



General Technical Information

Date:2001-10-09/MN
Rev. 2004-05-17 MN/AJ

Condensation in heat exchangers

Condensation is a phenomena that takes place when an air stream containing water vapour is cooled down to the condensation temperature. At atmospheric pressure the condensation temperature depends on air temperature and water content of the air (relative humidity or absolute moisture content).

As an example the condensation temperature is given below for a few examples.

Temperature	Relative Humidity	Absolute moisture	Condensation temp
°C	%	kg water/kg dry air	°C
20	40	.0059	6.0
20	20	.0029	-3.6
40	20	.0093	12.8
100	10	.0701	46.1

The first case above is a rather common value for the exhaust air condition which means that at 50% heat exchanger efficiency condensation will start at supply air temperatures of -8°C (and at higher efficiencies the condensation will take place for higher supply air temperatures).

From a heat transfer point of view condensation will increase the supply air efficiency because the latent heat that is released when water vapour condenses into liquid water will always increase the supply air temperature and thus improve the efficiency on the supply side. The exhaust side efficiency is then also lower than without condensation.

In the calculation program, Heatex Select, condensation is taken into account in the performance calculation and also the amount of condensing water is calculated. The calculations are limited to moisture contents of about 0.15 kg water per kg of dry air (which is a very large amount of water in the air corresponding to about 60°C and 100% RH). Heavy condensation may cause a moderate increase in pressure drop on the exhaust side.