



Trends in Supermarket Refrigeration

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General Market Development

There is a trend towards further globalization of retail trade and market concentration is accelerating. The top ten companies already represent 84% of the total retail food market. Hypermarkets, super-

markets and convenience stores are emerging as the three formats in retail food distribution on a global perspective. The hypermarket, a reference store format worldwide, is a flexible concept, handling large volumes with selections that vary according to local consumption requirements.

due to its stronger focus on groceries and fresh foods. Self service becomes more important inside the store and thus there is an increase in demand for remote chiller cabinets while the demand for service counters decreases. On the other hand, remote frozen food cabinets cannot participate in continuing the growth of frozen food sales because there is a preference for plug-ins.

The developing countries will experience strong growth in supermarket business in the near future.

Decision Criteria for the Choice of the Refrigeration Equipment

From the retailers' point of view there are no special requirements for the refrigeration equipment since they are selling food and not refrigeration equipment. Anyway, there are quite a few decision criteria and these are shown in Figure 1.

Costs and cost savings play a key part in this sensitive business. However, customers often accept a price premium of 5 to 10% for the No. 1 manufacture due to trust in quality, reliability and performance. Smaller operators are more short-term oriented and therefore only price focused. Efficiency, power savings, use of natural refrigerants become more

local selections

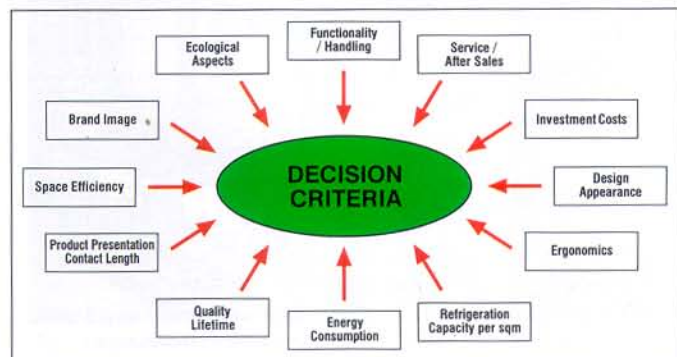


Figure 1: Decision criteria.

Capacity Range of Multicompressor Refrigeration Systems

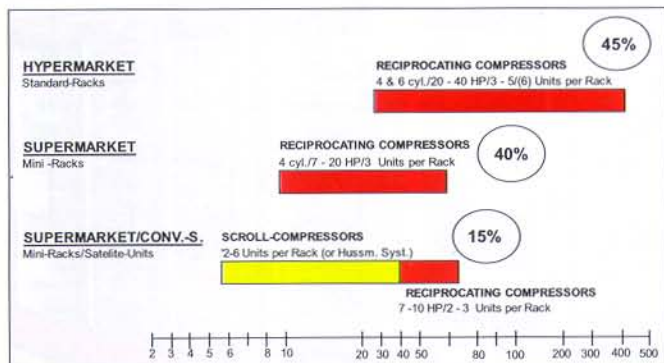


Figure 2 : Med-Temperature Range to = -10°C / tc = +45°C

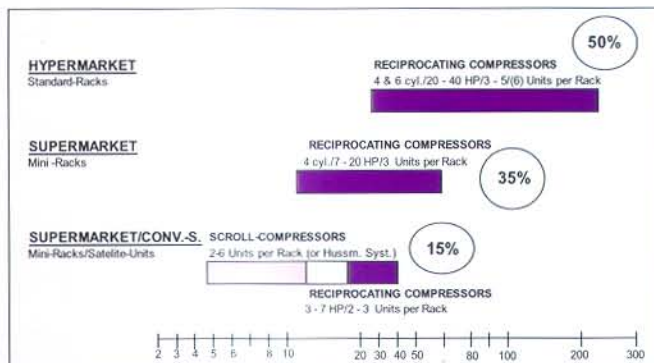


Figure 3 : Low-Temperature Range to = -35°C / tc = +40°C

and more important due to environmental and ecological aspects forced by global and local laws.

Refrigeration Equipment

Local and international manufacturers or contractors design their own equipment or ask a specialized company to supply the refrigeration equipment as per their system requirements.

In smaller supermarkets and convenience stores, condensing units are preferred while in hypermarkets and supermarkets mainly racks are used. An overview of currently used multicompressor refrigeration systems for medium and low temperature applications is illustrated in Figures 2 & 3.

Reciprocating compressors still dominate the market due to their wide application range especially in LT*. A typical LT and MT* rack with reciprocating compressors is shown in Figure 4.

Scroll compressors are mainly used in condensing units and small-size racks for medium temperature applications. In case of mini and midi racks there is a tendency to use a compressor mix. Scrolls for medium temperatures and reciprocating for low temperatures.

Figure 5 shows a rack with two scroll and one reciprocating compressor in parallel.

With the availability of small-size screw compressors, customers can design rack systems using screw compressors which will surpass all performance benchmarks of a reciprocating rack system. See Figure 6.

The refrigerants R404A and R507A are the preferred choice for both medium and low temperature applications. However, in some countries R22 is still used. HFCs will remain essential since they are highly efficient and they have very low safety requirements. Due to environmental aspects, natural refrigerants are increasingly being considered as a preferred refrigerant. CO₂ has good prospects in low temperature cascade systems and the first transcritical CO₂ systems have already been successfully tested in supermarkets in Europe.

A rack with reciprocating compressors for transcritical CO₂ application is shown in Figure 7.

Summary

Rack systems will remain the standard concept. Screw

* LT = low temperature & MT = medium temperature



Figure 4: A low temperature rack with reciprocating compressors.



Figure 5: Two scrolls and one reciprocating compressor in parallel.



Figure 6: A rack with screw compressors

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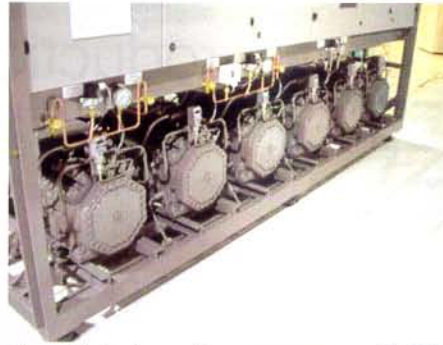


Figure 7: Reciprocating compressors with CO₂ in a rack.

racks will probably gain market share in the medium and larger capacity range in future by replacing larger reciprocating compressors. Scroll racks will gain some market share in medium

temperature applications but still remain of minor importance in low temperature applications.

With respect to refrigerants, it is more difficult to predict which direction the market will take. Global aspects have to be considered. None of the currently available refrigerants can meet all the requirements. However, the trend to natural refrigerants will continue.

Further developments in system design will occur in order to reduce the total refrigerant charge and the leakage rates to less than 5 percent. ❖

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