

THE NEW NOMAD VPU SERIES OF 1ST CHOICE COOLING

The unique cutting edge vacuum/PU insulation technology has been developed and patented and is used in the New Nomad VPU Cold Chain Box. It offers the medical and food cold chain industry critical protection and thermal Stability over a range of ambient temperatures from +35°C to -25°C. Temperature sensitive products like Vaccines, can be held at between +2°C and +8°C for **more than 72 hours** in an ambient temperature of 35°C, and for in excess of 50 hours in an ambient temperature of -25°C.

Figure 1 is a field test of VPU-586 using a PCM Refrigerant with a Phase Change Temperature of +5°C, in a summer environment - ambient temperature average 29°C.

FIELD TEST 1 VPU-586

Commenced 2015-08-17, 10:14:00 Completed 2015-08-21, 08:44:00 PCM Phase Change Point +5°C

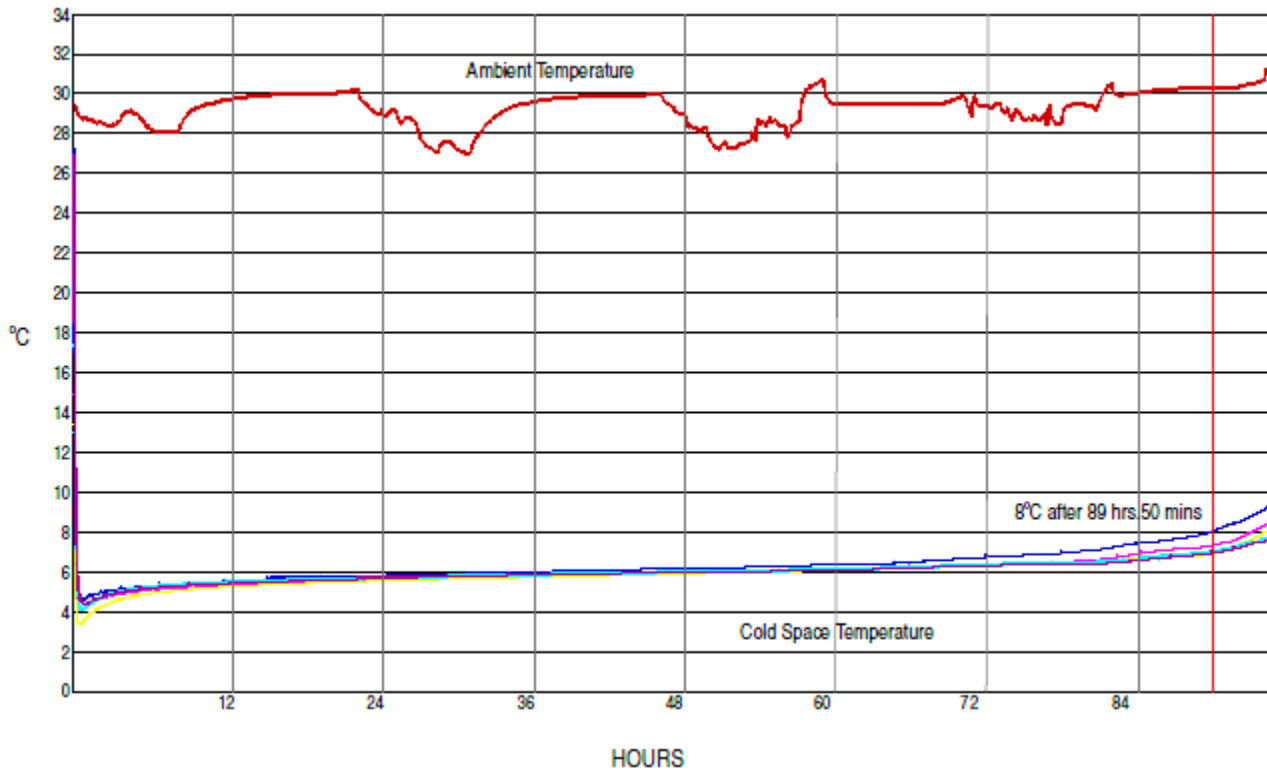


Figure 1.

