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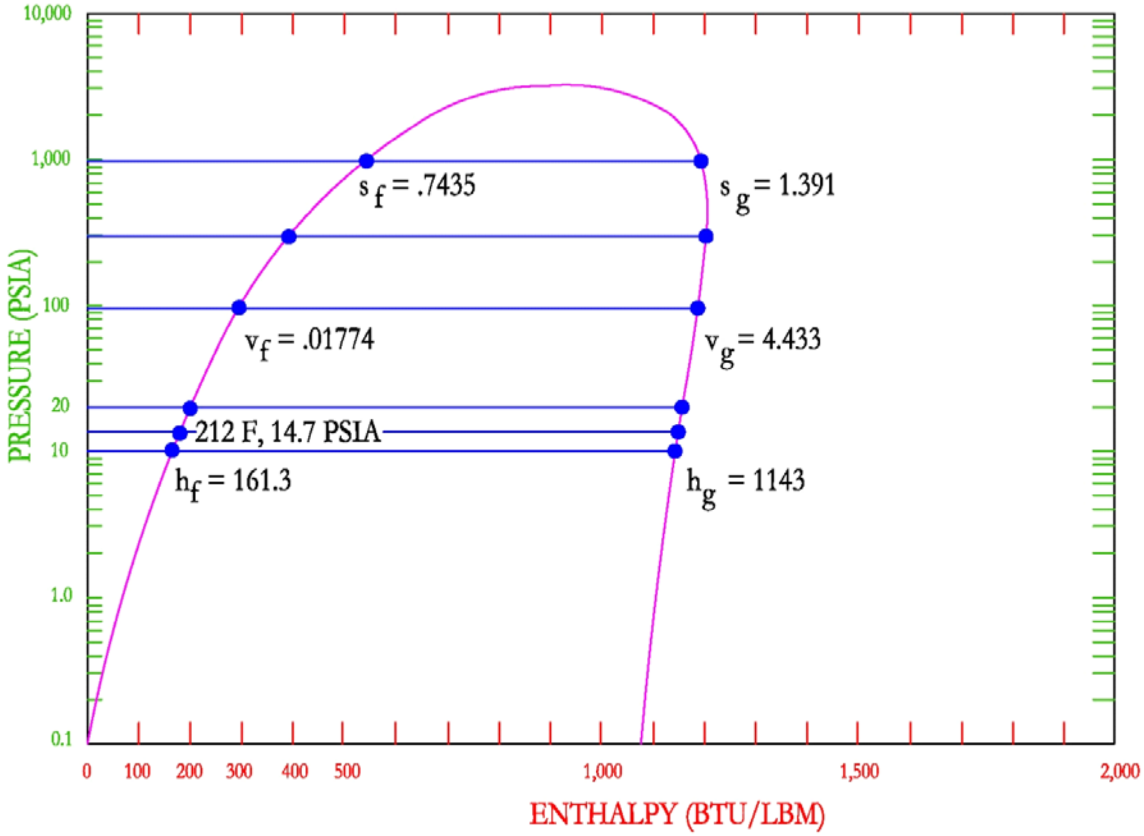
4.0 STEAM TABLES

There are three main types of steam tables that the engineer must be able to use the, (1) Saturation Tables as a function of pressure; (2) Saturation Tables as a function of temperature and (3) Superheated Steam Tables. Graphically the steam tables show the values of the outer dome on the pressure-enthalpy diagram. The following figure shows the points that are selected for the steam tables. This figure shows the values as a function of pressure.

