

### **Optimum number of parallel sections in evaporators**

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When designing the evaporator of a refrigeration system there are several options available concerning the layout of the tubing. For a given tube diameter, the total tube length determines the surface area of the refrigerant side.

Once the total tube length is chosen, the evaporator can be designed with fewer or larger number of parallel circuits and this choice will influence the performance: If few, long, parallel channels are chosen, the high mass flux will result in high heat transfer coefficients which tends to increase the evaporation temperature. On the other hand, a high mass flux and large length of the individual circuit will also lead to a large pressure drop and to a corresponding large drop in the saturation temperature. If a large number of parallel channels is chosen, the pressure drop will be low, but also the heat transfer coefficient.

As the COP of the system will be determined by the saturation temperature at the compressor inlet it is a matter of technical optimization to chose the number of parallel channels which gives the highest saturation temperature at the outlet.

The problem of choosing the optimum length of parallel channels have been treated previously by Granryd (1992), who based the analysis on correlations of heat transfer and pressure drop suggested by Pierre. It is clear, however, that the choice of heat transfer and pressure drop correlations is important for the outcome of the analysis. It is the purpose of this paper to investigate if the results of the original analysis will be different if it is based on other correlations than those of Pierre.

#### References:

Granryd E., 1992, Optimum Circuit Tube Length and Pressure Drop on the Refrigerant Side of Evaporators, Proc. Int. Refrig. Conf. Purdue, USA.