Figure 2 is a laboratory test in a temperature and humidity controlled cabinet of VPU-586 using a PCM Refrigerant with a Phase Change Temperature of +5°C in a winter Environment - ambient temperature average -20°C.

FIELD TEST 1 VPU-586

Commenced 2015-08-17, 15:36:00 Completed 2015-08-21, 12:02:00 PCM Phase Change Point +5°C

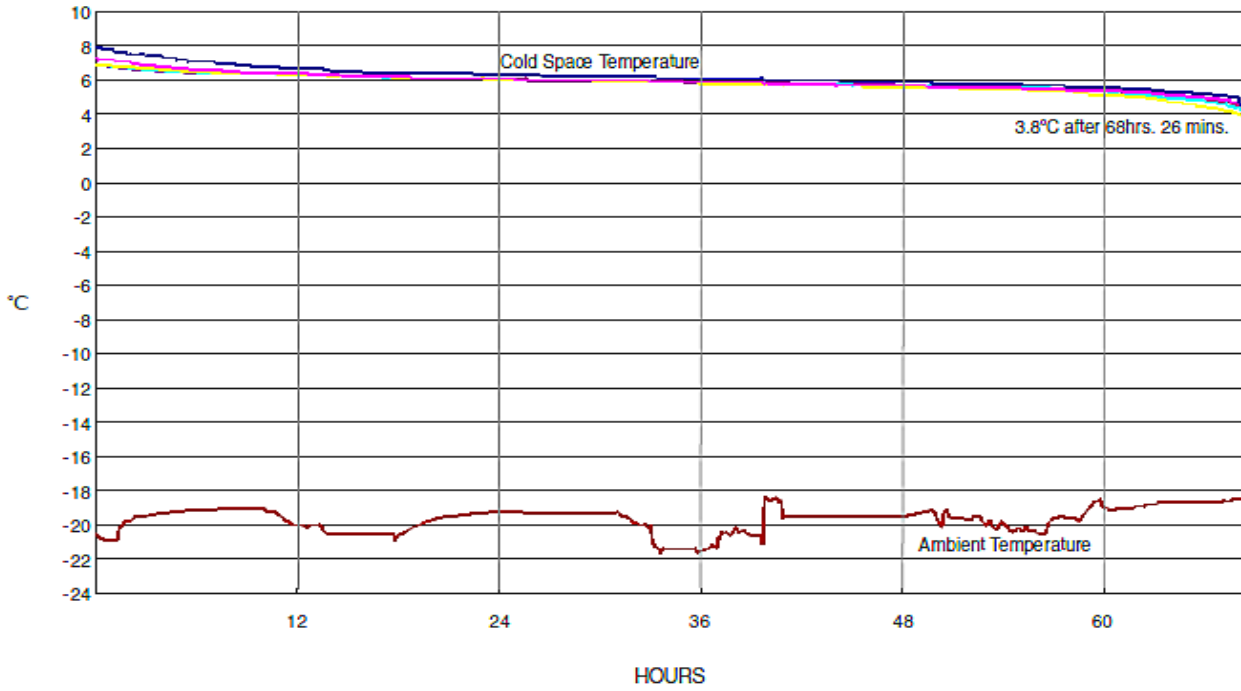


Figure 2.



VPU-586 cooler box offers a solution to the problem of maintaining critical protection and thermal stability over long distances, across regional climates. VPU-586 can maintain a payload temperature range of +2°C. to +8°C. for up to 210 hours during a long distance delivery, in ambient temperatures changing from +30°C to -20°C.

Payloads that need medical and food cold chain technology are diverse - temperature critical over many different ranges and are transported in and through many different ambient temperatures.

Our VPU Cold Chain Box design is only half the story.

The other half of the story is our advanced PCM technology that has made it possible for us to design a range of Refrigerants with a high latent heat capacity and precise Phase Change points.

