Week 9

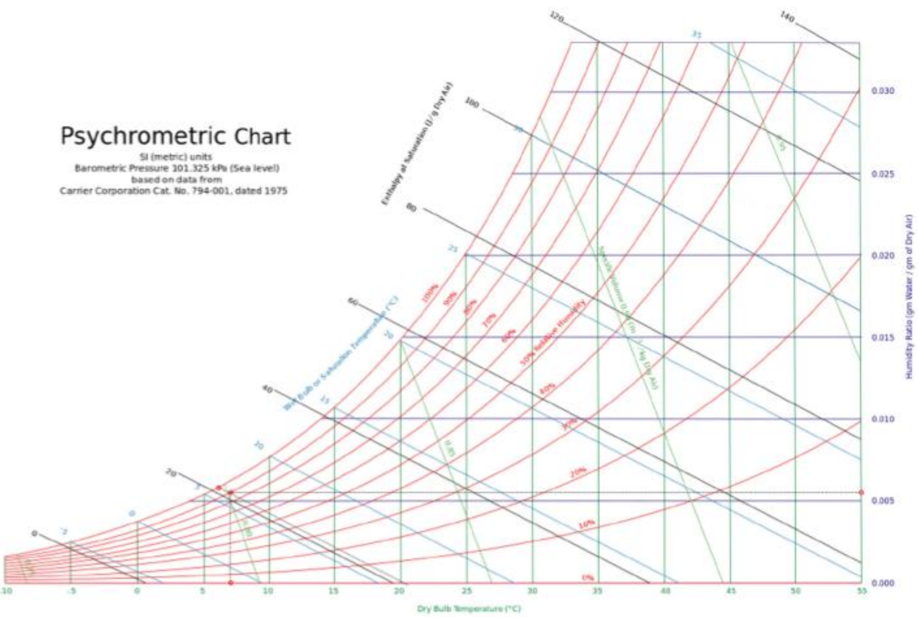
Task 1 Use a weather forecast website, and utilize the psychrometric chart and the formula we went through in the class to determine the absoloute humidity, the wet-bulb temperature and the mass of water vapour in the air in ClassRoom A (Aula A) of Piacenza campus in the moment that you are solving this exercise (provide the inputs that you utilized)

Umidità: Relative humidity, Pressione atmosferica: Air total pressure (1 hPa: 0.1 kPa), Temperatura effettiva: temperature to be utilized.

Il tempo oggi in Piacenza
Lunedì, 02 Dicembre 2019

	13:00	14:00	16:00	18:00	20:00	21:00	22:00
	PartlyCloud	PartlyCloud	LightCloud	LightCloud	PartlyCloud	Cloud	PartlyCloud
Temperatura effettiva	10°C	10°C	9°C	6°C	7°C	7°C	8°C
Temperatura percepita	10°C	10°C	8°C	5°C	7°C	6°C	7°C
Precipitazioni	0 mm	0 mm	0 mm	0 mm	0 mm	0 mm	0 mm
Umidità	79 %	77 %	89 %	90 %	90 %	92 %	91 %
Pressione atmosferica	1016 hPa	1015 hPa	1016 hPa	1017 hPa	1019 hPa	1019 hPa	1020 hPa

According to the data The time is 8 pm
Relative humidity is
=90%
Total air pressure =
101.9 kPa
Temperature in kelvin
scale T= 230 K



The absolute humidity
W= 0.0055

Bulb temperature T_{wb}=6C

W=$\frac{0.622xpv}{p-pv}$=0.005

P= 101.2 Ka

Pv≈ $0.823 kpa$

ϕ=$\frac{mv}{mg}$

ϕ=20%

$\because\ gas\ \geq water\ vapour$

$\therefore Rsp = 0.4615$

mv=$\frac{0.883}{0.4615*<230}$

mv ≅ 8.41x10^”

mg=$\frac{mv}{80\%} \cong 8.34x10^{\wedge} - 3$

ask 2 Utilize the same methodology we went through in the class and determine the sensible and latent load corresponding to internal gains, the ventilation, and the infiltration in a house with a *good* construction quality and with the same geometry as that of the example which is located in Brindisi, Italy

