TRANE AIR CONDITIONING

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# GENERAL SERVICE BULLETIN

ORDERING NUMBER **HCOM-SB-68**



SUBJECT: HERMETIC RECIPROCATING COMPRESSORS - MOTOR INSULATION RESISTANCE TESTING

## INTRODUCTION:

The purpose of this Service Bulletin is to discuss the use and interpretation of motor insulation resistance testing (megging) of hermetic reciprocating compressors.

## DISCUSSION:

Megger testing of hermetic reciprocating compressor motors can provide results which are subjective and may be misleading. The following information is intended to assist the field service technician in determining if a motor is suitable for operation.

There are many factors that contribute to low megger readings which include:

1. Type and amount of system contaminates (moisture, acid, dirt, etc.)
2. Condition of oil in the system.
3. Cleanliness of the compressor terminal board; both inside and out.
4. Oil level in the compressor. (High levels may cause the leads to be saturated and lower the reading. This basically becomes a dielectric strength test of the oil).
5. Type of insulation and terminal board material used.
6. Integrity of both motor lead and winding insulation.

Any one of the first five listed above can make a perfectly good compressor motor appear to have marginal insulation. With that in mind, the following recommendations are made concerning megging reciprocating compressor motors.

1. Any reading above 1 megohm is considered safe.

If a reading below 1 megohm is measured, an oil sample should be taken to determine the moisture and acid content of the system to determine if moisture is the cause of the low reading. Filter dryers should be installed and the oil should be changed. The compressor should then be remegged after the unit has been run for 24 hours (actual running time) to see if the megohm reading has risen. This may have to be done several times to clean up the system and bring the megohm reading up to an acceptable value.

3. Minimum meg readings considered safe to start a compressor should not be less than 1,000 ohms per volt of the nominal motor voltage.

Example: 230 volt compressor - 230,000 ohms
460 volt compressor - 460,000 ohms

If readings below these values are measured, the compressor should be isolated and evacuated down to 0.5 mm to insure complete dehydration, brought back to atmospheric pressure with refrigerant and remegged. If the meg reading does not improve to the point of being acceptable, the terminal board will have to be removed and cleaned. If the meg reading is still not acceptable, the motor will have to be removed and cleaned, dipped and baked by a reputable motor repair shop or replaced.

*CAUTION: DO NOT ATTEMPT TO MEASURE MOTOR INSULATION RESISTANCE ON A UNIT UNDER A VACUUM. THE UNIT MUST BE CHARGED WITH REFRIGERANT OR A NITROGEN HOLDING CHARGE, OR BE OPEN TO THE ATMOSPHERE BEFORE A MEGOHM INSULATION TEST CAN BE PERFORMED. MEGGING A MOTOR UNDER A DEEP VACUUM COULD RESULT IN A SPARK-OVER TO GROUND, EVEN WITH EXTREMELY LOW APPLIED VOLTAGE, WHICH CAN CAUSE CARBON TRACKING AND DAMAGE TO THE MOTOR WINDINGS. WHEN THIS OCCURS, REAPPLICATION OF NORMAL MOTOR VOLTAGES COULD CAUSE A LEAKAGE PATH TO GROUND WHICH COULD RESULT IN SEVERE MOTOR DAMAGE.*

MEGGING PROCEDURE:

Generally, a 500 volt DC megohm insulation tester is recommended for all resistance testing of reciprocating compressor motor windings. The use of a megger with a voltage output of more than 500 volts is not recommended for insulation systems of 600 volts or less because of the potential for insulation damage due to the higher than normal operating voltage.

*WARNING: SINCE THE MOTOR ACTS LIKE A CAPACITOR WHEN VOLTAGE IS APPLIED, THE MOTOR WINDING TERMINAL STUDS SHOULD BE GROUNDED TO THE MOTOR FRAME AFTER TESTING HAS BEEN COMPLETED. THIS WILL DECREASE ANY RESIDUAL VOLTAGE IN THE MOTOR THAT COULD RESULT IN SEVERE ELECTRICAL SHOCK.*

High potential (Hi-Pot) testing should not be conducted on motors in the field. High potential testing involves applying twice the motor rated voltage plus 1000 volts and then measuring the leakage to ground. This check is intended to verify integrity of windings during the assembly process. This test is not intended for field use and can be destructive to the motor.

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