TRANE

General Service Bulletin

RTHA-SB-16

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Literature Change History

New

Subject: Model RTHA Water Cooled Series R Centravac Motor Burn Cleanup Procedure.

Introduction:

This Service Bulletin contains recommended procedures for cleaning an RTHA Water Cooled Series R chiller after a compressor motor burn.

Discussion:

Heat generated by a compressor failure causes some oil and refrigerant to break down and form acids and sludges. The removal of these contaminants is critical for proper operation of the unit after repair.

Note: The Trane Company urges all HVAC servicers, working on Trane equipment and other manufacturer's products, to make every effort to eliminate, if possible, or vigorously reduce emissions of CFC, HCFC and HFC refrigerants to the atmosphere resulting from installation, operation, routine maintenance, or major service on this equipment. Always act in a responsible manner to conserve refrigerants for continued use, even when acceptable alternatives are available.

Since The Trane Company has a policy of continuous product improvement, it reserves the right to change specifications and design without notice. The installation and servicing of the equipment referred to in this booklet should be done by qualified, experienced technicians.

IMPORTANT NOTICE

Effective July 1, 1992, all service operations must use recovery systems to minimize losses of refrigerant to the atmosphere when servicing units with Class I and Class II refrigerants.

Class I (CFC) and Class II (HCFC) refrigerants include CFC-12, HCFC-22, CFC-500, CFC-502, CFC-11, CFC-113 and HCFC-123. Deliberate venting is prohibited by Section 608 of the Clean Air Act.

In the normal service of air conditioning systems, there are three major activities mandated by the EPA regulations: recovery, recycling and reclaiming.

1) Recovery – the act of removing refrigerant from the air conditioning unit so that losses of refrigerant to the atmosphere are minimized.

Whenever a refrigeration circuit is opened, the recovery of the refrigerant is required. If there is no reason to believe that the refrigerant is "bad", such as during service of gaskets, expansion valves or solenoid valves, the refrigerant is often returned to the unit without treatment. (Note: Always follow the equipment manufacturer's recommendations regarding replacement of unit filter driers during service.)

If there is reason to suspect that the refrigerant is bad, such as with a compressor failure, the refrigerant should either be replaced or recycled.

Recovery is also required when a piece of equipment is decommissioned. This prevents the loss of refrigerant upon disposal of the unit. The recovered refrigerant usually is sold to refrigerant reclaimers rather than reused in the customer's new equipment.

2) Recycling – the act of cleaning recovered refrigerant for use in the customer's equipment.

First, the refrigerant is boiled to separate the oil. Then it is run through a filter drier to separate moisture and acid.

Because of limited field testing capability, the quality and identity of any recycled refrigerant is suspect. For this reason, the EPA will most likely allow recycling of refrigerant only when it is returned to its original owner. Resale of the recycled refrigerant to third parties will not be allowed.

