ELKHART BRASS MANUFACTURING COMPANY

INSTALLATION and OPERATING INSTRUCTIONS
for
PRESSURE-MATIC®
AUTOMATIC PRESSURE REDUCING VALVES

I. Models and Sizes Covered:

UR-20, 1-1/2" size, bonnet types W,X,Y,YZ,Z,ZA,ZB,ZZ & ZZA

UR-25, 1-1/2" size, bonnet types W,X,Y,YZ,Z,ZA,ZB,ZZ & ZZA

UR-20, 2-1/2" size, bonnet types A,B,C,CD,D,DE,E,EF & F

UR-25, 2-1/2" size, bonnet types A,B,C,CD,D,DE,E,EF & F

UR-20S, 2-1/2" size, bonnet types A,B,C,CD,D,DE,E,EF & F

Inlet and Outlet Connections:

Valve Model & Size	*Inlet Thread	*Outlet Thread
UR-20, 1-1/2"	1-1/2" fem. NPT	1-1/2" fem. NPT
UR-25, 1-1/2"	1-1/2" fem. NPT	1-1/2" male NH
UR-20, 2-1/2"	2-1/2" fem. NPT	2-1/2" fem. NPT
UR-25, 2-1/2"	2-1/2" fem. NPT	2-1/2" male NH
UR-20S, 2-1/2"	2-1/2" fem. NPT	2-1/2" fem. NPT

*NPT = American National Standard Taper Pipe Threads (ANSI/ASME B1.20.1-1983, R2006)
NH = American National Fire Hose Connection Screw Thread (NFPA 1963-2009 Ed.)

II. Application Guidelines:

A. Automatic Sprinkler Systems

Pressure-Matic® valves are most commonly used in automatic sprinkler systems as floor control valves in high-rise buildings where supply riser pressures exceed 175 psi. These valves are listed by Underwriters Laboratories as Special System Water Control Valves-Pressure Reducing and Pressure Control Type (VLMT), and also meet the listing requirements for indicating valves. Requirements for the installation of pressure reducing valves in automatic sprinkler systems are given in Section 4-6.1.2 of NFPA 13, Standard for the Installation of Sprinkler Systems, Latest Edition. When designing Pressure-Matic® valves into a sprinkler system, the following maximum flow rate limits should be observed:

Valve Model	Bonnet Type	Max. Flow (gpm)	Max. Pressure (PSI)
UR-20 & UR-25 2-1/2"	A	500	400
	B	500	400
	C	500	400
	CD	500	400
	D	500	360
	DE	500	330
	E	500	290
	EF	500	250
	F	500	220
UR-20S 2-1/2"	A	400	400
	B	400	400
	C	400	400
	CD	400	400
	D	400	360
	DE	400	330
	E	400	290
	EF	400	250
	F	400	220
UR-20 & UR-25 1-1/2"	W	200	300*
	X	200	300*
	Y	200	300*
	YZ	200	300**
	Z	200	300***
	ZA	200	280
	ZB	200	250
	ZZ	200	220
	ZZA	200	190

*** ULC rated to 400 PSI**
**** ULC rated to 394 PSI**
***** ULC rated to 316 PSI**

These valves are also listed as a checking device, which eliminates the need for a separate check valve. When sprinklers on a given floor are fed from dual risers, the Pressure-Matic® valve acts as a check valve to prevent loss of sprinkler water supply in the event of damage to one riser.

Supervisory Switch Mounting Brackets

Brackets are available for the attachment of the following listed supervisory switches to the Pressure-Matic® valves.

Switch Mfr. & Model No.		Bracket No.
Potter Electric	OSYS-B	80738001
	PCVS	80574001
	PIVS-B	80736001(for sprinkler application)
	" "	80763001(hose valve application)
	PIVSU-A1	80823001
	PIVSU-A2	80823001
System Sensor	PIBV2	80574001
	OSY2	80574001

For proper installation of bracket and switch, see instruction sheet which accompanies bracket kit, and also refer to switch manufacturer's instructions.

Sprinkler System Installation Requirements

1. To permit easy replacement or repair of valve, pipe unions or rubber gasketed mechanical couplings should be installed immediately upstream or downstream of the valve.

2. A relief valve of not less than 1/2 inch size is to be installed on the downstream side of each Pressure-Matic® valve.

3. Pressure gauges are to be installed on the inlet and outlet sides of each pressure reducing valve.

4. Valve type should be selected to provide an outlet pressure not exceeding 165 psi at the maximum inlet pressure.

5. Upon system completion, each Pressure-Matic® valve must be tested under both flow and no-flow conditions to verify that static and residual outlet pressures and flow rates satisfy system design requirements, per requirements of Section 8-2.5 of NFPA 13.

