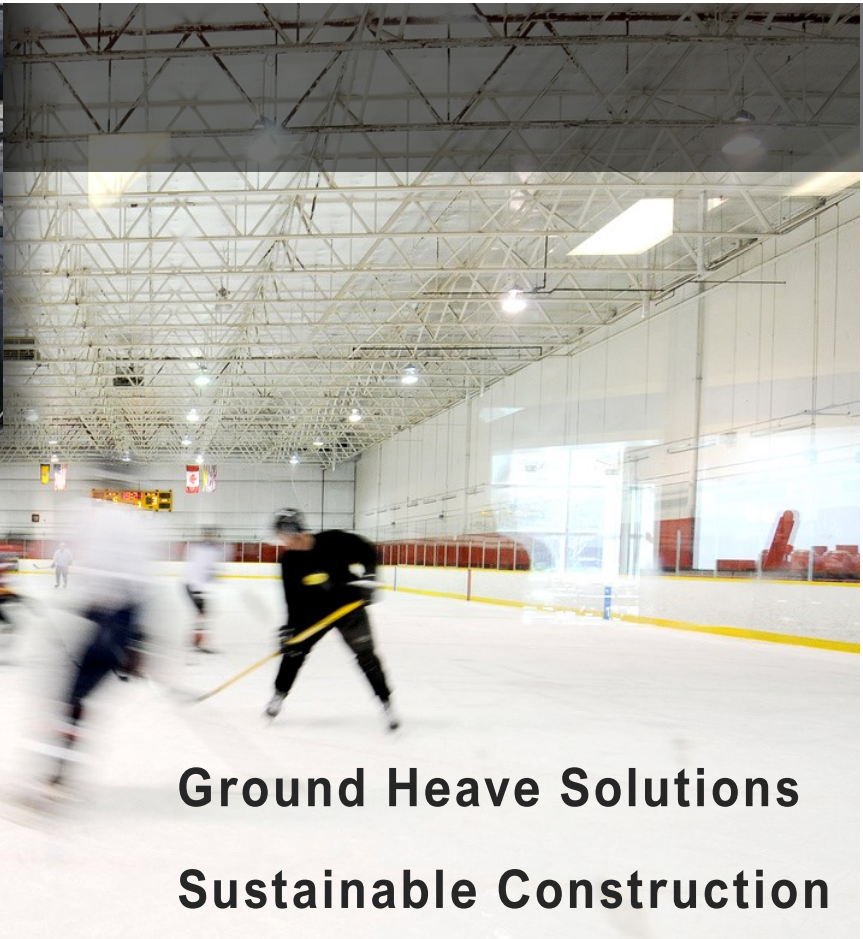


# ENGINEERED FLOORS

For Freezer and Cold Room Facilities



**Ground Heave Solutions**  
**Sustainable Construction**

 **CUPOLEX<sup>®</sup>**

# FREEZER FLOORS

## Ground Heave Solutions

Frost heave is a term commonly used to describe the displacement of structures caused by ice depositing underneath all or portions of structures operating constantly at low temperatures. Most refrigerated facilities are constructed with a slab-on-grade. In cases where the slab persistently operates below freezing ( $0^{\circ}\text{C}/32^{\circ}\text{F}$ ), frost from moisture in the soil will form underneath the slab unless some form of heat below the slab is provided. If the sub-slab is not heated, frost heave will not only eventually destroy the slab but also create other significant structural problems within the facility.