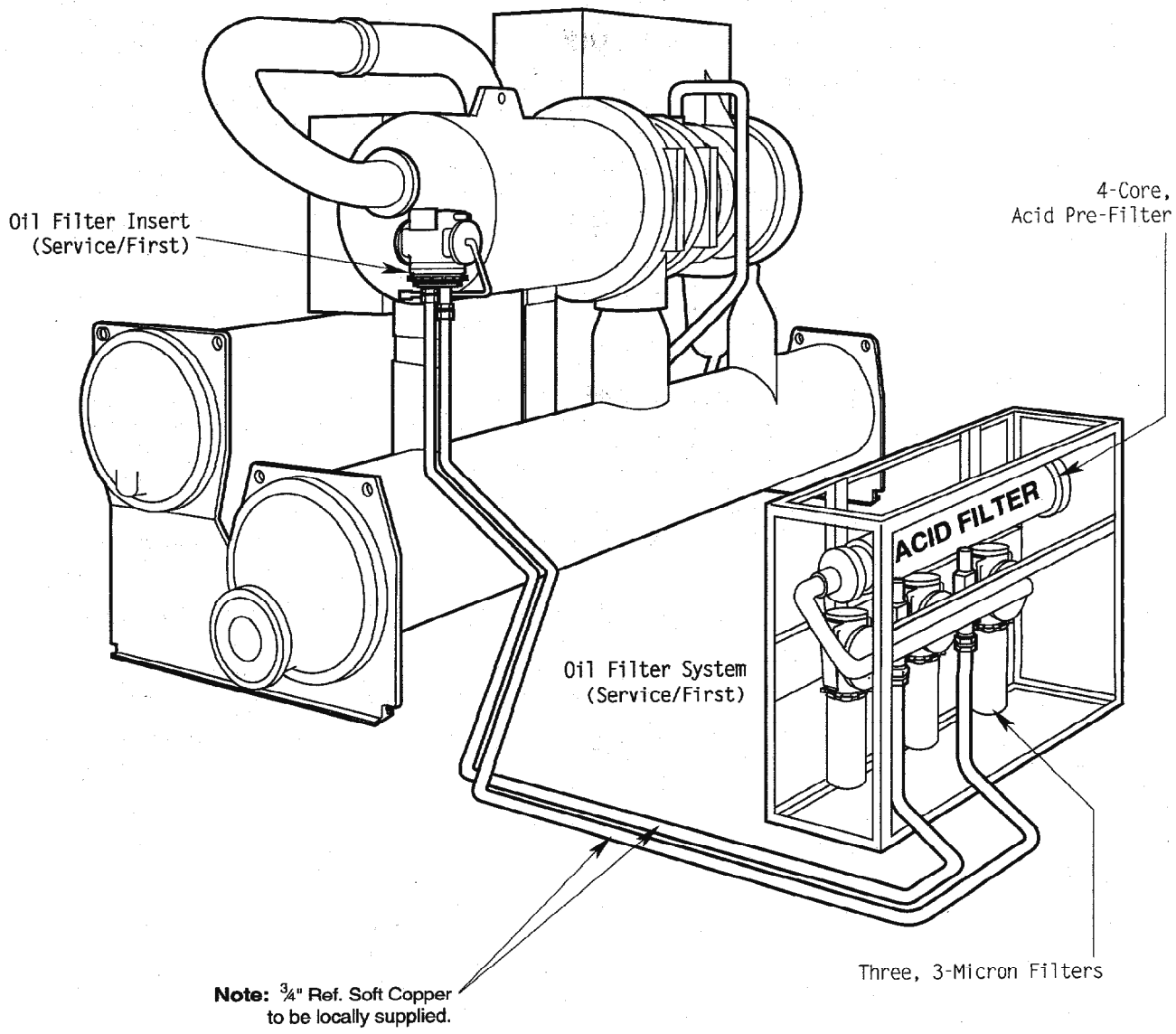
As a result, most servicers will only recycle refrigerant when the quantity of the refrigerant to be recycled and the expertise of the technician make it attractive to do so. Most suspect refrigerant will be sold to a reclaimer rather than be serviced in the field.

3) Reclaiming – the act of purifying refrigerant and testing it to ARI 700 "new" refrigerant standards. With reclamation, each batch of refrigerant undergoes extensive laboratory tests and the waste streams are disposed of according to environmental regulations.

Most reclamation will be done at centralized processing facilities because of the testing, waste handling and EPA certification requirements for reclamation. The Trane Company and others offer reclamation services for most refrigerants.

Reclamation is probably the most attractive alternative for users with salvaged and suspect refrigerant.

Figure 1
Layout of Typical RTHA with Filter System and Filter Insert



Note: Refer to the most recent issue of RTHA-IOM for proper oil type and quantity. The oil filter system will require an additional five (5) gallons of oil. Add the oil directly into the oil filter system.

Motor Burn Diagnosis

General

High Pressure refrigerants have a low boiling point at atmospheric pressure. Therefore, care must be taken, when working with water chillers that use high pressure refrigerants, to prevent freezing of the water in the evaporator and condenser heat exchangers. Always be sure there is sufficient water flow through the heat exchangers when adding or removing refrigerant.

Caution: Water must be flowing through the tube bundles during this entire process. Do not charge refrigerant into the unit unless there is water flow. Do not charge liquid refrigerant into the unit unless the pressure/temperature relationship is above 65 psig.

This bulletin contains the recommended cleanup procedures for the Series R systems. The oil is used as the scavenging agent, to carry the system contaminants to the filtering device. The oil also contains a percentage of the refrigerant, which is cleaned with the oil and helps to flush the evaporator and condenser.

Filtering Method

It is of utmost importance that the new or remanufactured compressor/motor assembly be protected from damage caused by circulating debris. The unload valves have small ports that can be plugged by this debris, making them inoperable. Therefore, all interconnecting piping must be thoroughly swabbed out. New or recycled refrigerant and new oil is required.

The oil filtering system, supplied by Trane Service/First, consists of two types of filters:

- A pre-filter that contains desiccant cores, to decrease the acid level of the oil and refrigerant
- Three final filters are connected in parallel, to remove particulate matter down to 3 microns.

