

REFRIGERATION BASICS

Modern refrigeration has many applications. The first, and probably the most important, is the preservation of food because most foods kept at room temperature spoil rapidly. However, when kept cold most foods will keep much longer.

Before looking at the operation of mechanical refrigeration, it is important to understand the physical and thermal properties of the mechanisms and substances used to extract heat.

Removing heat from the inside of the walk-in is somewhat like removing water from a leaking boat. A sponge may be used to soak up the water and then held over the side, squeezed, and the water released overboard. The operation may be repeated as often as necessary to transfer the water from the boat back into the lake.

In a walk-in, heat instead of water is transferred. Inside the walk-in heat is absorbed by the liquid refrigerant in the evaporator as the refrigerant changes from a liquid to a vapor. After the refrigerant has absorbed heat and turned it into a vapor, it is pumped into the condensing unit located outside the refrigerated space and then compressed. The heat is "squeezed" out by high temperature and then cooled in the condenser. This cycle repeats until the desired temperature is obtained.

Cold is a relative term used to describe low temperature, it is not something that is produced. Rather, the removal of heat results in a condition termed "cold". A refrigerator produces a condition called "cold" by removing heat from inside the refrigerator and the stored content within it. You have probably felt the heat on the floor as you walked by your refrigerator in your home. The principle of heat removal is the same for your walk-in cooler and/or freezer.

The fact that bacteria are present in most foods calls for it to be preserved in some fashion. Exposing the food to cold or low temperatures slows the growth of these bacteria preventing foods from spoiling as quickly. A cooler temperature slows the activity of all organisms, thus the growth of bacteria on refrigerated food slows dramatically.

The spoiling of food is actually the growth of bacteria. If the bacteria can be kept from increasing, the food will remain edible for a longer period of time. Since most foods contain a considerable amount of water, the food must be kept slightly above freezing temperatures.

If food is frozen slowly, at or near the freezing point of water, large ice crystals will form and break down the food tissues. When such food defrosts, it spoils rapidly and the taste and appearance of the food is greatly compromised. To prevent this problem fast freezing at temperatures between 0° F to -15° F is recommended. By using these low temperatures small crystals form which do not injure the food tissues. It is always important to keep in mind the difference between refrigerating and freezing.

Further, the standard walk-in cooler is designed to maintain the temperature of the product at 35° F, providing the temperature of the product is within 10° F of this temperature. If the product to be maintained is continually at a higher temperature, additional refrigeration system capacity will probably be required. The same parameters hold true for freezers.

To insure you have adequate refrigeration capacity, be sure to provide your sales consultant with as much information as possible about how you intend to use your cooler and/or freezer.

REFRIGERATION BASICS

(continued)

HEAT LOAD

As we mentioned earlier, the refrigeration system on your walk-in does not make things cold. The system instead removes heat from the walk-in structure. Where does the heat come from that must be removed by the refrigeration process? The two most common sources you can control are door openings and product load. Did you know that one 100-watt lamp left on in a walk-in would generate 8,208 BTU in a 24-hour period? Keep door openings and closings to a minimum to conserve energy. When working inside the walk-in, close the door behind you.

PRODUCT LOAD

The main heat source in your walk-in is the amount of heat that must be removed from the stored product. For example, if you load your walk-in with 1500 pounds of product at 0° F, very little heat will have to be removed to obtain a temperature of -10°F. If the same 1500 pounds of product is delivered from your supplier at +25° F, you must pay to run the refrigeration system to remove this heat from each and every pound of product, until the satisfactory temperature of -10° F is reached. You will have smaller utility bills if you let your supplier remove heat from the product, rather than doing it yourself. Remember, your unit is designed as either a holding unit (little or no product load) or has been designed to compensate for known product load. It is important to tell your sales consultant how you intend to use your unit. If significant product load occurs in a unit designed for holding, serious temperature problems may occur.

LOADING YOUR WALK-IN

Always move product into your walk-in as soon as you receive it. The longer you wait, the more heat it will absorb and the more you will pay to operate the walk-in. As you load your walk-in, be sure to allow plenty of airflow around the product because good airflow decreases the amount of time needed to remove heat. Be sure to allow adequate room around the evaporator. As well, never have a product closer than 12 to 16 inches to the evaporator. Remember, the evaporator is hot during defrost and can thaw a product that is too close.