

## PRODUCT APPLICATION NOTES

# thermoTab<sup>TM</sup> *active*

## What is thermoTab™ active?

**thermoTab™ active** is an innovative solution for temperature controlled logistics which enables the transport of temperature sensitive food and beverages without any need for active diesel run refrigeration system. It is segmented into two broad categories on the basis of applications: Chilled (2°C to 8°C) and Frozen (-25°C to -18°C).

These are two sheets of steel, cold formed and welded together through electrical resistance. The external surface is covered with a thin layer of zinc while into the plate is the Phase Change Material. An evaporator coil, made up of mild-steel, is positioned into the plate that allows freezing of the solution.



## How selection is done?



**1** Understanding Heat Load: Based upon the parameters (below) provided by the customer, a heat-load-calculation is carried out to determine the cooling capacity required.

### PARAMETERS

-  Temperature requirement
-  Ambient temperature
-  Room/container dimensions
-  Backup hours needed
-  Insulation thickness
-  Door operation (no. of doors, their size & opening time)



**2** Sizing of Refrigeration Capacity: Based upon the above calculated heat load, sizing of refrigeration capacity is done.

### PARAMETERS

-  Cooling capacity (kW-Hr)
-  No. Of charging hours required

**3** Selection of thermoTab™ active Plates: After the cooling capacity has been calculated and compressor rating is decided, selection of appropriate plate is made which is based on following parameters/constraints

### PARAMETERS

-  The energy rating of selected plate(s) should also be matched with the cooling capacity (kW-Hr) required as per point 1.
-  The dimension of the plate should fit in with the dimension of container walls

## How is it used?

For using these plates, the truck must have a thermally insulated box/container and a condensing unit coupled to these plates. Then these plates are generally positioned onto the roof, or on the side walls which then allow a constant temperature inside for the whole delivery time.



## Where it is used?

Sites where storage and transportation of following temperature sensitive items are needed:-

- Fresh fruits and vegetables
- Yogurt, milk and dairy products
- Raw meat and sea food
- Processed/canned food products
- Frozen food like ice-cream and cold meat
- Vaccines/drugs

## How is it better than conventional ventilated systems?

- This system doesn't have any moving parts, hence lower maintenance cost than the ventilated system ones.
- Whether the truck's engine is off or not, the cooling effect from the plates is continuously maintained.
- With such a system, there is neither any noise generation nor any pollution from the truck's compressor.

# Data Sheet

# thermoTab<sup>TM</sup> active PCM PLATES

## Chilled

Size	PUF Thickness (mm)	Back up (Hours)	Min. Refrigerant Temp. (°C)	Refrigeration Capacity (KW)	No. of thermoTab <sup>TM</sup> active 1370C Plates Required	Total weight of plates (kgs)	thermoTab <sup>TM</sup> active 1370C Plate Dimensions (mm)
8 ft	100	10	-15	1.02	4	244	1290 x 690 x 49
	100	16	-15	1.37	5	305	
	150	10	-15	0.82	3	183	
	150	16	-15	1.1	4	244	
10 ft	100	10	-15	1.12	4	244	1290 x 690 x 49
	100	16	-15	1.53	6	366	
	150	10	-15	0.89	3	183	
	150	16	-15	1.16	4	244	
14 ft	100	10	-15	1.31	5	305	1290 x 690 x 49
	100	16	-15	1.84	7	427	
	150	10	-15	1.02	4	244	
	150	16	-15	1.37	5	305	

### ASSUMPTIONS:

- 1** PCM charging duration:  
**10 hours**
- 2** No. of doors:  
**1**
- 3** Door opening duration:  
**30 mins** throughout the operation
- 4** Factor of safety:  
**15%**
- 5** Ambient Temp.:  
**40°C**

# Frozen

Size	PUF Thickness (mm)	Back up (Hours)	Min. Refrigerant Temp. (°C)	Refrigeration Capacity (KW)	No. of thermoTab™ active 1370F Plates Required	Total weight of plates (kgs)	thermoTab™ active 1370F Plate Dimensions (mm)
8 ft	100	10	-38	1.24	4	256	1290 x 690 x 49
	100	16	-38	1.75	6	384	
	150	10	-38	1.24	4	256	
	150	16	-38	1.43	5	320	
10 ft	100	10	-38	1.43	5	320	1290 x 690 x 49
	100	16	-38	2.04	7	448	
	150	10	-38	1.24	4	256	
	150	16	-38	1.43	5	320	
14 ft	100	10	-38	1.75	6	384	1290 x 690 x 49
	100	16	-38	2.34	8	512	
	150	10	-38	1.43	5	320	
	150	16	-38	1.75	6	384	

## ASSUMPTIONS:

- 1** PCM charging duration: **10 hours**
- 2** No. of doors: **1**
- 3** Door opening duration: **30 mins** throughout the operation
- 4** Factor of safety: **15%**
- 5** Ambient Temp.: **40°C**

**Disclaimer:**

The information given here is meant as a guide to determining suitability of our products for the stated applications. It is based on trials carried out by our laboratories and data selected from literature and shall in no event be held to constitute or imply any warranty. The products are intended for use in industrial applications. The users should test the materials before use and satisfy themselves with regard to contents and suitability in the desired application. Our formal specifications define the limits of our commitment. Recommendation herein may not be construed as freedom to infringe/operate under any third party patents. In the event of a proven claim, our liability is limited only to replacement of our material and in no case shall we be liable for special, incidental or consequential damages arising out of usage of our material. This datasheet is subject to change without notice.

## Sample Case Study: Cost Benefit Analysis for reefer vans using active plates

	Parameters	Without PCM		With PCM		Remarks
		Rs. Lacs		Rs. Lacs		
<b>Initial cost</b>	Cost of Truck	7		7		For TATA 407 Vehicle ( 8ft x 6ft x 6ft)
	Total cost of PCM-Eutectic Plates to be required			1.50		5 nos. of thermoTab™ active 1250C for 2° and C 12 hours backup
	Truck Body	1.5		1.50		Actual quotes from supplier and customer inputs
	Diesel Refrigeration unit cost	2.5				Inputs from customer
	Condensing unit for charging plates			1.75		Including installation charges as Rs. 15000
	<b>Total Capital Cost</b>	<b>11.00</b>		<b>11.75</b>		
<b>Operating cost</b>	Diesel Consumption for the vehicle ,Liters per hour		4		2.5	Source: Case study for refrigerated trucks & Data obtained from customer
	Per Day (12 hour), Liters		48		30	
	Diesel Cost Per annum (12 hrs. x365 days)	11.388		7.1175		
	Electricity Cost per day			0.001		Rs.6 per unit x 10 units (required to charge PCM plates)
	Electricity Cost per annum for 9 kWh - to charge the PCM Plates			0.219		
	Any other costs - Maintenance etc. (5% of the running cost)	0.569		0.367		
	<b>Total Running Cost per annum</b>	<b>11.96</b>		<b>7.70</b>		
	<b>Investment in Capital cost</b>	<b>0.75</b>				Lacs (difference between Refrigeration system and PCM cost)
	<b>Annual Savings using PCM system per truck</b>	<b>4.25</b>				Lacs (difference in their running cost)
	<b>Payback Period</b>	<b>3-4 months</b>				Including any other extra expenses