BRINDISI, Italy WMO#: **163200**

Lat: **40.65N** Long: **17.95E** Elev: **10** StdP: **101.2** Time Zone: **1.00 (EUW)** Period: **86-10** WBAN: **99999**

Annual Heating and Humidification Design Conditions

	Coldest Month	Heating DB 99.6%	Heating DB 99%	Humidification DP/MCDB and HR 99.6% DP	99.6% HR	99.6% MCDB	99% DP	99% HR	99% MCDB	Coldest month WS/MCDB 0.4% WS	0.4% MCDB	1% WS	1% MCDB	MCWS/PCWD to 99.6% DB MCWS	PCWD	
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	
(1)	2	2.9	4.1	-5.1	2.5	7.2	-3.0	3.0	7.4	13.4	10.2	12.4	10.6	3.4	250	(1)

Annual Cooling, Dehumidification, and Enthalpy Design Conditions

	Hottest Month	Hottest Month DB Range	Cooling DB/MCWB 0.4% DB	0.4% MCWB	1% DB	1% MCWB	2% DB	2% MCWB	Evaporation WB/MCDB 0.4% WB	0.4% MCDB	1% WB	1% MCDB	2% WB	2% MCDB	MCWS/PCWD to 0.4% DB MCWS	PCWD	
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	
(2)	8	7.1	32.8	23.6	31.1	24.3	29.9	24.3	27.2	29.7	26.3	29.0	25.6	28.3	4.2	180	(2)

	Dehumidification DP/MCDB and HR 0.4% DP	0.4% HR	0.4% MCDB	1% DP	1% HR	1% MCDB	2% DP	2% HR	2% MCDB	Enthalpy/MCDB 0.4% Enth	0.4% MCDB	1% Enth	1% MCDB	2% Enth	2% MCDB	Hours 8 to 4 & 12.8/20.6	
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	
(3)	26.3	21.8	29.2	25.4	20.7	28.5	24.7	19.7	27.9	86.0	30.1	82.2	29.1	78.5	28.3	1236	(3)

Extreme Annual Design Conditions

	Extreme Annual WS 1%	2.5%	5%	Extreme Max WB	Extreme Annual DB Mean Min	Mean Max	Standard deviation Min	Standard deviation Max	n-Year Return Period Values of Extreme DB n=5 years Min	n=5 years Max	n=10 years Min	n=10 years Max	n=20 years Min	n=20 years Max	n=50 years Min	n=50 years Max	
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	
(4)	11.3	9.9	8.7	31.4	0.4	37.3	1.4	3.0	-0.6	39.4	-1.4	41.1	-2.2	42.8	-3.2	44.9	(4)

q ig= 136+2.2+22 = 620w

q ig= 136+2.2*22*200+22+2 = 88w

A simple   information :

Aul=1.4m²

Aes=Awall=Aroof=

200+144=344m²

∴ Al=Aes=Asl= 344*1.4=481.6cm²

T cooling= 24c = 71k

T heating= 20c = 24k

DR= 7.1c = 71k

$\mathrm{DF}_{heating}$ =0.073

$\mathrm{DF}_{cooling}$=0.033

The rate of air flow:

$\mathrm{Qi}_{heating}$= Alx $\mathrm{IDf}_{heating}$

= 481.6x0.033

≅ 35.157 l/s

$\mathrm{Qi}_{cooling}$= Al x$\mathrm{IDT}_{cooling}$

≅481.6*0.0033

$\cong \frac{35.157L}{S}$

≅15.893l/s

Building :

$Qv - Vcooling = 0.05Acf + 3.5(Nbr + 1)$

0.05x200+3.5(Nbr+1)=17

$Qi - Vheating = \; Qi\ heating + Qv \cong 35.157 = 52.157l/s$

C sensible= 1,2,3Ciatent

3010W cooling= 0.0039

qinf -Ve= Cs Qivc ΔT

$\cong 300x32.893x0.0039$

= 386.13w

qinf -Ve= Cs Qivh ΔT heating

123x52x157x241