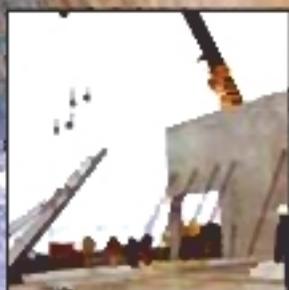
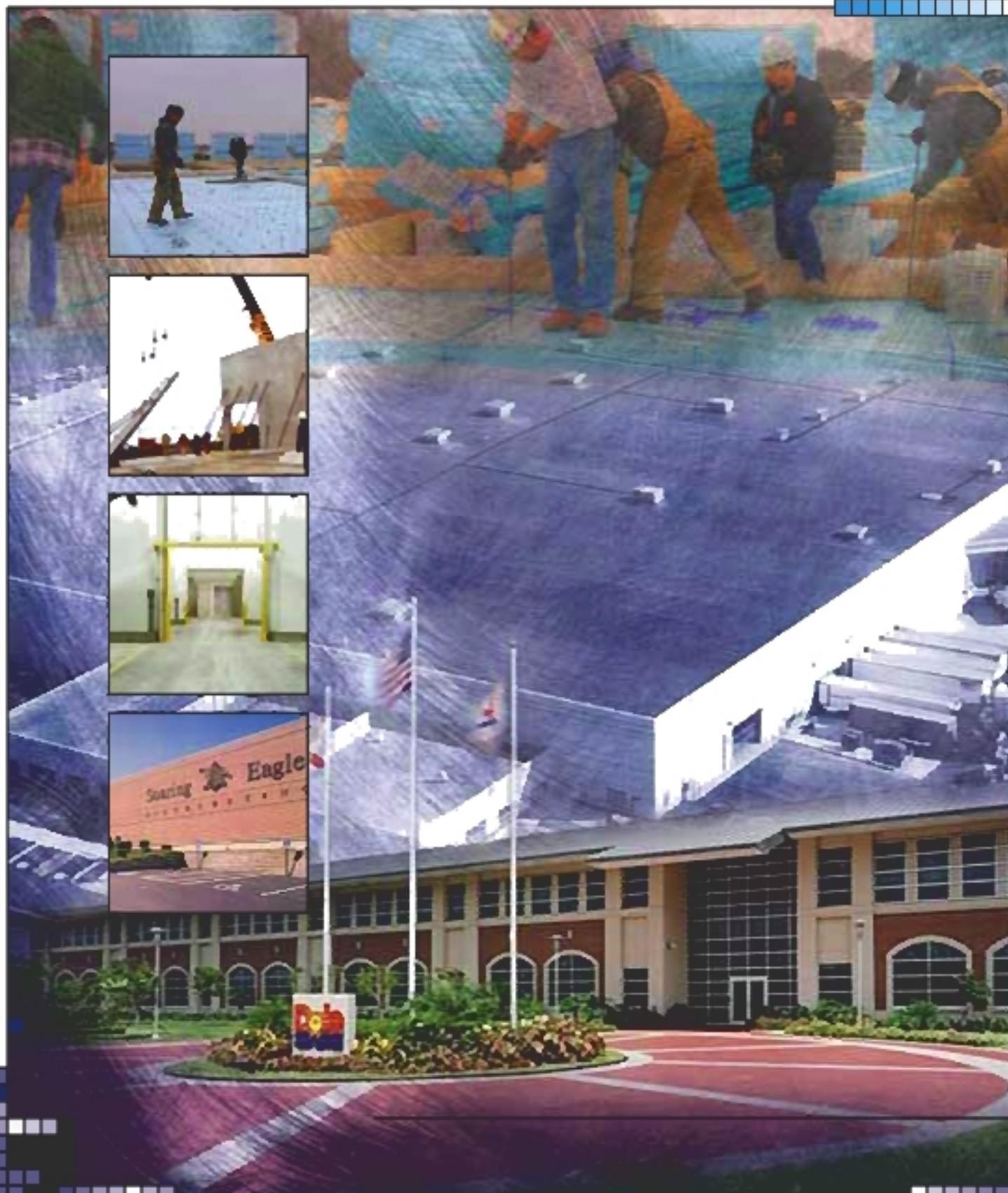


# THERMOMASS®

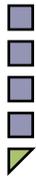
Building Insulation Systems



LOW-TEMPERATURE

# THERMOMASS®

## THE SYSTEM



Composite Technologies Corporation (CTC) was founded in 1980 by Robert T. Long. His innovative thinking and vision led to the development of the THERMOMASS® Building Insulation System. At the heart of the THERMOMASS® system is a patented continuous fiber composite connector, which is used to structurally tie two layers of concrete together through predrilled, prefabricated, extruded Dow brand insulation products. The non-conductive, chemically resistant, fiber composite connector allows the creation of an uninterrupted envelope of insulation throughout the exterior walls of the building. This creates a highly energy efficient building system that is virtually maintenance-free and has the ability to not only resist mold, but stand up to fire, earthquakes, hurricanes and tornadoes as well.