The oil entering the lubricating system of the compressor will therefore meet the compressor design requirements.

Caution: It is necessary to monitor the pressure drop across these filters, to prevent restricted flow of oil and possible damage to the compressor/motor assembly.

The time required to complete the cleanup procedures will depend on the severity of the burn.

Procedures

Caution: Be sure to adhere to all federal, state and local codes regarding the handling of refrigerant and oil.

Caution: Acid burns can result from touching the sludge found in the compressor and piping. Protective clothing and eye protection should be worn when handling contaminated parts.

Make certain that a compressor motor burn has actually occurred by performing the following tasks:

Caution: Be sure to lock "open" all electrical disconnects prior to performing any electrical tests. Failure to do so may result in electrocution.

1. Perform the proper electrical tests on the compressor to make an initial determination that a compressor motor burn has actually occurred. Be sure that all wiring to the compressor has been disconnected. MEG test procedures are outlined in HCOM-SB-68.

2. Draw a sample of oil from the system and analyze it for acid content.

Note: Recycle all refrigerant and dispose of all remaining oil according to EPA hazardous waste standards. Be sure to comply with all federal, state and local disposal regulations.

Note: If recycling cannot be accomplished, a new refrigerant charge will be required. Do not circulate contaminated refrigerant through the replacement compressor.

3. Remove the economizer cover and visually inspect the motor and the motor housing for any evidence of carbon residue.

Caution: If it is determined that motor burn has occurred, complete the following procedures as soon as possible. Rapid corrosion can occur if the contaminated refrigerant and oil is allowed to remain in the unit.

1. Remove the compressor, using the procedures outlined in RTHA- SB-14.

2. Remove the following interconnecting piping and clean thoroughly with a suitable cleaning agent:

a. Discharge line

b. Entire economizer line from the condenser orifice to the motor housing inlet, including the orifice.

c. Liquid line from the motor housing outlet to the evaporator orifice. Also clean the orifice.

d. Inlet to the evaporator connection

Note: All orifices must be replaced in the same direction that they were installed before cleaning. Be sure that the evaporator and condenser orifices are not interchanged when they are reinstalled.

3. If the compressor reinstallation is not immediate, make suitable flange covers, to close the refrigerant connection openings. Evacuate the system to 400 microns and place a nitrogen holding charge of 5 psig on the system.

Filter System

Compressor and Filter System Installation

1. Install the new compressor, using the procedures outlined in RTHA-SB-14.

2. Figure 1 illustrates the unit with the oil filter system installed. Remove the oil filter element and bowl. Install the insert for the oil filter system. The inlet and outlet are marked on the insert. See Figure 2.

3. Figure 2 shows the piping configuration from the filter insert to the filter system.

4. Install a new refrigerant filter element

5. Leak check the system. Be sure the load, unload and master solenoids are energized while leak checks are made.

6. Charge the RTHA unit with new oil via the oil sump angle valve on the oil tank. Follow the procedures outlined in the RTHA IOM for proper oil charges.

7. Charge the filter system with new oil via the inlet or outlet angle valves located on the filter system. This system will hold approximately 5 gallons when all four filters are installed.

Note: Remove all power from the load, unload and master solenoid valves while charging.

8. Pull the entire RTHA and filter system down to a vacuum of 400 microns. Be sure the load, unload and master solenoids are energized while pulling down the system.

9. Charge refrigerant "gas" via the economizer cover angle valve until the pressure/temperature relationship is above 65 psig.

Caution: Water must be flowing through the tube bundles during this entire process. Do not charge refrigerant into the unit unless there is water flow. Do not charge liquid refrigerant into the unit unless the pressure/temperature relationship is above 65 psig.

10. Weigh the remaining charge into the system via the ½ inch angle valve at the inlet to the evaporator. This can be liquid refrigerant if the pressure/temperature relationship is above 65 psig.

Note: The oil tank heaters must be energized and water flow must be established.

11. Install temperature sensors at the refrigerant filter inlet and outlet. A differential temperature must be monitored during the cleanup procedure. Make sure these strap-on sensors are insulated from ambient temperature. See Figure 3. With a clean element, the differential temperature across the refrigerant filter will be approximately 3.6 F. A differential temperature of 13 F indicates that the refrigerant line filter must be changed.

12. Prior to starting the unit, prepare a log to record the differential pressure across the filter system and the differential temperature across the refrigerant filter.

