



Leak-free for years to come

Refrigerant hose for the special demands of bus air-conditioning systems

Location:

Stuttgart, Germany

Challenge:

Equipping buses with hoses specifically for bus air-conditioning systems

Solution:

FC800 EverCool refrigerant hose

Results:

Resistance to heat, refrigerants, and oils and a long service life

“Most importantly, Eaton was able to improve service life significantly, with a refrigerant hose now lasting years instead of months”

Says EvoBus, summarising the enhanced product.

Eaton has developed a refrigerant hose specifically for use in buses. It sets itself apart due to its high temperature resistance and extremely low permeation rate. Most importantly, it offers the necessary flexibility to allow for the relative movement between the compressor and hoses when the engine starts. As a result, Daimler EvoBus could increase the lifetime of air conditioning hose assemblies in buses reducing their replacement cost over time.

Background

Today, most modern buses are equipped with full air conditioning – whether city buses or luxury coaches. This generally involves a central air conditioning unit with the condenser, evaporator, fan, and other units installed on the bus roof. However, the compressor is powered by the bus engine and is therefore installed in the engine compartment. Rigid lines, generally made from copper or a similar robust material, carry the refrigerant from the roof unit to the compressor and back.

Challenge

The rigid line system is fixed to the chassis. The compressor, on the other hand, is mounted on the engine. This installation location, however, presents a challenge, explains a designer responsible for bus air conditioning at EvoBus: “When the engine starts and stops, it moves by up to 1.5 centimetres, so the connection between the compressor and line must allow for this relative movement”. And that’s not all – the movement places torsional stress on the hose and it must also withstand temperatures of up to 125°C and pressures of up to 25 bar. Standard Air Conditioning hoses cannot meet these demands. The high mechanical stress on the hose caused by the movement of the engine can cause premature failure or refrigerant leakage due to the stress on the hose construct.



Powering Business Worldwide

Solution

Alternatives in the nominal sizes required for bus air conditioning were hard to find on the market. EvoBus therefore turned to Eaton to find a solution. The result is the FC800 EverCool hose, which Eaton designed specifically for use in bus air conditioning units. Unlike a corrugated hose, the FC800 EverCool core is made of a blended CR Rubber material, a synthetic characterised by its long-lasting elasticity, heat resistance and excellent resistance to a number of refrigerants and compressor oils. This core tube provides significantly greater flexibility than a corrugated hose and therefore allows for the relative movement.

Refrigerant losses are minimized

The core is covered by a polyamide barrier layer. This reduces the hose's permeation rate to just 0.5 kg/m²/year.

Sustainability is an integral component of EvoBus' business processes. EvoBus aims to be environmentally and climate-friendly, both in its manufacturing processes and its products. Eaton FC800 EverCool offers a degree of future-readiness in terms of possible legal requirements to continue reduction of GHG (Greenhouse gasses)

FC800 is qualified for use with R407C and HFO1234yf refrigerants (also known as "R1234yf"). "Eaton's goal is to develop products that sustainably improve quality of life and the environment. A long service life, low permeation rates and the certification of hose lines for environmentally friendly refrigerants such as R1234yf are important to us," explains Johannes Kammerlohr, EMEA Product Manager at Eaton.

Can also be installed in tight installation locations

There is often little space in bus engine compartments. The minimum bend radii for the FC800 EverCool is between 70 millimetres (nominal diameter 16) and 160 millimetres (nominal diameter 31). The design of the wire braid ensures that the hose does not buckle at these narrow radii and can therefore also be used in tight installation spaces. And FC800 carries a full vacuum rating. The cover of FC800 EverCool is an EPDM (ethylene propylene diene monomer rubber) which ensures temperature resistance up to 125°C and keeps moisture diffusion to a minimum.

Result

Eaton supplies the hoses completely assembled, i.e. in the length required depending on the bus type, and with the required flange connections. Leak-tightness is also of the highest priority for the connection between the hose and fitting, which is ensured by the design of the socket and nipple profile. In addition, Eaton checks each pre-assembled hose for leak-tightness before delivery. "Most important to the customer, Eaton was able to be significantly improve the service life, with a refrigerant hose now lasting years instead of months", says EvoBus summarizing the enhanced product.

About EvoBus

As Daimler AG's largest European subsidiary, EvoBus GmbH is responsible for the Daimler Group's bus business in Europe. Its product portfolio includes city and intercity buses, coaches and chassis. The merger of the Setra and Mercedes-Benz brands in 1995 laid the groundwork for the success of EvoBus GmbH. The company has a number of production sites and service centres in Europe with over 8,000 employees.



The FC800 EverCool refrigeration hose offers the necessary flexibility to allow for the relative movement between the compressor and hoses when the engine starts and allows for installation in space restrictive applications, due to its excellent bend radius.



The FC800 EverCool refrigeration hose ensures temperature resistance up to 125°C and keeps moisture diffusion to a minimum.