B. Standpipe System Applications

With their male hose thread outlet connections, the model UR-25 valves are intended for use as pressure reducing hose valves in standpipe systems. When hose racks are used, the UR-20 valves can be utilized along with a special hose nipple for support of the rack. The Pressure-Matic® valves are listed by Underwriters Laboratories as Standpipe Equipment Pressure Reducing Devices (VUTX). Requirements for the installation of pressure reducing valves in standpipe systems are given in Section 5-8 of NFPA-14, Standard for the Installation of Standpipe and Hose Systems, Latest Edition. The 2-1/2" UR-25 can be used for both Class I and Class III service, while the 1-1/2" version can used for Class II systems. NFPA 14 requires that hose valve outlet pressure for Class I and Class III service be no greater than 175 psi, and no less than 100 psi. When permitted by the authority having jurisdiction, pressures less than 100 psi may be allowed, but in no case shall the valve discharge pressure be less than 65 psi. Class II hose valves must be limited to a maximum residual outlet pressure of 100 psi, but the minimum outlet pressure shall not be less than 65 psi.

Acceptance Tests

Upon completion of system, each Pressure-Matic® hose valve shall be tested in accordance with paragraph 8-5.5 of NFPA 14 to verify that the installation is correct, that the valves are operating properly, and that the inlet and outlet pressures at the valve are in accordance with the design.

III. Valve Performance Characteristics & Limitations:

A. Valve Construction & Operating Principle

The Pressure-Matic® is a fairly simple pressure reducing valve, which utilizes a hydraulic piston and cylinder assembly within the valve bonnet to allow the valve to self-throttle in response to the pressure on the downstream side of the valve. Because the piston, main stem and valve seat float freely from the manual valve stem and handwheel assembly, the valve is able to self-close under static conditions, and maintain a reduced pressure under no-flow conditions, as well as under flowing conditions. Valve discharge pressure is transmitted to the top side of the piston through pressure passages in the main stem. The presence of the piston results in a net area differential which produces a hydraulic balancing force in the closed direction. The magnitude of this balancing force is in direct proportion to the hydraulic area of the piston.

The Pressure-Matic® is a non-adjustable pressure reducing valve design, which means that the pressure reduction ratio of a given valve cannot be varied. However, the valves are available with any of nine (9) different piston diameters in order to satisfy all expected inlet/outlet pressure ratios. The valve piston size is designated by a "type" letter, ranging from "A" through "F" for the 2-1/2" valves, and from "W" through "ZZA" for the 1-1/2" valves. Each valve "type" then provides a fixed pressure reduction ratio, meaning that the outlet pressure will always be a fixed percentage of the inlet pressure, regardless of inlet pressure. It should be noted, however, that

this pressure reduction ratio will tend to decrease with increase of flow rate through the valve. This behavior results due to friction loss through the valve.

B. Valve Type Selection

To determine the correct type (bonnet) for each Pressure-Matic® valve in the system design, please use the following steps.

1. Determine the standpipe or sprinkler riser residual pressure for each valve location. This is the inlet pressure at each valve under design flow conditions. In order to accurately determine these pressures, complete water supply data will be required, including results of municipal supply flow test, and the pump performance curve. The Pressure-Matic® inlet pressure will be equal to the sum of the pump discharge pressure and the municipal supply pressure at the design flow rate, less piping friction loss, and elevation loss.

2. Turn to the appropriate valve performance chart (Figs. I through VIII), based on valve size and body style. The valve flow range for each chart is indicated in the lower right corner of the chart. Be sure to use the correct chart for the designed flow rate through the valve.

3. Locate the valve inlet residual pressure on the vertical axis of the chart and draw a line from this pressure horizontally across the chart.

4. Locate the desired valve outlet residual pressure on the chart horizontal axis and draw a vertical line from this pressure across the chart.

5. From the intersection of the inlet and outlet pressure lines constructed in (3) and (4) above, move horizontally to the nearest valve performance curve (actually straight diagonal lines). This will be the appropriate valve for the chosen location.

> **EXAMPLE:** The residual inlet pressure at a straight pattern sprinkler system floor control valve is 275 psi at a design flow demand of 280 gpm. The desired residual outlet pressure is 120 psi. On the appropriate chart (Fig. III) it is seen that the intersection of the residual inlet and outlet pressure lines fall very close to the performance curve (straight line) for the "DE" valve. Therefore, the "DE" valve would be chosen, and would provide an actual residual outlet pressure of 125 psi.

6. Determine the valve static inlet pressure. This will be the sum of the municipal supply static pressure plus the pump churn pressure, less elevation loss.

7. To determine the valve static outlet pressure, refer to the appropriate static chart (Fig. IX or X). Locate the valve static inlet pressure on the vertical axis of the chart. Follow across to the appropriate valve curve (straight line) and drop down to the horizontal axis to read valve outlet static pressure.

> **EXAMPLE:** For the valve in step (5) above, the static inlet pressure is 290 psi. Follow the 290 psi inlet pressure line across the chart horizontally to the "DE" curve. Read the outlet static pressure of 153 psi on the horizontal axis directly below the point of intersection.

NOTE: If static outlet pressure is found to exceed the maximum outlet pressure allowed by NFPA 13 or NFPA 14, it will be necessary to re-select a valve type to the left of the originally chosen type

IV. Valve Care & Maintenance:

Pressure-Matic® valves require minimal maintenance, and can normally serve reliably for twenty years or longer in fire protection systems. However, a routine inspection and testing program is essential for any fire protection system to insure that it is in proper operating condition. NFPA 25, Standard for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems should be consulted for a determination of required test frequency and methods.

