Warm-Pack – for Room Temperature Application

Phase Change Material PCM22P

PCM 22P is an inorganic salt hydrate based PCM having phase change temperature at 22^0C. It stores thermal energy as latent heat in its crystalline form. During change in phase this latent heat is released or absorbed and the temperature of PCM remains constant. Warm-Packs with PCM22P can be used to maintain the temperature within an insulated container between +15 to +29°C.

Why PCM 22P?

Cold Supply Chain requires shipping of lot materials at room temperature. Extreme cold and heat can damage the shipped products.
PCM22P encapsulated in 400ml (TSM4) and 600ml (TSM6) can be FROZEN at temperatures below 15°C till the liquid inside is complete frozen. Insulated boxes equipped with these savEnrg™ Warm-Packs when exposed to high ambient temperatures during summer shipping are able to maintain temperatures around 22°C to 27°C.
PCM22P encapsulated in 400ml (TSM4) and 600ml (TSM6) can be WARMED at temperatures higher than 27°C till the liquid inside is completely melted. Insulated boxes equipped with these savEnrg™ Warm-Packs when exposed to low ambient temperatures during winter shipping are able to maintain temperatures around +15°C to 22°C.

Performance Test

To demonstrate the efficiency of savEnrg™ Warm-Packs with **PCM 22P**, a test was conducted. The standard 400ml (TSM4) and 600 ml (TSM6) containers were warmed (melted) using 40^0C hot water.

Test Method

The warmed savEnrg™ Warm-Packs with **PCM 22P** were kept in two types of insulated boxes. The boxes were exposed to sub-zero ambient temperatures. The temperature of the box inside and corresponding ambient temperature were logged with respect to time.

Test Conditions

Box "A"

Size (L x W x H)	= 16 x 12 x 12 (inch)
Insulation thickness	= 2" inch
Insulation material	= EPS Panels
TSM4 container size (L x W x H)	= 190 x 120 x 36 mm
PCM quantity	= 1.5 kg (in 2 TSM6 Bottles)

Box "B"

Size (L x W x H)	= 13 x 13 x 10 (inch)
Insulation thickness	= 2" inch
Insulation material	= PUF molded
TSM6 container size (L x W x H)	= 165 x 95 x 35 mm
PCM quantity	= 0.5 kg (in 1 TSM4 Bottle)

Test Results and Discussions

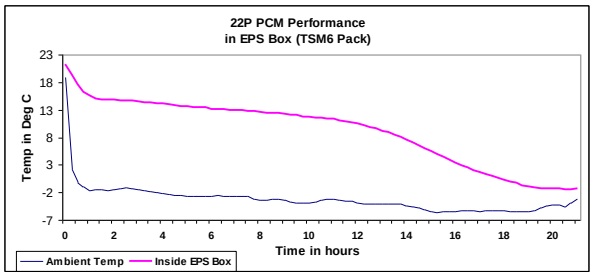

Fig. 01: Test result for PCM 22P in Box "A"

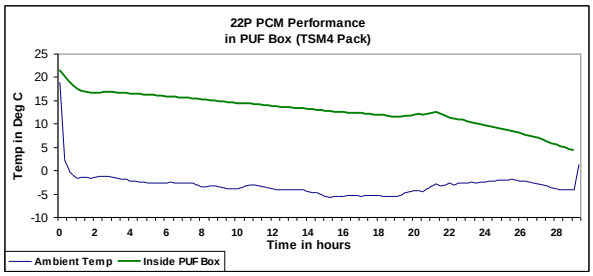

Fig. 02: Test result for PCM 22P in Box "B"

Conclusion

1. Temperature of the box was near 15^0C for around 15 hours in Box "A" and around 20 hours in box "B"
2. Size of the cooling box and it's insulation play an important role in performance of savEnrg Warm-Packs.
3. In both boxes the savEnrg Warm-Packs were able to maintain stable room temperatures for long hours.
4. Knowing the ambient temperatures, by choosing the proper box size, box insulation, the savEnrg Warm-Pack quantity can be calculated to maintain the desired temperature for the desired period.
5. Shipping boxes with savEnrg Warm-Packs can assure required shipping temperature control while maintaining optimized packaging and shipping costs.

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