PRODUCTION PROCESSING AND TEST PROCEDURE
R410A COOLING ONLY PACKAGE UNITS 6 TON AND ABOVE

OBJECTIVE:

THIS PROCEDURE IS INTENDED TO ASSURE THAT:
1. UNIT CONFORMS TO U.L. REQUIREMENTS
2. THE UNIT HAS NO REFRIGERANT LEAKS.
3. WIRING IS CORRECT.
4. MAJOR ELECTRICAL COMPONENTS OPERATE AND FUNCTION CORRECTLY

THIS PROCEDURE MAY NOT PROVE OR DISPROVE THAT:
1. DISTRIBUTOR TUBES, CHECK VALVES, PRESSURE CONTROLS, COILS AND COIL CIRCUITING ARE CORRECTLY INSTALLED AND ARE FUNCTIONAL.
2. THESE ITEMS SHOULD BE CHECKED USING STANDARD INSPECTION & SAMPLING TECHNIQUES.

REQUIREMENTS PRIOR TO OPERATIONAL TESTS

1.0 REFRIGERATION SYSTEM (REFER TO ADS-5241-01 FOR COMPONENT HANDLING AND CLEANLINESS SPECIFICATIONS)

TO MEET U.L. 1995 SECTION 73, COILS MUST BE PRESSURE TESTED AND LEAK TESTED TO THE HIGH SIDE DESIGN PRESSURE OF 550 PSIG. THE ASSEMBLED UNIT MUST BE PRESSURE TESTED AND LEAK TESTED TO THE LOW SIDE DESIGN PRESSURE OF 250 PSIG.

PRESSURE TEST WARNING: DO NOT EXPOSE THE LOW SIDE OF THE COMPRESSOR TO PRESSURES ABOVE 250 PSIG (R-410A) IF THE COMPRESSOR IS RUNNING OR 450 PSIG IF THE COMPRESSOR IS NOT RUNNING AS PERSONAL INJURY MAY RESULT.

1.1 PRESSURIZE ALL COILS, EXCEPT ALUMINUM MICRO CHANNEL COILS, TO 350 PSIG WITH DRY NITROGEN & CHECK FOR LEAKS. RELEASE PRESSURE. NOTE: MICRO CHANNEL COILS ARE PRESSURE TESTED BY THE VENDOR AND DO NOT REQUIRE 350 PSIG TEST.

1.2 SHIELD PERSONNEL AND PRESSURIZE ALL COILS, EXCEPT ALUMINUM MICRO CHANNEL COILS, TO 550 PSIG WITH DRY NITROGEN AND VISUALLY CHECK FOR GROSS LEAKS. RELEASE PRESSURE AND REMOVE SHIELD. NOTE: MICRO CHANNEL COILS ARE PRESSURE TESTED BY THE VENDOR AND DO NOT REQUIRE 550 PSIG TEST.

1.3 A SEPARATE REFRIGERANT HIGH PRESSURE SWITCH TEST SHALL BE PERFORMED FOR MODELS THAT HAVE COMPRESSORS WITHOUT AN INTERNAL PRESSURE RELIEF VALVE SUCH AS THE RKNL/RNL-B210/240/300. THE REFRIGERANT HIGH PRESSURE SWITCH SHALL BE BRAZED INTO A SHORT PIECE OF THE REFRIGERANT LINE FROM THE UNIT. A PLUG SHALL BE CONNECTED ON ONE END OF THE TUBE AND THE OTHER END CONNECTED TO A REGULATED PRESSURE SUPPLY CAPABLE OF DELIVERING 650 PSIG DRY AIR OR NITROGEN. EITHER A CALIBRATED PRESSURE GAUGE, OR AN ELECTRONIC "GO, NO-GO" GAUGE SHALL BE USED TO VERIFY THAT THE HIGH PRESSURE SWITCH IS "CLOSED" WITH NO PRESSURE APPLIED, AND "OPENS" WHEN A PRESSURE OF 610 PSIG WITH A TOLERANCE OF ±15 PSIG IS APPLIED. THE TEST APPARATUS SHALL BE SHIELDED FROM PERSONNEL BY A PROTECTIVE COVER WHEN IN USE.

1.4 PERFORM A 250-300-PSIG NITROGEN DEGRADATION TEST (OR EQUIVALENT) ON COMPLETE UNIT PRIOR TO HELIUM TEST TO MINIMIZE POTENTIAL HELIUM BOOTH SATURATION. RELEASE PRESSURE.
1.5 EVACUATE SYSTEM TO 25 INCHES OF MERCURY.

