 0.878	-6 0.145 0.878	-8 0.259 0.878	F 0.405 0.878	G 0.664 0.878	H 1.036 0.878	J 1.699 0.878
SET PRESSURE	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM
15	2	8	17	33	33	74	132	207	339	529	868
20	2	9	20	39	39	87	156	243	399	622	1021
25	2	10	23	45	45	100	179	280	459	716	1174
30	2	12	26	51	51	113	202	316	519	809	1327
35	3	13	29	57	57	126	226	353	578	902	1480
40	3	14	32	62	62	139	249	389	638	996	1633
50	3	17	38	74	74	165	296	462	758	1182	1939
60	4	20	44	86	86	192	342	535	877	1369	2245
66	4	21	47	93	93	207	370	579	949	1481	2428
70	5	23	50	98	98	218	389	608	997	1555	2551
80	5	25	55	109	109	244	435	681	1116	1742	2857
90	6	28	61	121	121	270	482	754	1236	1928	3163
100	6	31	67	133	133	296	529	827	1356	2115	3468
120	7	36	79	156	156	348	622	973	1595	2488	4080
140	8	41	91	180	180	400	715	1119	1834	2861	4692
160	9	47	103	203	203	453	809	1264	2073	3234	5304
180	10	52	115	226	226	505	902	1410	2312	3608	5916
200	12	58	127	250	250	557	995	1556	2551	3981	6528
220	13	63	139	273	273	609	1088	1702	2790	4354	7140
240	14	68	151	297	297	662	1182	1848	3030	4727	7752
260	15	74	162	320	320	714	1275	1994	3269	5100	8364
280	16	79	174	343	343	766	1368	2140	3508	5473	8976
300	17	85	186	367	367	818	1462	2285	3747	5846	9588
320	18	90	198	390	390	870	1555	2431	3986	6219	10200
340	19	95	210	414	414	923	1648	2577	4225	6593	10812
350	20	98	216	425	425	949	1695	2650	4345	6779	11118
380	21	106	234		460	1027	1835	2869	4704	7339	12035
400	22	112	246		484	1079	1928	3015	4943	7712	12647
420	23	117	258		507	1132	2021	3161	5182	8085	13259
440	24	122	269		531	1184	2208	3307	5421	8458	13871
460	26	128	281		554	1236	2301	3452	5660	8831	14483
480	27	133	293		578	1288	2394	3598	5899	9205	15095
500	28	139	305		601	1340	2861	3744	6139	9578	15707
600	33	166	365		718	1602	3178	4473	7334	11443	18767
668	37	184	405		798	1779	3327	4969	8147	12712	20847
700	39	193	424		835	1863	3794	5203	8530	13309	21826
800	44	220	483		952	2124	3976	5932	9726	15175	24886
839	46	230	507		998	2226	4213	6217	10192	15902	26079
890	49	244	537		1057	2359	4726	6589	10802	16854	27639
1000	55	274			1186	2646	5310	7391	12117	18906	31005
1125	62	308			1333	2973	7059	8303	13612	21238	34830
1500	82	409			1771	3952	9391	11038	18096	28234	46303
2000	109	544			2357	5257	11723	14684	24075	37563	61601
2500	136	679			2942	6563	12217	18331	30054	46891	76899
2606	142	708			3066	6840	12656	19104	31321	48869	80142
2700	147				3176	7085	12889	19790	32445	50622	83019
2750	149				3235	7216	14055	20154	33043	51555	
3000	163				3527	7869	16387	21978	36032		
3500	190				4113	9174	17343	25624	42011		
3705	201				4353	9709	17553	27119	44462		
3750	203				4405	9827	20081	27448			
4292	233				5040	11242		31401			
4500	244				5283	11785		32918			
5000	271				5868	13091		36564			
5500	298				6454	14397					
5774	313				6774	15112					
6000	325				7039						
6600	357				7741						
8000					9380						
9000					10551						
9500					11136						
9612					11267						

