-21C Inorganic PCM Thermal Storage Panel

Modular phase change panel for temperature-stable logistics and cold storage buffering. The panel is supplied as a material and module input for validated cold-chain packages, cold rooms, turnover boxes, and engineered buffer systems.

PHASE POINT	FORMAT	LATENT CAPACITY
-21C	800 x 400 x 18 mm	0.560 kWh/plate

Application fit

Frozen-goods logistics, -20C-class cold rooms, low-temperature turnover, and buffer modules.

Use boundary

Do not state interchangeability with -19C products without project temperature tolerance review.

Engineering reference | **Route validation required** | **No fixed duration claim**

Engineering data table

Parameter	Value	Notes
Product code	PCM-INO-PURE-138	Internal SKU retained for traceability
Material class	Inorganic Pure PCM	Public naming should remain application-oriented
Phase change point	-21C	Nominal design point
Density	1300 kg/m3	Product-library reference
Latent heat	310 kJ/kg	Product-library reference
Thermal conductivity	0.5 W/mK	Material-level reference
PCM fill volume	5.0 L per plate	Standard panel fill basis
PCM mass	6.50 kg	Calculated from volume and density
Estimated plate mass	7.22 kg	Includes HDPE enclosure estimate
Latent storage	0.560 kWh/plate	Design-calculated value

Calculation boundary

Panel mass, heat transfer rate, and system duration depend on enclosure wall thickness, fill ratio, contact resistance, air flow, container insulation, payload, ambient profile, and operating procedure. Values above are not a substitute for system-level thermal testing.

Selection guide by temperature zone

Zone	Recommended manual	Typical use	Do not use as
-42C	-42C Inorganic Panel	Deep-freeze buffering and special low-temperature process screening	General certified medical transport claim
-21C / -19C	-21C or -19C Inorganic Panel	Frozen goods, -20C-class cold rooms, low-temperature turnover	Automatic replacement without validation
5C	5C Hybrid Panel	2-8C screening, 5C cold-room disturbance buffering	Single-panel guaranteed 2-8C duration

Decision path

1. Define the allowed product temperature window. 2. Select the closest PCM phase point. 3. Select panel or UltraST module format by available space and heat-transfer method. 4. Estimate quantity by thermal load. 5. Validate with the real package, cold room, or route profile.

Application and validation checklist

Cold Chain Transport Integration

Use as a validated material layer inside reusable containers, liners, turnover boxes, or pallet boxes. Confirm pre-conditioning, payload, ambient temperature, opening events, and route profile before operational use.

Cold Storage Buffering

Use as a distributed thermal buffer for door-opening disturbance, outage recovery, peak-shaving concepts, and local storage modules. Confirm air flow, mounting, charging method, and product safety margins.

Validation item	Required before release
Cycling stability	Confirm phase-change repeatability under intended operating range
Leakage and package integrity	Check enclosure, seals, vibration, handling, and thermal cycling
Compatibility	Review contact materials, cleaning agents, payload, and packaging
Thermal curve	Record charge, hold, discharge, and recovery behavior
Compliance documents	Confirm SDS, TDS, transport classification, and project-specific requirements