POLICY BULLETIN

Tecumseh Compressor Company
Compressor Group

Subject: Design Guidelines when Applying Low Temperature AE, AZ, TH, and TP Compressors - CFC, HCFC, HFC Refrigerants

PB-115
PAGE: 1 of 4
REV DATE: 1/15/2007

ISSUED: January 15, 1976

Through years of laboratory and field-testing, compressor coking (i.e., oil being carbonized at the compressor valves due to excessive temperature and prolonged run times) has been analyzed and the following determinations made:

(1) Reasons why coking occurs, (2) the probabilities of coking as a function of system design, and (3) the approximate system design limits which eliminate coking conditions.

The listed definitions are offered as an aid to understanding various standard terms and abbreviations used in the tests and chart.

Line "AEO" = AE compressor Oil Charged
Line "AEOA" = AE compressor Oil + Additive Charged
Line "AZO" = AZ compressor Oil Charged
Line "TPO" = TP compressor Oil Charged
Line "THO" = TH compressor Oil Charged

Thermal Protector "Nominal" Sample = A calibrated sample overload representing the mid point of the tolerance range.

Machine Compartment = The area containing the system high side components such as compressor, condenser and fan.

The chart on Page 4 contains system design guidelines for the prevention of coking in compressors applied to refrigerator and freezer cabinets. To use the chart, the following tests must be made.

Test Place the test cabinet in 110°F (43.3°C) ambient on continuous run at rated voltage.

Test No. 1 After stable conditions are reached, measure the discharge temperature two inches ± ½ inch (50.8 ± 12.7 mm) from the housing. For accurate readings the discharge line must be insulated with 1/2" 12.7 mm) fiberglass, or equal, a distance of 2" (50.8 mm) each side of the thermocouple.

POLICY BULLETIN

Tecumseh Compressor Company
Compressor Group

Subject: Design Guidelines when Applying Low Temperature AE, AZ, TH, and TP Compressors - CFC, HCFC, HFC Refrigerants

ISSUED: January 15, 1976

If the measured discharge temperature is		Line "TPO" 220°F 104.4°C	Line "AEO" 225°F 107.2°C	Line "THO" 240°F 115.6°C	Line "AZO" 240°F 115.6°C	Line "AEOA" 250°F 121.1°C
a)	less than ----------					
	Proceed to Test No. 3					
If the measured discharge temperature is		Line "TPO" 220°F 104.4°C	Line "AEO" 225°F 107.2°C	Line "THO" 240°F 115.6°F	Line "AZO" 240°F 115.6°C	Line "AEOA" 250°F 121.1°C
b)	greater than ----------					
	but does not exceed ----	255°F 123.9°C	260°F 126.7°C	275°F 135°C	275°F 135°C	285°F 140.6°C
	Proceed to Test #2 and then to Test #3					
c)	Exceeds ----------	255°F 123.9°C	260°F 126.7°C	275°F 135°C	275°F 135°C	285°F 140.6°C
	Redesign mandatory without further test					

Test No. 2 — Place the test cabinet in a 90°F (32.2°C) room installed in its U.L. approved position (free standing or built in) and without any load. The control(s) should be set to the coldest setting except in the case of the refrigerator control which should be set no colder than 32°F (0°C). All heater(s) [set in warmest position] and defrost control(s) shall be operative.

After the cabinet has reached a stable cyclic condition, record the maximum discharge temperature and the percent run time (including defrost). If the intersection of the percent run time and discharge temperature is to the left of the appropriate line, then coking should not be experienced. If this point is to the right of the appropriate line, then coking would be expected and a system redesign is mandatory.

EXAMPLE:

A free standing cabinet with a compressor charged with oil (Line "AEO") recorded in Test No. 1 a discharge temperature of 256°F (124.4°C). (Point 1.) This temperature, being above 225°F (107.2°C), therefore requires that Test No. 2 be run. Results of Test No. 2 are 68% run and 234°F (112.2°C) discharge (Point 2), which shows the design to be marginal but should not experience coking. Had the percent run time been 86% (Point 3) instead of 68% with the same 234°F (112.2°C) discharge, then coking would be expected and a system redesign would be required.

(Continued)

It should be noted that as the system approaches the appropriate line, the chances of coking increase and that under no conditions shall a test cabinet exceed the values outlined in the chart.

A cabinet designed to operate below the design lines could be expected to coke if the usage environment is sufficiently hostile, such as:

1. Continuous above average ambient.
2. Relatively dirty, dusty, greasy atmosphere.
3. "Closed in" installation, disallowing normal condenser air pattern.
4. Excessive usage and high turnover of contents.
5. Abnormal voltages.

Test No. 3 — This further testing, in simulated hostile environment conditions, is designed to determine whether the thermal protector will limit the insulated discharge line temperature to an acceptable value.

Place the test cabinet in 110°F (43.3°C) ambient at rated voltage The thermal protector should be a nominal sample and should be installed in its proper position with the protective cover in place.

The cabinet is started and allowed to pull down (a period of three to six hours). In the latter stages of the pull down, the condenser air is blocked to simulate a dirt- clogged condenser. On fan cooled condensers, the air entering and leaving the machine compartment can be blocked using a large cloth or other suitable material. On static condensers, draping blanket type cloths on the condenser can block the air movement. This type of operational test, to the point of ultimate trip, tends to keep the compressor motor current down while the compressor temperature rises to a higher and higher point. The test should be continued to the point of a thermal protector trip or until all temperatures have stabilized.

(Continued)

Subject: Design Guidelines when Applying Low Temperature AE, AZ, TH, and TP Compressors - CFC, HCFC, HFC Refrigerants

ISSUED: January 15, 1976

The maximum insulated discharge line temperature measured is as follows:

	Line "TPO"	Line "AEO"	Line "THO"	Line "AZO"	Line "AEOA"
Maximum Discharge Line Temperature	255°F 123.9°C	260°F 126.7°C	275°F 135°C	275°F 135°C	285°F 140.6°C

If the discharge line temperature as recorded during the above test exceeds the limits prior to the thermal overload trip, the system design should be revised and/or reviewed with Tecumseh prior to release for production.