

# PlusICE™

## PASSIVE COOLING ICE PACKS





# WORLD LEADER IN TEMPERATURE CONTROL APPLICATIONS

## INTRODUCTION;

PlusICE Phase Change Materials (PCM) are non-toxic and environmentally friendly chemical solutions with operational temperature ranges between **-100 °C (-80 °F)** and **+885 °C (1,625 °F)**.

They can be either supplied as a solution which can be used to fill client's containers or using our standard range of ice packs & pouches.

In addition to our technical expertise, we offer (under the **PlusICE™** branding) what we believe to be the most comprehensive range of PCM solutions currently available commercially.

Phase Change Materials, commonly referred to as PCMs, are products that store and release thermal energy during the processes of melting and freezing. Phase Change Materials release large amounts of energy upon freezing in the form of latent heat but absorb equal amounts of energy from the immediate environment upon melting.

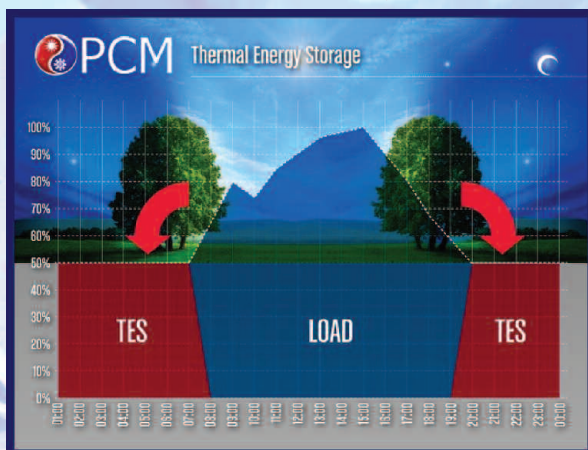
This enables thermal energy storage; heat or coolness being stored from one process or period of time and used at a later point in time or transferred to a different location. PCMs can also be used to provide thermal barriers or insulation, particularly useful for industry sectors such as temperature controlled transport.

Interestingly, the simplest, cheapest and most effective Phase Change Material is water/ice. Unfortunately, its freezing point of 0°C (+32°F) precludes it from the majority of energy storage applications. However, a number of alternative Phase Change Materials have been identified and developed that freeze and melt like water/ice, but at temperatures from the cryogenic range to several hundred degrees centigrade.

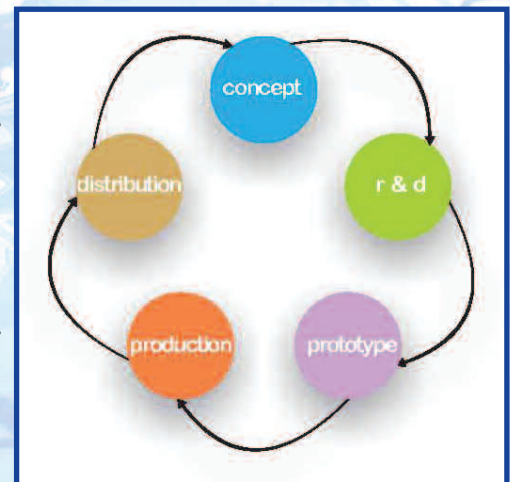
PlusICE Phase Change Material (PCM) can be either supplied as solution which can be used to fill client's containers or alternatively using our standard range of permanently sealed metallic or non-metallic cells which enable heat transfer via natural convection with surrounding air for any temperature controlled packaging and handling applications.

From initial concept, research and development to production and distribution, our office and manufacturing facility in the UK and our Licensed outlets around the world offer bespoke products to meet unique customer requirements.

## HOW DOES IT WORK;



Conversely, when the material is melted, an equal amount of energy is absorbed from the immediate environment as it changes from solid to liquid. The energy stored by the Phase Change Material is released to keep the surrounding space & product below a pre-set desired temperature. The heat transfer between the icepack and the surrounding space provides a cooling facility without a mechanical cooling system.



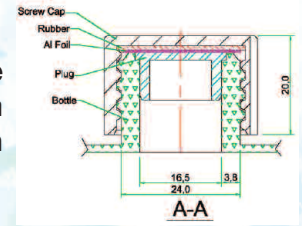
Thermal Energy Storage (TES) is the temporary storage of high or low temperature energy for later use. It bridges the gap between energy requirement and energy use. A thermal storage application may involve a 24 hour or alternatively a weekly or seasonal storage cycle depending on the system design requirements.