Below is a summary of the required frequency of inspections and testing for pressure reducing valves:

Valve Application	Inspection	Flow Test
sprinkler system pressure regulating control valve	quarterly	annually
hose connection and hose rack assembly pressure regulating valve	quarterly	5-years

Flow test results should be compared to previous test results, and to system performance criteria. Because the Pressure-Matics® are non-adjustable type valves, test results should not vary significantly from previous test results unless the water supply or pump characteristics have changed, resulting in a higher or lower inlet pressure to the Pressure-Matic® valve. If changes to the water supply result in unsatisfactory performance of the PRV, the upper bonnet subassembly may be field replaced with a different type to achieve a different reduction ratio.

For information on bonnet subassembly replacement or on any repair parts, please contact:

Elkhart Brass Mfg Co
PO Box 1127
Elkhart, IN 46514
574-295-8330

NOTE: The outlet pressure shown on the following charts are subject to a tolerance of ±10%.

Fig. I Model UR-20S, 2-1/2"

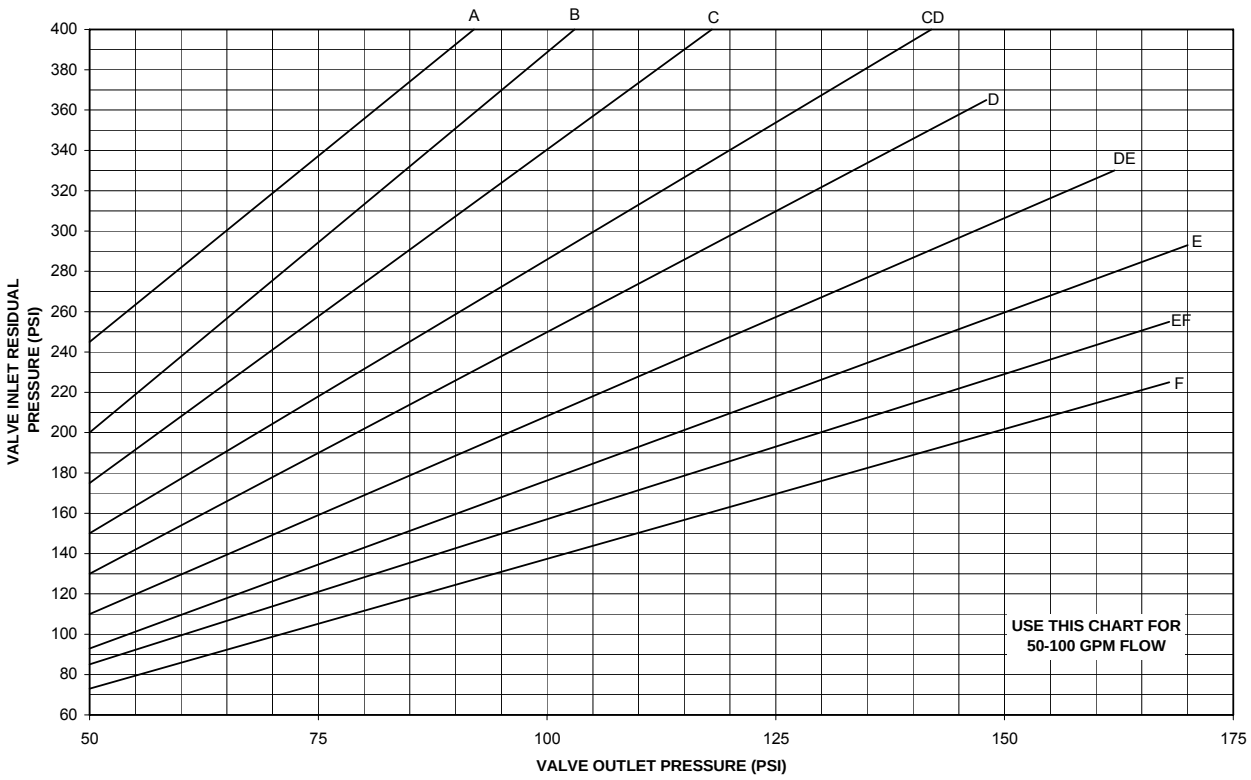

Fig. II Model UR-20S, 2-1/2"

