

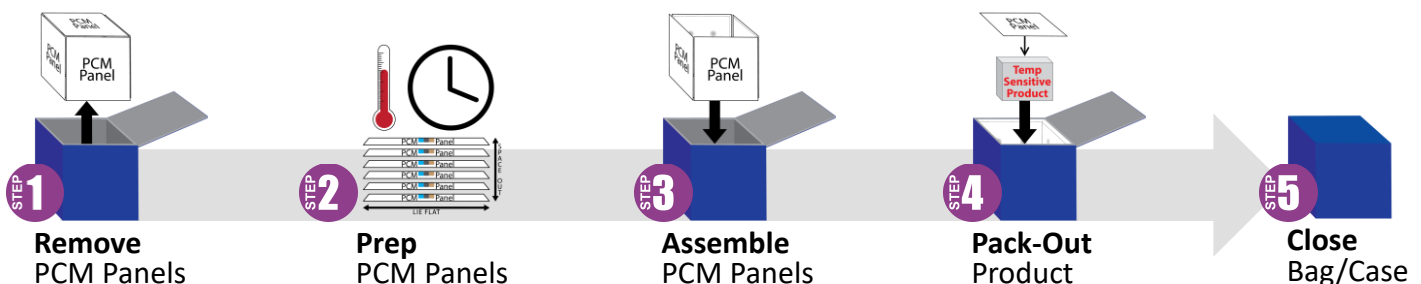
Cool Cube™

Best Practices

Call for
Technical Support
(608) 526-6901



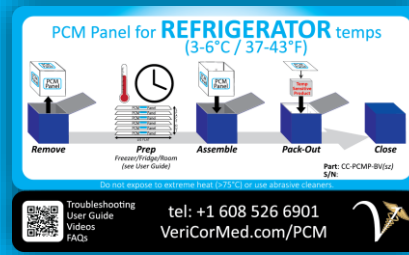
- Prep the PCM (phase change material) panels before use according to one of the described methods provided by VeriCor.
- Ensure all components are clean and free of damage.
- Lay panels flat when turning them solid (to disperse liquid throughout the panel).
- Enable ample air flow around all panel sides.
 - Use spacers (pencils) or racks. →
- Freezing/melting times vary depending on number of panels being prepped and equipment being used.
- Assemble using all six panels for maximum hold time.
 - Using less panels does not change the holding temperature, but does decrease the hold time.
- Panels are reusable (10,000+ cycles).
 - End-of-life disposal: Panels are a plastic #2, typically recycled by businesses/communities. PCM is nontoxic and readily biodegradable.
- Use a calibrated data logger or other temperature monitoring device to observe internal temperature.
- Avoid unnecessary opening of the Cool Cube™ after loading payload. Opening of the Cool Cube™ will decrease hold time.
- An infrared temperature thermometer can assist in ensuring the panels reach a safe pack-out temperature (good for finding out the approximate temperature of each panel).
- The farther the ambient temperatures are from the melting point, the quicker PCM will change states (solidify/liquefy).



Various methods based on type of panel, equipment available & purpose.

Cool Cube™ Refrigerator PCM Panels

for vaccine, blood, medicine & more



Blue Tab/Label

All Sizes



This PDF is **clickable!** Click the QR code for a video, or the row for more information on the method.

Video	Method	Use	Required Equipment	Prep Location (Time)	Advantage(s)	Drawback(s)
	A <i>(method used in User Guide)</i>	Keep product cold (in warm conditions)	Freezer & Refrigerator	Freezer (≈ 2 hrs*) Fridge (≈ 3 hrs*)	Precise panel temperature Maximum hold times	Multi-step
	B	Keep product cold (in warm conditions)	Refrigerator	Fridge (≈ 24 hrs*)	Precise panel temperature	Possibly shorter hold times (dependent on fridge temp)
	C	Keep product cold (in warm conditions)	Freezer	Freezer (≈ 2 hrs*) Room (25-40 min)	Fastest total prep time Maximum hold times	Multi-step Wait time before assembly
	D	<i>Prevent freezing (in extreme cold)</i>	<i>Refrigerator</i>	<i>Fridge (≈ 24 hrs*)</i>	<i>Prevents product from frozen temperatures</i>	<i>Not for preventing warming</i>
	E	Keep product cold (in warm conditions)	Freezer & Room	Freezer (≈ 2 hrs*) Room (≈ 5-20 min)	Precise panel temperature Maximum hold times	Most technical

previously Series 4 → now Refrigerator PCM

*Panels may be stored at this stage indefinitely (for longer than indicated).

