

ENGINEERING POLICY

Tecumseh Compressor Company
Compressor Group



Tecumseh

ENGINEERING POLICY ON: Control of Return Gas

EP-2

PAGE: 1 of 2

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The design of unitary air conditioning, heat pump, or remote commercial refrigeration system must be such that there exists no possibility of operation with excessive flood back.

- 1.0 To determine whether this situation exists, the following test is recommended:
 - 1.1 Run the system at ARI 67°F (19.4°C) outdoor and 67°F (19.4°C) [DB]/57°F (13.9°C) [WB] indoor freeze test conditions, or the lowest operating voltage, fan speed or temperature that may be required for the design. Use 50% of the design air-flow over the evaporator.
 - 1.2 Measure the oil pan temperature with a thermocouple located as low as possible on the compressor shell.
 - 1.3 At these conditions the oil pan temperature must be:
 - 1.3.1 Low Side Compressor - Et +35°F (19.4°C) min.
 - 1.3.2 Hi Side Compressor - Ct + 10°F (5.6°C) min.
 - 1.4 At these conditions the discharge (D2I) temperature must be: (See Table 1 of [PB 112](#) for D2I thermocouple)
 - 1.4.1 Low Side Compressor - Ct +35°F (19.4°C) min.
- 2.0 If the oil pan or discharge temperature criteria cannot be met, it is recommended that one or a combination of the following steps be taken:
 - 2.1 The object is to design a system, which uses the lowest practical refrigerant charge. Coils should be designed to obtain highest practical velocity without abnormal pressure drop. Usually the smaller diameter tube can be used to reduce total internal system volume. Capillary tubes should be selected with a large bore, long length, which tends to assure better system balance over a wider operating range. (Following is recommended capillary tube size sheet.)

The smaller diameter liquid line should be used that will provide proper liquid flow to the refrigerant control device. Over sizing the liquid line should be avoided as it adds extra charge to the system.

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EXAMPLE					
Length of Copper Tube		O.D.		R22 @ 100°F (37.8°C)	
Ft.	m.	In.	mm.	Lbs.	Kg.
25	7.62	1/4	6.35	0.35	0.159
25	7.62	3/8	9.53	0.90	0.408
25	7.62	1/2	12.7	1.80	0.816

2.2 Use a Suction Line Accumulator

At light evaporator load, liquid refrigerant will flow to the compressor due to the inadequacy of the refrigerant control device. To prevent this liquid from entering the compressor, the proper size accumulator should be used between the evaporator outlet and the compressor. The preferable location is adjacent to the compressor.

The size of the accumulator required can be obtained by testing at ARI freeze test conditions; 50% air flow, and removing the charge from the system until the conditions outlined in 1.3 and 1.4 are met. Determine the volume of the container that will hold the charge removed at the evaporator temperature during the test. The minimum size of the accumulator to be used should be 125% of the volume determined. Other accumulator selection guidelines can be found in ER-12.

2.3 Use a Low Pressure Control: When using the low pressure control to prevent continued operation at flood back conditions, the cutout setting should be 5 psig (34.5 kPa) higher than the conditions which satisfy the oil pan and discharge temperature requirements outlined in the freeze test.

2.4 Use a Suction Line Temperature Control: Place a thermocouple on the suction line at least 9" (228.6 mm) from the compressor and positioned where the thermostat bulb would be located. During the freeze test, note the suction temperature, which will satisfy the oil pan and discharge temperature criteria and set the thermostat to open at no less than this temperature.