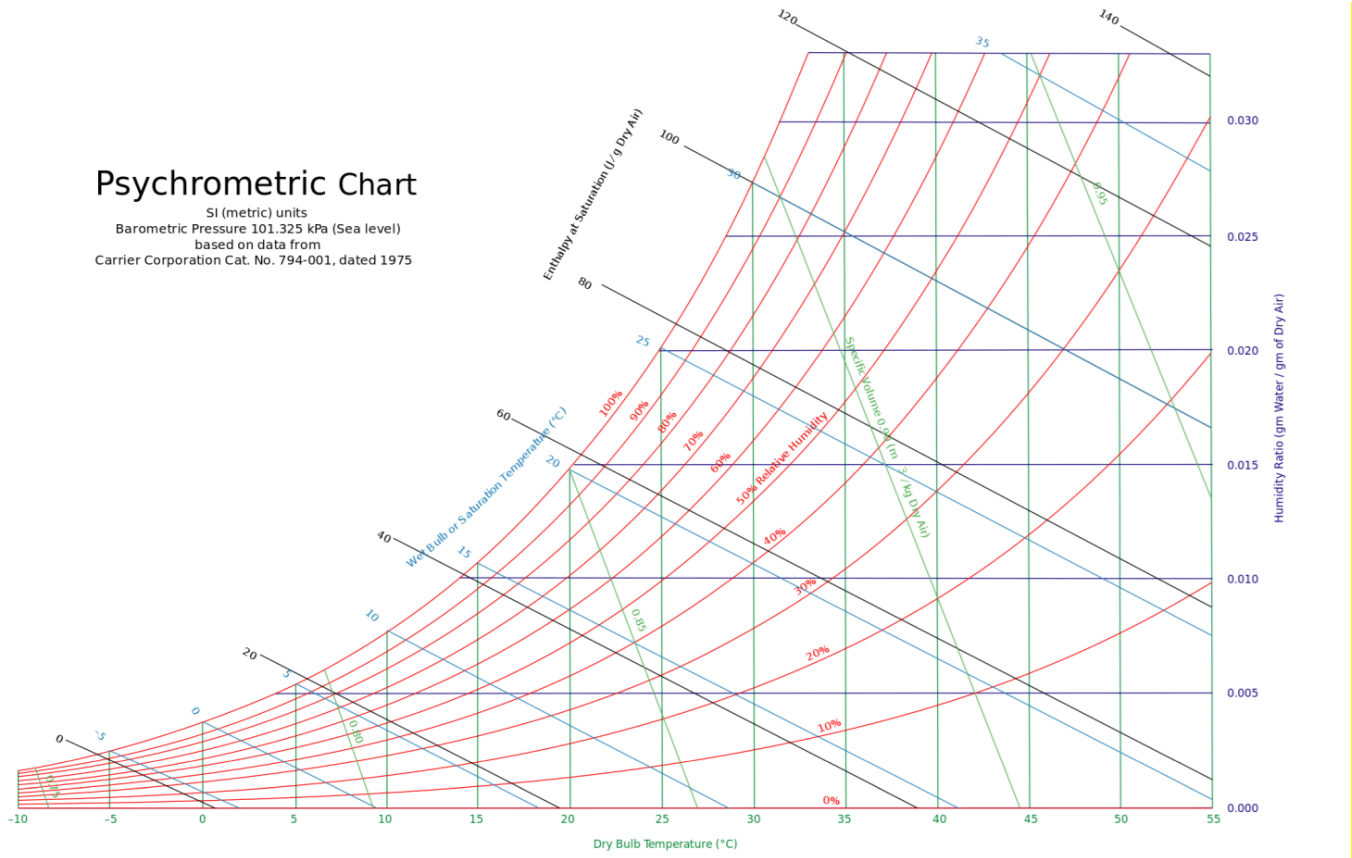
Week9_sconde 10634529

TASK 1:

