



Environmentally Friendly Innovation in Rail HVAC



APPLICATIONS

Light Rail Vehicles | Metros | Regional and Commuter Trains



GREEN TECHNOLOGY INSIDE



CONTINUING WITH ITS ENVIRONMENTAL FOCUS, MERAK HAS DESIGNED AND MANUFACTURED an HVAC unit that uses the environmentally friendly refrigerant HFO1234yf – putting the company one step ahead on the environmental protection front.

MERAK ENVIRONMENTAL CARE

Being environmentally responsible by, for example reducing the power consumption and greenhouse gas emissions of its products is a priority of Merak. Following further research and development work in this field, Merak has designed and manufactured its first HVAC unit using the HFO1234yf refrigerant. The use of this new refrigerant, which has a global warming potential much lower than ones in current use, (4 compared with 1,300 for the R134a) represents a revolutionary change in air conditioning systems for railway vehicles.

ENVIRONMENTAL ASPECTS

Indicators	R134a	R407C	HFO1234yf
GWP (Global Warming Potential) 100 years	1,300	1,653	4
ODP (Ozone Depletion Potential)	0	0	0
Average lifetime in the atmosphere	13.8 years	6-40 years	11 days

Source: IPCC Third Assessment Report 2001

ENVIRONMENTALLY FRIENDLY INNOVATION IN RAIL HVAC



CUSTOMER BENEFITS

- Environmentally friendly refrigerant
- Reduction of greenhouse gas emissions due to low Global Warming Potential (GWP100 years = 4)
- Weight, dimension and cooling circuit are similar to HVAC equipment using the R134a refrigerant
- Can be used with high efficiency in all climatic zones contrary to CO₂ and air cooling systems
- Cost of this new equipment is much lower than that using air and CO₂ as cooling agents
- This technology can be used in all types of railway vehicles

MAIN TECHNICAL CHARACTERISTICS

Roof-mounted compact HVAC unit with two independent cooling circuits

- Refrigerant HFO1234yf
- Cooling capacity: 35 kW
- Ambient temperature: 40 °C
- Number of compressors: 2
- Voltage / frequency: 400V / 50Hz
- Control panel mounted inside the HVAC unit
- Adaptable to all train communication networks

MAIN MILESTONES OF GREEN HVAC TECHNOLOGY

1987

Montreal Protocol on substances that deplete the ozone layer. As a result, these substances (CFCs and HCFCs) have to be progressively eliminated.

1997

Kyoto Protocol to reduce greenhouse gases (GHG) emissions.

2006

European Directive 2006/40/EC. Prohibits mobile air conditioning systems (MACs) from using fluorinated greenhouse gases with a Global Warming Potential higher than 150. This directive applies to the automotive sector.

2007-2010

Several automotive manufactures analyze alternatives in order to comply with the directive. The HFO1234yf is tested in car air conditioning systems. Merak investigates and compares alternative technologies (CO₂, air and HFO1234yf cooling

agents) and builds several prototypes. SAE International recommends HFO1234yf as the refrigerant in air conditioning systems in cars to fulfill the EU requirements.

July 2010

General Motors announces that it will introduce the HFO1234yf refrigerant in some models by 2013.

September 2010

Merak, as a leader in its field, introduces the first HVAC unit with the environmentally friendly refrigerant HFO1234yf.

Today

Merak continues to develop the performance and application of environmentally friendly HVAC solutions.

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