Phase Change Materials (PCMs) are products that store and release thermal energy during the process of melting & freezing (changing from one phase to another). When such a material freezes, it releases large amounts of energy in the form of latent heat of fusion, or energy of crystallisation.



## PASSIVE COOLING ICE PACKS;

Eutectic plates are manufactured using HDPE plastic containers and after filling the containers with PlusICE solution are sealed using our triple sealing mechanism which ensures a leak free operation. Our standard range of ice packs are produced in four sizes to cover wide range of temperature controlled shipping applications.



| IcePACK Design Data                    |                     |        |        |           |             | 2013-1 |
|--|---------------------|--------|--------|-----------|-------------|--------|
| ANTI-CONDENSATION APPLICATIONS         |                     |        |        |           |             |        |
| PCM Type                               | 8~25C               |        |        |           |             |        |
| Type                                   | EXTERNAL DIMENSIONS |        |        | Weight kg | Capacity Wh |        |
|  | L (mm)              | W (mm) | H (mm) |           |             |        |
| Small                                  | 150                 | 80     | 30     | 0.49      | 19          |        |
| Medium                                 | 150                 | 135    | 30     | 0.83      | 33          |        |
| Large                                  | 300                 | 150    | 30     | 1.85      | 76          |        |
| FlatICE                                | 500                 | 250    | 32     | 5.47      | 222         |        |
| UPTO 18~20C NIGHT AMBIENT APPLICATIONS |                     |        |        |           |             |        |
| PCM Type                               | S27                 |        |        |           |             |        |
| Type                                   | EXTERNAL DIMENSIONS |        |        | Weight kg | Capacity Wh |        |
|  | L (mm)              | W (mm) | H (mm) |           |             |        |
| Small                                  | 150                 | 80     | 30     | 0.40      | 17          |        |
| Medium                                 | 150                 | 135    | 30     | 0.68      | 29          |        |
| Large                                  | 300                 | 150    | 30     | 1.51      | 67          |        |
| FlatICE                                | 500                 | 250    | 32     | 4.47      | 195         |        |
| UPTO 23~25C NIGHT AMBIENT APPLICATIONS |                     |        |        |           |             |        |
| PCM Type                               | S32                 |        |        |           |             |        |
| Type                                   | EXTERNAL DIMENSIONS |        |        | Weight kg | Capacity Wh |        |
|  | L (mm)              | W (mm) | H (mm) |           |             |        |
| Small                                  | 150                 | 80     | 30     | 0.48      | 22          |        |
| Medium                                 | 150                 | 135    | 30     | 0.81      | 38          |        |
| Large                                  | 300                 | 150    | 30     | 1.81      | 87          |        |
| FlatICE                                | 500                 | 250    | 32     | 5.35      | 254         |        |
| UPTO 25~27C NIGHT AMBIENT APPLICATIONS |                     |        |        |           |             |        |
| PCM Type                               | S34                 |        |        |           |             |        |
| Type                                   | EXTERNAL DIMENSIONS |        |        | Weight kg | Capacity Wh |        |
|  | L (mm)              | W (mm) | H (mm) |           |             |        |
| Small                                  | 150                 | 80     | 30     | 0.65      | 18          |        |
| Medium                                 | 150                 | 135    | 30     | 1.11      | 32          |        |
| Large                                  | 300                 | 150    | 30     | 2.50      | 72          |        |
| FlatICE                                | 500                 | 250    | 32     | 7.35      | 210         |        |

\*Consult our sales team for other temperature applications



\*\*Consult our sales team for other shapes/sizes

## APPLICATIONS;

In principal, the above ice packs can be filled with any of our PlusICE Phase Change Material (PCM) with operational temperature ranges between **-100°C (-80°F)** and **+89°C (192 °F)** for any custom-made applications.

However, the most common applications for the enclosures remain for the anti-freeze protection as well as over-heating protection applications.

The same ice packs can be used for maintaining the warm packaging and shipment applications for any critical electronic (like satellite / military equipment transport) or special product temperature stabilisation applications.

## DESIGN;

The above table illustrates the standard sizes, weights and capacities of the most commonly used application range but if required custom-made size and shape of containers can be manufactured to suit any special applications. Generally, cooler night ambient is the only energy source to charge the above ice packs and therefore we have various temperature PCM ice packs to suit the location and application conditions around the World.

Of course, good ideas are not the exclusive right of PCM! Many of the non-standard applications are initiated by our customers, whether end-user or developer.