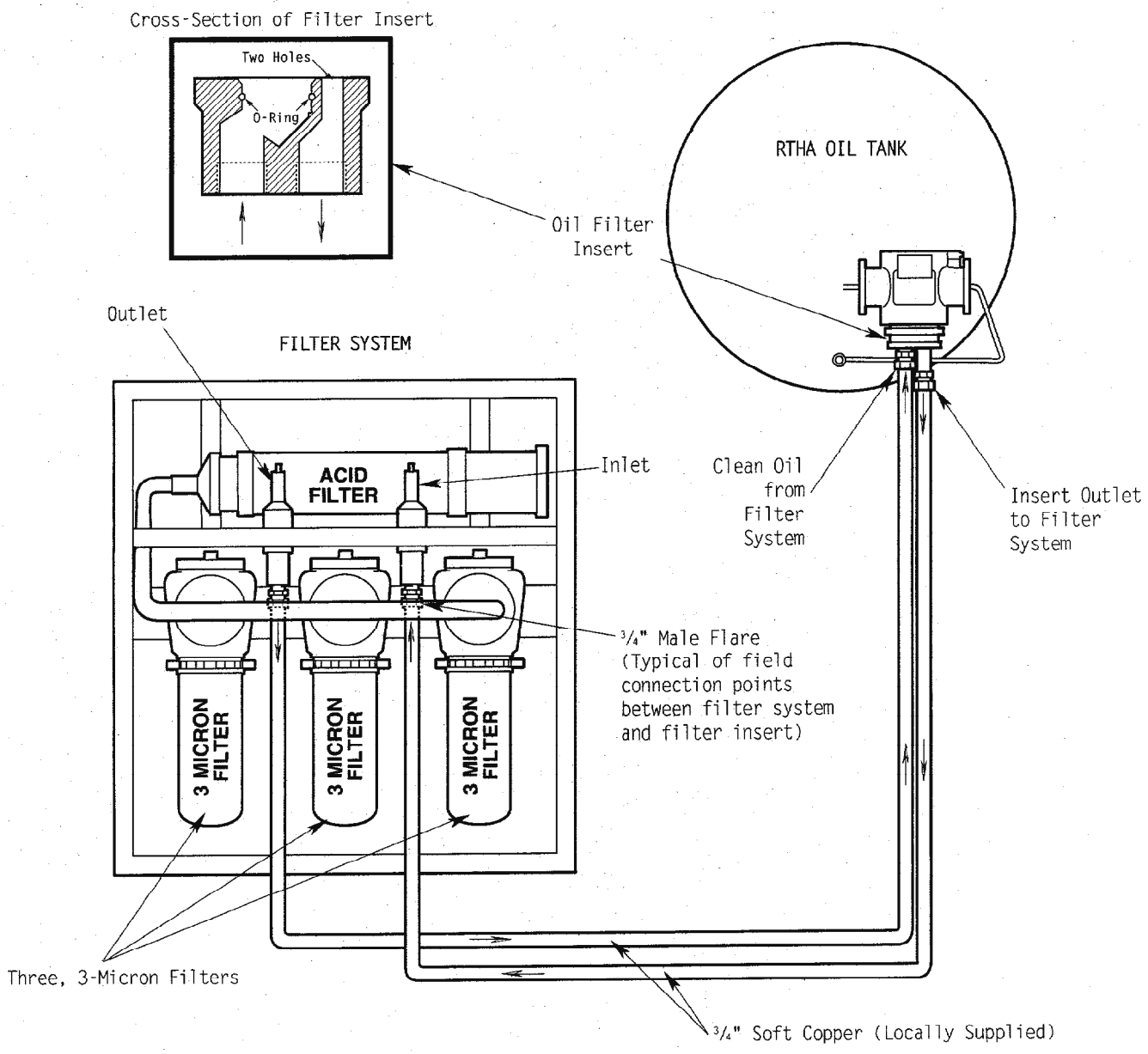
13. Closely monitor the differential pressure across the filter system during the first 8 hours, because frequent filter changes will be required each time the differential pressure becomes 25 psid or the acid number is greater than 0.05.

Note: When a filter change is required, shut down the unit and valve off the filter system. be sure to draw an oil sample and check the acid number. If the oil is acidic, change out the oil charge. A "reclamation" of the filter system will be required. The system will have a little oil and the remainder will be gas. The oil that was put into the filter system will now be in the oil tank. After changing filters, transfer approximately 5 gallons of oil from the oil tank to the filter system, using an oil pump. The level of oil left in the oil tank needs to be the amount specified in the RTHA IOM.

