Practical test: finoox® versus microox®: Two technologies compared

The microox® technology developed by Güntner from conventional micro channelling has been very successful in its first three years on the market for stationary refrigeration equipment. The technical advantages of this new technology are already sufficiently well known and researched.

Specially customized dual-fan test unit, in each case with one microox® and one finoox® coil

In the spring of 2010, to determine whether there are any differences in practical use between this and traditional finoox® technology (finned tube heat exchangers), particularly as regards contamination and cleaning, Güntner's testing department launched a comprehensive series of tests which ran for over 16 months.

The tests compared soiling and fouling for finoox® and microox®, because after all, soiling on the air side of a heat exchanger is a significant parameter affecting the thermal performance of a drycooler or condenser.

To study the fouling and soiling of microox® (microchannel) und finoox® (finned tube) heat exchangers, a number of dual-fan test devices were each equipped with one microox® and one finoox® coil, and set up at different locations within Germany. The devices were not connected to a refrigeration system, but the fans were run continuously.

The locations for the equipment were carefully selected to choose situations that reflected as far as possible typical applications, in order to be able to document realistic stress conditions. For example, one unit was set up on the North Sea coast to enable us to compare soiling behaviour near the sea. Another one was placed in the grounds of an active steelworks in the Ruhr region to register realistic heavy-industry conditions.

The fourth unit was in the countryside in order to record soiling levels among fields, meadows and farmland. Two more units were placed in a city in order to simulate conditions with traffic congestion and high levels of dust.

Example of soiling in a city location

The soiling was evaluated regularly both visually and by measuring the pressure drop across the heat exchanger coils.

However, it was not possible to use the data of all the units for comparison. Due to a malfunctioning sensor in one case and repeated cutting off of the power supply for two units, the resulting values for these three units were not useful for a valid comparison of microox® and finoox®. The remaining three units were the ones positioned in a garden, on urban factory premises and close to a much frequented road.

Pressure loss during the course of a year

The three units used for comparison showed a very similar behaviour regarding the time curve of their pressure losses. In the beginning, the pressure loss was changeless for an extended period of time. During this period, there was no noticeable soiling. Then the pressure loss increased quite rapidly up to a point where the fans started to work in pump mode. After cleaning the heat exchangers, the process repeated itself: The pressure drop stayed unchanged for an extended period of time and then increased rapidly.

The reason for this behaviour is quite obvious when the development of the pressure drop is seen in relation to the course of the years (see figure 1). The increase of the pressure drop always starts in April and peaks in June. When the heat exchangers have been cleaned in August or September, there is no further increase. Only during the following springtime the increase of pressure drop restarts.

When examining the heat exchangers and kind of soiling they show over an extended period of time, it is easy to explain the characteristics of the pressure drop development. At the beginning of the process, larger seeds or seed vessels start to accumulate at the heat exchangers' surface. In the course of time, they start to form a felt-like mat that acts as a filter and retains even the smallest particles. At that point, there is a massive increase in pressure drop, which in the case of the experiment led to the fans working in pump-mode.