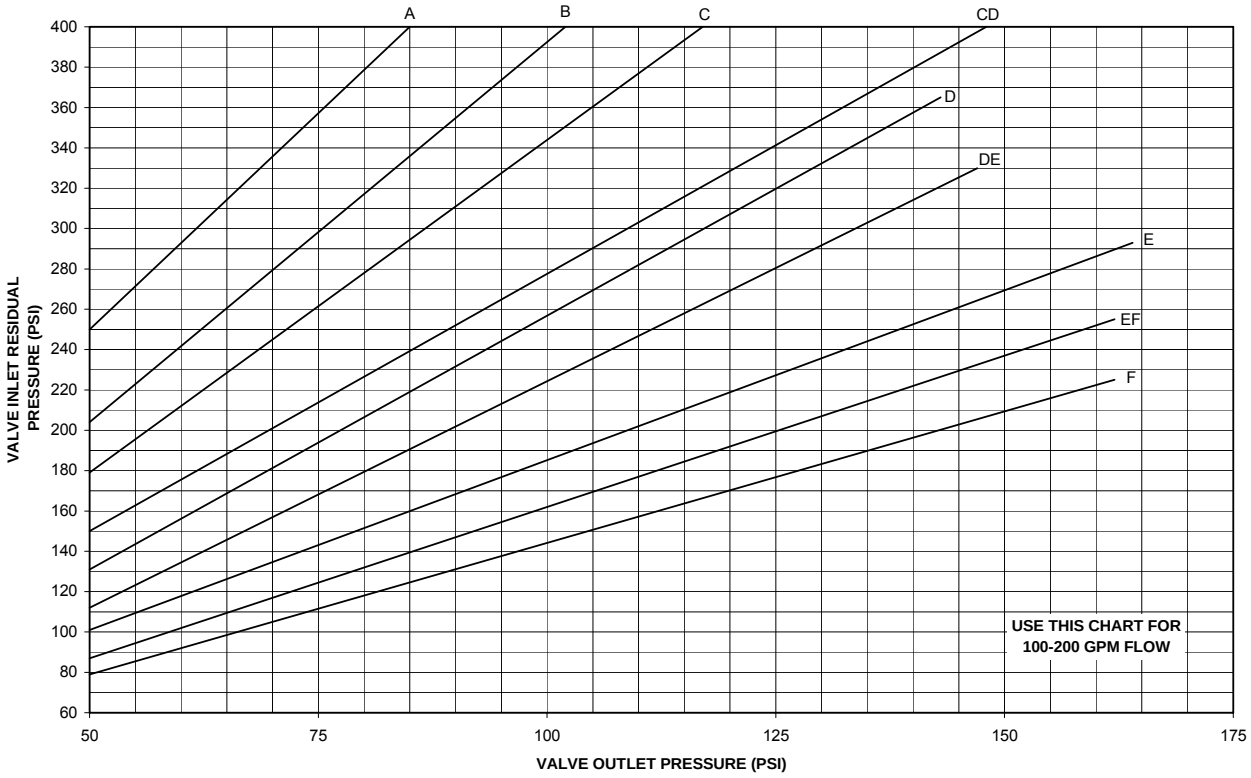

Fig. III Model UR-20S, 2-1/2"

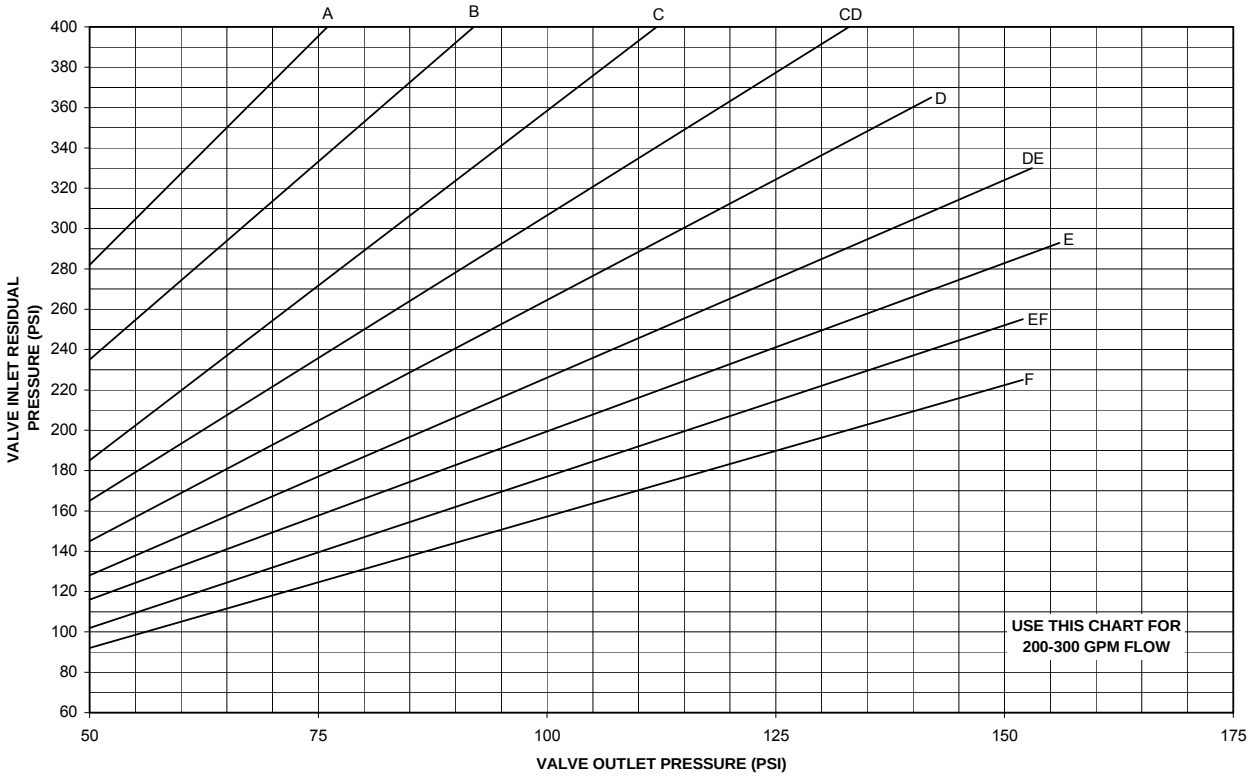

Fig. IV Model UR-20S, 2-1/2"

