

DESIGN AND FABRICATION GUIDELINES

I-INTRODUCTION

Lennox split system condensing units and heat pumps (four tons and under) match with line sets of varying lengths of up to 50 feet (linear). These applications offer quick and simple installations that are trouble free if the line sets are properly installed. On split commercial applications and residential installations beyond 50 feet, special design considerations must be followed to assure satisfactory system performance. An improperly designed system could result in a serious loss of capacity or even compressor failure.

This manual does not include piping information for Zonemaster systems. Refer to the Zonemaster installation instructions for further information about the Zonemaster system.

The intent of this manual is to represent generally accepted safe engineering practices. Specifications and limits outlined in this manual are subject to change. System design should conform to all codes, laws and regulations applying at the site at the time of installation. In addition, the procedures and limits outlined in this manual do not supersede local, state or national codes under any circumstances. If you have questions or comments about any of this information, contact Lennox Application (Technical Support) in Dallas, Texas.

II-GENERAL INFORMATION

Four prime considerations in designing refrigeration lines are:

- 1) cost of tubing, refrigerant and installation;
- 2) pressure drop in lines;
- 3) oil return; and
- 4) amount of refrigerant in the system.

Cost is an obvious consideration which dictates that the smallest tubing possible be used that will result in a system with acceptable pressure drop.

Pressure drop is important from a performance standpoint. The following general statements point out the effects of pressure drop in the various components of the refrigeration piping system:

1) *Pressure drop in the suction line reduces capacity and increases power consumption.* For air conditioning systems, a one pound drop in the suction line reduces capacity approximately one percent. A suction line pressure drop of up to 3psi (3% capacity loss) is generally acceptable. A higher pressure drop may be necessary in some applications to achieve adequate velocity for oil return even though this will result in higher capacity loss.

2) *Pressure drop in the liquid line produces no significant capacity loss as long as 100% liquid is delivered to the expansion valve and the pressure available is adequate to produce the required flow.* Pressure drop due to lift must be added to the friction losses to determine total pressure drop. At normal liquid temperatures, R22 pressure drops 1/2 pound per foot of vertical liquid lift.

Oil return is a major consideration since some oil is continually being circulated with the liquid refrigerant and separates in the evaporator. Oil must be returned to the compressor by entrainment with the refrigerant vapor. Minimum velocity must be 800 fpm (approximately) in horizontal runs, 1500 fpm (approximately) in vertical suction risers.

Subcooling should be at least 10°F leaving the outdoor unit. All Lennox equipment is designed so that the charge may be adjusted to provide at least 10°F subcooling. This will allow a 30 to 35 pound drop in the liquid line (including pressure drop due to friction loss and vertical lift).

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Lennox Refrigerant Piping Design And Fabrication Guidelines

Camilla Rothe

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