BEFORE YOU BUY

A COOL ROOM OR WALK IN FREEZER

there are several matters to consider...

THERMO TECH

Refrigeration & Air Conditioning

First the box or cold room, this is generally constructed of polystyrene (EPS) or polyurethane sandwich panel. There are also fire resistant panels available because EPS can be a fire hazard, read this article regarding managing risks with EPS.

The thickness of the panel varies depending on the temperature and application while the width is standard at 1.2m. Consequently, the most economical sizes are multiples of 1.2m, for example 2.4m, 3.6m, 4.8m and so on.

Door position and size need to be carefully considered. Whether you need glass display doors to merchandise refrigerated product or just doors for access. Do you need a door for personnel or a fork hoist or both? If both you can have a personnel door in a big sliding door. With the larger sliding doors automatic opening is an option so the door can be operated by the driver of the hoist.

Door design is particularly important if merchandising because the product needs to be displayed effectively. If the room is not for merchandising, then door design is important because access needs to be swift and efficient. If doors are left open the load on the refrigeration equipment increases and that means higher power costs combined with stress on the equipment. Doors for walk in freezers are critical because warm moist air introduction can lead to plant failure.

If the door is to be left open, there are many products that can mitigate the loss of refrigerated air to the local environment. Strip curtains are opaque plastic strips that hang from a bracket on the inside of the door frame. The strips divide when penetrated by an object entering the room and close again behind. A more sophisticated option for open doors is the air curtain. This device blows ambient air down from the outside of the opening to create a division between the refrigerated space and the outside environment. There are high speed motorised screen doors that can manage the separation at the door opening. These doors open and close rapidly to mitigate loss of refrigerated air at averaging 1.2m per second travel.

Another matter to be considered is the insulation in the floor. Medium temperature cool rooms can be constructed on an uninsulated concrete floor. A walk-in freezer room will need an insulated floor. One method is to have the freezer room floor constructed out of panel and sitting over and raised above the surface. This is so air can circulate under the room and minimise condensation. Insulated panel floors can result in a step of 250 to 300mm into the freezer room. The other method used for a freezer room is to excavate the floor and carefully construct a heated insulated surface that provides no step into the room. Construction of this type of floor needs to be correct or the consequences are dire. What can happen with a poorly constructed freezer floor is moisture turns to ice, expands and the floor is pushed upwards. The whole floor can be destroyed by ice forming under the floor.

With a plan in place for the cold room construction the next consideration is the refrigeration plant. Again, we design medium temperature cool rooms differently from low temperature freezer rooms. In between the two is the cool room that requires a temperature around zero Celsius. This type of room can be used to store fish or meat and requires aspects of medium temperature and low temperature design.

The most dynamic aspect of our industry now is the uncertainty over refrigerants. This is a complicated subject that you might want to study in detail or make contact for a detailed explanation. In brief the refrigerants that replaced the CFC's and HCFC's are the HFC's. HFC's do not affect the ozone layer but have been found to create significant greenhouse gases. Consequently, many countries are phasing out HFC's and New Zealand is expected to follow. At the time of writing the Government imposes a levy on refrigerants based on their individual global warming potential (GWP). Because of the levy many of the common refrigerants are increasing in cost. We have been advising our customers to switch to lower GWP refrigerants or natural refrigerants like Hydrocarbons, CO2 and Ammonia. Right now there are very few viable refrigerant alternatives for small to medium size cool rooms and freezer rooms.

Refrigeration plant is designed and selected based on the product to be stored and the heat load it provides. Products such as vegetables meat and fish require consideration of both temperature and humidity. Product that is entering the room at a higher temperature than the room storage temperature will add cooling load to the equipment. This extra load needs to be calculated based on the type of product, the mass entering over time, the temperature entering, and the desired storage temperature after what period. Other sources of heat in the room are door openings, people, vehicles, lighting and machinery.

Cooling load can be affected by the location of the room. For example a cool room outside in full sunlight will receive more heat energy on a hot day than one under cover or located in a ventilated space. A cool room in a hot kitchen will receive more heat energy than one outside on a cool day. Geographical location and ambient temperature matters with an outdoor cool room in Auckland receiving more heat energy than one in Invercargill.

With the information above we can begin calculating the maximum cooling load. Then we calculate how many hours per day we want the refrigeration equipment to operate and select the equipment that will remove the calculated cooling load. Refrigeration equipment selection is a case of taking off the shelf components and matching them together to suit the situation. Will single or three phase power be available, do the electrical mains have sufficient capacity to support the equipment? Do we need any redundancy for critical products?

Thermo Tech can custom design, install and maintain a wide range of cool room and walk in freezer room solutions.

For more information on or other products or applications please contact us

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