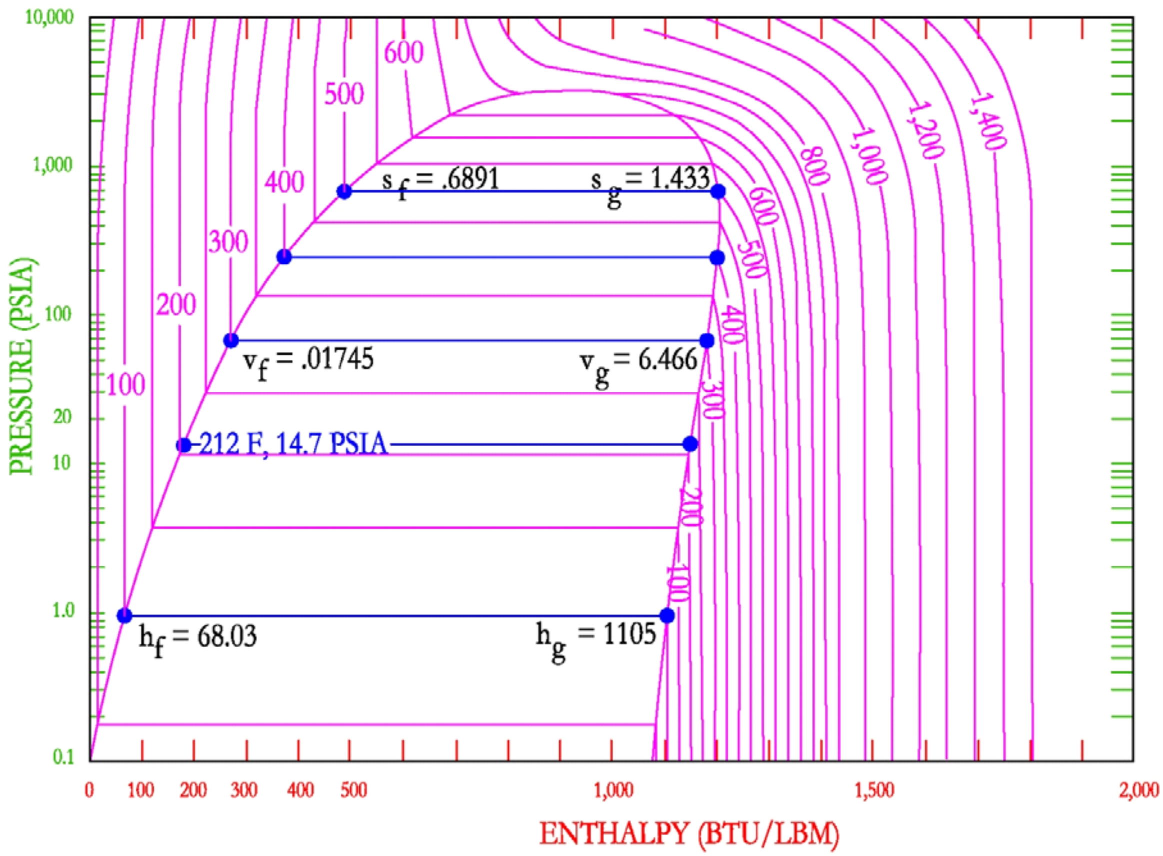


STEAM TABLES BY PRESSURE

		v=specific volume		h=enthalpy			s = entropy	
P	T	v_f	v_g	h_f	h_g	h_{fg}	s_f	s_g
10	193	.01659	38.42	161.3	1143	981.9	.2836	1.788
14.7	212	.01671	26.80	180.2	1150	970.1	.3122	1.757
20	228	.01683	20.09	196.3	1156	959.9	.3359	1.732
100	328	.01774	4.433	298.5	1188	889.0	.4694	1.607
300	417	.01890	1.544	394	1203	809.4	.5882	1.511
1000	545	.02160	0.446	542.7	1193	649.9	.7435	1.391

FIGURE 7: STEAM TABLES AS A FUNCTION OF PRESSURE

The following figure shows the points that are selected for the steam tables. This figure shows the values as a function of temperature.



STEAM TABLES BY TEMPERATURE

		v=specific volume		h=enthalpy			s = entropy	
T	P	v_f	v_g	h_f	h_g	h_{fg}	s_f	s_g
100	.951	.01613	349.8	68.03	1105	1037	.1296	1.982
212	14.7	.01671	26.80	180.2	1150	970.1	.3122	1.757
300	67.03	.01745	6.466	269.7	1180	910.3	.4372	1.635
400	247	.01864	1.864	375.1	1201	826.4	.5667	1.528
500	681	.02044	0.6756	487.9	1202	714.4	.6891	1.433

FIGURE 8: STEAM TABLES AS A FUNCTION OF TEMPERATURE

Practice Problem 2: Steam Air Coils

50 lbm/hr of steam enters a heating coil at a pressure of 15 PSIA. 700 CFM of air enters the coil at 60 F. Assume 100% efficient heat transfer. What is the resulting existing temperature of the air?

a) $105\ °F$

b) $110\ °F$

c) $115\ °F$

d) $125\ °F$

SOLUTION 2: STEAM AIR COILS

50 lbm/hr of steam enters a heating coil at a pressure of 15 PSIA. 700 CFM of air enters the coil at 60 F. Assume 100% efficient heat transfer. What is the resulting existing temperature of the air?

Steam at 15 PSIA has an enthalpy of vaporization of 970 Btu/lb.

$$Q = \dot{m}_{steam} * h_{fg} = 1.08 * CFM * \Delta T$$

$$50 \frac{lbm}{hr} * 970 \frac{btu}{lb} = 1.08 * 700 * \Delta T$$

$$\Delta T = 64\ ^{\circ}\mathrm{F}$$

The final temperature of the air is 124 F.

$$60^{\circ}\mathrm{F} + 64\ ^{\circ}\mathrm{F} = 124\ ^{\circ}\mathrm{F}$$