1.6 PRESSURIZE COMPLETE UNIT TO 150-300 PSIG USING HELIUM; CHECK FOR LEAKS USING LEAK DETECTOR CAPABLE OF SENSING A LEAK OF .000018 ATM-CC/SEC. OF HELIUM.

1.6.1 UNIT MUST BE IN AN AREA FREE OF CONTAMINANTS THAT ARE DETECTABLE BY THE LEAK TEST EQUIPMENT.

1.6.2 LEAK CHECK COMPRESSOR, ALL BRAZED CONNECTIONS, COILS AND COIL END PLATES WITH THE HELIUM LEAK DETECTOR PROBE POSITIONED 0.25" FROM THE SURFACE BEING CHECKED AND MOVING AT A RATE NOT TO EXCEED 1 INCH PER SECOND. THE FINNED AREAS OF THE COILS CAN BE CHECKED AT A FASTER RATE NOT TO EXCEED 10 INCHES PER SECOND. TRACE ALONG THE LENGTH OF THE COIL WITH AN APPROXIMATE TYPICAL SPACING OF 4" BETWEEN PASSES. EACH FACE OF THE COIL ASSEMBLY SHOULD BE CHECKED AS SPACE ALLOWS.

1.7 RELEASE THE HELIUM GAS FROM THE UNIT.

1.8 EVACUATE THE SYSTEM UNTIL THE SYSTEM PRESSURE STAYS UNDER 1,000 MICRONS 30 SECONDS WITH THE VACUUM PUMP ISOLATED FROM THE SYSTEM.

1.9 CHARGE UNIT WITH R-410A CHARGE AS SPECIFIED IN APPLICABLE BILL OF MATERIALS. LOW SIDE VAPOR CHARGING IS ALLOWED WHILE SIMULTANEOUSLY CHARGING THE HIGH SIDE. THE LOW SIDE CHARGE RATE SHOULD NEVER EXCEED THE HIGH SIDE RATE.

1.10 PERFORM LEAK CHECK ON CONNECTION (PROCESS TUBE OR SERVICE VALVE) NOT PREVIOUSLY CHECKED WITH HELIUM.

1.11 IF A LEAK IS DISCOVERED, RECOVER REFRIGERANT AND REPEAT STEPS 1.4 THRU 1.10. ANY NEW COILS ADDED AS REPLACEMENTS MUST BE TESTED USING STEPS 1.1 AND 1.2.

2.0 DIELECTRIC STRENGTH TEST

2.1 NOTE: IT IS NOT NECESSARY TO GROUND LOW VOLTAGE TERMINALS. CONNECT PIGTAILS TO LOW VOLTAGE TERMINAL BLOCK AND GROUND TO UNIT CHASSIS. APPLY THE SPECIFIED VOLTAGE (SHOWN BELOW) FOR THE INDICATED TIME BETWEEN CHASSIS GROUND AND CONTACTOR TERMINALS L1, L2 & L3 AND T1, T2 & T3. UNIT MUST WITHSTAND THE VOLTAGE FOR THE SPECIFIED TIME.

<table>
<thead>
<tr>
<th>HIPOT TESTER</th>
<th>TRIP POINT SETTING</th>
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<tbody>
<tr>
<td>ALL D.C. HIPOT TESTERS</td>
<td>1 MILLIAMPS, 1000 VSEC. RAMP</td>
</tr>
<tr>
<td>MANUAL A.C. HIPOT TESTER</td>
<td>7 MILLIAMPS</td>
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<tr>
<td>MANUAL A.C. HIPOT TESTER USED ON MULT-COMPRESSOR UNITS</td>
<td>25 MILLIAMPS</td>
</tr>
<tr>
<td>A.C. HIPOT TESTERS USED IN AUTOMATED RUN TEST STATIONS</td>
<td>25 MILLIAMPS</td>
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<tr>
<th>UNIT NAMEPLATE</th>
<th>A.C. HIPOT MINIMUM TEST VOLTAGE</th>
<th>D.C. HIPOT MINIMUM TEST VOLTAGE</th>
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</thead>
<tbody>
<tr>
<td>VOLTAGE</td>
<td>1 SECOND</td>
<td>1 MINUTE</td>
</tr>
<tr>
<td>200 TO 340</td>
<td>1775</td>
<td>1480</td>
</tr>
<tr>
<td>350 TO 480</td>
<td>2352</td>
<td>1960</td>
</tr>
<tr>
<td>575 TO 600</td>
<td>2640</td>
<td>2200</td>
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NOTE:

2.2 IF UNIT FAILS INITIAL DIELECTRIC TEST, DISCONNECT UNIT TRANSFORMER LOW VOLTAGE LEADS AND RETEST. IT IS POSSIBLE FOR 24V COMMON TO LEAD TO GROUND CAUSING A FALSE FAILURE.

