Formuleblad
Gaswetten & h-x (Mollier) diagram

Ideale gaswet:

$$pV = nRT$$

$$pV = mR_mT$$

$$p = \rho R_mT$$

Dalton:

$$p_{tot} = \sum_i p_i = \frac{RT}{V}\sum_i \frac{m_i}{M_i}$$

Verzadigde dampdruk

t [°C]	p_{ds} [Pa]
0	611
2	706
4	813
6	934
8	1072
10	1227
12	1401
14	1597
16	1817
18	2062
20	2337
22	2642
24	2982
26	3360
28	3778
30	4241
40	7375
50	12335
60	19920
70	31160
80	47360
90	70110
100	101325

Vochtige lucht

$$h = c_{p,l} * t + x(r_o + c_{p,d}t)$$

$$x = \frac{m_d}{m_{dl}}$$

$$m_{tot} = m_{dl}(1+x)$$

$$p_d = \frac{p \cdot x}{0.622 + x}$$

$$x = 0.622\frac{p_d}{p - p_d}$$

$$\rho = 219,3\frac{(1+x)}{(0,622+x)*(t+273,15)}[kg/m^3]$$

met: $\frac{p}{R_{m,d}} \approx 219,3[kg/m^3]$

Benaderingen voor verzadigde dampspanning:

$$p_{ds} = 0,813e^{\frac{t}{17,6}} - 0,2[kPa] \quad (t<40°C)$$

$$p_{ds} = 0,0713t^3 - 0.0686t^2 + 59,971t + 580,25[Pa]$$

Omrekenen.

druk:

1 atm =101,3 kPa

1 bar= 100kPa

1 torr=133,3 Pa

Eigenschappen van 'vochtige'lucht.

Molmassa:

$M_l = 28,8kg/kmol$

$M_d = 18kg/kmol$

$M_d / M_l = 0,622$

Ideale gasconstante: R=8,315 J/mol K

Specifieke gasconstante: $R_m = \frac{R}{M} kJ/kgK$

Getal van Avagadro: N_a=6.022 10^{23} mol^{-1}

$c_{p,l} = 1.00(6)kJ/kgK$:

$c_{p,d} = 1.88kJ/kgK$

$c_{p,w} = 4.18kJ/kgK$

$r_o = 2491kJ/kg$ {bij T=273K}

Luchtbehandeling:

Mengen van lucht:

$$x_m = \frac{G_1x_1 + G_2x_2}{G_1 + G_2} \quad h_m = \frac{G_1h_1 + G_2h_2}{G_1 + G_2}$$

$$x_m - x_a = \frac{G_b}{G_a + G_b}(x_a - x_b)$$

$$h_m - h_a = \frac{G_b}{G_a + G_b}(h_a - h_b)$$

Ontvochtigen (koeler):

$$BF = \frac{h_{uit} - h_{opp}}{h_{in} - h_{opp}}$$

Bevochtigen(adiabatisch):

$$\eta_{ad} = \frac{x_{uit} - x_{in}}{x_{\max} - x_{in}}$$

$Q_v = q_m * (h_B - h_A)$ [kW]

$Q_k = q_m * (h_A - h_B)$ [kW]

$Q_v = q_v * 1,20 * (T_B - T_A)$ [kW]

$Q_k = q_v * 1,20 * (T_A - T_B)$ [kW]

VWF = $Q_{voelbaar}/Q_{totaal}$

Totale Enthalpie $h = h_l + x.h_d$