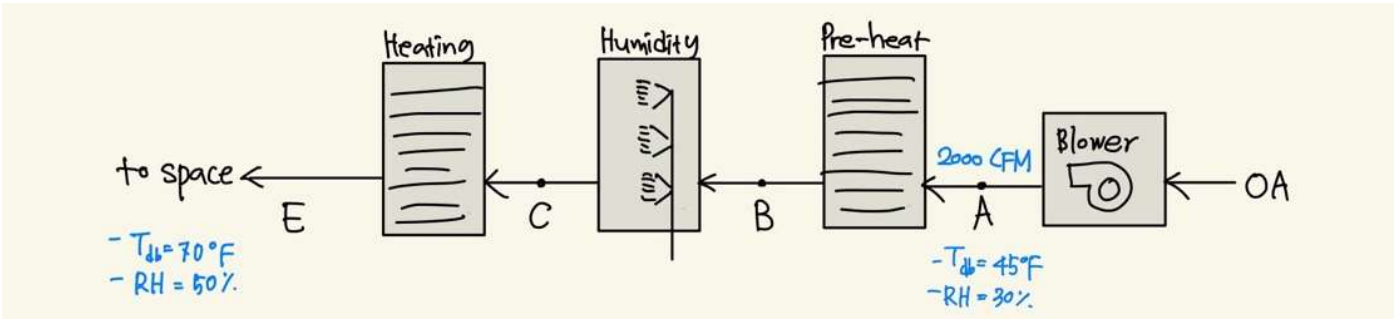
ARC 523, Fall 2023
Seungmin Lee

Assignment #5
Due: Nov. 16th, 2023

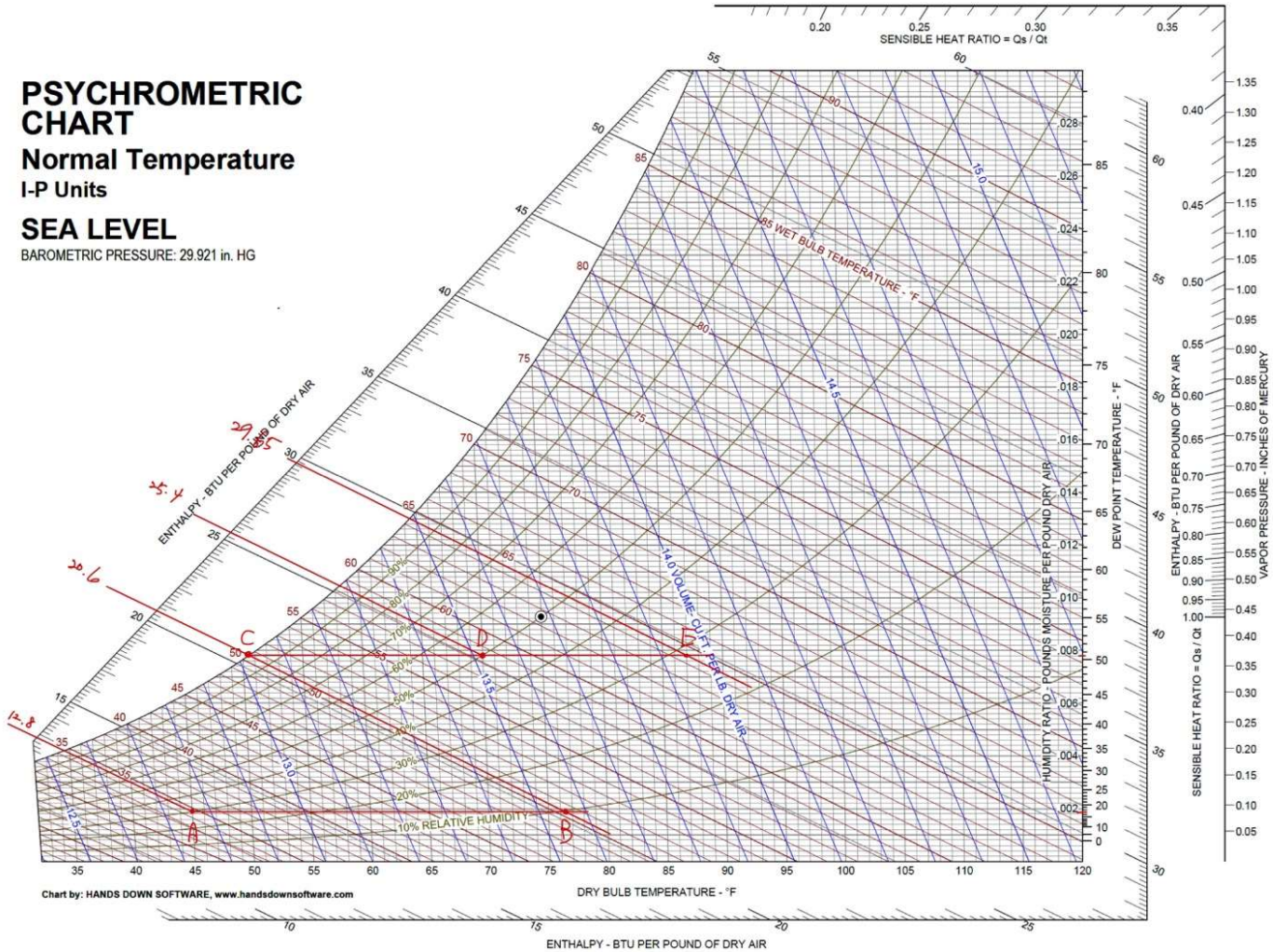
HEATING ENERGY CALCULATIONS

Parameters



Calculations

1) The air conditioning cycle on the Psychrometric chart



2) The table

State Point	Tdb (°F)	Twb (°F)	Tdp (°F)	RH (%)	h (Btu/ lb_a)	v (ft^3/lb_a)	W (lb_w/lb_a)	m (lb_a/hr)	Q (ft^3/min)
A	45	34.6	17	30	12.8	12.76	0.00185	9404.39	2000
B	76.5	50.5	17	10	20.6	13.55	0.00185	9404.39	3228.84
C	50.5	50.5	50.5	100	20.6	13.03	0.0078	9404.39	3228.84
D	70	58.5	50.5	50	25.4	13.52	0.0078	9404.39	3981.19
E	87	64.5	50.5	28	29.65	13.95	0.0078	9404.39	4647.34

3) (20.6-12.8) * 9404.39 = 73354.24 Btu/hr

4) Since the enthalpy is the same, no energy is required.

5) (0.0078-0.00185) * 9404.39 = 55.96 lbw/hr

55.96 / 8.34 lbw/gal = 6.71 gph

6) (29.65-20.6) * 9404.39 = 85109.73 Btu/hr

7) $The\ adjusted\ supply\ air\ CFM = \frac{E\ (space\ heating\ loads) \times v\ (air\ volume)}{(h_E - h_D) * 60\ min/hr} = \frac{40000 * 12.76}{(30.2 - 2\ \ .4) * 60}$

$$= 1772.22\ ft^3/min$$

- Less air than 2000 CFM
- This is because the enthalpy difference has increased.