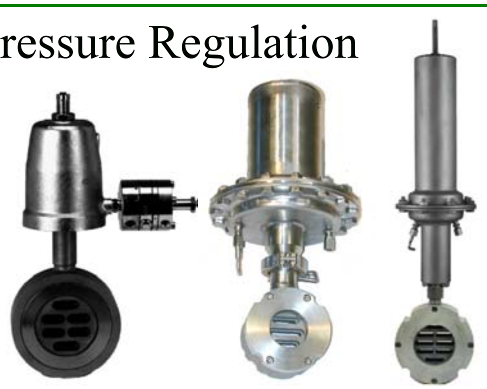
On-Off Valves

Control Valves from –328 to 1,580 °F, 4,900 psi

Manual Valves

Pressure Regulation



Sanitary & High Purity Valves

Accessories

SCHUBERT & SALZER INC.

Phone: (800) 747-9180

www.National-Utilities.com

www.SchubertSalzerInc.com

National Utilities Co.

Saturated Steam Table

Steam Pressure PSIG	Temp. ºF	Sensible Heat BTUH/lb h_f	Latent Heat BTUH/lb h_{fg}	Total Heat BTUH/lb h_g
0	212	180	971	1151
10	239	207	952	1159
25	266	236	934	1170
50	297	267	912	1179
75	320	290	896	1186
100	338	309	881	1190
125	353	325	868	1193
150	365	339	858	1197
200	387	362	838	1200
250	406	381	821	1202
300	422	399	805	1204
400	448	428	778	1206
500	470	453	752	1205
600	489	475	729	1204

Steam

$$C_v = \frac{\text{lbs./hr}}{2.1[(P_2-P_1)(P_1+P_2)]^{1/2}}$$

Liquid

$$C_v = Q\,[S/(P_2-P_1)]^{1/2}$$

Gas

$$C_v = \frac{Q_a\,[G(T_a+460)]^{1/2}}{1360[(P_2-P_1)(P_1+P_2)]^{1/2}}$$

P_1 = Inlet pressure PSIA
P_2 = Outlet pressure PSIA
Q = Gallons per minute
Q_a = Gas flow (SCFH)
C_v = GPM at 1 PSI *dP*
S = Specific gravity of fluid
G = Specific gravity of gas
T_a = Gas temperature (ºF)
t = Time in hours
C_p = Specific heat of liquid
D = Density in lbs/gallon
T_2-T_1 = Temperature change in ºF
h_{fg} = Latent heat of steam

Steam Demand Sizing

Steam tracing:
Use 50 lb/hr/100 ft of tracer

Heating water with steam:
lbs/hr = (GPM/2) · (T_2-T_1) or (GPM) · (500) · (T_2-T_1) /h_{fg}

Heating oil with steam:
lbs/hr = (GPM/4) · (T_2-T_1)

Heating air with steam:
lbs/hr = (CFM/900) · (T_2-T_1)

Heating liquids in steam heat exchangers:
lbs/hr = (GPM) · (60) · C_p · D · (T_2-T_1) / h_{fg}

Heating liquids in steam jacketed kettles:
lbs/hr = (Gallons) · S · C_p · D · (T_2-T_1) / (h_{fg} · t)

Common Conversions

Specific gravity of air G = 1
US gallon of water = 8.33 lbs.
1 cubic foot of water = 7.48 gallons
Air specific volume = 1/density = 13.1 ft^3/lb
G of any gas = density of gas/0.076
1 pound of steam = 1 pound of condensate
1 HP = 42.44 BTU per minute
1 BTUH = 12,000 tons of refrigeration
1 GPM = 8.0208 cubic feet per hour

Common Conversions

Specific gravity of water = 1
1 ft^3 of water = 62.34 lbs@ std. condition
1 cubic foot of air = 0.076 lbs.
Air molecular weight M = 29
G of any gas = molecular wt. of gas/29
1 kilowatt-hr = 3,413 BTU
1 pound of water = 0.1198 gallons
1 inch of mercury = 0.4912 psi
1 in of water = 0.03613 psi

Flow conversion of gas

$$\text{SCFH} = \frac{\text{Lbs/hr}}{\text{Density}} \qquad \text{SCFH} = \frac{\text{Lbs/hr} \cdot 379}{M} \qquad \text{SCFH} = \frac{\text{Lbs/hr} \cdot 13.1}{G} \qquad \text{GPM} = \frac{\text{Lbs/hr}}{500 \cdot G}$$

$K_v = C_v \cdot 0.862$

$C_v = K_v / 0.862$

G of gas at flowing temp = $\frac{G \cdot 520}{T_a(°F) + 460}$

Standard conditions are 14.69 psia & 60 °F

National Utilities Co.
12040-K W. Ferrick St. Milwaukee, WI 53226
(414) 358-4400 voice (414) 358-4404 fax