

Come the revolution

Facing the limits of conventional fin technology Guntner is turning to the newly developed microox micro-channel for heat exchangers, reports **Rodney Jack**

■ IN A MONTH'S TIME THE FIRST BATCH OF GÜNTNER GVX CONDENSERS WILL ROLL OFF the production line of an enlarged site in Tata, Hungary.

There, general manager Bernd Gantner and his team will see the fruits of two years' research dedicated to the "most significant project in Guntner history".

The aim was to combine the advantages of heat exchangers in mobile refrigeration – efficiency, weight and cost – with those of their finned counterparts, namely a simple manufacturing process and the dimensions possible, as well as build up an in-house automated micro-channel production line for brazed aluminium heat exchanges using microox technology.

Microox, a redevelopment of micro-channel technology used in the automotive sector, promises reduced refrigerant charge, high energy and cost efficiency, and reduced unit weight for customers.

For Guntner, there is the potential to "revolutionise" the sector. Mr Gantner predicts that "microox will pave the way for the market entry of micro-channel technology for stationary refrigeration installations".

Aluminium strips are laid between two closely joined profiles (distance 8-10 mm) and through their alternate contact surfaces, a heat exchanger package is formed. This is then joint-brazed in a brazing furnace.

The development of microox only makes sense if it results in practical benefits for the commercial market.

The technology has been adapted accordingly and in three key areas: power density, reducing the refrigerant charge, and pressure levels.

The challenge was also laid down to build module sizes that satisfy the demands of stationary refrigeration.

Dr Franz Summerer, technical director of research and development, says the improvements to the power density per footprint (kW/sq m) lead to a reduction in the profile depth to 45 mm and enlarged the dimension to approximately 1.2 m x 2.4 m (from 1 m x 2 m). This means, Summerer claims, that the power density was enhanced by 15 per cent on average compared to comparable conventional units.

Micro-channel heat exchanges employ aluminium extrusions which contain several small channels with an approximate diameter of 1 mm.

The small separation distances and channel diameters are the main reasons for the increased fin efficiency and the low refrigerant volume of the heat exchanger. The fact that aluminium is the only material used protects the units from galvanic corrosion and reduces maintenance costs.

Due to their profile, the microox heat exchangers can be cleaned with a high pressure cleaner, with a fan nozzle at a pressure of up to 120bar.

During its remodelling of micro-channel, Guntner also focussed on corrosion of the inside of the unit. If a moist and old refrigerant is used, galvanic corrosion might be expected. But tests in collaboration with the chemical company Solvay showed that even when using extremely old refrigerant oils with water additives, no corrosion could be detected.

The virtues of micro-channel go beyond high power density and corrosion, however. The refrigerant charge is an important topic generally in the industry. Leak tightness is the main objective of the F-Gas regulation. With microox, Guntner says the refrigerant charge in condensers can be reduced by up to 60 per cent.

Summerer adds: "The GVX condenser with microox technology will be available for HFCs and natural refrigerants (ammonia, hydrocarbons and CO₂). Even pressure levels of up to 120 bar for CO₂ gas coolers are already planned."

Even though production of microox heat exchangers will start in July, Guntner has moved to assure the market that the conventional heat exchanger units with finnox technology will not vanish from the manufacturer's product range.

The industry is ready for the next big leap, says Gantner: "If anybody claims that refrigeration engineering does not offer any ground-breaking innovations anymore, he is completely mistaken." ■

WHY ALUMINIUM?

Aluminium plays a key role in microox technology with the heat exchanges made entirely of the material, but why?

■ Aluminium is less expensive than copper. It is lightweight, so that the overall weight of a GVX condenser with microox technology can be reduced by up to 30 per cent compared to with conventional condenser.

■ Reduced weight means it is easier to transport the units, which can even be mounted, eg to walls with a low load-bearing capacity. Additionally, the modular system allows the combination of any

number of condenser modules.

■ The heat exchangers can be cleaned with a high pressure cleaner with fan nozzle at a pressure of up to 120 bar. Additionally the GVX is equipped with an open flap for cleaning and can be cleaned thoroughly, which has a positive effect on the energy consumption of the plant and on the operating costs.

■ The fact that aluminium is the only material used protects the units from galvanic corrosion and reduces maintenance costs.