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## APPLICATION ENGINEERING

### SPLIT SYSTEM APPLICATION TIP # 98-01

#### LONG REFRIGERANT LINES

A frequent question is: "Can I exceed the refrigerant line length published in the Product Data manual?" or some variation of that theme. **If the equipment involved is a 38AKS013-044 or 38AH used in air conditioning duty**, the answer is YES, ... POSSIBLY, ...IF the following guidelines are followed. This information does NOT apply to heat pumps.

- 1) What size should the lines be? Use a reference manual such as the Carrier System Design Manual, Chapter 3, Piping Design, or the Carrier E20-II Refrigerant Piping Design software, or the ASHRAE Handbook to size the refrigerant lines.
- 2) Do I need a liquid line solenoid? If the lineal length of the refrigerant lines exceeds 75 feet a liquid line solenoid installed at the indoor unit is required. Liquid line solenoids are always a good idea, but mandatory in applications with line lengths in excess of 75 feet.
- 3) Do I need a suction accumulator? If the lineal length of the suction line exceeds 100 feet a suction accumulator is required. Pay particular attention the possible need for double suction risers on all applications.
- 4) Does the system have enough compressor oil? The answer may be NO! For split systems using semi-hermetic compressors, check the oil level at startup after the system has stabilized and adjust as required. See the appropriate Installation and Service Instructions for information on checking and adjusting compressor oil level.
- 5) How long can the refrigerant lines be? Unfortunately there is no easy answer for this question. The most commonly used limit is based upon the maximum allowable refrigerant charge. This limit is defined as 4 lb. of refrigerant per ton of capacity, e.g., a 25 ton system should not contain more than 100 lb. of refrigerant. The following test should be applied as a final check to all long line applications to determine if your application exceeds this limit. Once the liquid line size has been determined (see #1) calculate the weight of the refrigerant in the liquid line. (use the chart in the Carrier System Design Manual, Chapter 3 Piping Design) Find the weight of the refrigerant in the condensing unit. It is listed in the Product Data as the "typical operating charge". Add the weight of the refrigerant in the liquid line to the weight of the refrigerant in the condensing unit to determine the approximate total charge weight. If the weight of the total refrigerant charge is close to or exceeding the 4 lb. per ton limit, you must choose: reduce the size of the liquid line (per guidelines, see #1 above) and suffer some loss of capacity, reduce the line length, or back away from the application.

Please remember that all refrigerant lines should be as short as possible. When encountering a long line application be sure that all avenues which would result in a shorter line length are explored. If long lines are the only choice, follow the guidelines above when designing the system.

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