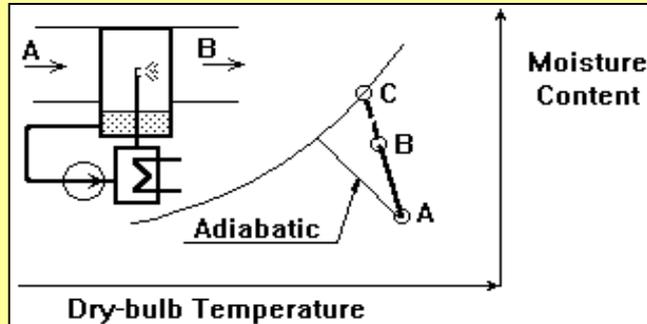


Humidification with heating

This document shows how **Thermo Utilities, MS Excel Add-ins** can be used for calculation of air washer with heating of spray water. In an air conditioning plant, air flow rate of 2 kg/s passes through a spray water humidifier with a contact factor 0.7. The calorifier provides 40 kW. Determine the moisture content and temperature of the air leaving the humidifier and the amount of make-up water needed. The dry and wet-bulb temperature of the inlet air are 9 C and 3 C respectively.



Inputs		Units
Inlet air, DBT	9.00	C
Inlet air, WBT	3.00	C
Inlet air, mass flow rate	2.00	kg/s
Contact factor of the humidifier	0.70	
Heat provided by the calorifier	40.00	kW
Atmospheric pressure	1.01	bar

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

$$cf = (mcB - mcA)/(mcC - mcA)$$

or

$$cf = (hB - hA)/(hC - hA)$$

Output		
moisture content of inlet air	0.0022	
Spec. enthalpy at inlet	14.5	kJ/kg
Spec. enthalpy at outlet	34.4999	kJ/kg
Spec. enthalpy at ADP	43.0713	kJ/kg
Temperature at ADP	15.3825	C
moisture content at ADP	0.0109	
Estimate spec. enthalpy at ADP	43.0712	kJ/kg
Diff = Estimated(h) - h = 0	0.0001	
Use solver to reach the goal		
moisture content of outlet air	0.0083	
make-up water req.	0.0122	kg/s
Dry-bulb temp at outlet	13.50	C

Assumed

Goal

Taftan Data  
Email: support@taftan.com

If you want to know more about "Taftan Data" or other software developed by this company please visit our website:

<http://www.taftan.com>

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<a href="http://www.tartan.com">http://www.tartan.com</a>	
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