

OPERATING  
MANUAL

# Stirling Ultraguard<sup>™</sup>

-70°C PHASE CHANGE MATERIAL



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# Safety

Your high-value biological assets can be further protected unpowered, for longer.



## Gloves

**Caution:** Utilize insulated gloves suitable for ultra-low temperatures when handling frozen Phase Change Material (PCM) bricks.



## Brick Inspection

**Caution:** Inspect PCM bricks upon receipt and prior to each conditioning cycle to ensure there is no damage that would result in leakage. If the brick is damaged, utilize chemical safety goggles and rubber gloves and drain the brick in a sewer with ample water. Observe all federal, state and local environmental guidelines when disposing of the material. Safety Data Sheet available on request.



## Eye Hazard

**Caution:** The PCM solution inside the sealed plastic casing is an eye hazard and can cause serious eye damage if not addressed. If a brick is damaged and the PCM solution enters the eye, hold the eyelids apart and flush eyes for 20 minutes. Remove contact lenses if present. Contact a physician.



# Stirling Ultraguard

**Stirling Ultraguard is a -70°C Phase Change Material (PCM) housed in a plastic casing, called a brick.**

PCM releases large amounts of latent energy as it transitions from a solid to a liquid state and has been designed to provide extended cooling properties.

Stirling Ultraguard bricks are conditioned or transitioned from a liquid to solid state by freezing them below -70°C to store up the necessary amount of cooling energy.

Once the color changes from green to white and the PCM looks solid, the brick has crystalized and is ready to extend ultracold temperature times inside an ultra-low temperature (ULT) freezer cabinet set below -70°C.

## **What happens when there is a power outage?**

When the ULT25NEU cabinet is no longer powered and begins to warm above -70°C, the PCM will change phase to absorb energy and prolong the warmup profile in the cabinet.

**-70°C**

PCM PROTECTION -  
THE INDUSTRY'S  
FIRST



# Product Features

## ❖ -70°C PCM Solution

Provides up to an eight hour warmup profile from -80°C to -60°C when used inside Stirling Ultracold's ULT25NEU portable freezer.

## ❖ Conditioning Confirmation

The PCM solution changes from green to white when the brick transitions from a liquid to solid state, indicating it's prepared for use.

## ❖ Non-Toxic Material

Stirling Ultraguard's salt-based PCM is non-toxic, non-hazardous and non-flammable.