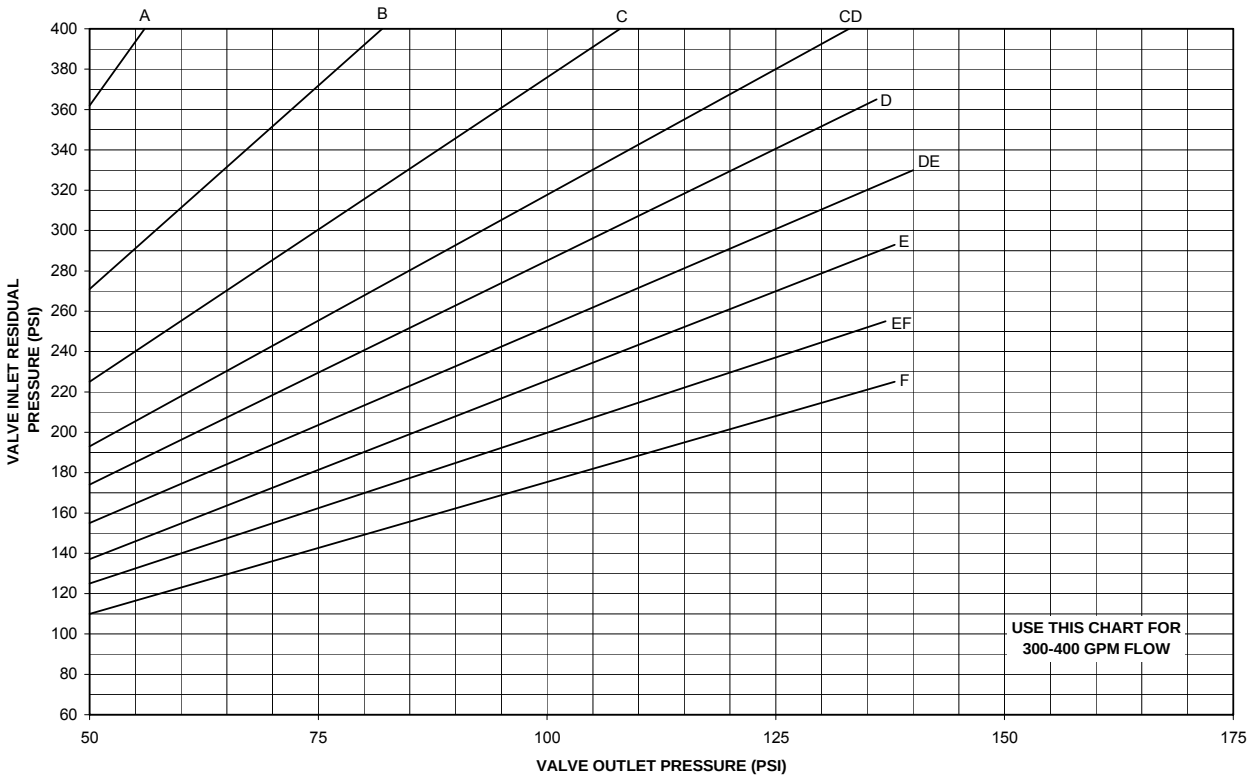

Fig. V Model UR-20 & 25, 2-1/2"

