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GE Consumer Service Training

Technician Manual

R134a
Refrigeration
Servicing Procedures

Pub. No. 31-5247

SERVICING 134a COMPRESSORS

The attachment describes GE Consumer Service's recommended servicing of HFC 134a compressors. A few important highlights:

1. The 134a compressor utilizes a new type of oil, and ester oil, which is **not** compatible with compressors containing R-12, even trace amounts.

2. With a 134a replacement, the original dryer **must always** be replaced. A new filter/dryer (WR86X0096) has been developed and **must** be installed.

3. 134a replacements **require** separate CFC recapture pumps, tanks and tools. This is required since 134a cannot tolerate trace amounts of R-12 or other CFC's.

4. All brazing will be copper to copper using silfos. Silver solder **must not** be used because the flux contains water. Repairs to silver solder joints are permissible.

5. The servicing of 134a compressor does not allow the use of damp mops or rags to cool joints, as the 134a system cannot tolerate moisture. Forms jelly-like residue, plugs cap tube.

HFC-134a - HEALTH, SAFETY AND HANDLING

HEALTH, SAFETY, AND HANDLING CONSIDERATIONS FOR HFC 134a ARE SIMILAR TO THOSE FOR R-12 (SEE BELOW).

HEALTH, SAFETY & HANDLING	R-12	HFC 134A
Allowable overall exposure limit	1,000 PPM	Same
Vapor exposure to skin	No effect	Same
Liquid exposure to skin	Can cause frostbite	Same
Above minimum exposure limit	Asphyxiant, cardiac sensitization	Same
Safety and handling	Wear appropriate skin and eye protection	Same
a. Large spills	Vacate/ventilate area	Same
b. Exposure to fire	Will not burn on its own, combustion products are toxic	Same
c. Tanks and equipment	Existing rules/procedures for R-12 also apply for HFC 134a	

PROPERTIES OR CHARACTERISTICS OF REFRIGERANTS

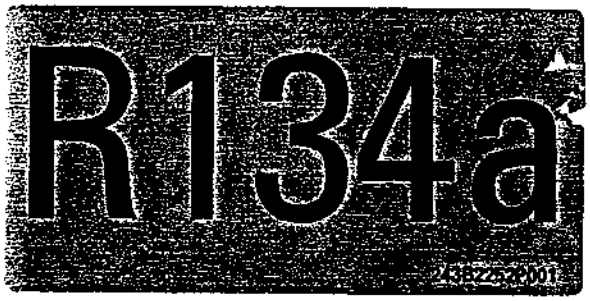
PROPERTIES/CHARACTERISTICS	R-12	HFC 134A
Ozone depletion potential (ODP)	1	0
Global warming potential (GPW)	3	0.3
Flammability	NO	NO
High-side system operation pressure at 75 degrees F. ambient	HFC 134a approximately 120-140 PSIG lower or same as R-12	
Low-side system operation pressure at 75 degrees F. ambient	HFC 134a approximately 0 - +2 PSIG lower or same as R-12	

R134a WITH ESTER OIL IS SO CHEMICALLY SPECIFIC THAT MOST COMPRESSORS AND DRYERS CANNOT BE USED WHEN SERVICE IS REQUIRED. ONLY APPROVED COMPRESSORS OR HI-SIDES CAN BE USED. GE WILL PROVIDE THE COMPRESSORS WITH CORRECT OIL AND THE SPECIAL FITTINGS. ALL SERVICE BRAZE JOINTS WILL BE COPPER-TO-COPPER. THE CHARGING VALVE WILL BE A MALE FLARE WITH SCHRADER. THE DRYER ***MUST*** BE CHANGED EACH TIME THE SEALED SYSTEM IS REPAIRED. THE DRYER WILL BE PART OF A NEW ASSEMBLY IN SERIES WITH A FILTER. THE DRYER CONTAINS A NEWLY APPROVED DESICCANT THAT IS A ***MUST*** FOR THESE 134a REPAIRS. THE DRYER WILL HAVE A PROCESS TUBE WITH A SPECIAL SCHRADER FITTING TO ASSIST RECOVERY OF THE SERVICE CHARGE AND THE PURGE SWEEP CHARGE. IT CAN ALSO SERVE AS AN IDENTIFIER FOR 134a, THAT IS PROVIDED SOMEONE HAS NOT PREVIOUSLY ERRONEOUSLY SUBSTITUTED THE INCORRECT PARTS. THE FILTER IS REQUIRED TO STABILIZE ANY CHEMICAL REACTIONS CAUSED BY THE REPAIR. ***DO NOT SUBSTITUTE*** OTHER DRYERS LIKE WR86X93 OR WR86X92, AS THE DESICCANT IS CHEMICALLY MISMATCHED FOR THIS APPLICATION. WHEN THE DRYER IS REMOVED, IT SHOULD ALWAYS BE OPENED AND INSPECTED FOR CAPILLARY DEPOSITS OR BLOCKAGE.

THE ELECTRONIC LEAK DETECTOR WILL WORK WELL FOR LEAK SEARCHING -- IT CAN BE USED WITH GAS TRAPS TO ASSURE FINDING ANY LEAKS THAT COMPARE TO TYPICAL R12 SEALED SYSTEM PROBLEMS. THE MOLECULES IN 134a ARE SMALLER WHICH MEANS THAT THE LEAKS CAN OCCUR FROM MICROSCOPIC OPENINGS. IMPROVED BRAZING IS CRITICAL FOR SUCCESS! DO NOT USE SOAPY WATER SOLUTIONS TO LOOK FOR LEAKS -- ESPECIALLY ON LO-SIDE LEAKS THAT MIGHT ALLOW WATER TO BE SUCKED INTO THE SEALED SYSTEM. COOLING JOINTS WITH A WET MOP OR RAG SHOULD ALSO BE DISCONTINUED. DO NOT USE SOAP BUBBLES, RAGS -- USE YOUR LEAK DETECTORS. REMEMBER ANY MOISTURE CAN RESULT IN A REFRIGERATOR FAILURE AND LIKELY A SCRAPPED REFRIGERATOR.