CAPACITIES • STANDARD CU.FT. PER MINUTE, 10% OVERPRESSURE, AT 60°F, Z = 1.0

OXYGEN #/HR=5.06 x SCFM M=32; C=356 F80 SERIES

ORIFICE SIZE	-1M	-2M	-3M	-4M	-4	-6	-8	F	G	H	J
AREA (in²)	0.003	0.015	0.033	0.065	0.065	0.145	0.259	0.405	0.664	1.036	1.699
K(.90*K_d)	0.878	0.878	0.878	0.878	0.878	0.878	0.878	0.878	0.878	0.878	0.878
SET PRESSURE	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM
15	1	7	16	31	31	69	124	194	317	495	812
20	2	8	19	37	37	81	146	228	373	582	955
25	2	10	21	42	42	94	167	262	429	670	1098
30	2	11	24	47	47	106	189	296	485	757	1241
35	2	12	27	53	53	118	211	330	541	844	1384
40	3	13	30	58	58	130	233	364	597	931	1527
50	3	16	35	69	69	155	276	432	709	1106	1813
60	4	19	41	80	80	179	320	501	821	1280	2100
66	4	20	44	87	87	194	346	541	888	1385	2271
70	4	21	46	91	91	204	364	569	932	1455	2386
80	5	24	52	102	102	228	407	637	1044	1629	2672
90	5	26	57	113	113	252	451	705	1156	1804	2958
100	6	29	63	124	124	277	495	773	1268	1978	3244
120	7	34	74	146	146	326	582	910	1492	2327	3817
140	8	39	85	168	168	375	669	1046	1715	2676	4389
160	9	44	96	190	190	423	756	1183	1939	3025	4962
180	10	49	107	212	212	472	844	1319	2163	3375	5534
200	11	54	119	234	234	521	931	1456	2387	3724	6106
220	12	59	130	256	256	570	1018	1592	2610	4073	6679
240	13	64	141	277	277	619	1105	1729	2834	4422	7251
260	14	69	152	299	299	668	1193	1865	3058	4771	7824
280	15	74	163	321	321	717	1280	2001	3281	5120	8396
300	16	79	174	343	343	765	1367	2138	3505	5469	8968
320	17	84	185	365	365	814	1454	2274	3729	5818	9541
340	18	89	196	387	387	863	1542	2411	3952	6167	10113
350	18	92	202	398	398	888	1585	2479	4064	6341	10399
380	20	99	219		431	961	1716	2684	4400	6865	11258
400	21	104	230		453	1010	1803	2820	4624	7214	11831
420	22	110	241		475	1059	1891	2957	4847	7563	12403
440	23	115	252		496	1107	1978	3093	5071	7912	12975
460	24	120	263		518	1156	2065	3229	5295	8261	13548
480	25	125	274		540	1205	2153	3366	5518	8610	14120
500	26	130	285		562	1254	2240	3502	5742	8959	14693
600	31	155	341		672	1498	2676	4185	6861	10704	17555
668	34	172	379		746	1664	2973	4648	7621	11891	19501
700	36	180	397		781	1742	3112	4867	7979	12449	20417
800	41	206	452		891	1987	3549	5549	9098	14195	23279
839	43	215	474		933	2082	3719	5815	9534	14875	24395
900	46	228	502		989	2207	3941	6163	10104	15765	25854
1000	54	269			1110	2475	4421	6913	11335	17865	29003
1125	60	302			1246	2781	4967	7766	12733	19866	32580
1500	80	402			1657	3696	6603	10325	16927	26411	43313
2000	107	534			2205	4918	8784	13736	22520	35137	57623
2500	133	667			2752	6139	10966	17147	28113	43862	71933
2606	133	667			2868	6398	11428	17870	29298	45712	74966
2700	139				2971	6628	11838	18511	30350	47353	77657
2750	144				3026	6750	12056	18853	30909	48225	
3000	160				3299	7360	13147	20558	33705		
3324	187				3847	8582	15329	23969	39298		
3500	197				4071	9082	16223	25368	45591		
3750	200				4121	9192	16419	25675			
4292	229				4714	10516	18784	29373			
4500	240				4942	11024		30792			
5000	266				5489	12245		34203			
5500	293				6037	13467					
5774	307				6337	14136					
6000	319				6584						
6600	351				7241						
8000					8774						
9000					9869						
9500					10417						
9612					10539						