About Refrigerator PCM (Phase Change Material)

PCM absorbs and releases thermal energy during the process of melting and freezing. When solid PCM melts, it absorbs the heat from the environment, yet its temperature stays at the melting point until totally liquid. Conversely, when liquid PCM freezes, it absorbs the cold from the environment yet stays at its temperature until totally solid. *Therefore, PCM an ideal, passive solution for a variety of applications that require temperature control.* The most common PCM is water, which has a melting point of 0 °C (32 °F). When solid, ice/water maintains a temperature of 0 °C until it turns completely liquid. So, in essence, the 0 °C melting point makes it unsafe for most refrigerated temperature-sensitive applications.

Cool Cube™ **Refrigerator PCM** has a melting point of 4.5 °C/40.1 °F. When the PCM is solid, a panel helps the Cool Cube™ stay cool (about 5 °C) in warm/hot environments. When the PCM is liquid, a panel helps the Cool Cube™ stay warm (about 4 °C) in freezing conditions. It's right around that 4.5 °C/40.1 °F where a PCM panel's temperature plateaus for a while during the warming up and/or cooling down processes.

How to prepare Refrigerator PCM panels for use in the Cool Cube™

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All Sizes



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PCM Panel for **REFRIGERATOR** temps
(3-6°C / 37-43°F)

Remove Prep (Freezer/Fridge/Room - See User Guide) Assemble Pack-Out Close

Part: CC-PCM-BV(s)
C/N:

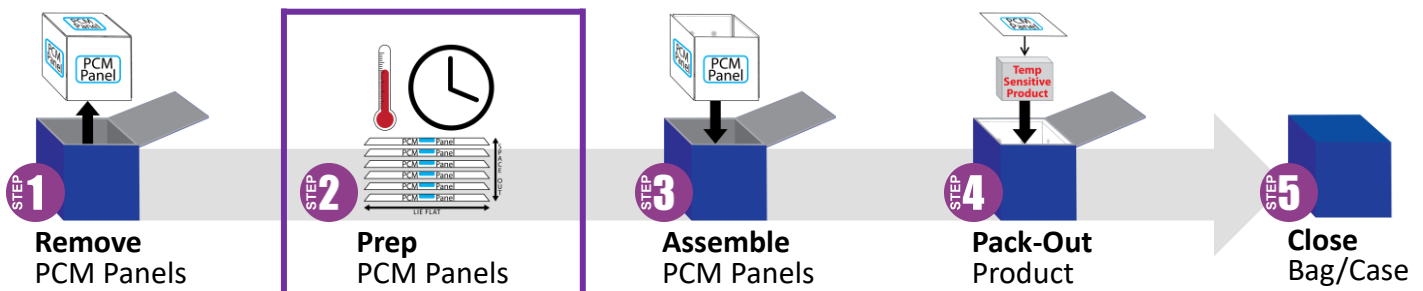
Do not expose to extreme heat (275°F) or use abrasive cleaners.

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Video



Prep Method A: Freezer/Fridge Prep to keep product cold



DO NOT assemble panels directly from a freezer, as they may be initially below 0°C.

Panel Prep

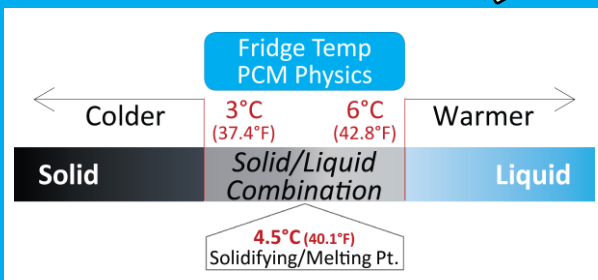
- 2.1 Lay panels flat in a freezer** until all the PCM (phase change material inside the panel) turns solid. At -15°C/5°F the PCM will solidify in a couple hours.
- 2.2 Transfer panels into a fridge** at least 3 hours before use. Panels may be stored in the fridge until needed for assembly or until the PCM melts.*

* If a fridge maintains 4°C/39°F or below, the PCM within the panels will not melt (melting point is 4.5°C/40°F), which will keep the panel solid indefinitely until pack-out. If the fridge maintains 5°C/41°F or above, periodically check for melting and restart at step 2.1 to ensure optimal performance.

- 2.3 Shake panels to verify the PCM is solid.** If there is liquid, restart at step 2.1 to ensure the longest hold time. Using liquid PCM or panels with a solid/liquid combination decreases the hold time.