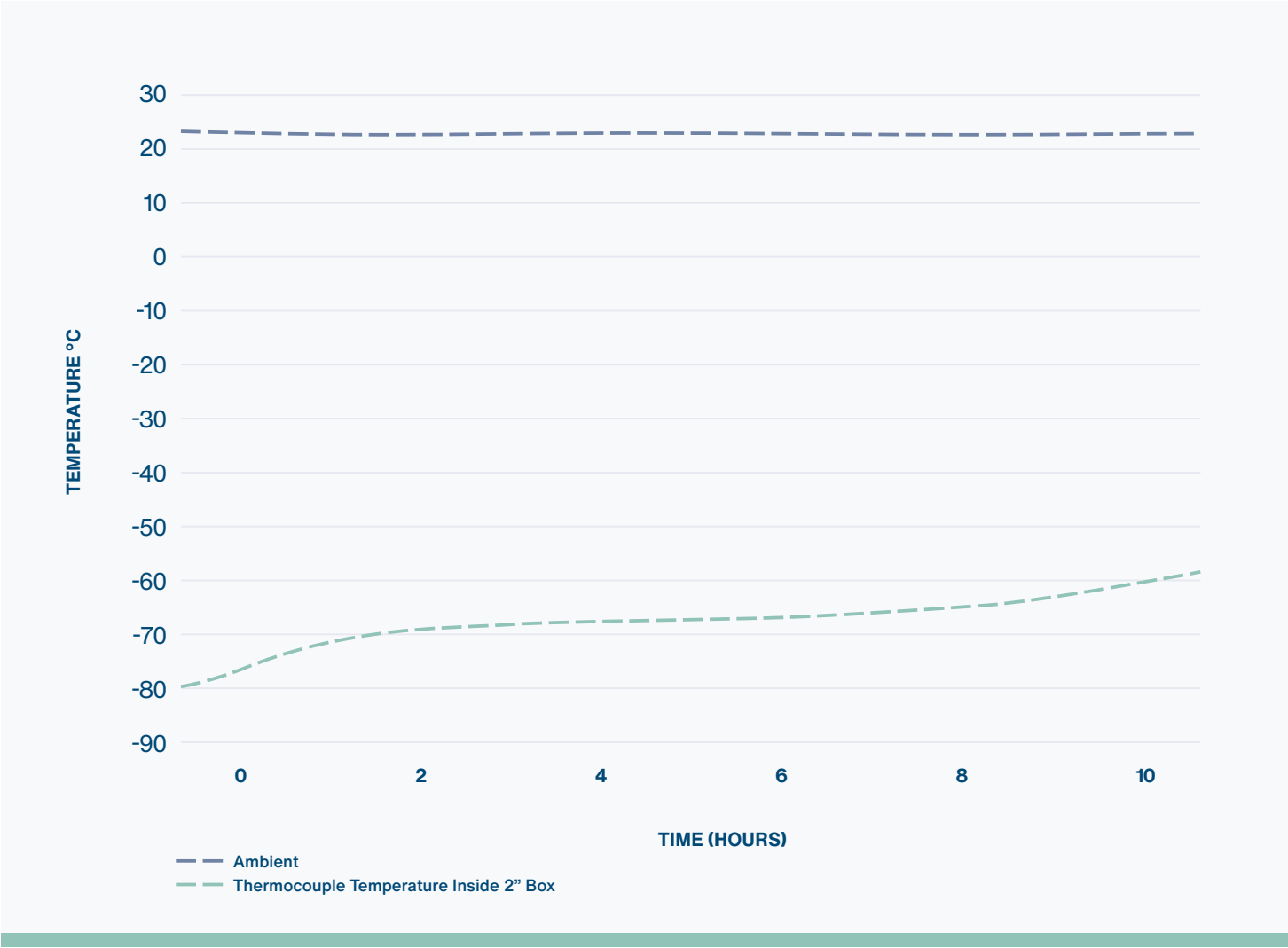


# Stirling Ultraguard Thermal Performance:

-80°C to -60°C

Notes:

- Warmup profile graph is generated from a three brick configuration in the ULT25NEU.
- Ten 2" boxes were placed inside the freezer with PCM bricks surrounding them.
- A weighted thermocouple was placed inside a 2" box located near the center of the freezer cabinet.
- Ambient Condition: 23°C +/-1°C.
- Temperature performance will vary based on a number of factors.



# ULT25NEU Portable or SU780XLE Upright

## Ultra-Low Temperature Freezers



# -86°C

FOR THE CONDITIONING  
TEMPERATURE

## Step 1

### Step 1:

- Condition PCM in an empty cabinet.
- Remove the baskets from the ULT25NEU.
- Remove any items except for the metal shelves from the SU780XLE.
- Set the temperature to -86°C and let the freezer pull-down to temperature.



## Step 2A

### Step 2A (ULT25NEU):

Place each brick vertically against the inner walls in an empty cabinet. The bricks will be a green color when removed from packaging. Put foam lid back in the freezer and close lid.

OR



## Step 2B

### Step 2B (SU780XLE):

Place the brick horizontally against the inner walls in the empty cabinet of the SU780XLE. The bricks will be a green color when removed from packaging. Close the inner doors and outer door to the freezer.

# ULT25NEU Portable or SU780XLE Upright

Ultra-Low  
Temperature  
Freezers



## 48 HRS

AT -86°C IN THE  
ULT FREEZER

### Step 3

**Step 3:**

Cool the bricks for 48 hours at -86°C in the ULT freezer.



### Step 4

**Step 4:**

Visually inspect the conditioning of the bricks. The brick should be white and feel solid.



### Step 5

**Step 5:**

Place the bricks inside a ULT freezer cabinet at -70°C or cooler. The PCM will begin transitioning when the cabinet warms above -69°C.



