



Application Engineering Bulletin

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NON-STANDARD APPLICATION OF COPELAND COMPRESSORS

Every Copeland compressor model undergoes extensive laboratory tests throughout its approved operating range with the refrigerant or refrigerants for which it was designed. At the present time, compressors are tested and released only for refrigerants R-12, R-22, R-502, R-404A/507 and R-134a.

Application of Copeland Compressors with Refrigerants Other Than Approved Refrigerants

Frequently, manufacturers wish to take advantage of available compressor models for applications with non-standard refrigerants, for example R-13 or R-503 in cascade systems. Compressors purchased for use with refrigerants other than R-12, R-22, R-502, R-404A/507 or R-134a are sold only with the understanding that the responsibility for the application lies solely with the customer. It is Copeland's intention in selling its compressors that they not be used other than in applications approved by Copeland. Any field failures of compressors utilizing non-standard refrigerants must be considered as resulting from the application, and will be handled accordingly.

*Certain refrigerants, however, due to their toxicity of flammability, are specifically **prohibited under any circumstance**, for use in Copeland compressors.*

ASHRAE Standard 15-70 defines these refrigerants as Group 2 and Group 3 refrigerants. Specifically, the refrigerants are:*

Group 2

R-40 Methyl Chloride
R-611 Methyl Formate
R-717 Ammonia
R-764 Sulphur Dioxide

Group 3

R-170 Ethane
R-290 Propane
R-600 Butane
R-601 Isobutane
R-1150 Ethylene

Should it come to the attention of Copeland that any user is applying Group 2 or Group 3 refrigerants in Copeland compressors, Copeland will immediately discontinue the sale of such compressors to the user and will insist that all pending use of such compressors with such refrigerants be immediately discontinued.

*The purpose of ASHRAE Standard 15-70 is to assure the safe design, construction, installation, operation and inspection of every refrigeration system employing a fluid which normally is vaporized and liquefied in its refrigeration cycle.

Application of Copeland Compressors with R-12, R-502, R-22, R-404A/507 and R-134a Beyond Standard Operating Ranges

The standard approved operating range for Copeland compressors is listed on the published literature for the model of interest. When an O.E.M. desires to apply a compressor outside its standard operating range because of a specific fixture design or other conditions, the following Application Test requirements must be met to obtain Copeland approval for application. It is the responsibility of the O.E.M. to prove that the compressor will not be overloaded, overheated, or otherwise damaged by the application, with pressure limiting valves or other controls applied if necessary to limit the load or damage inducing condition.

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Approval of any non-standard application must be considered tentative until proven satisfactory by field experience.

Test data must be compiled on recording charts or by continuous readings at time intervals short enough to accurately reflect the compressor performance.

Specifications for Compressor Application

1. A sample compressor with thermocouples installed in Copeland specified locations (See Table A) must be used for the test. Depending on the compressor model, other locations may be required also.
2. Tests must be run with the specific model and system design with which the compressor is to be applied. If the final production system is not identical to the prototype system tested, tests will have to be repeated on a standard production system.
3. Calibrated instrumentation must be provided to obtain an accurate record of the following:
 - a. Line voltage at compressor terminals.
 - b. Compressor motor amperage draw.
 - c. Discharge pressure.
 - d. Suction pressure.
 - e. Suction line temperature six inches upstream of the suction service valve.
 - f. Discharge line temperature six inches downstream of the discharge service valve.
 - g. Compressor motor winding temperatures.
 - h. Compressor valve plate temperature at discharge port.
 - i. Fixture return air temperature.
 - j. Elapsed time for each reading.
4. The fixture and condensing unit shall be allowed to soak in an ambient temperature of 110° F. for 24 hours prior to starting the test.
5. Unit shall be started and operated at a line voltage at the compressor terminals 10% below the compressor nameplate voltage rating (except for single phase dual voltage models, which should be 5% (10% for K-bodies-CAV) below lower nameplate voltage). No pressure or load limiting devices shall be used other than those planned for the standard production units. Ambient temperatures of 110° F. shall be maintained for the condensing unit, and operation continued until fixture temperature achieves its steady operating value. Data listed in Part 3 shall be taken during this test.
6. A light load, high voltage test shall be conducted by raising the voltage at the compressor terminals 10% above the nameplate rating and limiting the suction pressure to the minimum operating suction pressure anticipated, and continuing the test until motor temperatures stabilize. Data listed in Part 3 shall be taken during this test. Ambient temperature can be normal or lower.
7. If a run capacitor is used on a motor compressor released as an induction run motor (IAA, IAB), the voltage must be measured across the starting relay and the run capacitor under light load, high voltage conditions in Paragraph 6. Record voltage from C to S terminals and S to R terminals while operating with the run capacitor installed and voltage at the compressor terminals 10% above the nameplate rating.
8. Copies of complete test data shall be submitted to the Copeland Application Engineering Department for comments or approval. A separate test is required for each combination of fixture and compressor to be used.
9. Unless the above test data is submitted and Copeland approval obtained, application of Copeland compressors beyond the standard operating range will be considered misuse and abuse of the compressor, adversely affecting the compressor warranty.
10. Copeland reserves the right to witness any and all tests, or to request that tests be rerun if considered desirable or necessary by Copeland.

Table A

COPELAND CORPORATION

Identification of Thermocouple Leads on Laboratory Test Compressors

All thermocouples will be type T copper-constantan. The number of thermocouples and their designation will depend on the compressor model and electrical characteristics.

All Compressors

DVP	Discharge gas at discharge valve backer.
OIC	Oil temperature inside crankcase.
PET	Protector enclosure, cavity between the protector and stator.
PVA	Protector vapor ambient. measured above protector.

Single Phase Motors

MLE	Main winding. lead end of motor.
SLE	Start winding. lead end of motor.
MOL	Main winding, opposite lead end of motor
SOL	Start winding. opposite lead end of motor,

Three Phase Motors

SL	Slot Liner
ILE	Inner winding lead end
MLE	Middle winding lead end
OLE	Outer winding lead end
IOLE	Inner winding opposite lead end
MOLE	Middle winding opposite lead end
OOLE	Outer winding opposite lead end