PCM Panel Shake Test



ISTA 7D Thermal Performance Study

Lab-Qualified Hold Times When Starting with Solid PCM

	Qualified Temps:	2-8°C	1-6°C	1-10°C
Cool Cube™ 03	Utilizing Six (6)	65 hrs	39 hrs	70 hrs
Cool Cube™ 08	Refrigerator Temp	76 hrs	53 hrs	83 hrs
Cool Cube™ 28	PCM Panels	103 hrs	68 hrs	108 hrs
Cool Cube™ 96	(Blue Tab/Label)	126 hrs	112 hrs	128 hrs

Times listed are based on lab-validated, 24-hour cycles of a summer profile (hot ambient temperatures) without the additional thermal mass of a payload, which if conditioned properly, will improve hold times. Actual performance times may vary.

Cool Cube™ Refrigerator PCM Panels

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All Sizes



Blue Tab/Label



PCM Panel for **REFRIGERATOR** temps
(3-6°C / 37-43°F)

Remove Prep (Freeze/Fridge/Room Temp User Guide) Assemble Pack-Out Close

Part: CC-PCM-BV(Sz) C/N:

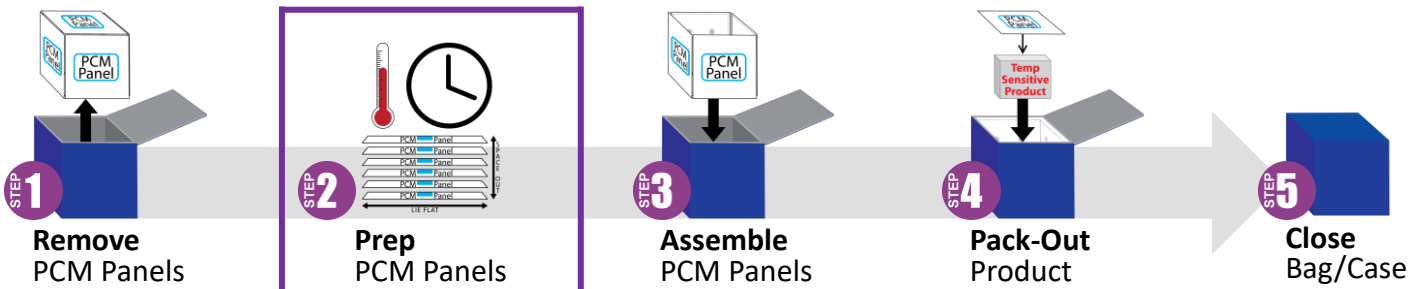
Do not expose to extreme heat (275°C) or use abrasive cleaners.

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Video



Prep Method B: Fridge ONLY Prep to keep product cold



This prep is for when the Cool Cube™ will be used for shorter durations.

Panel Prep

2.1 Lay panels flat in a refrigerator for a minimum of 24 hours before use.

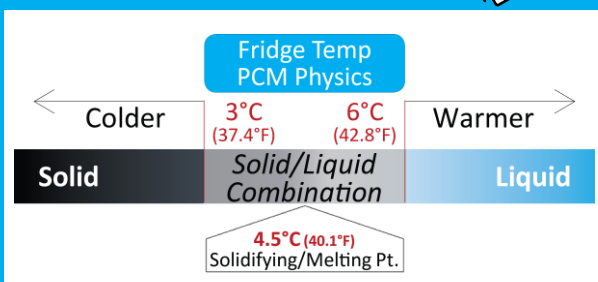
2.2 Shake panels to check the state of the PCM (phase change material inside the panel).



- If *liquid*...panel is at the fridge temp but above 5°C; anticipate shorter hold times.
- If *solid*...panel is at the fridge temp but below 4°C; ideal for maximum hold times.
- If *solid/liquid combination*...panel is at the fridge temp of 4-5°C; monitor time/temp.

In a refrigerator that maintains 4°C or below, the PCM will be solid (ideal for keeping product cold in warm/hot conditions). In a refrigerator that maintains 5°C or above, the PCM will be liquid. Although the PCM is liquid, the panel is at the temperature of the storage environment after 3 hours (i.e., stored in a 6°C fridge, the panels are at 6°C). Assembling the Cool Cube™ with liquid PCM panels (additional thermal mass) will help keep the product at its temperature, just for a shorter amount of time. Monitor Cool Cube™ temperature closely.