# ULT25NEU

## Placement Options

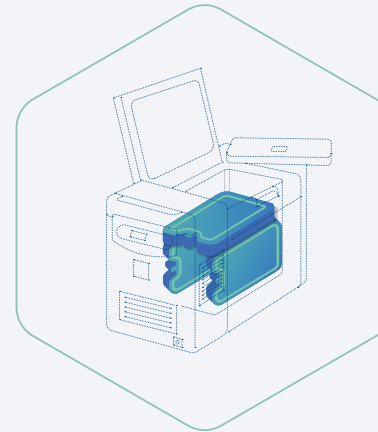
There are a variety of configurations for the PCM bricks inside a Stirling Ultracold ULT25NEU portable freezer.

Suggested options are not all-inclusive but should help plan for future use cases. Three bricks are designed to provide a warmup profile of up to eight hours in the freezer. Warmup profiles may vary based on payload, charge time, brick placement and temperature monitoring probe location within the freezer.

### Option 1 (Largest Payload Space)

Placing **two bricks (Image A)** horizontally against the cold wall and **one brick (Image C)** below the foam lid.

This configuration will store **ten x 2-inch boxes (Image B)**.



UP TO  
**8 HRS**

WARMUP PROFILE  
IN THE FREEZER



# ULT25NEU

## Placement Options

### Option 2

#### (Simplest Packout)

Three bricks in top ULT25NEU basket stacked on top of the bottom basket holding six x 2-inch boxes.



### Option 3

#### (Vial Storage)

Bricks with vial boxes. Place third brick on top of configuration.



### Option 4

#### (Rack)

Bricks in vial storage rack.



1 Brick



SPECIFICATION	DATA	
Weight (1 Brick)	2.75 kg / (6.06 lbs.)	
Dimensions (1 Brick)	mm (H x D x W) 38.1 x 295.1 x 175	in. (H x D x W) 1.5 x 11.6 x 6.9
Conditioning Time (3 bricks)	48 hours in a ULT freezer set to -86°C.	
Hold Time	Results will vary and validation for customer specific use cases should be conducted prior to usage. The product has been tested to provide up to an eight hour warmup profile in the ULT25NEU, per the protocol on page 6.	
PCM Type	Hydrated Salts	
Flammability	Non-flammable	
SHIPPING SPECIFICATION (3 BRICK KIT)	DATA	
Transport	Not restricted for transport per DOT, IMDG and ICAO/IATA regulations.	
Weight (3 Bricks)	9.5 kg / (21 lbs.)	
Shipping Dimensions (3 Bricks)	mm (H x D x W) 177.8 x 381 x 228.6	in. (H x D x W) 7 x 15 x 9



## Disclaimer



The information provided in this document is based on testing and experience with the product that Stirling Ultracold believes are reliable, but thermal performance results will vary. There are many factors beyond Stirling Ultracold's control that can impact the thermal performance within the customer's particular application. Due to the range of factors impacting the performance of the product, the user is solely responsible for evaluating Stirling Ultracold's product and determining whether it is fit for a particular purpose or application.

## Intended Use



Stirling Ultraguard -70°C Phase Change Material (PCM) bricks are designed to slow the warmup profile in the ULT25NEU or other ULT freezers when power is lost.

## Warranty and Limited Remedy



Stirling Ultracold warrants that the Stirling Ultraguard product meets the performance specifications and is free of damage at the time Stirling Ultracold ships the product. Stirling Ultracold makes no other warranties or conditions-based claims on the product. If a Stirling Ultraguard product does not conform to this warranty at the time of receipt, then the sole and exclusive remedy is, at Stirling Ultracold's option, the replacement of product or refund of the purchase price.

## Limitation of Liability



The customer should inspect the product prior to use and identify any damage. Except for the limited remedy stated here, Stirling Ultracold is not liable for any loss or damage arising from or related to the Stirling Ultraguard product.

For service questions related to Stirling Ultraguard, contact

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**Storage Solutions**

**SUPCM-LIT-OM-A**