

TECHNICAL DATA SHEET OF HimaCool™

savE® Phase Change Materials (PCM) are organic or inorganic chemical compounds that have large amount of heat energy stored in the form of Latent Heat which is absorbed or released when the materials change state from solid to liquid or liquid to solid. The PCM retains its latent heat without any change in physical or chemical properties over thousands of cycles. Various specific temperature PCM's are commercially available in the market (varying between -350°C to 900°C) depending upon the applications.

Applications

PCM provides energy efficient solutions for many industries including:

- Insulation for Building and Piping Products
- Biopharmaceutical Transportation
- Telecommunications and Heat Sinks
- Hot and Cold Storage
- Food / Poultry / Milk Products Transportation
- Boiler and Hot Water Systems Industry looking to exploit Off-Peak Electricity Tariffs / Reducing Chilling Equipment Costs by Storing Energy at Off-Peak Hours

However, there is no limit as to who can apply PCM technology to their operation, to improve thermal management, cost and energy efficiencies.

About HimaCool™

HimaCool™ is a thermal energy storage (TES) based 24x7 micro cold-room which enables cooling at a fixed temperature range, even after sunset. TES technology eliminates the dependency on electrical batteries for cooling during non-sunshine hours.

The Technology

- 1.) During sunshine hours, electrical energy is produced by solar PV modules. These modules installed on roof of the cold-room convert light energy into electrical energy, and this electrical energy powers the refrigeration system to reduce the room temperature.
- 2.) As a result, HimaCool™ functions on solar energy to run the condensing unit during the day and simultaneously, stores thermal energy in Phase Change Material (PCM) based ThermoTab™ active plates
- 3.) The ThermoTab™ active plate is a set of cold-framed and welded sheets of steel. The interior section of the plate has evaporator coils running through it and the remaining space is filled with PCM.
- 4.) When the refrigerant flows through the evaporator coils, the PCM freezes and uses the stored thermal energy to maintain the temperature throughout the night.
- 5.) In retrospective, HimaCool™ operates for 24 hours on receiving only 6-7 hours of sunlight.

Technical Specification:

Type	Chilled				
Temperature (Deg C.)	2°C to 8°C				
Storage capacity (MT)	3	5 to 7	20	40	50
PUF Insulation	100mm	100	100	100	100
Solar Plant Capacity (kW)*	3.2	5	10	20	25
Area required for solar PV installation (m2)	On coldroom roof	On coldroom roof or 28	56	180	230
Refrigeration Capacity (TR)	1.6	2.5	5	12	15
Solar Converter VFD (HP)	5	7.5	10	20	25
Backup Battery (Ah)	200	300	600	600	600
PCM TES Capacity (kW-hr)	8	13	26	52.3	65.4
PCM Active plates	6	12	24	48	55

*note- solar system capacity totally depend upon local weather condition, before finalising the order we must know the site details to calculate the required capacity for solar system.

Critical temperature and storage

All fruits and vegetables have a 'critical temperature' below which undesirable and irreversible reactions take place, thereby resulting in food spoilage. The storage temperature always must be above this critical temperature. Critical temperatures for some of the important crops are:

Commodity	Apple	Beans green	Brinja	Cabbage	Carrots	Cauli-flower	Cucumber	Grapes	Lemons	Lime	Mango	Potato
Commodity Critical Temp. (°C)	-1 - 3	4 - 7	0 - 2	0 - 2	0 - 2	0 - 2	7 - 10	-1 - 1	4 - 15	3 - 10	11 - 18	1.5 - 4

Nigeria & Western Africa

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