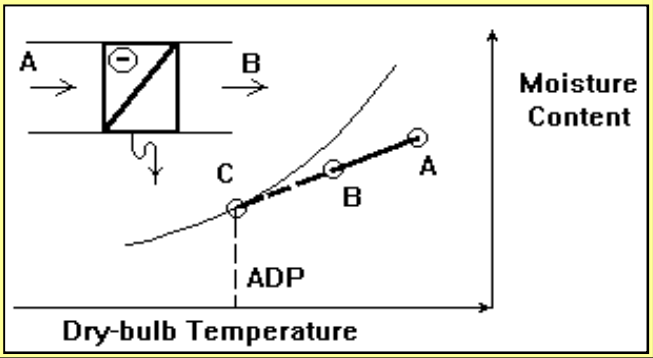
This document shows how Thermo Utilities, MS Excel Add-ins can be used for calculation of sensible cooling with dehumidification.
In an air conditioning plant, air flow rate of 2 kg/s passes through a coil. The dry-bulb temperature decreases from 24 C to 12 C.
The moisture content of the air decreses from 0.010 to 0.008.
Determine the load on the coil, contact factor of the coil and apparatus dew-point temperature, ADP.



Inputs		Units
on-coil air, DBT	24.00	C
on-coil air, moisture content	0.010	
on-coil air, mass flow rate	2.00	kg/s
off-coil air, DBT	12.00	C
off-coil air, moisture content	0.008	
Atmospheric pressure	1.01	bar

The contact factor of a coil is defined as the efficiency for dehumidification. A 100% efficient coil will bring the moisture content of the air to the saturation moisture content at the apparatus dew-point, mcC. The contact factor of the coil can be defined by moisture content differences:

cf = (mcA - mcB)/(mcA - mcC)
or
cf = (hA - hB)/(hA - hC)

Output			
Specific enthalpy of the on-coil air	49.4733	kJ/kg	
Specific enthalpy of the off-coil air	32.2385	kJ/kg	
Load on the coil	34.4695	kW	
Apparatus dew-point moisture conter	0.0077		Assumed
Apparatus dew-point temperature	10.4	C	
Apparatus dew-point enthalpy	29.9	kJ/kg	
Coil contact factor Eq1	0.88		
Coil contact factor Eq2	0.88		
Diff = Eq1-Eq2 = 0	0.0003		Goal
Use the solver to reach the goal			

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