

## Critical Temperature

All fruits and vegetables have a 'critical temperature' below which undesirable and irreversible reactions take place. The storage temperature must always be above this critical temperature.

Critical temperatures for some of the important crops:

Commodity	Critical Temperature (°C)
Apple	-1 - 3
Beans, green	4 - 7
Brinjal	0 - 2
Cabbage	0 - 2
Carrots	0 - 2
Cauliflower	0 - 2
Cucumber	7 - 10
Grapes	-1 - 1
Lemons	4 - 15
Lime	3 - 10
Mango	11 - 18
Potato	1.5 - 4

## SUSTAINABLE DEVELOPMENT GOALS

ACHIEVED USING THIS TECHNOLOGY

2 ZERO HUNGER	Zero hunger
7 AFFORDABLE AND CLEAN ENERGY	Clean and affordable energy
11 SUSTAINABLE CITIES AND COMMUNITIES	Sustainable cities and communities
13 CLIMATE ACTION	Climate action

## Recognition for PLUS<sup>®</sup>



TCL- Supply Chain Innovation Award for pharmaceuticals



ASSOCHAM- Innovative Technology Award – 2015 Healthcare category



FICCI- DST Lockheed Martin Award – 2015



CII- Industrial Innovation Award – 2014 & 2017



MIT- Innovators under 35 India Award – 2016 & 2017



WWF- Climate & Energy – 2021



GITA- Global Innovation & Technology Alliance – 2022



Scan the QR code to visit our website



Representante en Latinoamérica  
mariaclaudia.ramirez@qasaysoluciones.com  
www.qasaysoluciones.com

**PLUS<sup>®</sup>**  
TECHNOLOGY FOR  
A BETTER WORLD

PLUS<sup>®</sup> Advanced Technologies Pvt. Ltd.

B-205, Tower-B, Pioneer Urban Square, Sector-62,  
Gurugram-122101 (Haryana), India  
Telephone: +91-124-4309490-91-92 | Fax: +91-124-4824214  
E-mail: info@pluss.co.in



# HIMACOL<sup>TM</sup>

## PCM BASED GRID FREE COLD ROOM

With Integrated Phase Change Materials (PCM) based on Thermal Energy Storage system



**PLUS<sup>®</sup>** | TECHNOLOGY FOR  
A BETTER WORLD





Established in 1994, Pluss Advanced Technologies Pvt. Ltd. (formerly Pluss Polymers Pvt. Ltd.) is a materials research and manufacturing company involved in the field of specialty polymeric additives and Phase Change Materials. Research and innovation have been the focus of the company since inception. The company bears the distinction of pioneering and creating cost effective and innovative products and applications that provide impacting solutions. Experience, interdisciplinary thinking, and practical skills form the growth guidelines for PLUS<sup>®</sup>. PLUS<sup>®</sup> is a subsidiary of Carborundum Universal, a Murugappa group company.



## ADVANTAGES:



**5 MT PCM based cold room** (3 MT and other customized solutions also available).



**100% grid and diesel free:** Powered by solar energy; net-zero carbon footprint.



**Electrical battery free:** Installed PCM plates act as thermal batteries.



**Frozen Temp. range:** -15 to -25 °C.  
**Chilled Temp. range:** +2 to +8 °C.



**High quality produce:** HimaCool<sup>™</sup> functioning as farm gate for farmers.



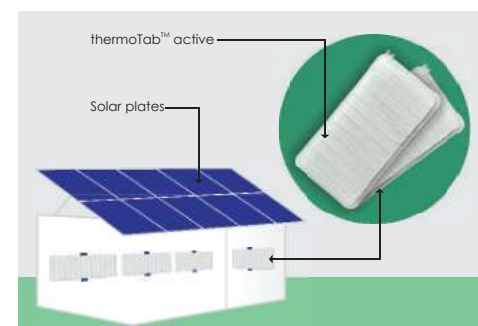
Increases farmer's income and encourages entrepreneurship.

## About HimaCool<sup>™</sup>

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

## The Technology

- During the daytime, HimaCool<sup>™</sup> functions on solar energy to run the condensing unit and simultaneously, stores thermal energy in Phase Change Material (PCM) based thermoTab<sup>™</sup> active plates.
- The thermoTab<sup>™</sup> 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.
- When the refrigerant flows through the evaporator coils, the PCM freezes and uses the stored thermal energy to maintain the temperature throughout the night.
- In retrospective, HimaCool<sup>™</sup> operates for 24 hours on receiving only 6 hours of sunlight.



## PCM-Phase Change Materials

PCM is used to describe materials that use phase change (solidify, liquify, evaporate or condense) to absorb or release large amounts of energy at constant temperatures. PCMs leverage the natural property of latent heat to help maintain product and environment temperature for extended periods of time.