CAPACITIES • STANDARD CU.FT. PER MINUTE, 10% OVERPRESSURE, AT 60°F, Z = 1.0

HELIUM #/HR=0.633 x SCFM M=4; C=377 F80 SERIES

ORIFICE SIZE AREA (in^2) $K(.90*K_d)$	-1M 0.003 0.878	-2M 0.015 0.878	-3M 0.033 0.878	-4M 0.065 0.878	-4 0.065 0.878	-6 0.145 0.878	-8 0.259 0.878	F 0.405 0.878	G 0.664 0.878	H 1.036 0.878	J 1.699 0.878
SET PRESSURE	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM
15	4	21	47	93	93	208	371	580	950	1483	2431
20	5	25	56	109	109	244	436	682	1118	1744	2860
25	6	29	64	126	126	281	501	784	1285	2005	3289
30	7	33	72	142	142	317	567	886	1453	2267	3717
35	7	37	81	159	159	354	632	988	1620	2528	4146
40	8	40	89	175	175	390	697	1090	1788	2789	4575
50	10	48	106	208	208	464	828	1295	2123	3312	5432
60	11	56	122	241	241	537	959	1499	2458	3835	6289
66	12	60	132	260	260	581	1037	1622	2659	4149	6803
70	13	63	139	273	273	610	1089	1704	2793	4358	7146
80	14	71	155	306	306	683	1220	1908	3128	4880	8004
90	16	78	172	339	339	756	1351	2112	3463	5403	8861
100	17	86	189	372	372	829	1481	2317	3798	5926	9718
120	20	101	222	437	437	976	1743	2725	4468	6971	11433
140	23	116	255	503	503	1122	2004	3134	5138	8017	13147
160	26	131	289	569	569	1268	2266	3543	5808	9062	14862
180	29	146	322	634	634	1415	2527	3951	6478	10108	16576
200	32	161	355	700	700	1561	2788	4360	7148	11153	18291
220	35	177	389	765	765	1707	3050	4769	7818	12199	20005
240	38	192	422	831	831	1854	3311	5177	8488	13244	21720
260	41	207	455	897	897	2000	3572	5586	9158	14289	23434
280	44	222	488	962	962	2146	3834	5995	9829	15335	25149
300	47	237	522	1028	1028	2293	4095	6404	10499	16380	26863
320	50	252	555	1093	1093	2439	4356	6812	11169	17426	28578
340	53	267	588	1159	1159	2585	4618	7221	11839	18471	30292
350	55	275	605	1192	1192	2658	4748	7425	12174	18994	31149
380	60	298	655		1290	2878	5141	8038	13179	20562	33721
400	63	313	688		1356	3024	5402	8447	13849	21608	35436
420	66	328	722		1421	3171	5663	8856	14519	22653	37150
440	69	343	755		1487	3317	5925	9264	15189	23698	38865
460	72	358	788		1552	3463	6186	9673	15859	24744	40579
480	75	373	821		1618	3610	6447	10082	16529	25789	42294
500	78	389	855		1684	3756	6709	10490	17199	26835	44008
600	93	464	1021		2012	4487	8016	12534	20549	32062	52581
668	103	516	1135		2235	4985	8904	13923	22828	35617	58410
700	108	540	1188		2340	5219	9322	14577	23900	37289	61153
800	123	616	1354		2668	5951	10629	16621	27250	42517	69726
839	129	645	1419		2795	6236	11139	17418	28557	44555	73069
890	137	684	1504		2963	6609	11805	18460	30265	47221	77441
1000	153	767			3323	7414	13243	20708	33951	52971	86871
1125	172	862			3733	8328	14876	23262	38138	59505	97586
1500	229	1145			4963	11072	19777	30925	50702	79107	129733
2000	305	1524			6603	14730	26311	41143	67453	105244	172596
2500	380	1902			8243	18388	32845	51360	84205	131380	215458
2606	396	1982			8591	19164	34230	53526	87756	136921	224545
2700	411				8899	19851	35459	55447	90905	141834	232603
2750	418				9063	20217	36112	56469	92581	144448	
3000	456				9883	22046	39379	61577	100956		
3500	532				11523	25704	45913	71795	117708		
3705	563				12195	27204	48592	75984	124576		
3750	570				12343	27533	49180	76903			
4292	652				14120	31499	56263	87979			
4500	683				14802	33020		92229			
5000	759				16442	36678		102447			
5500	835				18082	40337					
5774	876				18981	42341					
6000	910				19722						
6600	1001				21960						
8000					26281						
9000					29561						
9500					31200						
9612					31568						