The continued development of this system represents a dramatic advancement in building technology for many types of temperature and atmosphere controlled facilities throughout the world and offers unsurpassed advantages over block/brick, steel and insulated metal panel construction.

## A HISTORY OF SUCCESS



For over 20 years, THERMOMASS® has been the industry leading system for concrete sandwich wall construction. Extensive testing, research and development of innovative technologies keeps CTC at the forefront. With a track record of over 100,000,000-sq. ft. of sandwich walls in the US and around the world in use today, we have more experience than all other building insulation systems combined.

The energy efficiency of the finished building combined with the ease and speed of construction has made our building system the preference of industries ranging from education and correctional facilities to freezers, coolers, distribution centers and retail facilities. They keep returning to the THERMOMASS® Building Insulation System because it provides them with unparalleled construction quality, aesthetic versatility and energy savings.





## A FAMILY OF COMPONENTS



The THERMOMASS® Building System is a technologically advanced system that delivers exceptional construction with superior insulation effectiveness.

### Connectors

Our family of continuous fiber composite connectors is made from a resilient composite matrix and possesses incredible strength and durability. They are far superior to steel and or plastic connectors in sandwich wall panels because they are non-corrosive, chemically resistant and have low thermal conductivity with unsurpassed structural strength.

### Insulation:

Dow brand insulation products are a "closed cell" structure, that means no gaps or voids between cells. The rigid board construction resists all forms of water penetration including water vapor transmission. The high thermal resistance and high compressive strength make it a valuable component in the THERMOMASS® Building System.



Dow insulation used in the THERMOMASS® Building System:

Styrofoam® Brand Extruded Polystyrene

ISOCAST R Polyisocyanurate

ProPEL® Extruded Polypropylene



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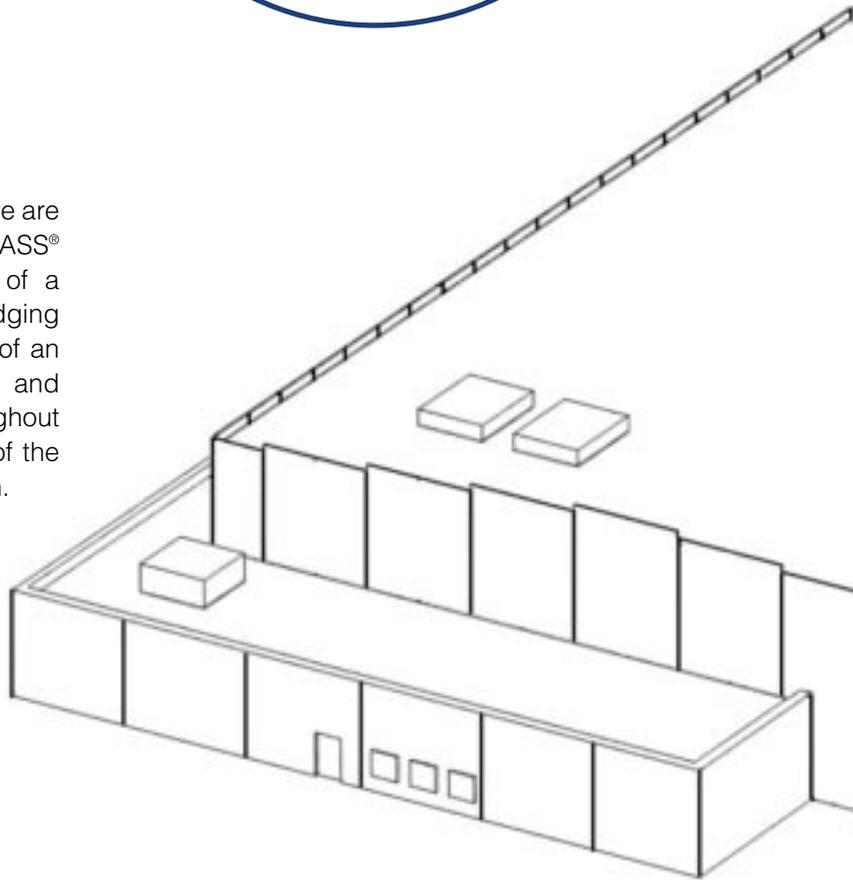
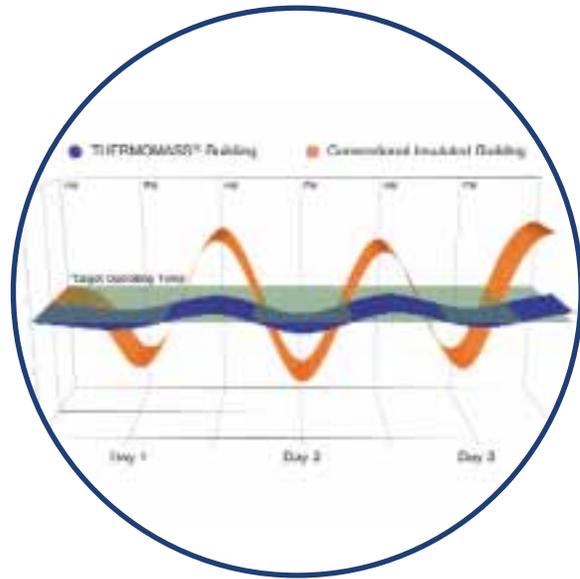
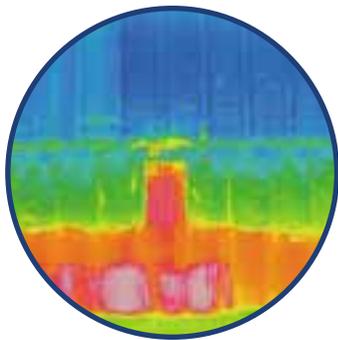
## BUILDING INSULATION SYSTEM

LOW-TEMPERATURE

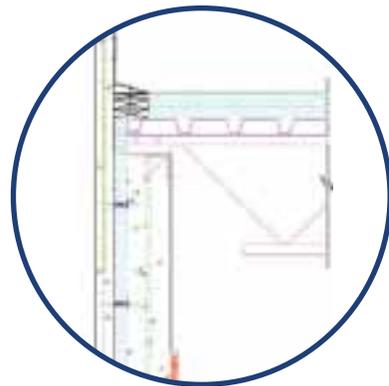
The ability of concrete to store energy and dampen the effect of temperature change on the loads placed on cooling systems is known as the **“Thermal Mass Effect.”** Due to the mass effect created by the THERMOMASS® Building Insulation System, the performance R-value of the system can be two to three times greater than that of the material R-value. No other concrete or insulated metal panel (IMP) system can come close.



Through the science of thermographic imaging we are able to prove the benefits of the THERMOMASS® system. The blue color in the above image of a THERMOMASS® facility shows zero thermal bridging and no energy loss. Below, in a thermal image of an insulated metal panel (IMP) system. The red and yellow colors indicate massive energy loss throughout the joints as well as energy loss at the bottom of the panel due to moisture saturation of the insulation.