PCM Panel Shake Test



ISTA 7D Thermal Performance Study

Lab-Qualified Hold Times When Starting with Solid PCM

	Qualified Temps:	2-8°C	1-6°C	1-10°C
Cool Cube™ 03	Utilizing Six (6)	65 hrs	39 hrs	70 hrs
Cool Cube™ 08	Refrigerator Temp	76 hrs	53 hrs	83 hrs
Cool Cube™ 28	PCM Panels	103 hrs	68 hrs	108 hrs
Cool Cube™ 96	(Blue Tab/Label)	126 hrs	112 hrs	128 hrs

Times listed are based on lab-validated, 24-hour cycles of a summer profile (hot ambient temperatures) without the additional thermal mass of a payload, which if conditioned properly, will improve hold times. Actual performance times may vary.

Cool Cube™ Refrigerator PCM Panels

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All Sizes



Blue Tab/Label



PCM Panel for **REFRIGERATOR** temps
(3-6°C / 37-43°F)

Remove → Prep (Freezer/Room) → Assemble → Pack-Out → Close

Part: CC-PCM-BV(s)
C/N:

Do not expose to extreme heat (275°C) or use abrasive cleaners.

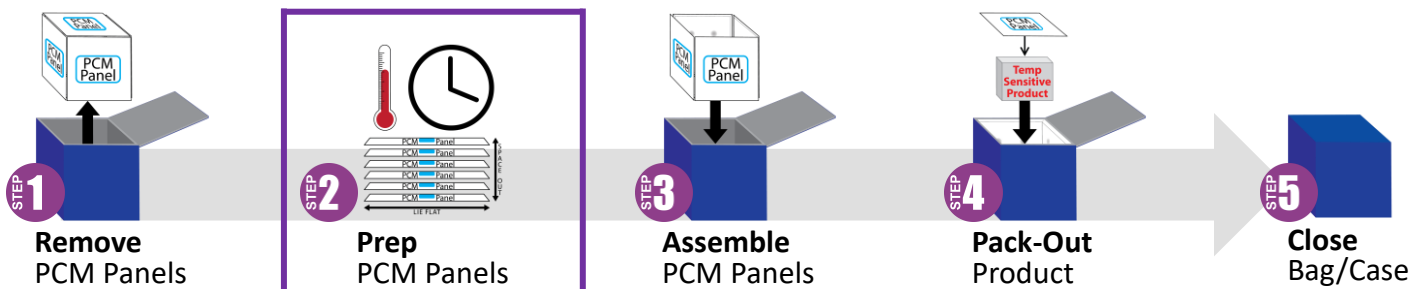
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Prep Method C: Freezer/Room Prep to keep product cold



DO NOT assemble panels directly from a freezer, as they may be initially below 0°C.

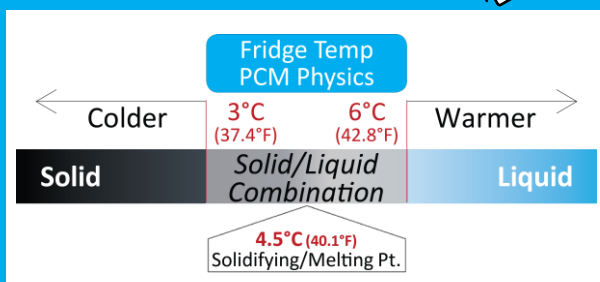
Panel Prep

- 2.1 Lay panels flat in a freezer until all the PCM (phase change material inside the panel) turns solid. At -15°C/5°F the PCM will solidify in a couple hours.
- 2.2 Transfer panels into a room temperature environment just before use to allow the PCM inside to rise to the appropriate operating temperature. Approximate times:

"03" size = 25 minutes	Times based on a 22°C/72°F room.	"28" size = 35 minutes
"08" size = 30 minutes		"96" size = 40 minutes
- 2.3 Wipe off condensate. After frost turns to condensate, the panel is above 0°C.
- 2.4 Shake panels to verify the PCM is solid. If a little liquid is heard, it is at 4.5°C. If there is a lot of liquid, restart at step 2.1 to ensure the longest hold time. Using liquid PCM or panels with a solid/liquid combination decreases the hold time.