2.3 IF UNIT IS EQUIPPED WITH A COPLAND SCROLL COMPRESSOR AND FAILS THE DIELECTRIC STRENGTH TEST, REPEAT THE TEST AFTER COOLING OPERATION TEST BEFORE REJECTING THE UNIT. CAUTION: DETERMINE THAT THE COMPRESSOR IS THE CAUSE FOR TEST FAILURE BEFORE ATTEMPTING FURTHER OPERATION OF THE UNIT.
3.0 MANUAL OPERATIONAL TEST CONNECTIONS & SWITCH BOX SETTINGS

(SEE SECTION 9.0 FOR AUTOMATIC TESTING)

EACH UNIT MUST BE TEST RUN TO ASSURE THAT IT PERFORMS SATISFACTORY AND HAS BEEN ASSEMBLED WITH GOOD WORKMANSHIP.

NOTE: MODELS EMPLOYING ICM, MODEL AY1700, PCB (PRESSURE CONTROL BOARD), A JUMPER MUST BE PLACED ACROSS TEST PINS ON BOARD PRIOR TO PERFORMING RUN TESTS. FIND THREE PINS THAT ARE TOGETHER ON THE BOARD AND JUMPER THE TWO MARKED “TEST”.

3.1 SET THE SWITCHES ON THE TEST BOX (ES) TO THE FOLLOWING POSITIONS.
REFER TO FIGURE 1 ON SHEET 4

COOL / HEAT: COOL
BLOWER: OFF
HEAT STAGE 1 (W1): OFF

COMP. 1 (Y1): OFF
HEAT STAGE 2 (W2): OFF

COMP. 2 (Y2): OFF

3.2 (A) CONNECT POWER SUPPLY TO UNIT.

(B) CONNECT LOW VOLTAGE TEST LEADS TO APPROPRIATE THERMOSTAT CONNECTIONS.

(C) CONNECT ELECTRIC HEAT TEST PLUG.

3.3 CONNECT HIGH AND LOW PRESSURE GUAGES TO THE APPROPRIATE SERVICE PORTS FOR EACH SYSTEM.

3.4 VERIFY THAT THE INDOOR BLOWER MOTOR HAS BEEN WIRED FOR THE CORRECT UNIT VOLTAGE.
THIS MAY BE DONE DURING BLOWER SUB-ASSEMBLY.

3.5 ENSURE THAT UNIT SUPPLY AND RETURN OPENINGS ARE CONFIGURED TO PREVENT AIR RECIRCULATION.

4.0 UNDER VOLTAGE START TEST

4.1 SET APPROPRIATE START VOLTAGE AS SHOWN BELOW. VOLTAGE SHOULD BE MEASURED AT THE EQUIPMENT FIELD WIRING CONNECTION POINT AT THE MOMENT THE COMPRESSOR STARTS. (LOCKED-ROTOR VOLTAGE)

UNIT RATING PLATE VOLTAGE / HERTZ
200-220 / 50
208-230 / 60
380 / 60
380-415 / 50
460 / 60
575 / 60

TEST VOLTAGE (* 3 VOLTS)
180 (50 Hz) OR 197 (60 Hz)
207
342
342 (50 Hz) OR 375 (60 Hz)
414
518

4.2 TURN ON UNIT POWER SUPPLY SWITCH AT THE TEST CONSOLE.

4.3 THE INDOOR BLOWER MUST START WHEN THE “BLOWER” SWITCH IS MOVED TO THE “ON” POSITION.

4.4 USING THE “Y1” & “Y2” SWITCHES, EACH COMPRESSOR MUST OPERATE SEPARATELY. OBSERVE THE PRESSURES ON THE NON-OPERATING SYSTEM TO VERIFY THAT THERE IS NO CROSS-CIRCUITING OF REFRIGERANT TUBING.
CIRCUITING FOR MANUAL TEST BOX
5.0 COOLING OPERATION TEST

5.1 INCREASE UNIT POWER SUPPLY VOLTAGE TO THE VALUE SHOWN ON THE UNIT RATING PLATE.

5.2 OPERATE ALL COMPRESSORS SIMULTANEOUSLY UNTIL PRESSURES STABILIZE. RECORD PRESSURES AND AMPERES.

5.3 IF UNIT IS EQUIPPED WITH LOW-AMBIENT CONTROLS, THE OUTDOOR FANS WILL CYCLE ON WHEN DISCHARGE PRESSURE RISES ABOVE 450 PSIG AND "OFF" WHEN PRESSURE FALLS BELOW 250 PSIG.

