TRANE™

General Service Bulletin

HCOM-SB-77

Library	**Service Literature**
Product Section	**Refrigeration**
Product	**Scroll Compressor**
Model	**RA, CG, SW, CU, RW**
Literature Type	**General Service Bulletin**
Sequence	**77**
Date	**February 1, 1991**
File No.	**SV-RF-HCOM-SB-77-291**
Supersedes	**New**

Subject: Scroll Crankcase Heater Removal

Introduction:

The purpose of this service bulletin is to announce the removal of the crankcase heater from the scroll compressor. It will discuss the design features of the scroll which make a crankcase heater unnecessary and the testing that was done to verify the acceptability of the removal of the crankcase heater.

Background:

Traditionally the crankcase heater has been used to keep liquid refrigerant from migrating to the compressor during the off cycle. The crankcase heater warms the oil and the crankcase, which raises the pressure in the compressor and limits the amount of refrigerant migrating to the compressor. The reasons why it is desirable to keep the refrigerant from migrating to the compressors are:

1) To prevent the refrigerant from diluting the oil and causing lubrication problems.

2) To prevent the oil from leaving the crankcase at startup, which causes lubrication problems and can cause oil and liquid refrigerant slugging of the compressor due to the violent foaming that occurs during startup.

There are two cases where the crankcase heater is ineffective in preventing oil dilution and oil foaming:

1) Refrigerant floodback to the compressor during operation.

2) Piping practices which allow liquid refrigerant to free drain into the compressor's high side or low side during the off cycle.

Design Features:

The scroll compressor incorporates many design features which make it superior in its ability to manage the problems of oil dilution and oil and refrigerant slugging compared to the typical reciprocating compressor.

The scroll compressor does not employ suction or discharge valves which can break due to oil and refrigerant slugging caused by the severe foaming that can occur during startup. The compression occurs due to the gas being trapped in pockets formed by the fixed and orbiting scroll and the volume being continually reduced until the gas exits through the discharge port. This important design feature of the scroll compressor allows the compressor to ingest either liquid refrigerant or oil without doing any damage.

When the scrolls separate, to pass liquid, the load on the bearings is reduced, allowing a thinner oil film to be suitable for lubricating the bearings. In a reciprocating compressor, the load on the bearings increases when it is pumping liquid. The results of liquid refrigerant or oil slugging in a reciprocating compressor are poorly lubricated bearings, accelerated bearing wear and potential failure.

The scroll uses rolling element bearings which require a thinner oil film than journal bearings, so proper lubrication is easier to maintain under oil dilution conditions.

The inlet for the scrolls is high in the shell of the compressor. This allows for more room in the shell for liquid refrigerant and also provides a better opportunity for oil separation to occur before the refrigerant is pumped out of the compressor. This minimizes oil loss.

Tests:

Two tests were run to evaluate the crankcase heater removal. The first was an endurance test and the second was a migration test using a typical split system.

Endurance Test.
The endurance test was a test in which the compressor was started up 1000 times with the compressor crankcase full of liquid refrigerant, 32 pounds, and run until the crankcase was cleared of the refrigerant. The compressor also was run with very low superheats to keep the crankcase cold. The compressor was cycled 6 minutes on and 6 minutes off.

This test simulates a condition in which the compressor starts with a refrigerant rich oil mixture. The 1000 starts under these conditions are much more severe than 1000 normal starts. The reason for this is that for the compressor to fill full of refrigerant, as simulated in the test, the compressor would have to be off for at least 72 hours and be the coldest spot in the system. In most instances, as proved by the migration tests, it is not possible to migrate the same amount of refrigerant as used in the endurance test to the compressor.

Migration Test
The second test was a migration test involving a typical field built-up system using a split system condensing unit with the air handling unit above the condensing unit and 140 feet of refrigerant lines. This is a worst case situation because 1) the evaporator is above the condensing unit, 2) split systems normally have more refrigerant charge per nominal ton than packaged equipment and 3) the compressor during low ambients is in a colder location than the evaporator coil which promotes migration.

Tests were run with and without the crankcase heater from a low ambient of -5 F to a high ambient of 115 F. Without the crankcase heater, the maximum height of liquid refrigerant obtained in the compressor was less than the maximum allowable liquid refrigerant height for the compressor.

Compressor Changes:

As of December 1, 1990, the compressor will be built without the crankcase heater well.

The compressor model number design sequence will change from D to E.
EXAMPLE: CSHS100K0E00
——— DESIGN SEQUENCE

Parts Availability:

Compressors without the crankcase heater well will be direct replacements for compressors with the crankcase heater well but will require that the crankcase heater be removed both physically and electrically from the unit.

There are no internal compressor changes associated with the crankcase heater removal. If a crankcase heater fails, it need not be replaced. It is suggested that the wiring be removed or properly capped to prevent accidental shorting out of the crankcase heater wires.

Crankcase heaters will continue to be available until current inventory has been depleted. Refer to the unit parts list for the proper part number of the crankcase heater.

Unit Production Changes:

COMMERCIAL SYSTEMS GROUP —

MACON — Self Contained Systems Business Unit

Self Contained Units effective July 27,1990.

PUEBLO — Water Chiller Systems Business Unit
Water Cooled Cold Generator®
Compressor — Chiller
Water Cooled Condensing Unit
Compressor Unit

All Effective October 1, 1990.

UNITARY PRODUCTS GROUP —

CLARKSVILLE
Split systems 20-60 tons, effective December 8, 1990.

Air Cooled Cold Generators, effective December 8, 1990.

Large Unitary Rooftop, effective with scroll implementation.

Unitary Rooftop, effective December 8, 1990.

FT. SMITH
Split System Condensing Units, effective October 1990.