The weather today in Piacenza

Thursday, 05 December 2019

	15:00	4:00 pm	17:00	7:00 pm	8:00 pm	21:00	23:00
	PartlyCloud	PartlyCloud	PartlyCloud	LightCloud	Sun	LightCloud	LightCloud
Effective temperature	8 ° C	6 ° C	6 ° C	2 ° C	1 ° C	1 ° C	1 ° C
Perceived temperature	8 ° C	5 ° C	5 ° C	0 ° C	-1 ° C	1 ° C	1 ° C
Rainfall	0 mm	0 mm	0 mm	0 mm	0 mm	0 mm	0 mm
Humidity	70 %	83 %	77 %	91 %	90 %	89 %	88 %
Atmospheric pressure	1026 hPa	1026 hPa	1026 hPa	1027 hPa	1027 hPa	1027 hPa	1027 hPa
Wind intensity	4 km / h	6 km / h	6 km / h	6 km / h	6 km / h	3 km / h	4 km / h
Wind direction	IS	IS	IS	S	S	S	OR
Probability of fog	0 %	0 %	0 %	0 %	0 %	0 %	0 %
Dew point	3 ° C	3 ° C	2 ° C	1 ° C	0 ° C	0 ° C	0 ° C
Clouds	56 %	57 %	39 %	13 %	10 %	22 %	17 %
Low clouds	4 %	6 %	7 %	11 %	4 %	5 %	11 %
Medium clouds	0 %	0 %	0 %	0 %	0 %	1 %	9 %
High clouds	54 %	54 %	34 %	4 %	7 %	19 %	1 %



$$T = 8°$$
$$\omega = 70\%$$
$$P = 102.6\ kPa$$

$$Water\ saturation\ pressure\ of\ 4\ °$$
1.072 kPa

Area of Classroom = 12m x 6m x 5m

From the Chart:

$$T_{wb} = 10\ °$$
$$\omega = 0.005$$
$$Pv = 0.656\ kPa$$
$$P = 102.6\ kPa$$
$$R_{sp} = 0.4615$$

For ideal Gas

$$m_v = \frac{Pv}{R_{sp} * T} = \frac{0.656(12 * 6 * 5)}{0.4615(273 + 8)} = 1.8210kg$$
$$m_g = \frac{m_v}{\delta} = \frac{1.8210}{70\%} = 2.601\ kg$$
$$\mathrm{h}_a = 1.005 * 3 = 3.015\ kJ/kg_{water\ vapor}$$
$$\mathrm{h}_v = 2501.3 + 1.82 * 3 = 2506.76\ kJ/kg_{water\ vapor}$$
$$\mathrm{h} = \mathrm{h}_a + \omega \mathrm{h}_v = 3.015 + 0.005 * 2601.54 = 16.0227$$

Task 2:

H = $2.5m^2$
Floor Area = $200m^2$
Wall Area = $144m^2$

Internal Gains:

$$Q_{ig\ sensible} = 136 + 2.2\ A_{cf} + 22\ N_{oc}$$
$$= 136 + 2.2 * 200 + 12 * 2 = 620\ W$$

$$Q_{ig.\ latent} = 20 + 0.22\ A_{cf} + 12N_{oc}$$
$$= 20 + 0.22 * 200 + 12 * 2 = 88\ W$$

Infiltration

From the table Good quality => $A_{ul} = 1.4\frac{cm^2}{m^2}$

$$A_L = A_{cs} * A_{ul}$$

(200+144)1.4 =481.6 cm^3

$$Q_l = A_l * IDF$$

From the Table; IDF heating = 0.073 $L/5cm^2$

V infiltration heating $(Q_L) = A_L * IDF = 481.6 * 0.073 = 35.16\frac{L}{s}$

V infiltration cooling $(Q_L) = A_L * IDF = 481.6 * 0.033 = 15.89\frac{L}{s}$

Ventilation

$$Q_v(V_{ventilation}) = 0.05 * A_{cf} + 3.5(N_{br} + 1)$$
$$= 0.05 * 200 + 3.5 * 2 = 17\frac{L}{s}$$
$$Q_v\left(V_{inf-ventilation\,\mathrm{heating}}\right) = 35.16 + 17 = 52.16\frac{L}{s}$$
$$Q_v\left(V_{inf-ventilation\,cooling}\right) = 15.89 + 17 = 32.89\frac{L}{s}$$

The required minimum of the whole building ventilation rate in Brindisi

$$\delta T_{cooling} = 31.1°C - 24°C = 7.1°C\ therefore\ 7.1\ K$$
$$\delta T_{\mathrm{heating}} = 21°C - (-4.1°C) = 25.1°C\ therefore\ 25.1\ K$$
$$C_{sensible} = 1.23\ ,\ C_{latent} = 3010$$
$$\delta\omega_{cooling} = 0{,}0039$$
$$Q_{inf-ventilation\,cooling\,sensible} = C_{sensible} * V\delta T_{cooling} = 1.23 * 32.89 * 7.1 = 287.25$$

$$Q_{inf-ventilation\,cooling\,latent} = C_{latent} * V\delta\omega_{cooling} = 3010 * 32.89 * 0.0039 = 386.13\ W$$

$$Q_{inf-ventilation\,\mathrm{heating}\,sensible} = C_{sensible} * V\delta T_{\mathrm{heating}} = 1.23 * 52.16 * 25.1 = 1610.34\ W$$