14. With clean filter elements, the differential pressure in the filter system will be 4 psid ±1.5 psi. A differential pressure of 25 psid indicates that all filters in the filter system need to be changed.

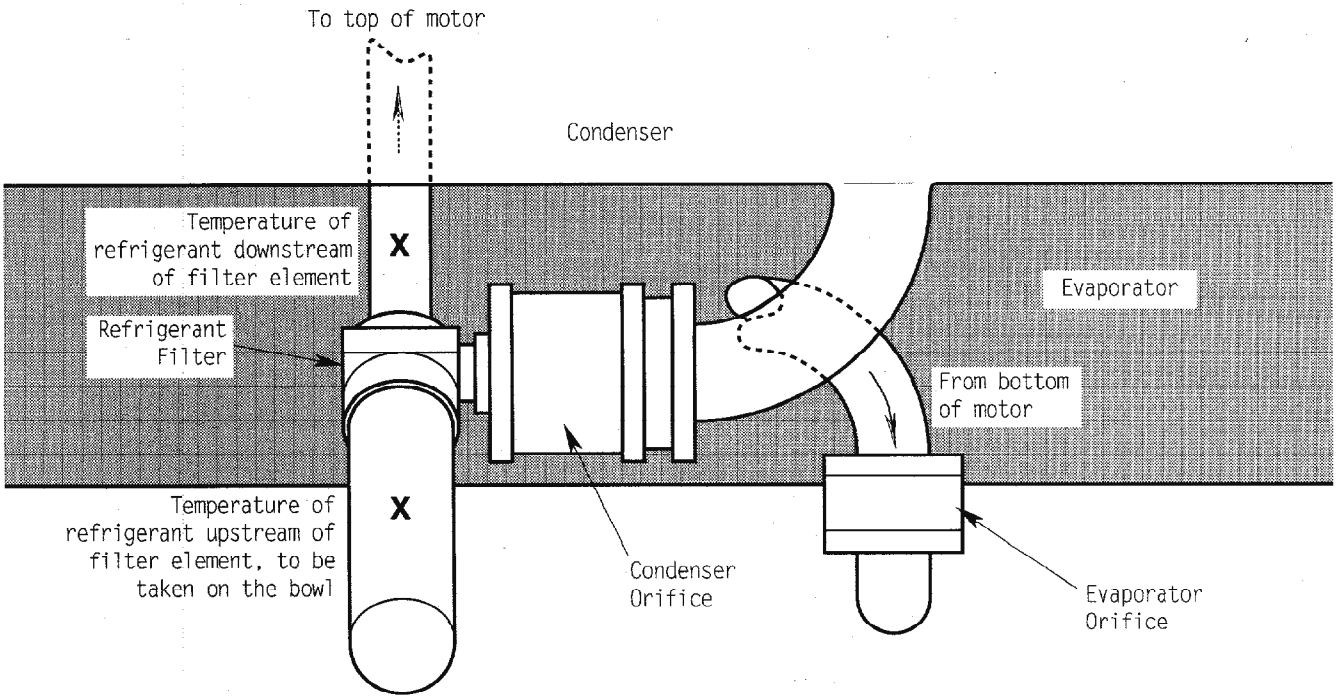
15. Use the field acid test kit to check for acid in the system. An acid number greater than 0.05 is an indication that the oil charge in the RTHA and filter system must be changed.

Figure 2
Filter System and Filter Insert
Piping Installation Diagram



Not To Scale

Figure 3
Refrigerant Filter



Caution: Do not restart the unit with the oil level greater than the amount specified in the RTHA IOM. Catastrophic damage to the compressor will occur if the additional oil from the filter system is not transferred (via an oil pump) from the oil tank back to the filter system, prior to restart.

16. Change the filter elements, as required, until the differential pressure across the oil filter system remains constant for an 8-hour period. At this time the unit is clean and the filter system can be removed.

17. After removal of the filter system, re-adjust the oil and refrigerant charges, as required, per the RTHA IOM specifications.

18. Remove all used oil filter elements and remaining oil from the filter system. Clean thoroughly prior to returning the filter to Trane Service/First. If the oil filter system is to be stored, it must be thoroughly cleaned prior to storage.

Parts Ordering Information

This service bulletin is informational only and does not authorize parts or labor.

For ordering information on the rental of the oil filter system and replacement cores, contact:

Trane Service/First
Tube Analysis Department
4500 Morris Field Drive
Charlotte, NC 28208
(704) 392-4600