CAPACITIES • STANDARD CU.FT. PER MINUTE, 10% OVERPRESSURE, AT 60°F, Z = 1.0

HYDROGEN #/HR=0.316 x SCFM M=2; C=356 — F80 SERIES

ORIFICE SIZE	-1M	-2M	-3M	-4M	-4	-6	-8	F	G	H	J
AREA (in^2)	0.003	0.015	0.033	0.065	0.065	0.145	0.259	0.405	0.664	1.036	1.699
$K(.90*K_d)$	0.878	0.878	0.878	0.878	0.878	0.878	0.878	0.878	0.878	0.878	0.878
SET PRESSURE	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM
15	6	29	63	124	124	277	495	774	1269	1980	3247
20	7	34	74	146	146	326	582	910	1493	2329	3819
25	8	39	85	168	168	375	670	1047	1716	2678	4392
30	9	44	96	190	190	424	757	1183	1940	3027	4964
35	10	49	108	212	212	473	844	1320	2164	3376	5537
40	11	54	119	234	234	521	931	1456	2388	3725	6109
50	13	64	141	278	278	619	1106	1729	2835	4423	7254
60	15	74	163	321	321	717	1280	2002	3282	5121	8399
66	16	80	176	348	348	775	1385	2166	3551	5540	9086
70	17	84	185	365	365	814	1455	2275	3730	5819	9543
80	19	94	208	409	409	912	1629	2548	4177	6517	10688
90	21	104	230	453	453	1010	1804	2821	4625	7215	11833
100	23	115	252	497	497	1108	1978	3094	5072	7914	12978
120	27	135	297	584	584	1303	2327	3639	5967	9310	15268
140	31	155	341	672	672	1498	2676	4185	6862	10706	17557
160	35	175	385	759	759	1694	3025	4731	7756	12102	19847
180	39	195	430	847	847	1889	3375	5277	8651	13498	22136
200	43	216	474	934	934	2085	3724	5823	9546	14894	24426
220	47	236	519	1022	1022	2280	4073	6368	10441	16290	26716
240	51	256	563	1110	1110	2475	4422	6914	11336	17686	29005
260	55	276	608	1197	1197	2671	4771	7460	12231	19083	31295
280	59	297	652	1285	1285	2866	5120	8006	13125	20479	33584
300	63	317	697	1372	1372	3062	5469	8551	14020	21875	35874
320	67	337	741	1460	1460	3257	5818	9097	14915	23271	38164
340	71	357	786	1548	1548	3452	6167	9643	15810	24667	40453
350	73	367	808	1591	1591	3550	6341	9916	16257	25365	41598
380	80	398	875		1723	3843	6865	10735	17599	27459	45032
400	84	418	919		1810	4039	7214	11280	18494	28856	47322
420	88	438	964		1898	4234	7563	11826	19389	30252	49612
440	92	458	1008		1986	4429	7912	12372	20284	31648	51901
460	96	478	1053		2073	4625	8261	12918	21179	33044	54191
480	100	499	1097		2161	4820	8610	13464	22074	34440	56480
500	104	519	1142		2248	5016	8959	14009	22968	35836	58770
600	124	620	1364		2686	5993	10704	16738	27443	42817	70218
668	138	689	1515		2984	6657	11891	18594	30485	47564	78003
700	144	721	1586		3124	6970	12449	19467	31917	49798	81666
800	164	822	1809		3562	7947	14195	22196	36391	56778	93114
839	172	861	1895		3733	8328	14875	23260	38136	59501	97579
890	183	913	2009		3957	8826	15765	24652	40417	63061	103417
1000	205	1024			4438	9901	17685	27654	45339	70740	116010
1125	230	1151			4986	11122	19866	31065	50932	79465	130320
1500	306	1530			6628	14786	26411	41299	67709	105643	173250
2000	407	2035			8818	19671	35137	54943	90080	140546	230491
2500	508	2540			11008	24556	43862	68588	112450	175450	287731
2606	529	2647			11472	25592	45712	71481	117193	182849	299866
2700	548				11884	26510	47353	74046	121399	189411	310627
2750	559				12103	26999	48225	75410	123636	192901	
3000	609				13198	29441	52588	82233	134821		
3500	710				15388	34326	61314	95877	157191		
3705	752				16286	36329	64892	101472	166363		
3750	761				16483	36769	65677	102700			
4292	870				18856	42064	75136	117490			
4500	912				19767	44097		123167			
5000	1013				21957	48982		136811			
5500	1114				24147	53867					
5774	1170				25347	56544					
6000	1216				26337						
6600	1337				28965						
8000					35097						
9000					39476						
9500					41666						
9612					42157						