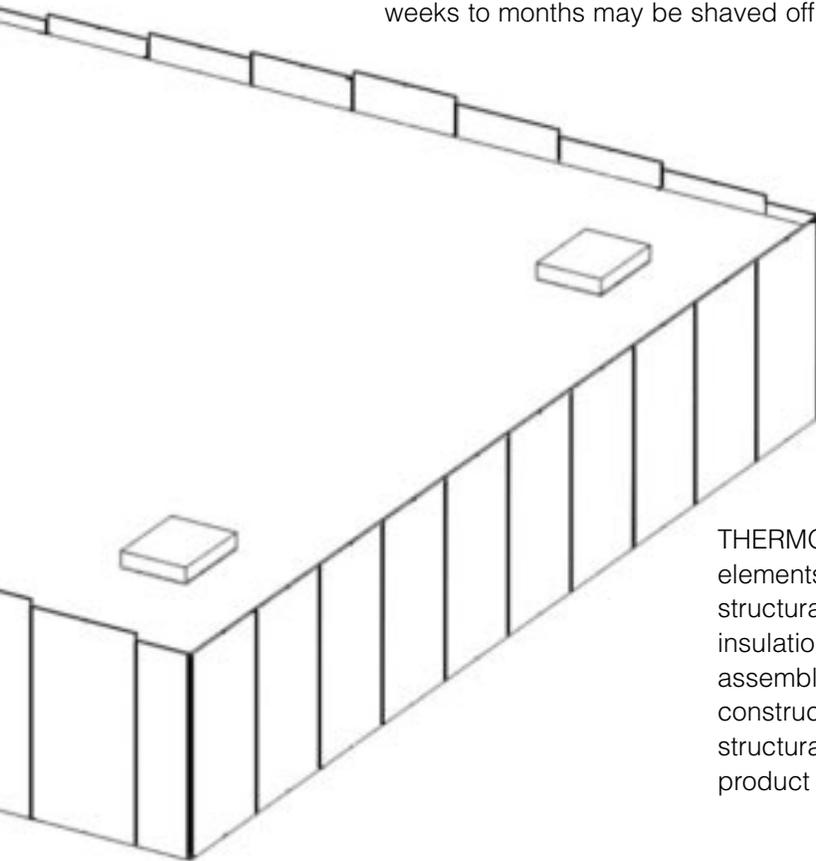
THERMOMASS® uses edge to edge and opening to opening insulation, enabling the exterior and interior wythes of concrete to behave independently. This allows the exterior wythe to expand and contract with exterior temperature change while the interior wythe remains constant. This eliminates the chance of thermal cracking and thermal bowing. Unlike competing systems, THERMOMASS® eliminates thermal short circuits, air infiltration and moisture drive through the buildings panels and joints.





One way that the THERMOMASS® insulation system helps the owner save money is in cooling costs. Because the THERMOMASS® panels have excellent thermal storage properties, facilities using them have a reduced total load requirement. Owners of these buildings have taken advantage of this by purchasing multiple smaller refrigeration units, thereby allowing them to stage compressor usage. THERMOMASS® cold storage warehouse owners have also been able to apply pre-cooling and load shifting techniques to the operation of the facility. This reduces the energy costs by as much as 50%.

The THERMOMASS® Building Insulation System is ideal for fast-track construction. Concrete insulation panels can be cast on-site (tilt-up), or at a casting facility (precast) and shipped to the job site. Through proper planning and the use of THERMOMASS®, weeks to months may be shaved off the project schedule.



THERMOMASS® insulated concrete panels are load bearing elements. These panels eliminate the need for perimeter structural steel framing and protective curbing. Instead the insulation, structure and cladding are provided in one assembly. Load bearing panels offer significant design and construction savings by simplifying the building perimeter structural conditions. Thus, freeing up interior space for product movement and storage.

Your maintenance department will have appreciation for the durability of THERMOMASS® insulated concrete walls. The rugged interior and exterior finishes require minimal upkeep and are virtually impervious to forklift damage. This dramatically reduces building maintenance costs over the life of the building.



# THERMOMASS®

## BUILDING INSULATION SYSTEM

### A SOUND INVESTMENT

- Building a better facility doesn't always cost more. The added features and benefits of the THERMOMASS® Building Insulation System will not “break the bank” on the project. In fact, it's a common misconception that insulated metal panel construction methods are cheaper than using insulated concrete. To build a high performance low temperature facility, there is not a more cost effective way than concrete sandwich wall construction and the THERMOMASS® Building Insulation System.

### KEEPING TEMPS DOWN AS ENERGY COSTS RISE

- Energy costs usually go in one direction-up. History has shown that energy costs will continue in an upward trend. While there's not much that you can do to control the cost of energy, there is something that you can do to control the amount of energy that your low-temperature warehouse will use.

The THERMOMASS® Building System featuring Dow STYROFOAM brand insulation helps low-temperature facilities run at peak energy efficiency by creating a floor to roof thermal envelope. Less energy used equals lower fuel costs.

Because it helps control energy costs, the THERMOMASS® Building System is an investment in the long-term profitability of your low-temperature facility.

### CUSTOM DETAILING AND WARRANTY

- Proven building details are essential to the success of insulating concrete sandwich panels for controlled low temperature environments. Without them, you simply cannot guarantee the continuity of the insulation envelope. CTC provides custom details for each facility along with all the technical design assistance necessary to ensure the success of the project. We work closely with architects, engineers, contractors and owners to guarantee the integration of the THERMOMASS® building system. Our commitment to excellence is backed by our low-temp warranty.