5.4 MOVE THE BLOWER SWITCH TO THE "OFF" POSITION. THE INDOOR BLOWER MUST STOP AFTER APPROXIMATELY 0 TO 53 SECOND DELAY.

6.0 EMERGENCY ELECTRIC HEAT AND BLOWER INTERLOCK TEST

6.1 MOVE THE ‘COMPRESSOR 1’ & "COMPRESSOR 2" AND "BLOWER" SWITCHES TO "OFF" POSITION. THE COMPRESSORS, OUTDOOR FANS AND INDOOR BLOWER MUST STOP.

6.2 MOVE THE "WI" & "W2" SWITCHES TO THE "ON" POSITION. THE INDOOR BLOWER MUST RUN. BOTH LAMPS ON THE "ELECTRIC HEAT SIMULATOR" MUST BE ILLUMINATED.

AFTER COMPLETION OF THE ABOVE TEST, RESTORE THE ECONOMIZER AND ELECTRIC HEAT CONNECTIONS OR JUMPERS AS SPECIFIED IN THE BILL OF MATERIALS.

7.0 CAUSE FOR REJECTION

7.1 FAILURE TO COMPLY WITH ANY "MUST" OR "MUST NOT" STATEMENTS.

7.2 UNIT AMPERES MORE THAN 10% UNDER OR OVER THOSE OF THE SAME MODEL. QUALITY ASSURANCE MAY SET ABSOLUTE VALUES, IF DESIRED.

7.3 OUT-OF-BALANCE FAN BLADE(S) OR BLOWER WHEEL.

7.4 FAILURE OF BLOWER OR FAN MOTOR(S) TO RUN AT NORMAL SPEED AND/OR DIRECTION.

7.5 NOISY COMPRESSORS, FAN OR BLOWER MOTORS.

7.6 FAILURE OF COMPRESSORS TO START AND RUN AT SPECIFIED TEST CONDITIONS.

7.7 DISCHARGE AND SUCTION PRESSURES NOT WITHIN RANGE SHOWN ON CHARGE CHART.
8.0 ADDITIONAL REFRIGERANT LEAK TEST:

8.1 THE UNIT IS TO BE LEAK TESTED AFTER EVACUATION/CHARGING AND SUBSEQUENT BOX OUT OR FINAL PACKAGING.

THE LEAK TEST TO BE PERFORMED NO SOONER THAN FOUR (4) HOURS AFTER BOX OUT OR PACKAGING WITH A LEAK DETECTOR HAVING A SENSITIVITY OF 0.25 OZ./YR. OR ONE (1) HOUR AFTER BOX OUT OR PACKAGING USING A LEAK DETECTOR WITH A SENSITIVITY OF 0.10 OZ./YR. THE LEAK DETECTOR PROBE SHOULD ENTER THROUGH THE CARTON OR PACKAGING NEAR THE BOTTOM OF THE UNIT.

THE LEAK TEST WAIT TIME BEGINS WHEN THE UNIT HAS BEEN DELIVERED TO THE DESIGNATED LEAK INSPECTION AREA. ONCE THE UNIT WAIT TIME HAS STARTED, THE UNIT SHOULD NOT BE MOVED UNTIL COMPLETION OF THE LEAK TEST.

9.0 AUTOMATIC TEST STATION CONNECTIONS

9.1 (A) ATTACH THE POWER SUPPLY/HI-POT. CONNECTIONS FROM THE TEST STATION TO THE UNIT CONTACTORS.

(B) CONNECT LOW VOLTAGE TEST LEADS TO APPROPRIATE THERMOSTAT CONNECTIONS AND TO THE TEST STATION.

(C) CONNECT ELECTRIC HEAT TEST PLUG.

(D) CONNECT HIGH AND LOW PRESSURE TRANSDUCERS TO THE SERVICE PORTS FOR EACH SYSTEM.

(E) POSITION DISCHARGE AIR DUCT OVER HORIZONTAL SUPPLY AIR OPENING. BOTTOM DUCT CONNECTION OPENING MUST BE COVERED.

9.2 VERIFY THAT THE INDOOR BLOWER MOTOR HAS BEEN WIRED FOR THE CORRECT UNIT VOLTAGE. THIS MAY BE DONE DURING BLOWER SUB-ASSEMBLY.

9.3 SCAN THE UNIT MODEL AND SERIAL NUMBER BAR CODE AND INITIATE THE AUTOMATIC TEST SEQUENCE IN ACCORDANCE WITH THE TEST STATION OPERATOR'S MANUAL PROVIDED BY THE MANUFACTURER.