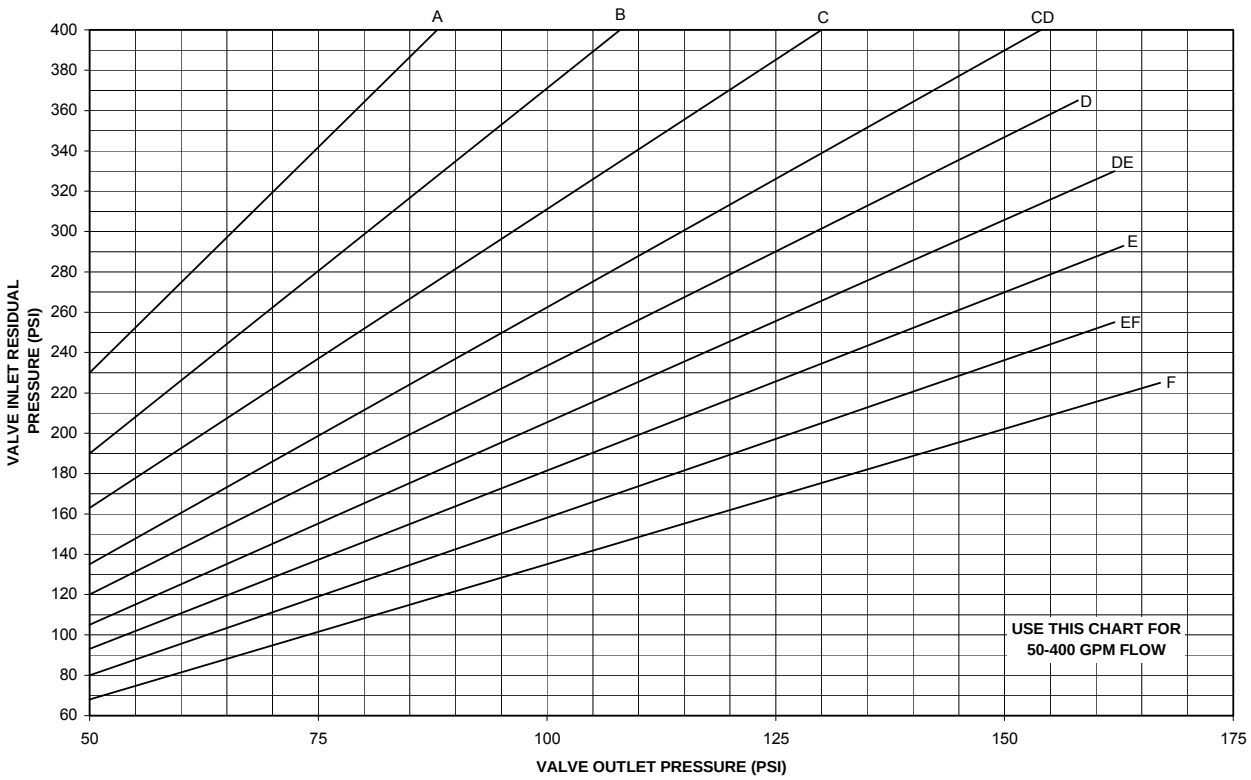

Fig. VI Model UR-20 & 25, 2-1/2"

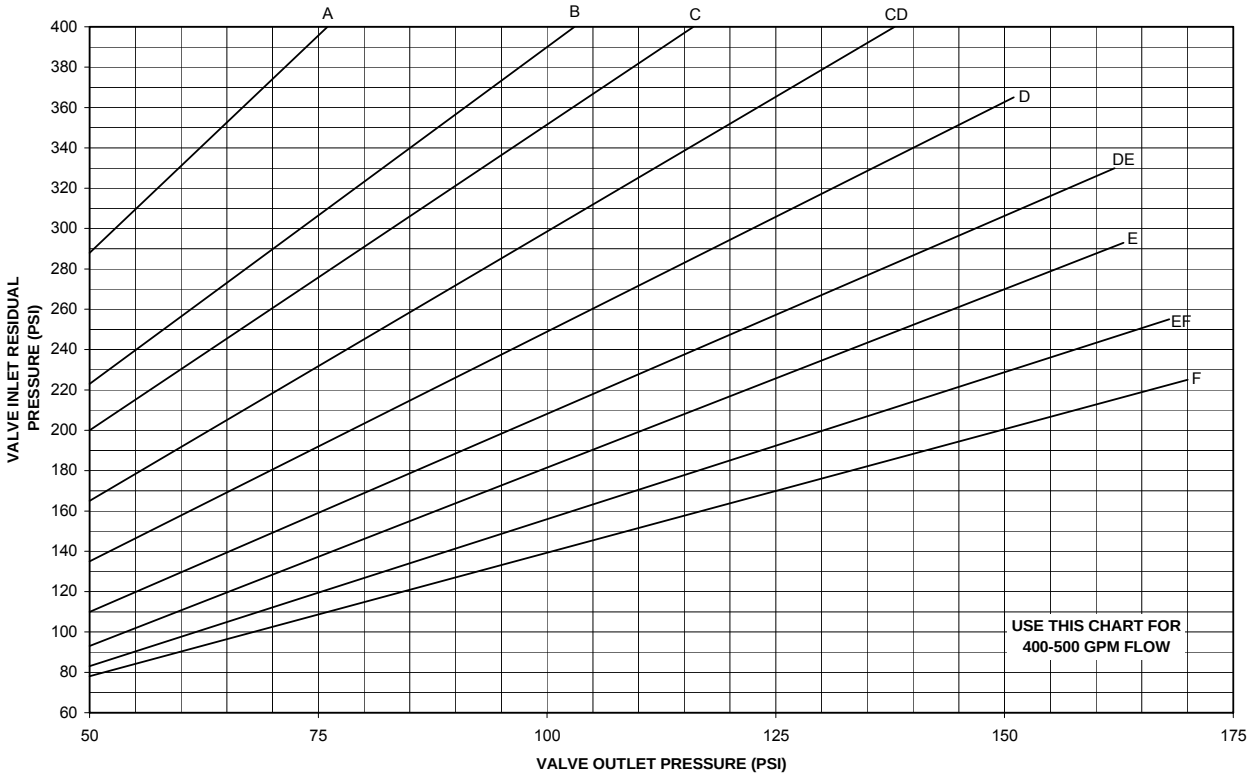

Fig. VII Model UR-20 & 25, 1-1/2"

