

Please do not change any of the values in this sheet

Atmospheric air pressure - (As recorded from engine data)

954 [mBar]
 95400 [Pa]
 2 [C]
 275 [K]
 86 [%]

$$\rho_{\text{humid air}} = \frac{p_d}{R_d T} + \frac{p_v}{R_v T} = \frac{p_d M_d + p_v M_v}{R T}$$

where:

Density of the humid air (kg/m³)

$$\rho_{\text{humid air}} = 1.205643 \text{ Kg/m}^3$$

Partial pressure of dry air (Pa)

Specific gas constant for dry air, 287.058 J/(kg·K)

Temperature (K)

0.236817846

Pressure of water vapor (Pa)

Specific gas constant for water vapor, 461.495 J/(kg·K)

Molar mass of dry air, 0.028964 (kg/mol)

Molar mass of water vapor, 0.018016 (kg/mol)

[Universal gas constant, 8.314 J/\(K·mol\)](#)

The vapor pressure of water may be calculated from the [saturation vapor pressure](#) and [relative humidity](#). It is found by:

$$p_v = \phi p_{\text{sat}}$$

$$p_u = 606.8287 \text{ [Pa]}$$

Where:

Vapor pressure of water

Relative humidity

Saturation vapor pressure

The saturation [vapor pressure of water](#) at any given temperature is the vapor pressure when relative humidity is 100%. One formula ^[1] used to find the saturation vapor pressure is:

$$p_{\text{sat}} = 6.1078 \times 10^{\frac{7.5T}{237.3}}$$

$$p_{\text{sat}} = 7.056147 \text{ hPa}$$

$$p_{\text{sat}} = 705.6147 \text{ [Pa]}$$

where T is in degrees C. Note:

This will give a result in hPa (100 Pa, equivalent to the older unit millibar, 1 mbar = 0.001 bar = 0.1 kPa)

[is found considering partial pressure, resulting in:](#)

$$p_d = 94793.17 \text{ [Pa]}$$

[Where p simply denotes the observed absolute pressure.](#)

$$\rho = \frac{p}{R_{\text{specific}} T} \quad 1.2085 \text{ [kg/m}^3]$$

R = 287.058 J/Kg K

T = Temperature in degrees Kelvin

P = Absolute Pressure in Pa