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Sustainable, efficient, safe and practical:

ECOOOLTEC revolutionises transport refrigeration

- **Natural refrigerants with single-figure global warming potential**
- **Highest operational safety due to fully hermetic cooling circuits**
- **Ultra fast pull-down times thanks to phenomenal refrigerating capacity**

The newly founded transport refrigeration specialist ECOOLTEC Grosskopf GmbH has developed a new generation of purely electrically driven transport refrigeration machines that are extraordinarily economical and, thanks to their natural refrigerant, cool cargo in a particularly sustainable manner. In addition, the units are extremely powerful and highly efficient.

ECOOOLTEC Grosskopf GmbH has developed a revolutionary generation of transport refrigeration machines for use on commercial vehicles. "Our forward-looking refrigeration machines have been designed to benefit from the latest environmentally friendly technologies. As a result, the units not only work in a particularly sustainable and efficient manner, but they are also enormously powerful, quiet and highly integrable at the same time," explains CEO Henning Altebäumer.

The ECOOLTEC TM182 refrigeration unit can be operated electrically from the truck engine via their in-house high-performance alternator, a battery, or a separate power generator, which therefore negates the need for a highly polluting integrated diesel engine. This means that, unlike widely used diesel refrigeration machines, the ECOOLTEC unit produces neither local pollutant nor

CO₂ emissions when in battery operation, and up to 98 percent fewer emissions via the alternator drive.

Unrivalled low global warming potential with GWP value of less than 3

The technological highlight of the system is the use of sustainable refrigerants. Instead of the fluorinated refrigerants (hydrofluorocarbons) R452A and R410A, which are predominantly used in transport refrigeration and have GWP (Global Warming Potential) values of approximately 2,000; ECOOLTEC relies on natural refrigerants with GWP values of 3 and 1 respectively. The European F-Gas Regulation (EU) No. 517/2014 restricts the use of all fluorinated refrigerants, and in some cases even bans them. This will restrict the operational life of refrigeration systems, especially if refrigerants are no longer available for servicing. Rising prices for F-gases are already and will continue to cause operating costs to rise considerably.

ECOOLTEC already uses future-proof natural refrigerants for all its electrically driven transport refrigeration machines. Hydrocarbons are characterised by a high energy efficiency of the refrigeration process and offer good availability at a competitive price.

Maximum operational reliability through fully hermetic refrigeration circuits

Important to stress the ECOOLTEC design pays very close attention to maximum operational safety. Since the hydrocarbon-based refrigerant R1270 (propene, GWP: 3) used by ECOOLTEC for refrigeration is flammable, ECOOLTEC has secured the system against leakage into the structure by means of a patent-pending, fully hermetic refrigeration circuit and an incredibly small refrigerant charge down by 90 percent when compared with conventional transport refrigeration systems.

The refrigeration process takes place completely outside the cargo hold. Therefore, the natural, constantly present air flow ensures that in the unlikely

event of escaping, propene immediately mixes with the ambient air and evaporates. This prevents the formation of a flammable mixture. In the box body, the natural refrigerant CO₂ ensures cold distribution. The R1270 and CO₂ circuits flow past each other outside the body via a plate heat exchanger and are thus thermally linked.

90 percent less refrigerant required

The low-maintenance refrigeration system from ECOOLTEC also has an enormous refrigerating capacity to meet the extreme temperature safety requirements of the demanding food distribution. The ECOOLTEC TM182 uses specially developed scroll compressors in a horizontal design. Thanks to their infinitely variable speed control, the system achieves very high capacity, controllability and high energy efficiency while at the same time generating low operational vibrations and extremely low noise emissions. The running smoothness is also remarkable, the sound level significantly lower than that of comparable diesel-powered cooling machines on the market. This is of particular benefit to the people in the cities during night-time deliveries as well as to the driving personnel.

Even in high ambient temperatures, the availability and operational reliability of the system is maintained through refrigerant injection. By careful selection and design of the system, the heat exchangers and other system components allowed the refrigerant charge to be reduced by more than 90 percent compared to conventional solutions. At the same time, the efficiency of the system was increased by engineering larger heat transfer surfaces without the need to increase overall unit dimensions.

Enormous performance for the most demanding applications

This makes the unit suitable for even the most demanding applications, particularly those with high load volumes, lowest box room temperatures and frequent door openings. As a result, the TM182 offers the highest temperature

safety and the shortest pull-down times under all conditions. Despite its high performance, the machine's energy consumption is remarkably low.

When operating at the same cooling capacity, the system uses 60 to 80 percent less energy than a conventional diesel-powered system. Highly efficient natural refrigerants as well as large heat exchanger surfaces in combination with a high air flow rate ensure unrivalled efficiency.

Compact dimensions allow complete integration into the structure

Despite its high performance, the unit is particularly compact. Thanks to the use of specially developed components, the ECOOLTEC transport refrigeration unit achieves an extremely flat overall height of only 250 millimetres and is thus designed for complete integration into the vehicle roof of a refrigerated rigid vehicle, trailer or semi-trailer. Importantly, the unit can be fully integrated into the body without any significant loss of loading volume. At the same time, the refrigeration unit weighs comparatively little, so that the vehicle operator benefits from an optimised payload.

Since roof-mounted refrigeration units are integrated at the front and at the top of the body, they are directly supplied with fresh, as opposed to exhaust air from the truck engine compartment, which can be at temperatures of up to 90 °C. This installation position and unit design facilitate unrestricted air flow across the condenser and due to this position, the lower air intake temperature makes the unit extremely energy-efficient. With the quick-change system, the roof refrigeration unit can be removed or replaced in minutes for easy maintenance.

Delivering food with the greenest footprint with ECOOLTEC refrigeration

The ECOOLTEC TM182 can be mounted on semi-trailers and rigid vehicle bodies. Thanks to the specially developed inverter, it can be connected to all common types of drive. "Of course, the perfect solution from an environmental perspective is to combine it with a battery-electric drive with or without a fuel

cell," says CTO Dr. Jürgen Süß. However, the electrical energy supply with the help of the ECOOLTEC alternator on the truck engine is also easily possible with conventional diesel or gas drive. The system can also be plugged in to a mains power supply.

"The entire cold chain already has the possibility to be F-gas free, today that possibility is now available to the transport refrigeration link of that chain," explains Dr. Jürgen Süß. "Fleet operators in the food industry can now actually offer ice cream and frozen pizza with the greenest footprint," he adds.

Caption

ECOOLTEC relies on natural refrigerants with single-figure GWP values instead of the predominantly used fluorinated refrigerants with GWP values of around 2,000.

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