CAPACITIES • STANDARD CU.FT. PER MINUTE, 10% OVERPRESSURE, AT 60°F, Z = 1.0

NATURAL GAS #/HR=3.00 x SCFM M=19, C=345 F80 SERIES

ORIFICE SIZE AREA (in²) K(.90*K_d)	-1M 0.003 0.878	-2M 0.015 0.878	-3M 0.033 0.878	-4M 0.065 0.878	-4 0.065 0.878	-6 0.145 0.878	-8 0.259 0.878	F 0.405 0.878	G 0.664 0.878	H 1.036 0.878	J 1.699 0.878
SET PRESSURE	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM	SCFM
15	2	9	20	39	39	87	156	243	399	623	1021
20	2	11	23	46	46	102	183	286	469	732	1201
25	2	12	27	53	53	118	211	329	540	842	1381
30	3	14	30	60	60	133	238	372	610	952	1561
35	3	15	34	67	67	149	265	415	680	1062	1741
40	3	17	37	73	73	164	293	458	751	1171	1921
50	4	20	44	87	87	195	348	544	891	1391	2281
60	5	23	51	101	101	225	403	629	1032	1610	2641
66	5	25	55	109	109	244	435	681	1116	1742	2857
70	5	26	58	115	115	256	457	715	1173	1830	3001
80	6	30	65	129	129	287	512	801	1313	2049	3361
90	7	33	72	142	142	318	567	887	1454	2269	3721
100	7	36	79	156	156	348	622	973	1595	2488	4080
120	8	42	93	184	184	410	732	1144	1876	2927	4800
140	10	49	107	211	211	471	842	1316	2157	3366	5520
160	11	55	121	239	239	533	951	1488	2439	3805	6240
180	12	61	135	266	266	594	1061	1659	2720	4244	6960
200	14	68	149	294	294	655	1171	1831	3001	4683	7680
220	15	74	163	321	321	717	1280	2002	3283	5122	8400
240	16	81	177	349	349	778	1390	2174	3564	5561	9120
260	17	87	191	376	376	840	1500	2346	3846	6000	9840
280	19	93	205	404	404	901	1610	2517	4127	6439	10560
300	20	100	219	432	432	963	1719	2689	4408	6878	11279
320	21	106	233	459	459	1024	1829	2860	4690	7317	11999
340	22	112	247	487	487	1086	1939	3032	4971	7756	12719
350	23	115	254	500	500	1116	1994	3118	5112	7975	13079
380	25	125	275		542	1208	2158	3375	5534	8634	14159
400	26	131	289		569	1270	2268	3547	58115	9073	14879
420	28	138	303		597	1331	2378	3718	6096	9512	15599
440	29	144	317		624	1393	2488	3890	6378	9951	16319
460	30	150	331		652	1454	2597	4062	6659	10390	17039
480	31	157	345		679	1516	2707	4233	6940	10829	17758
500	33	163	359		707	1577	2817	4405	7222	11268	18478
600	39	195	429		845	1884	3366	5263	8628	13462	22078
668	43	217	476		938	2093	3739	5846	9585	14955	24525
700	45	227	499		982	2191	3914	6121	10035	15657	25677
800	52	258	569		1120	2499	4463	6979	11442	17852	29277
839	54	271	596		1174	2618	4677	7313	11991	18708	30681
890	57	287	632		1244	2775	4957	7751	12708	19827	32516
1000	64	322			1395	3113	5560	8695	14255	22242	36476
1125	72	362			1568	3497	6246	9767	16014	24985	40975
1500	96	481			2084	4649	8304	12985	21289	33216	54473
2000	128	640			2773	6185	11048	17275	28323	44190	72470
2500	160	799			3461	7721	13791	21565	35356	55165	90468
2606	166	832			3607	8047	14373	22475	36848	57491	94283
2700	172				3737	8335	14889	23281	38170	59554	97667
2750	176				3805	8489	15163	23710	38873	60652	
3000	192				4150	9257	16535	25855	42390		
3500	223				4838	10793	19278	30146	49424		
3705	236				5120	11423	20403	31904	52308		
3750	239				5182	11561	20650	32291			
4292	274				5929	13226	23624	36941			
4500	287				6215	13865		38726			
5000	319				6904	15401		43016			
5500	350				7592	16937					
5774	368				7970	17778					
6000	382				8281						
6600	420				9107						
8000					11035						
9000					12412						
9500					13101						
9612					13255						

