General Discussion

To obtain the best pressure and/or temperature control, each valve should be sized according to its specific application and the actual capacity of the valve.

When A Regulator is Undersized or Oversized

When a regulator is undersized insufficient fluid flows through the valve to meet peak requirements. The time required to bring a system up to pressure/temperature will increase.

When a regulator is oversized it could have a tendency to “hunt”. When a valve operates for a long period of time with the disc barely off its seat, premature erosion (wire drawing) of the disc and/or seat can occur. This erosion is a result of the fluid’s extreme velocity flowing across the valve seat.

Velocities & dBA

Extreme velocities cause excessive noise, commonly expressed in dBA. Therefore, in most cases, a properly sized valve will be smaller than the connecting pipes. In systems where the noise level must meet OSHA requirements, established by law in 1970, a maximum of 90 dBA (based on an eight-hour time/weight average) is allowable. To achieve this noise level, velocities have to be reduced by using oversized valves with reduced ports, silencers, mufflers, and increasing pipe size downstream from the valve. Consult factory when noise requirements are part of the valve specification.

Capacity Calculations for Steam Loads

When BTU Load is Known

$$\text{Capacity (lbs/hr)} = \frac{\text{BTU}}{1000}$$

The above equation, for capacity in pounds per hour of steam, is found by dividing the total BTU requirements by the latent heat of the steam used. (In this case, 1000 can be used as an approximation for the latent heat of the steam pressures for which this regulator is suitable.)

When Square Feet Equivalent Direct Radiation (EDR) is Known

$$\text{Capacity (lbs/hr)} = \frac{\text{Sq Ft EDR}}{2}$$

When Heating Water with Steam

$$\text{Capacity (lbs/hr)} = \frac{\text{GPM}}{2} \times \text{Temp Rise °F}$$

When Heating Air with Steam Coils

$$\text{Capacity (lbs/hr)} = \frac{\text{CFM}}{900} \times \text{Temp Rise °F}$$

When Heating Fuel Oil with Steam

$$\text{Capacity (lbs/hr)} = \frac{\text{GPM}}{4} \times \text{Temp Rise °F}$$

When Cooling Fluid with Cold Water

$$\text{Capacity (GPM)} = \frac{\text{Coolant lbs/hr}}{8.3 \times 60}$$

Sizing Valves/Regulators

Selection of the proper Watson McDaniel valve will be simplified by reference to the descriptive literature for each valve and knowledge of the initial pressure, reduced pressure, temperature, and capacity required. There is seldom any direct relation between the correct size of the valve and the size of the pipe conducting the fluid to and from the valve. Regulating valves operate more effectively and with less maintenance when sized for the job in accordance with the Capacity Tables.

Viscosity Correction Factor

When sizing for fuel oil, syrups, etc., use the water capacity in the charts, then multiply by the correct viscosity factor listed below. The SSU number is at flowing temperature and can be found on the Basic Viscosity Chart on the back of Page CED-640.

SSU	Correction Factor
50	0.86
100	0.78
200	0.71
500	0.62
1000	0.56
2000	0.51
5000	0.44
7000	0.41
10,000	0.39

SELF CONTAINED REGULATORS

WATSON McDANIEL COMPANY
975 Madison Ave. Valley Forge Corporate Center Norristown, PA 19403
www.watsonmcdaniel.com 610 666-5711 Fax 610 666-0404

PR-570
1/01