COLD STORAGE FOR ROOT CROPS

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1. Size of Storage

You must consider the product coming in on pallets, boxes, bushels, etc. to determine working size. Do not automatically assume a 10' x 10' storage is large enough. By laying out your product and traffic patterns, either with a computer or on graph paper, you will be able to see the physical size needed. Another space consideration is the required clearances around the product to move the amount of air you need to cool it effectively.

2. Building your Storage - Again, How Big is Big Enough?

A small simple cooler can be built using standard framing techniques: 2x4 walls and 2x6 ceiling rafters. The standard framing method is usually good for small storages 8'x10' through 12'x16'. You must also include a vapor barrier in your cooler. This can be achieved by installing plastic sheeting on the warm side of the cooler walls and ceiling.

We do not recommend fiberglass insulation. If there is ever a problem with the vapor barrier, the fiberglass insulation will absorb moisture and lose its insulation value.

However, we do recommend rigid foam board insulation with a minimum insulation R-value of R-17 and a max R-value of R-25. Increasing the R-value above R-25 in a walk-in cooler does not improve cooler efficiency. Therefore, insulating your cooler beyond R-25 is simply an unnecessary expense. You will still need to install a vapor barrier on the warm side of the cooler walls and ceiling when you use rigid foam board insulation.

Spray foam insulation is another option for insulating your cooler. It is more expensive than other methods of insulating. The advantage of spray foam insulation is its high R-vale in a relatively small space. Another advantage being spray foam actively seals the structure, and acts as its own vapor barrier.

3. Sizing the Refrigeration Equipment

There are no "Rules of Thumb", do not use them as they will only get you into trouble. What may have worked for your cousin, neighbor, or friend will not necessarily work for you. In many cases, improperly sized refrigeration will do more harm than good.

There are many engineering calculations used to determine the proper sizing of a refrigeration system. To properly size a specific system, we must first gather certain information from the grower in order to perform these calculations.

1. How large is your storage?
2. What is the amount of insulation and how tight (drafty) is the structure?
3. What is the type of product being stored (what type of fruit or veggie?)
4. How is the product packaged? (closed boxes, open boxes, bushels, crates, bags, bulk?)
5. What is the turn over cycle on the product (How long is the product planned to be stored and how much product will enter and exit the storage in a given day?)
6. What is the product's core temperature when it enters the storage and how quickly do you want to cool it?
7. What is the final temperature and humidity level desired in the storage?
8. How often in the storage entered per day?

There are many quick charts available online for sizing coolers, but they do not account for high initial loads in the refrigeration system or storage of product with high heat of respiration like Spinach, Asparagus, Raspberries or Sweet Corn. The products are examples of produce that generate a tremendous amount of internal heat while in storage.

When reviewing compressor selection charts, one must consider the BTU's, not the compressor horsepower. If you were to look at these charts, you would see many manufacturers make compressors with the same horsepower but with varying BTU's and capacities by well over 25%. The BTU rating on a compressor is the only way to properly select a compressor. Remember, when buying refrigeration: "Your paying for BTU's, not horsepower). Almost all refrigeration compressors are small, black and shiny, but unless you read the name plate you have no idea of the capacity, voltage, or the phase (single or three phase)

Another consideration is where the compressor will be located. Not all compressors can sit outside in the elements. Specifically designed weather enclosures , controls and heaters may be needed to place your equipment outside and have it work properly.

4. Humidity

Humidity is what makes a vegetable cooler special and different from the standard cooler. To store vegetables or fruit, we want high humidity levels, generally over 90%RH or more. Humidity levels lower than this will cause your product to wilt and shrivel, losing weight and appearance.

Contrary to popular belief, humidity is not governed by the compressor, but rather it is determined by the evaporator coils inside the cooler. All refrigeration systems are natural dehumidifiers, and a refrigeration system serving fruit and vegetable storages must be professionally designed with the proper equipment selection to pull or maintain the desired humidity levels in the storage. It is very hard to remedy an improperly sized system by adding humidification after the fact, frequent ice and freezing problems usually plague such systems.

5. Purchasing Used Coolers

Purchasing used refrigeration equipment is a popular cost-savings among growers. However, one must be careful of the equipment purchased because as previously mentioned: NOT ALL REFRIGERATION IS CREATED EQUAL!

If you purchase a used walk-in cooler that was previously used to store beer, soda or milk, those coolers were designed to hold 38-40 degrees with 50% relative humidity. If fruits and veggies were stored in these coolers, the product would become dehydrated and lose both weight and storage life.

If you purchase a used walk-in cooler that was previously used to store flowers, it is usually well suited to store fruits and vegetables. Flower coolers are designed for high humidity.

We do not recommend purchasing used equipment until you see it run and observe how it performs. It's like buying a used a motor from the junk yard, until you see it work....it's still junk.