CAPACITIES • STANDARD CU.FT. PER MINUTE, 10% OVERPRESSURE, AT 60°F, Z = 1.0

CARBON DIOXIDE #/HR=6.96 x SCFM M=44; C=345 F80 SERIES

ORIFICE SIZE	-1M	-2M	-3M	-4M	-4	-6	-8	F	G	H	J
AREA (in^2)	0.003	0.015	0.033	0.065	0.065	0.145	0.259	0.405	0.664	1.036	1.699
$K(.90*K_d)$	0.878	0.878	0.878	0.878	0.878	0.878	0.878	0.878	0.878	0.878	0.878
SET PRESSURE	**SCFM**	**SCFM**	**SCFM**	**SCFM**	**SCFM**	**SCFM**	**SCFM**	**SCFM**	**SCFM**	**SCFM**	**SCFM**
15	1.2	5.9	13	26	26	57	102	160	262	409	671
20	1.4	7.0	15	30	30	67	120	188	308	481	789
25	1.6	8.0	18	35	35	77	138	216	355	553	907
30	1.8	9.1	20	39	39	88	156	244	401	625	1026
35	2.0	10	22	44	44	98	174	273	447	698	1144
40	2.2	11	25	48	48	108	192	301	493	770	1262
50	2.6	13	29	57	57	128	228	357	586	914	1499
60	3.1	15	34	66	66	148	265	414	678	1058	1735
66	3.3	17	36	72	72	160	286	447	734	1145	1877
70	3.5	17	38	75	75	168	301	470	771	1202	1972
80	3.9	19	43	84	84	188	337	526	863	1347	2208
90	4.3	22	47	94	94	209	373	583	956	1491	2445
100	4.7	24	52	103	103	229	409	639	1048	1635	2681
120	5.6	28	61	121	121	269	481	752	1233	1924	3154
140	6.4	32	70	139	139	310	553	865	1418	2212	3628
160	7.2	36	80	157	157	350	625	977	1603	2500	4101
180	8.1	40	89	175	175	390	697	1090	1787	2789	4574
200	8.9	45	98	193	193	431	769	1203	1972	3077	5047
220	10	49	107	211	211	471	841	1316	2157	3366	5520
240	11	53	116	229	229	511	914	1429	2342	3654	5993
260	11	57	126	247	247	552	986	1541	2527	3943	6466
280	12	61	135	265	265	592	1058	1654	2712	4231	6939
300	13	65	144	284	284	633	1130	1767	2897	4520	7412
320	14	70	153	302	302	673	1202	1880	3082	4808	7885
340	15	74	162	320	320	713	1274	1992	3267	5097	8358
350	15	76	167	329	329	734	1310	2049	3359	5241	8595
380	16	82	181		356	794	1418	2218	3636	5673	9304
400	17	86	190		374	834	1490	2331	3821	5962	9777
420	18	90	199		392	875	1563	2443	4006	6250	10250
440	19	95	208		410	915	1635	2556	4191	6539	10723
460	20	99	217		428	956	1707	2669	4376	6827	11197
480	21	103	227		446	996	1779	2782	4561	7116	11670
500	21	107	236		465	1036	1851	2895	4746	7404	12143
600	26	128	282		555	1238	2212	3458	5670	8847	14508
668	28	142	313		617	1375	2457	3842	6299	9827	16116
700	30	149	328		646	1440	2572	4022	6594	10289	16873
800	34	170	374		736	1642	2933	4586	7519	11731	19239
839	36	178	392		771	1721	3073	4806	7879	12294	20161
890	38	189	415		817	1924	3257	5093	8351	13029	21367
1000	42	212			917	2046	3654	5714	9368	14616	23969
1125	48	238			1030	2298	4105	6418	10523	16419	26926
1500	63	316			1369	3055	5457	8533	13990	21827	35796
2000	84	420			1822	4064	7260	11352	18612	29039	47622
2500	105	525			2274	5074	9063	14171	23234	36250	59449
2606	109	547			2370	5288	9445	14769	24214	37779	61956
2700	113				2455	5477	9784	15299	25083	39135	64180
2750	115				2501	5578	9964	15581	25545	39856	
3000	126				2727	6083	10865	16990	27856		
3500	147				3179	7092	12668	19809	32478		
3705	155				3365	7506	13407	20965	34373		
3750	157				3406	7597	13570	21219			
4292	180				3896	8691	15524	24275			
4500	189				4084	9111		25448			
5000	209				4537	10120		28267			
5500	230				4989	11130					
5774	242				5237	11683					
6000	251				5442						
6600	276				5985						
8000					7251						
9000					8156						
9500					8609						
9612					8710						

SIZING

F80 SERIES

FORMULAS

VAPORS OR GASES (capacity in scfm)

$$A = \frac{V\sqrt{MTZ}}{6.32\ CKP_1}$$

VAPORS OR GASES (capacity in lbs/hr)

$$A = \frac{W\sqrt{TZ}}{CKP_1\sqrt{M}}$$

CONVERSION

$$W = \left(\frac{M}{6.32}\right)V$$

A = Valve orifice area (in^2)
V = Flow capacity (SCFM)
W = Flow capacity (lbs/hr)
M = Molecular weight of flowing media
T = Inlet temperature, absolute (°F + 460)
Z = Compressibility factor (1 if unknown)
C = Gas constant
K = Derated valve coefficient of discharge (.878) = .90 • K_d
K_d = Certified valve coefficient (.975)
P_1 = Pressure at valve inlet during flow (PSIA) (set pressure + overpressure + P_a)
P_a = Atmospheric Pressure (PSIA) (14.7)