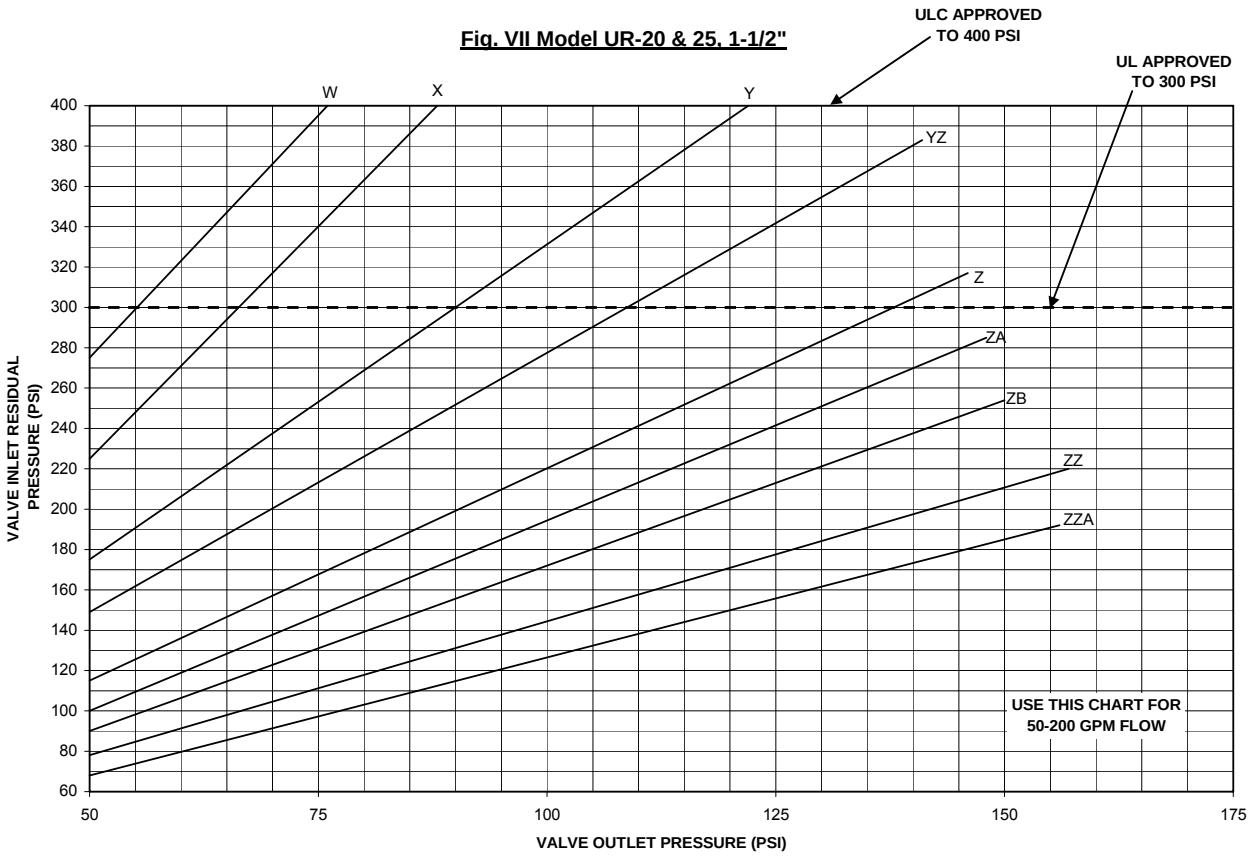

Fig. VIII Model UR-20 & 25, 1-1/2"