IDENTIFYING REFRIGERATION PRODUCTS CHARGED WITH HFC 134a

A LABEL HAS BEEN DEVELOPED TO ALERT THE TECHNICIAN THAT THE SEALED SYSTEM CONTAINS R-134a.



SERVICE REPLACEMENT COMPRESSORS

GE WILL HAVE COMPRESSORS WITH TUBES ATTACHED. THESE TUBES MUST BE CUT AND BRAZED TO THE TUBES THAT WERE CUT WHEN THE ORIGINAL COMPRESSOR WAS REMOVED. (NO RUBBER PLUGS - A CHARGE VALVE WILL ALLOW RELEASE OF NITROGEN).

TUBES CAN BE LEFT OPEN ONE HOUR WITHOUT CONCERN AS LONG AS THE NEW FILTER/DRYER IS INSTALLED.

HFC 134a SERVICE PROCEDURE

The following HFC 134a sealed system failures will be serviced the same as R-12 system failures. Sweep charge procedure should be used. However, the dryer must always be replaced.

A. Non-operation compressor
B. Noisy compressors
C. High-side leaks
D. Low side leaks
E. Restrictions
F. Recharge
G. Dryer changes

Notes: A new filter/dryer will be shipped with replacement compressors.
The purge/sweep charge procedure is the only procedure to be used to purge contaminants from the sealed system/combined with the R134a recovery pump.

At the present time, the following sealed system failures will not be serviced and the product must be exchanged. Service procedures for the following repairs will be communicated by September 1994.

A. Plugged capillary tube

SERVICE EQUIPMENT

The following list of equipment is needed for the servicing of HFC 134a systems, and will be available through normal supply order channels.

Proposed R134a Service Equipment

Item	Gem P/N	Quantity	Description
A	RU9100S1	1	Standard RU9100 Recovery Pump (R12, 22, 500, 502, 134a) with 3700-70060 Standard Recovery Hose Kit replaced with 3700-70064. R134a Hose Kit and 2 3700-70065 R134a permanent adapters installed on the inlet and outlet.
B	TB788S1	1	Standard 30# Recovery Tank with 2 3700-70065 permanent adapters installed on the liquid and vapor parts.
C	TB400	1	R134a Service Tool Kit consists of a tool box approximate size 14" X 5" X 5" containing the following service tools and fittings.
C1	TB134aS1	1	Charge cylinder with graduations for R134a. Has 1 foot permanently attached hose with 1/2 Acme anti-blow back valve.
C2	TB020	1	High side adapter, 1/2 Acme male port (Schrader to 7/16" Acme swivel female port with Schrader Depressor). Allows for connection of standard 1/2 Acme R134a hoses to high side.

SERVICE EQUIPMENT

C3	MPV31S1	1	R134a high side piercing valve; standard piercing valve with 7/16" Acme male port with Schrader
C4	MPV31S2	1	R134a low side piercing valve; a standard piercing valve with 1/2" Acme male port with Schrader.
C5	TB441	1	R134a diagnostic pressure gauge, standard - 30 in Hg to 150 PSI gauge on 3 inch hose with 1/2 Acme female port (swivel) with Schrader.

(All parts from GEM Products)

Notes:

1 3700-70064 Hose kit consists of two hoses in a bag. One 8 foot blue R134a striped hose having 1/2 ACME fitting on one end and ball valve with 1/2 ACME fitting with Schrader depressor on the other end. One 3 foot red R134a striped hose having 1/2 ACME fitting on one end with ball valve and 1/2 ACME fitting on the other end. All of these components are common to automotive R134a service. The 1/2 ACME fitting on these hoses will allow direct attachment to the 1/2 port found 30 and 50 pound R134a refrigerant cylinders sold to that industry.

2 The 3700-70065 permanent adapters are configures with 1/4 flare female on one side with preapplied thread locker and 1/2 ACME male configuration on the other. Once installed they cannot easily be removed.

3 The practice of using a slightly smaller port on the high side of a system and then supplying an adapter to allow normal hoses to be used is a common method of differentiating the high side port from the low side for the serviceman in the automotive industry.

EVACUATION AND CHARGING PROCEDURE

* Recover 134a from the sealed system by attaching to Hi-side piercing valve (minimum 15" vacuum).

* Make necessary repair.

* Attach 134a charging cylinder to process tube port on compressor.

* Evacuate the system, using the refrigerator compressor and the recovery pump, which is attached to the new filter/dryer assembly, to a minimum 20" vacuum.

* Stop recovery pump, close ball valve at Hi-side port connection and add 3 ounces of 134a to system. Let refrigerator operate for 5 minutes circulating the refrigerant.

* Open ball valve and recover the purge/sweep charge using the recovery pump and the refrigerator compressor until a 20" vacuum is attained. Close the ball valve and remove the recovery hose.

* Charge the system with the 134a refrigerant using the quantity on the rating plate plus 1/2 ounce due to adding the filter/dryer assembly.

* Using the electronic leak detector, check all brazed joints plus both Schrader ports. Re-install caps to Schrader ports. Dress all tubing to prevent rattles.

SCHRADER CORE . . . . . GEMLINE PT# 3700-99010
CAP, 1/2 ACME . . . . . GEMLINE PT# 3700-70092
CAP, 7/16 ACME. . . . . .GEMLINE PT# 3700-70093
134a PROCESS TUBE WR86X0097
134a FILTER/DRYER WR86X0096