- *P_1 IS THE PRESSURE AT THE VALVE INLET DURING THE RELIEF CYCLE. IT MAY VARY SLIGHTLY FROM THE PROCESS PRESSURE DUE TO PIPING FRICTIONAL LOSSES AND CROSS SECTIONAL AREA CHANGES. THESE LOSSES SHOULD BE DETERMINED FOR ACCURATE SIZING AND TO ENSURE PROPER VALVE ACTION.*
- *FORMULAS LISTED ARE FOR CRITICAL FLOW CALCULATIONS. FOR SUBCRITICAL CONDITIONS CONTACT **FLOW SAFE** ENGINEERING FOR APPLICABILITY AND METHODOLOGY.*
- *TO ACCURATELY AND QUICKLY SIZE FLOWSAFE VALVES, USE **FLOWSIZE** - THE FLOWSAFE RELIEF VALVE SIZING PROGRAM.*

PART NUMBERING

F80 SERIES

01 – XXXXX – XXXX

CONFIGURATION
1-STD(No Lift Lever)
2-Micro, Extended Inlet
4-w/Lift Lever

SEAT TYPE

F84 Series	(-2M)	MICRO	188
F84 Series	(-3M)	MICRO	189
F84 Series	(-4M)	MICRO	190
F84 Series	(-4)	MED	155
F84 Series	(-6)	MED	156
F84 Series	(-8)	MED	157
F84 Series	(-4)	LRG/X-LRG	158
F84 Series	(-6)	LRG/X-LRG	159
F84 Series	(-8)	LRG/X-LRG	160
F84 Series	(F)	LRG/X-LRG	161
F84 Series	(G)	LRG/X-LRG	162
F84 Series	(H)	LRG/X-LRG	163
F84 Series	(J)	LRG/X-LRG	164

PLASTIC (F84)

F85 Series	(-1M)	MICRO	184
F85 Series	(-2M)	MICRO	185
F85 Series	(-3M)	MICRO	186
F85 Series	(-4M)	MICRO	187
F85 Series	(-4)	MED	165
F85 Series	(-6)	MED	166
F85 Series	(-8)	MED	167
F85 Series	(-4)	LRG/X-LRG	168
F85 Series	(-6)	LRG/X-LRG	169
F85 Series	(-8)	LRG/X-LRG	170
F85 Series	(F)	LRG/X-LRG	171
F85 Series	(G)	LRG/X-LRG	172
F85 Series	(H)	LRG/X-LRG	173
F85 Series	(J)	LRG/X-LRG	174

ELASTOMER (F85)

NACE ADDER
4=Nace Trim
Blank=Non-Nace

MATERIAL
1=Brass
2=Carbon Steel
3=Stainless Steel
5=Aluminum
6=Special

SIZE
0=M/MED/LARGE
1=X-LARGE

INLET DIAMETER (in)

1	=	1/2
2	=	3/4
3	=	1
4	=	1-1/2
5	=	2

INLET CONNECTION

M	= MNPT	O	= FLANGED, RF
F	= FNPT	R	= FLANGED, RTJ
S	= SPECIAL	G	= GRAYLOC
V	= VCR	BP	= BRITISH PIPE THREAD
S	= SAE	MS	= MS33649

*ALL SAFETY RELIEF VALVES SHOWN IN THIS CATALOG ARE CAREFULLY SET AND TESTED PRIOR TO SHIPMENT. THE **FLOW SAFE** TESTING DEPARTMENT INCLUDES PNEUMATIC FACILITIES FOR TESTING VALVES WITH SET PRESSURES UP TO 10,000 PSIG. UNLESS OTHERWISE SPECIFIED BLOWDOWN IS FACTORY SET AT 7%. TEST REPORTS ON EACH VALVE ARE AVAILABLE UPON REQUEST.*

SIZING & SELECTION EXAMPLES

GAS & VAPOR (10% Overpressure)

The following procedure is recommended in sizing & selecting *FLOW SAFE* valves:

(1.) Determine the Operating Conditions:
- V = Flow Capacity (SCFM)
- W = Flow Capacity (lbs/hr)
- M = Molecular Weight of flowing media
- T = Inlet Temperature, (°R=°F+460)
- Z = Compressibility factor (See AGA Handbook) (Z = 1.0, if unknown)
- C = Gas Constant (p.14)
- K = Valve Coefficient of Discharge (.878)
- P_1 = Pressure at valve inlet during flow (psia) (Set pressure + Overpressure + P_a)
- Type Fluid: _____

(2.) Calculate the required Valve orifice area(A) for the operating conditions:

$$A = \frac{V\sqrt{MTZ}}{6.32\,CKP_1}$$ Capacity(V) in SCFM

$$A = \frac{W\sqrt{TZ}}{CKP_1\sqrt{M}}$$ Capacity(W) in LBS/HR

(3.) Select an orifice area equal to or greater than A:

Orifice Size:	-1	-2	-3	-4	-6(D)	-8(E)	F	G	H	J
Area(in²):	.003	.015	.033	.065	.145	.259	.405	.664	1.036	1.699

(4.) Select the Body size to handle the set pressure (Page 4), and the selected orifice.