“We operate about 250,000 square feet under refrigeration. The operating temperature varies from about 29° F to about 33° F. The rooms are very large – 100 ft. wide and 200 ft. long. It usually takes 200 tons of refrigeration to maintain the room. I'm seeing 50 to 90 tons to keep the THERMOMASS® Facility to 32° F.”

**Ray Penner**  
Refrigeration Manager  
Gerawan Farming.

LOW-TEMPERATURE



## FIRE RESISTANCE



THERMOMASS® insulated walls provide incredible structural integrity and security plus an added measure of fire safety. Our connectors have been tested by a leading United States fire testing agency where a panel constructed with THERMOMASS® fiber composite connectors was subjected to 1093 °C (2000 °F) for four hours with no degradation. The temperature of the surface of the wall opposite the fire rose only 20.8 °C (37.6 °F) during the testing period. The standard for passing this test was 121 °C (250 °F).



## ANALYSIS SOFTWARE APPLICATION TOOLS



With our State-of-the-art analysis application suite, we can produce studies and testing on the transfer of moisture, heat migration and humidity levels on panel wall systems. By using these software applications, we can accurately predict reactions to weather from both external and internal climate conditions. Our analysis application suite includes:

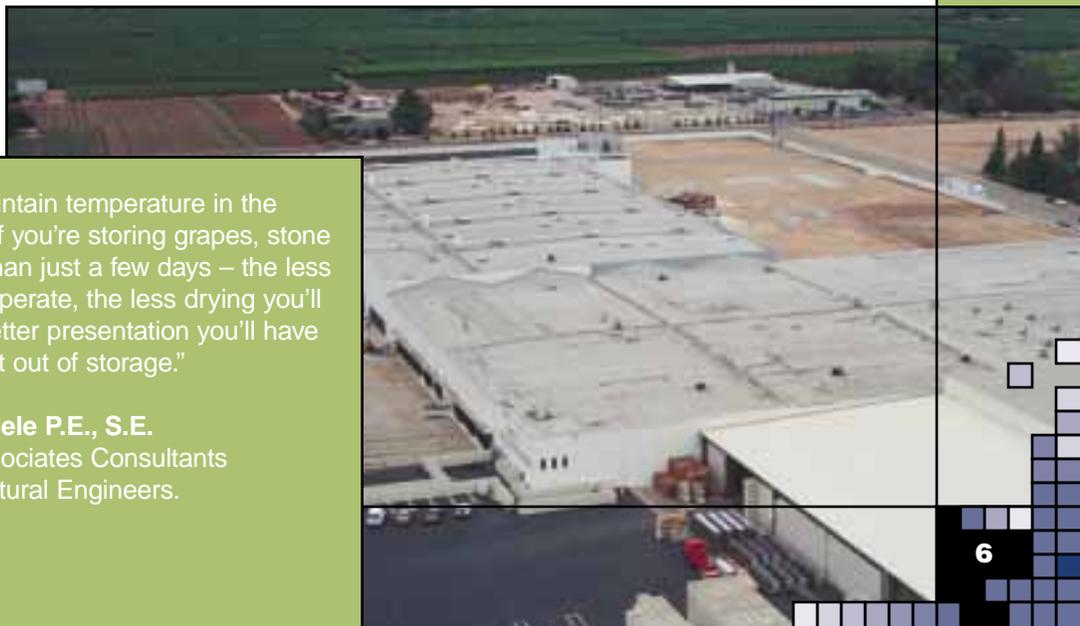
- Isothermal analysis
- Mass Performance analysis
- Energy Efficiency and Cost Reduction analysis
- Construction Cost Estimates and Building Life Cycle Payback analysis
- Dewpoint analysis, Moisture and WUFI
- Thermographic analysis
- Finite Element analysis

LOW-TEMPERATURE



"It's much easier to maintain temperature in the THERMOMASS® Building. If you're storing grapes, stone fruit or whatever, for more than just a few days – the less refrigeration that you can operate, the less drying you'll have of the product, the better presentation you'll have when you pull it out of storage."

**Gerald A. Mele P.E., S.E.**  
Gerald Mele & Associates Consultants  
Civil and Structural Engineers.





**THERMOMASS<sup>®</sup>**  
Building Insulation Systems



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