PCM Panel Shake Test



ISTA 7D Thermal Performance Study

Lab-Qualified Hold Times When Starting with Solid PCM

	Qualified Temps:	2-8°C	1-6°C	1-10°C
Cool Cube™ 03	Utilizing Six (6)	65 hrs	39 hrs	70 hrs
Cool Cube™ 08	Refrigerator Temp	76 hrs	53 hrs	83 hrs
Cool Cube™ 28	PCM Panels	103 hrs	68 hrs	108 hrs
Cool Cube™ 96	(Blue Tab/Label)	126 hrs	112 hrs	128 hrs

Times listed are based on lab-validated, 24-hour cycles of a summer profile (hot ambient temperatures) without the additional thermal mass of a payload, which if conditioned properly, will improve hold times. Actual performance times may vary.

Cool Cube™ Refrigerator PCM Panels

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PCM Panel for **REFRIGERATOR** temps
(3-6°C / 37-43°F)

Remove → Prep (Freeze/Fridge/Room) → Assemble → Pack-Out → Close

Part: CC-PCM-BV(SL) C/N

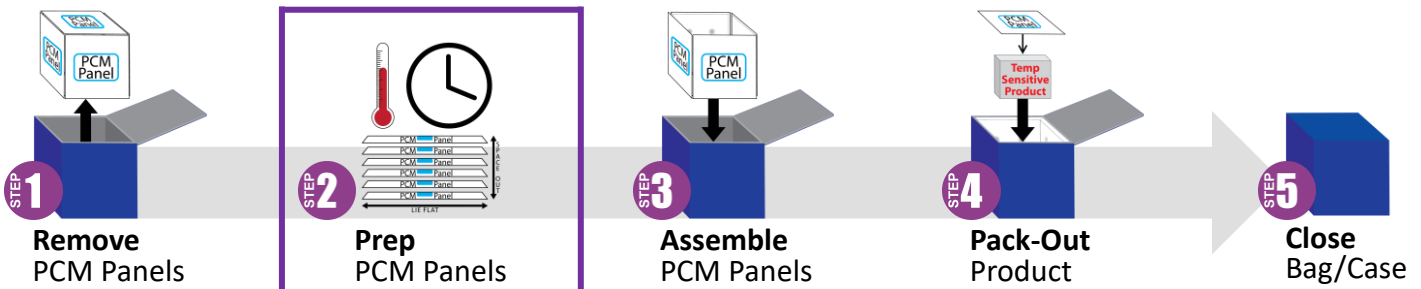
Do not expose to extreme heat (275°C) or use abrasive cleaners.

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Prep Method D: Fridge Prep to prevent freezing



DO NOT assemble panels directly from a room temp, as they may be initially above 8°C.

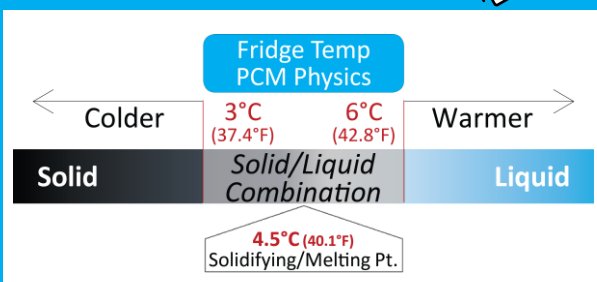
Panel Prep

2.1 Place panels in a fridge between 5° and 8°C for at least 24 hours before use so the PCM (phase change material inside the panel) is liquid.*

* Panels may be stored in the fridge until needed for assembly or the PCM solidifies. If a refrigerator maintains 5°C or above, the PCM within the panels will not get solid (the solidifying point is 4.5°C), keeping the PCM liquid indefinitely until pack-out. Liquid PCM panels will protect the product from freezing until the PCM becomes completely solid.

2.2 Shake panels to verify the PCM is liquid. If solid, restart at step 2.1 to ensure the longest hold time. Liquid PCM will prevent the product from freezing (at refrigerator temps) in extreme cold the longest. Using solid PCM or panels with a solid/liquid combination decreases the hold time.

PCM Panel Shake Test



ISTA 7D Thermal Performance Study

Lab-Qualified Hold Times When Starting with Solid PCM

	Qualified Temps:	2-8°C	1-6°C	1-10°C
Cool Cube™ 03	Utilizing Six (6)	65 hrs	39 hrs	70 hrs
Cool Cube™ 08	Refrigerator Temp	76 hrs	53 hrs	83 hrs
Cool Cube™ 28	PCM Panels	103 hrs	68 hrs	108 hrs
Cool Cube™ 96	(Blue Tab/Label)	126 hrs	112 hrs	128 hrs

Times listed are based on lab-validated, 24-hour cycles of a winter profile (cold ambient temperatures) without the additional thermal mass of a payload, which if conditioned properly, will improve hold times. Actual performance times may vary.