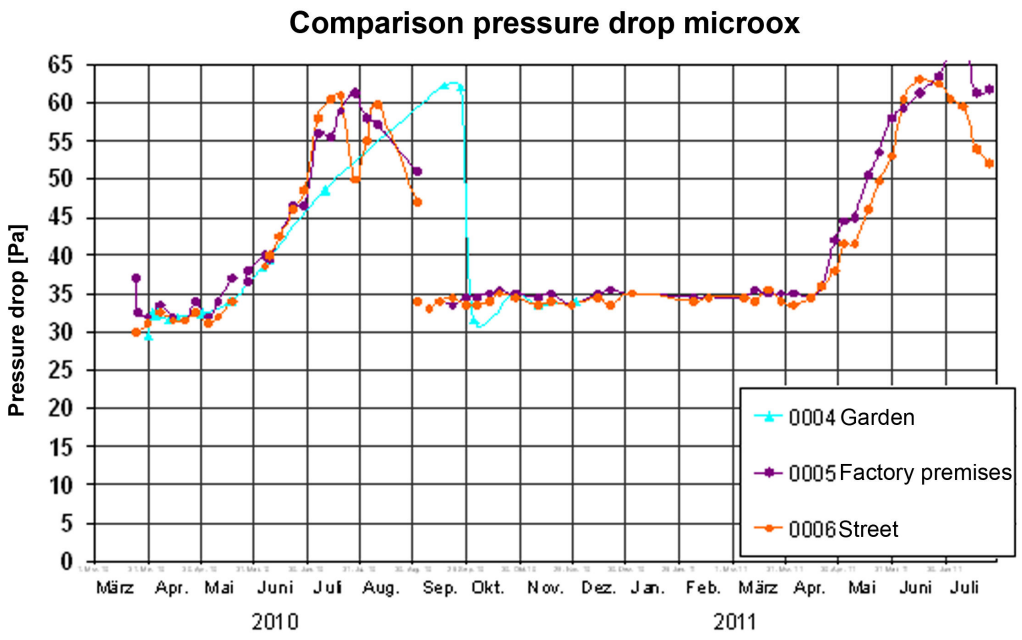

Figure 1: Pressure drop during the seasons

During the experiment, no noticeable difference was registered in the soiling characteristics of the two heat exchanger technologies. Indeed, the microox® heat exchangers reached the maximum admissible pressure drop about two weeks before the finoox® heat exchangers (see figure 2). However, taking into account that the fans were operated at maximum speed during the whole time of the experiment, it is safe to assume that the pressure drop increase is going to proceed much slower in a real refrigerating operation.

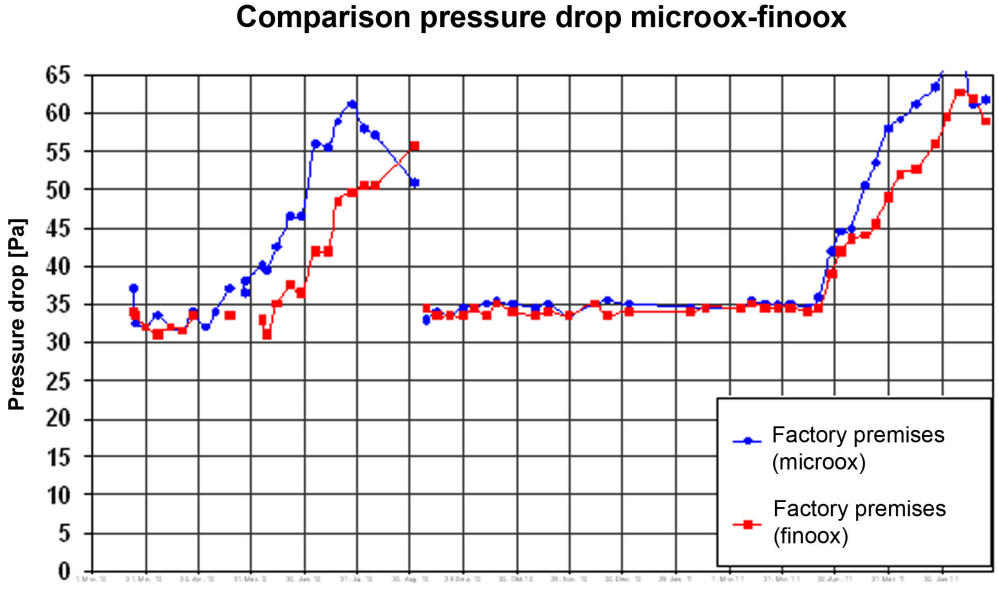

Figure 2: Comparison of pressure drop development in microox® and finoox®

Taking into account all relevant factors, it can be regarded as certain that the yearly soiling development does not materially influence the COP (Coefficient of Performance) of the refrigerating plant. The decisive factor is the cleaning date. The heat exchangers should be cleaned at the beginning of summer, when the dissemination of the bigger seeds and inflorescences is over. As the next soiling period will only start during the following spring, there is no point in repeating the cleaning process. Cleaning once, at the right point in time, is enough to maintain the refrigerating plant's capacity.