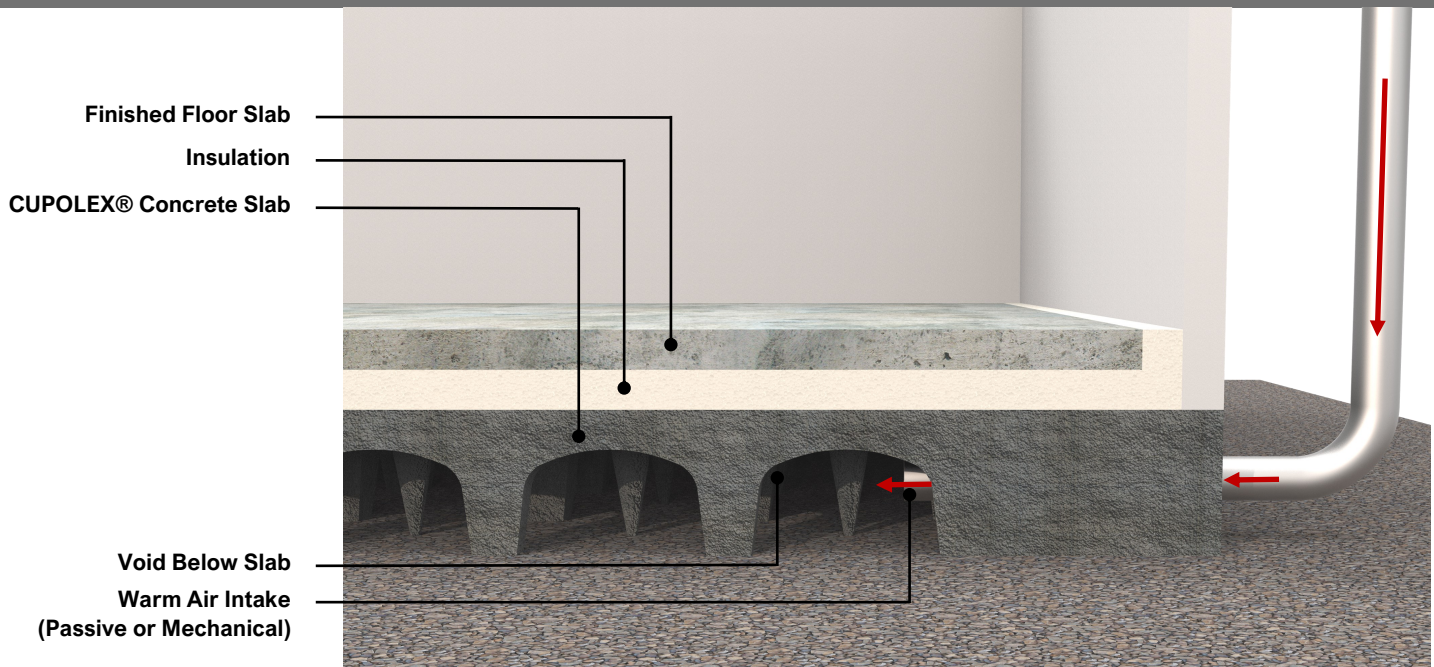
A properly designed CUPOLEX® passive or mechanically heated aerated concrete floor will provide sufficient heat to prevent frost formation under the slab; thereby preventing structural failures while minimizing the parasitic heat gain to the refrigerated space.

### Concrete Floors for Refrigerated Buildings

CUPOLEX® provides engineered floor systems for freezer warehouse floors and ground heave solutions. Our engineered CUPOLEX® floors are passively or mechanically heated to prevent frost formation. This alleviates the structural concerns associated with frost heave on freezer floors and also minimizes the parasitic heat gain to the refrigerated space.

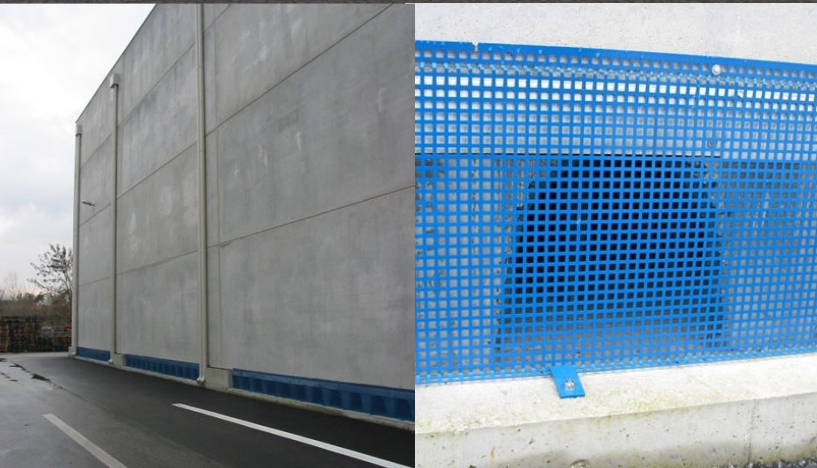
### APPLICATIONS

- Refrigerated freezers (distribution and long-term storage)
- Blast freezers (spiral freezers, blast cells, hardeners, etc.)
- Ice rinks
- Curling sheets



