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Refrigeration Case History
Forane® 134a

Retrofitting Automotive Air Conditioners from R-12 to Forane® 134a

. . . and replacing mineral oil with Planetelf® PAG lubricant

Automotive air conditioners, also known as mobile air conditioners (MACs), even though small in size do not lack in complexity. MACs pose a special problem for retrofitting due to the presence of elastomer hoses (several materials); variable system operation (compressor RPM is a multiple of engine RPM); multitude of compressor types (rotary vane, piston, scroll, etc.); expansion device type (fixed orifice tube or thermal expansion valve (TXV)), etc. All of the above, plus a variety of vehicle specific problems, such as age, geographic location, etc. make retrofitting a MAC a challenging project.

All refrigerant and system handling regulations that apply to stationary air conditioners and refrigeration units, also apply to MACs. In addition, a set of Society of Automotive Engineers (SAE) J-standards specific to mobile applications also apply. One of the most important regulations deals with the retrofitting of the service ports. Typically, MACs have 2 service ports, one on each side of the system. The high side is a 3/8" flare fitting and the low side a standard 7/16" refrigeration flare fitting, both with external threads. After a system retrofit is completed, these fittings must be changed to Forane 134a approved fittings per SAE J-639 (internal, metric threads) in such a way that the CFC 12 original fittings are permanently disabled.

Regarding the refrigerant choice for a retrofit, overwhelmingly, the mobile air conditioning industry has chosen HFC 134a as the leading candidate and Elf Atochem fully supports this position. However, while HFC 134a is the only pure refrigerant available, there are several other candidates in the market in the form of blends, and servicemen should be aware of them to avoid possible cross contamination of refrigerants in their equipment. The Mobile Air Conditioning Society (M.A.C.S.) has petitioned the U.S. EPA to ban the use of any refrigerant other than HFC 134a for MAC retrofits.

For lubricant oils, there is currently a choice of 2 synthetic materials: Poly Alkaline Glycols (PAGs) or Polyolesters (POEs). Although it varies with the car manufacturer, most have chosen PAGs as their Original Equipment Manufacturers' (OEM) fluid, as well as their retrofit fluid. However, in some instances a manufacturer may recommend the use of a PAG for OEM and a POE for retrofits. Be sure to check with the vehicle manufacturer for any oil specifications if available. If no oils are specified for retrofits, then use the recommended OEM oil.

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Follow this step-by-step guide to retr
CFC 12 to the new F

The retrofit procedure that follows is a recommendation developed and tested by Elf Atochem in a fleet of vehicles, and is based on SAE, M.A.C.S. and industry recommendations. In general, if a vehicle manufacturer has developed a specific retrofit procedure, that procedure and not the one listed here should be followed.

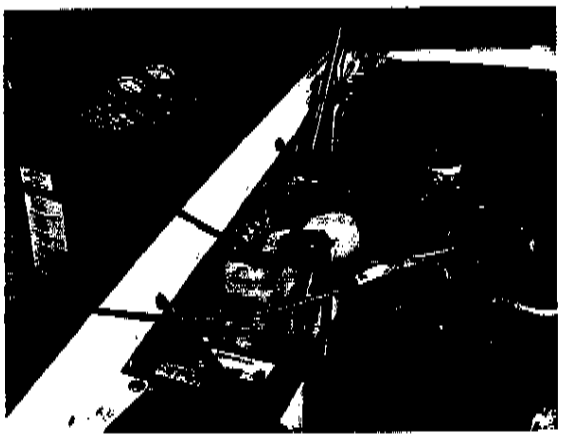
1. *Thoroughly leak check and evacuate the system for signs of previous leaks, defective components, etc. Replace or repair as necessary after charge recovery. Empty systems should be charged with a small amount of CFC 12 to leak check.*

2. *Recover CFC 12 charge into a suitable container by means of approved recovery equipment.*

3. *Pull a system vacuum to 29" of Hg. for 5 minutes. (If not flushing, evacuate at the same level for 45 minutes and go to STEP 7.)*

4. *Connect the power flushing equipment and flush for 30 minutes or longer. Systems with a TXV will need external heat to "open" the valve.*

5. *Recover liquid CFC 12 refrigerant used to flush and evacuate to 29" of Hg. for 30 minutes.*

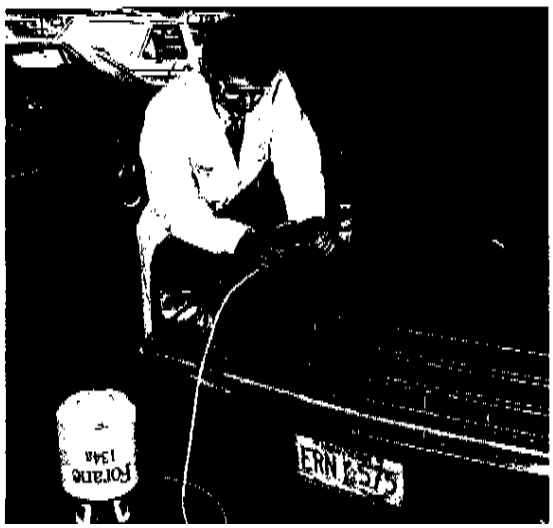


ting automotive air conditioners from ane® 134a refrigerant

6. *Add the recommended amount of HFC 134a compatible lubricant per system compressor manufacturer's specifications, usually 6 to 8 fl. oz.*

7. *Install SAE approved HFC 134a fittings disabling all other CFC 12 fittings in the system.*

8. *Re-evacuate the system and recharge with Forane 134a using 90% by weight of the original CFC 12 charge.*



9. *Leak check system again, paying special attention to any connections that may have been worked on.*

10. *Clearly label the system indicating it has been retrofitted to HFC 134a and a synthetic oil.*

For up-to-the-minute technical advice call 1-800-RETRO94.

If our guidelines differ from Original Equipment Manufacturer's (OEM) guidelines, follow OEM guidelines.