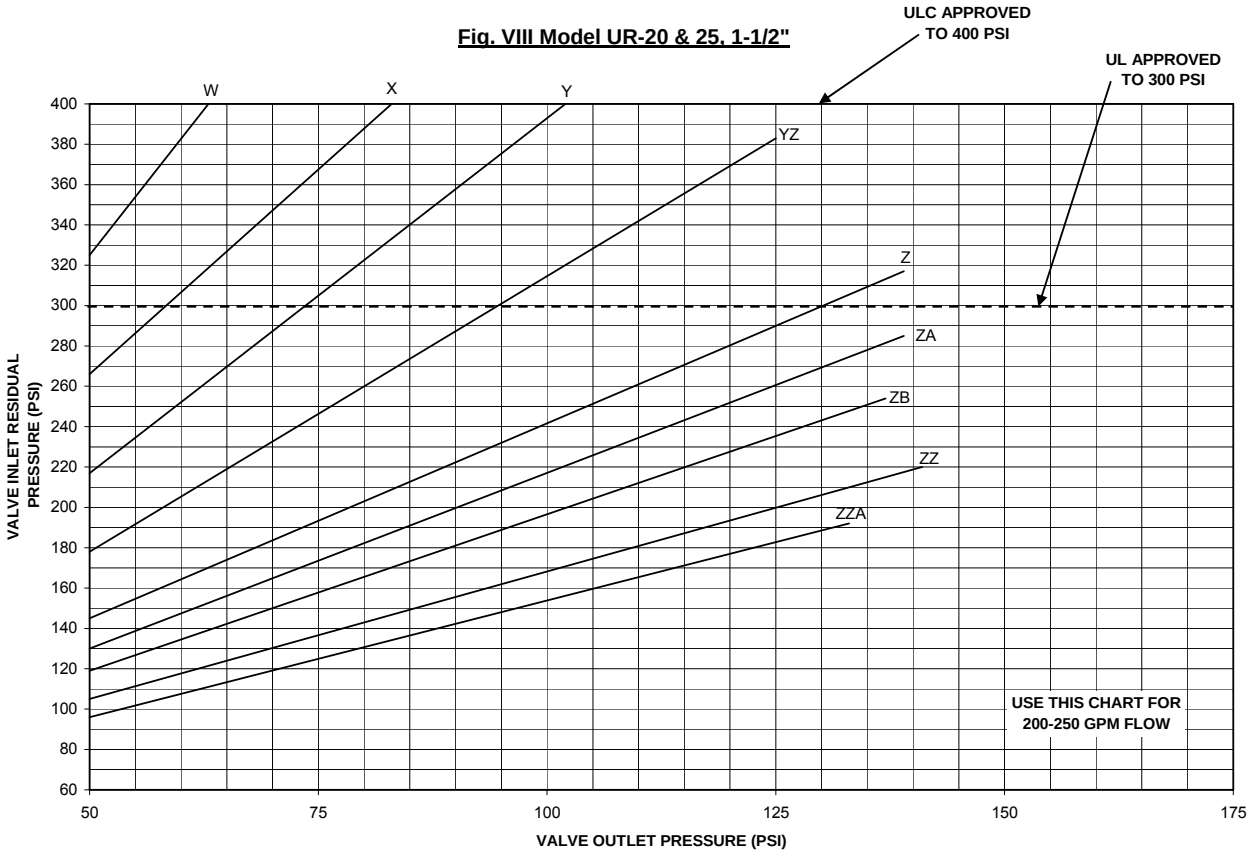

Fig. IX Model UR-20, UR-25 & UR-20S, 2-1/2"

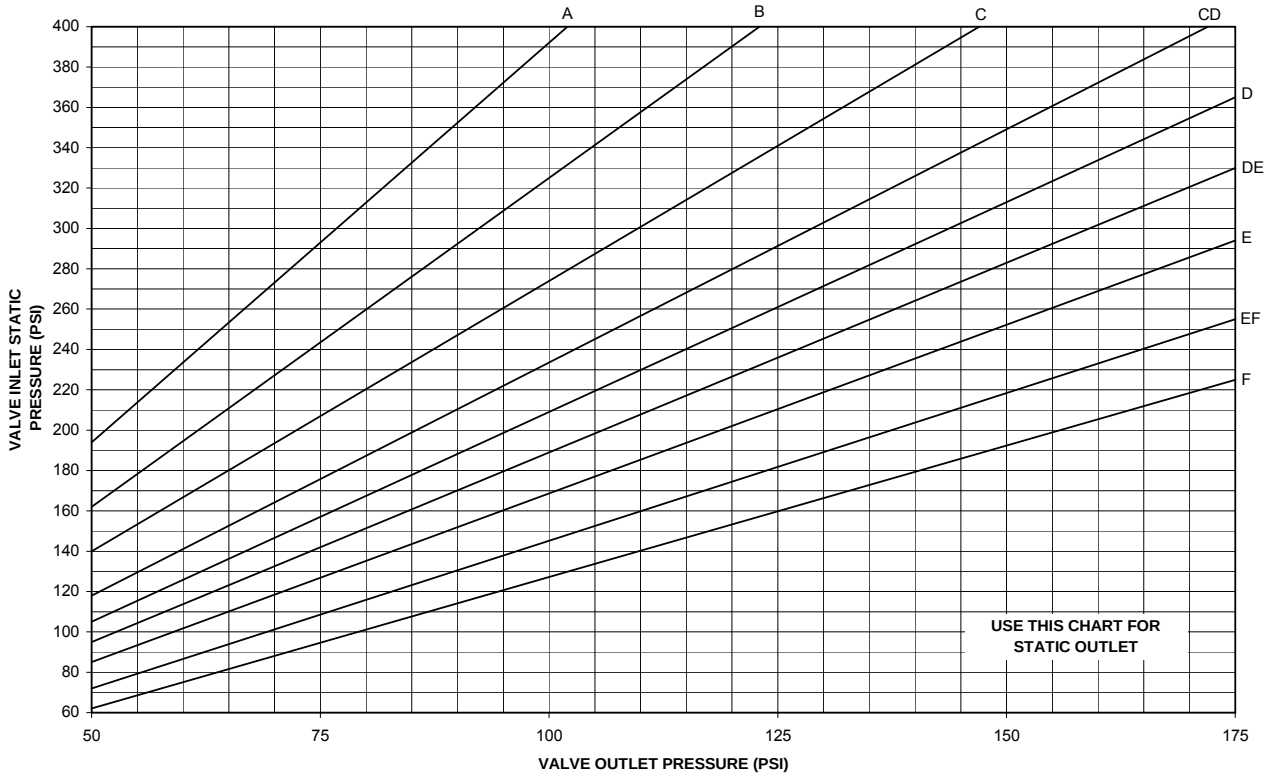

Fig. X Model UR-20 & 25, 1-1/2"