## TECHNICAL SUPPORT

PCM Products offers full system design support to assist in proper selection and integration into existing or new installations as well as product development services from conception to completion as part of our customer commitment.

We offer full consultancy on product development on a strict confidentiality basis and the possibility of Licensee, know-how and technology transfer options for local manufacturing. Please consult our technical sales team at [info@pcmproducts.net](mailto:info@pcmproducts.net) for your specific application or visit our web site [www.pcmproducts.net](http://www.pcmproducts.net)



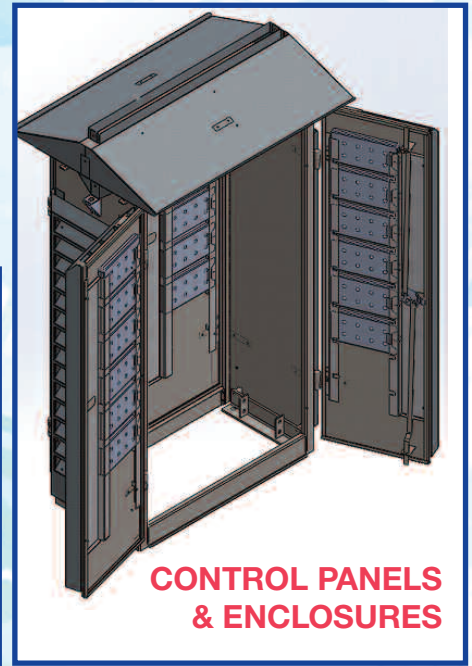
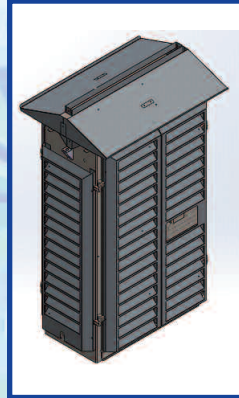
# WORLD LEADER IN TEMPERATURE CONTROLLED ENCLOSURES

## ELECTRONIC / ENCLOSURES PASSIVE COOLING

Main circuit boards/processors generate heat and if this heat is not removed it accumulates within the confined space and the enclosure temperature rises and when it goes above the maximum operating limit of the electronics (generally +45 °C (112 °F)) the system shuts itself down from the safety protection units.

By selecting a PCM that changes phase at a temperature between ambient and the upper operational limit, cool energy can be stored during unused periods. Later this stored energy acts like a heat sponge to soak up the heat from the circuit.

Heat generated by the electrical equipment together with solar gains can be absorbed by the PCM and in return the enclosure temperature is maintained below the upper limit of the system for a safe and reliable operation without any additional cooling system.



**CONTROL PANELS & ENCLOSURES**

## DATA PROTECTION



**HEAT SHIELD**

When a data logger is placed in excessively hot locations like engine tests, ovens, furnaces etc., it may be exposed to temperatures greater than the recommended maximum operating temperatures. Some loggers can cope as high as 110 OC (240 OF) but beyond that they are damaged beyond repair. Insulation delays this heat conduction and offers limited time, but by simply adding PCM as part of the insulation kit the standard time delay of this heat migration can be increased by as much as 10~20 times and effectively the logger can be kept within the high temperature environment far longer than by using conventional insulation alone.

A number of manufacturers offer safes for data back up. Although they offer protection against direct combustion of the content, the internal temperature of the safe may rise to excessive levels if exposed to fire for any length of time.

This can render sensitive storage media such as data disks, tapes, CDs and DVDs useless. By simply incorporating a PCM thermal shield in to the safe, the contents can be protected from the outside temperatures for much longer.



**DATASAFE**

## BATTERY COOLING

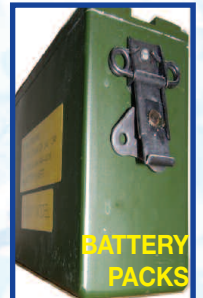
During their charging and discharging period all batteries generate heat and if the batteries are located within a sealed enclosure this heat can become excessive.

The higher the temperature the greater the life of the battery is reduced. Additionally, the holding power as well as the output during discharge are reduced significantly.

By simply incorporating PCM heat sinks which are charged under standard ambient conditions and later this stored PCM energy absorbs the heat generated by the batteries during charging or discharging periods. PCM heat sinks overcome the fluctuation of the battery temperatures which can be stabilised for a reliable, safe operation and extended life.



**BATTERY CELL**



**BATTERY PACKS**

For additional information contact;  
  
Distributor/Installer Stamp



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