(5.) Determine the Connection size & type (threaded or flanged).

(6.) Select the materials based upon the fluid pressure, temperature, and corrosivity (Page 7 or 11)

(7.) Determine the Assembly Part Number (Page 8 or 12)
XX-XXXXX-XXX

(8.) Determine the Connection Number, XXXXXX (Flanged Connections only, Page 9 & 13)

(9.) Complete the Specification Sheet & Order Form (Page 24)
Important: Include the piping configuration if possible

EXAMPLE #1: F85 Series

Fluid: Natural Gas (M: 19, C:345)
Set Pressure: 200 psig Overpressure=10%
Inlet Temperature (T): 100°F = 100+460 = 560°R
Back Pressure: Atmospheric W=5200 lb/hr
P_1=200+20+14.7 = 234.7 psia, Z=1.0, K=.878

$$A = \frac{5200\sqrt{560 \times 1.0}}{234.7(345)(.878)\sqrt{19}} = .397\ in^2$$

- Use a **"F"** orifice, with a flow area of .405 in²
- From Page 4, a Large body is required for 200 psig with **"F"** orifice and Elastomer seat (F85).
- Connection Type: Flanged, 1-1/2 x 2.
- For Natural Gas, Standard *FLOW SAFE* F85-F Materials are satisfactory: See Page 11
  Flow Wetted Metal Parts: **Carbon Steel**
  Seat: **Elastomer(Buna-N)**
- Select the F85 Valve Assembly Number (Page 12):
  P/N: 01-1171F-402
- Connection Number (Page 13): **05F042**
- Complete the Specification Sheet & order form

EXAMPLE #2: F84 Series

Fluid: Cryogenic Nitrogen Vapor (M:28, C:356)
Set Pressure: 200 psig Overpressure=10%
Inlet Temperature (T): -320°F = -320+460=140°R
V: 4500 SCFM, Z = 1.0, K = .878
Back Pressure: Atmosphere

$$A = \frac{4500\sqrt{(28 \times 140 \times 1.0)}}{6.32(356)(.878)234.7} = .608\ in^2$$

- Use a **"G"** orifice with a flow area of .664 in²
- From Page 4, a Large Body with Plastic seat is required for 200 psig and -320°F: F 84-G
- Connection Type: Threaded, 1-1/2 x 2.
- For Cryogenic N_2 vapor, Standard *FLOW SAFE* F84 Materials are satisfactory: See Page 7.
  Flow Wetted Metal Parts: **Brass**
  Seat: **Plastic (Teflon)**
- Select the F84 Valve Assembly Number (Page 8):
  P/N: 01-1162F-403
- Complete the Specification Sheet & order form

FLOW SAFE
"Environmental Performance for Industry"

COMPANY _____
REF. NO. _____
FLOW SAFE REF. NO. _____

SPECIFICATION SHEET AND ORDER FORM

PLEASE ANSWER ALL QUESTIONS			SKETCH AREA/COMMENTS
SERVICE CONDITIONS	TAG NO.		
	QTY.		
	SERVICE MEDIA		
	MOLECULAR WEIGHT (M)		
	SPECIFIC GRAVITY		
	COMPRESSIBILITY FACTOR		
	VISCOSITY		
	REQUIRED CAPACITY	SCFM	
		LB/HR.	
		GPM	
	SET PRESSURE	PSIG	
		BARS	
	ALLOWABLE OVERPRESSURE %		
	REQUIRED BLOWDOWN %		
	BACK PRESSURE PSIG	BARS	
	RELIEVING TEMPERATURE °F	°C	
	REQD CLEAN LEVEL √ LOX ☐	GOX ☐	
VALVE SELECTION	BODY MATERIAL		
	SEAT & SOFT GOODS		
	TRIM MATERIAL		
	CONNECTION NUMBERS		
	OPTION NUMBER		
	SIZE INLET/OUTLET		
	FLANGE FACING	RF ☐ SF 64-125 RMS ☐ 126-250 RMS ☐	
	ORIFICE SELECTED	ORIFICE CALCULATED	
	VALVE ASSEMBLY NUMBER		
	ACCESSORIES		
	MODIFICATIONS		

FLOW SAFE, INC.
"Environmental Performance for Industry"
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Your Authorized Representative:

PHOTOCOPY FOR YOUR RECORDS – SEND OR FAX COPY TO FLOW SAFE INC, OR YOUR AUTHORIZED REPRESENTATIVE