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All Sizes



Blue Tab/Label



PCM Panel for **REFRIGERATOR** temps
(3-6°C / 37-43°F)

Remove → Prep (Freezer/Room) → Assemble → Pack-Out → Close

Part: CC-PCM-BV(s)
C/N:

Do not expose to extreme heat (275°C) or use abrasive cleaners.

VeriCorMed.com/PCM

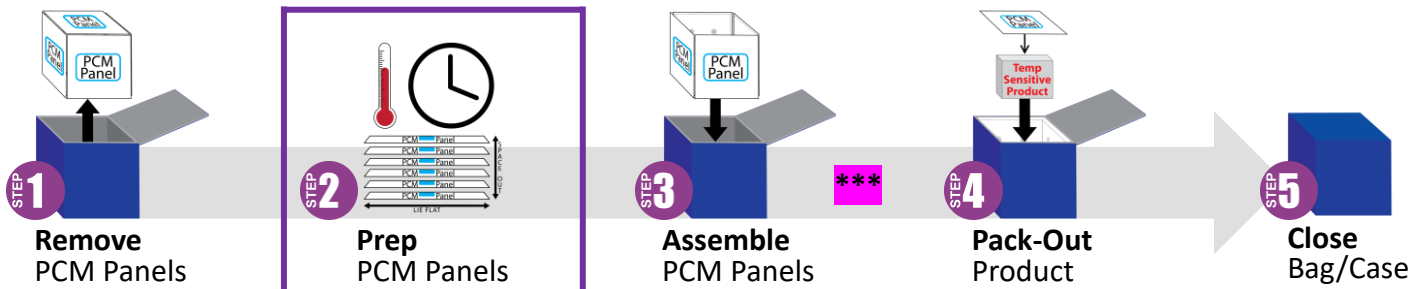
tel: +1 608 526 6901

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Video



Prep Method E: Freezer/Room Prep to maintain 1-6°C



DO NOT assemble panels directly from a freezer, as they may be initially below 0°C.

Panel Prep

2.1 Lay panels flat in a freezer until all the PCM (phase change material inside the panel) turns solid. At -15°C/5°F the PCM will solidify in a couple hours.

2.2 Transfer panels into a room temperature environment just before use to allow the PCM inside to rise to the optimal 1°C. Approximate times:

"03" size = 5 minutes

"08" size = 10 minutes

Times based on a 20°C/68°F room.

"28" size = 15 minutes

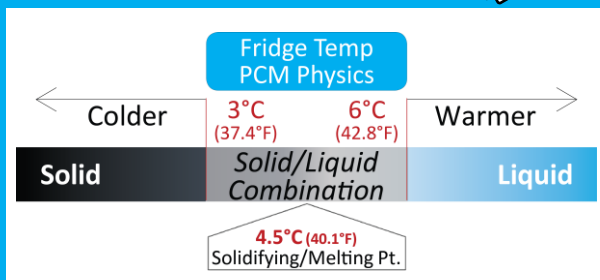
"96" size = 20 minutes

2.3 Wipe off condensate & shake. After frost turns to condensate, the panel is above 0°C. Shake panels to verify that the PCM is completely solid. If liquid is heard, re-freeze (Step 2.1) and proceed. Using liquid PCM decreases the hold time considerably.

***** After Step 3 (before pack-out), insert a thermometer** and close to monitor when the Cool Cube™ gets to the 1°C mark. If below the 1°C mark, wait until it warms up to 1°C before packing out. To speed up the process, transfer panels into a room temperature environment for a couple of minutes and re-check. Pack-out at 1°C will ensure a maximum hold time between 1° and 6°C.



PCM Panel Shake Test



ISTA 7D Thermal Performance Study

Lab-Qualified Hold Times When Starting with Solid PCM

	Qualified Temps:	2-8°C	1-6°C	1-10°C
Cool Cube™ 03	Utilizing Six (6)	65 hrs	39 hrs	70 hrs
Cool Cube™ 08	Refrigerator Temp	76 hrs	53 hrs	83 hrs
Cool Cube™ 28	PCM Panels	103 hrs	68 hrs	108 hrs
Cool Cube™ 96	(Blue Tab/Label)	126 hrs	112 hrs	128 hrs

Times listed are based on lab-validated, 24-hour cycles of a summer profile (hot ambient temperatures) without the additional thermal mass of a payload, which if conditioned properly, will improve hold times. Actual performance times may vary.