## DESIGN FEATURES

- The mechanical or passive air distribution below CUPOLEX® floors is engineered to guarantee an unrestricted air flow below the entire concrete slab.
- In warmer climate areas, the engineered CUPOLEX® floor can be easily vented as a passive or active system using outside air
- Significantly reduces moisture that may condense inside the CUPOLEX® void space
- Maximum amount of heat entering the subsoil
- Under-floor heat can be supplied from outside air, warm exhaust air from a process equipment, or any other conveniently located space.
- Provides additional protection and better temperature control with heated air
- Allows ventilating from a furnace/makeup air unit or recover heat from the hot gas coming off the refrigeration system.
- Can be designed as a “closed” systems, meaning the air used in the under-floor system is recirculated after adding heat and dehumidifying.
- Allows the use of a fan to aerate the sub-floor network
- Manufactured to ISO 9001:2015 high quality standards



## BENEFITS & ADVANTAGES

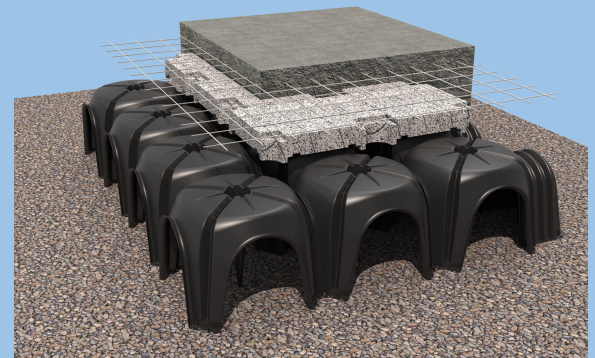
- Easy to inspect
- Simple design and lower cost than other electric, hydronic heating systems or vented piping systems
- Minimizes maintenance
- No risk of plugging of conventional pipe branches by frost, ice, or other debris.
- Energy cost is less than electrical resistance
- No environmental concerns of leaking glycol into the soil
- Manufactured to ISO 9001:2015 high quality standards


## Engineered Isol-Cupolex® System

CUPOLEX® offers unique and cutting edge engineered floor systems options for freezer and cold facilities, such as the patented Isol-Cupolex® system.

The engineered Isol-Cupolex® insulated crawl space is designed to create an insulated passive or active vented subfloor as a monolithic concrete pour, which significantly saves time and construction cost, compared to a two-pour insulated concrete floor slab. The form-based concrete geometry created by the engineered Isol-Cupolex® does not weigh on the insulation but the loads are transferred directly to the supporting subbase.

## ISOL-CUPOLEX®





# Protecting Refrigeration Floors from Frost Heave

We design insulated aerated concrete floors, which, combined with heat, prevent structural failures from ground heave.

The CUPOLEX® Floor is a proprietary patented plastic concrete forming system manufactured by Pontarolo Engineering Inc. The concrete forms are part of a design package provided by CUPOLEX®. CUPOLEX® engineers design the concrete floor by sustainably engineering the geometry of concrete using CUPOLEX® structural dome methodology. On a site-specific basis, CUPOLEX® engineers select the type and size of CUPOLEX® forms necessary to meet the required voids and elevation and that will provide the ultimate performance for your project. The forms are supplied to contractors by CUPOLEX® to assemble the concrete cast-in-place floor, as to the design and specifications provided by the CUPOLEX® design engineers.

CUPOLEX® forms are custom made to meet your site-specific requirements such as varying depths, weather, special accommodations for ventilation, special requirements for delivery and logistics, supporting working-load capabilities and any special impact resistance during installation and placement of the concrete.

## CUSTOMIZED DESIGN PACKAGE

- **Value engineering**  
CUPOLEX® engineers review each project, provide value engineering, and identify the type and size of CUPOLEX® forms for every project
- **Preliminary drawings**  
Design coordination, conceptual designs, sections and details provided to designers
- **Engineered design drawings**  
Issued for construction (IFC) and supported with FEA structural calculations, PE stamp, construction documents and specifications
- **CUPOLEX® installation shop drawings**  
Issued to contractor with detailed CUPOLEX® formwork installation procedures
- **On-site Support**  
Construction training and inspections, with completion statements and regulatory compliance reporting where required