CASE STUDY

RS-20 (R-480A) replacing R-134a in Bus A/C

Introduction

In the current context of the transition toward more sustainable refrigerants, GRIT has introduced an innovative solution for the maintenance of automotive refrigeration equipment: the RS-20 (R-480A).

On this success case study, the RS-20 is used in automotive climatization, specifically in buses. The tests were carried out on a hybrid diesel-electric model from the brand Irizar. However, the RS-20 performance was also tested in other brand units.

The newly developed refrigerant R-480A (RS-20), with a GWP=291, is designed to be a drop-in replacement for R-134a (GWP=1430) with a lower GWP.

Therefore, its thermodynamic properties are very similar to R-134a, ensuring optimal performance in all systems that previously were working with R-134a. Thus, the RS-20 is a solution that guarantees great performance and high efficiency in automotive A/C while contributing to carbon footprint reduction and improving long-term profitability.

RS-20 Main Features

0	291	A1	POE
ODP	GWP	Safety Classification	Compatible Lubricants

Temperature Range: High and Medium

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A/C Air Conditioning System Details

The system is an air conditioning unit model UL700 G3+FRONTBOX TM65. It contains a Valeo compressor directly belt-driven from the diesel engine.

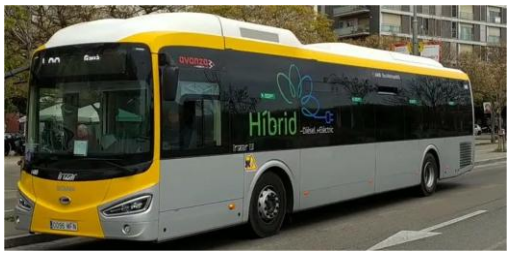
The system was designed to operate with R-134a and has a refrigerant capacity of 5.3 kg. The condensers are located on the top part of the bus (roof), while cooling is achieved through multiple thermostatic expansion valves along the cooling channel inside the bus aisle.

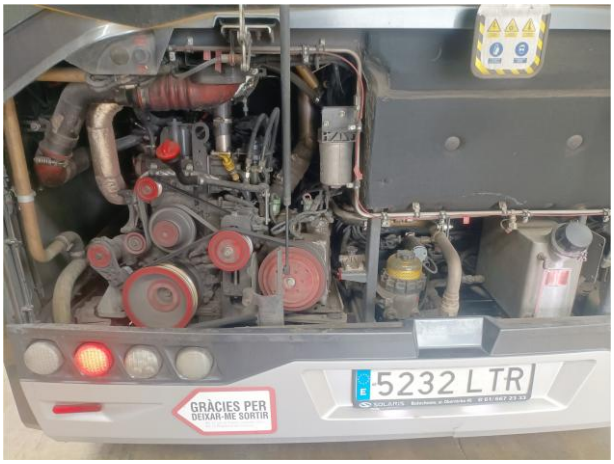
Refrigerant Replacement

CoolTech AC790 Pro recovery machines from Robinair were used to remove the R-134a and charge the RS-20; common equipment in automotive workshops.

1) R-134a removal using the recovery machine.
2) Vacuum and leak-checking
3) RS-20 charge and system adjustments: The R-480A recovery machine was filled to maximum capacity, The system was then charged with the established amount. No adjustments were made to the equipment.

Two recovery machines were used during the whole process to avoid gas mixing: one for the R-134a and another for the R-480A charge.





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RS-20 System Performance

The operating conditions of the system with both refrigerants were tested and got the following results:

Regular Performance	RS-20	R-134a
High Pressure (bar)	13.5	9.5
Low Pressure (bar)	1.6	1.2
Evaporator Fan	40%	42%
Air Outlet Temperature (°C)	12.5	12.4

Maximum Power Performance	RS-20	R-134a
High Pressure (bar)	12.5	9.5
Low Pressure (bar)	1.2	1
Evaporator Fan	100 %	100 %
Air Outlet Temperature (°C)	13	13.1

Conclusions

Using the new RS-20 (R-480A), the system offered an optimal performance and was able to successfully fulfil the bus' A/C objective results, even under extreme conditions and operating at full capacity.

These results proves that the performance between the system using the RS-20 or R-134a are nearly the same.

More Information

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