The whole story means that our VPU and PCM technologies combine to provide a cold chain solution for a wide range of temperature critical product. With longer holding times when compared with other cold chain products and an absolute advantage by providing low cost cold chain transport over long distances.

As an example, VPU-586 can maintain a holding temperature for its vaccine payload for up to 72 hours. On many occasions the same time it takes to deliver the vaccines to° hospitals or health services located in the most remote parts of the world!

Item	Ambient Temperature	Temperature Range	Holding Times
1	35°C	2°C ~ 8°C	72
2	35°C	5°C ~ 25°C	100
3	-20°C	2°C ~ 8°C	48
4	-20°C	5°C ~ 25°C	48
5	35°C	-18°C	36
6	35°C	-30°C ~ 0°C	72
7	30°C ~ -20°C	2°C ~ 8°C	210

Figure 3 is a laboratory test in a temperature and humidity controlled cabinet, of VPU-584 using PCM Refrigerant with a Phase Change Point of -10°C to maintain a holding temperature within the range of -20°C and 0°C for a minimum period of 72 hours, an ambient temperature of -32°C .

FIELD TEST of Nomad VPU-584

Commenced 2015-08-06,22:17:00 Completed 2015-08-10, 14:42:00 PCM Phase Change Point -10°C

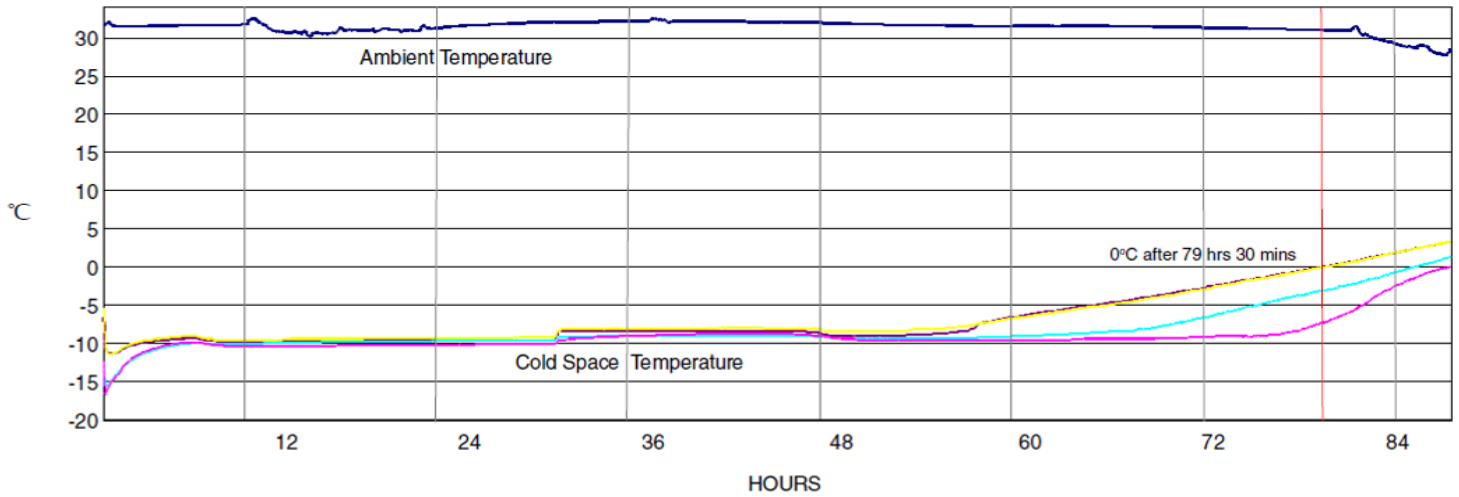


Figure 3



Figure 4 is a field test of VPU-584 using a PCM Refrigerant with a Phase Change Point of -10°C . to maintain a holding temperature within the range of -30°C and 0°C for a minimum period of 66 hours, in an ambient temperature average of 30°C .

FIELD TEST OF VPU-584

Commenced 2015-08-10, Completed 2015-08-13, 08:42:32 PCM Phase Change Point -10°C

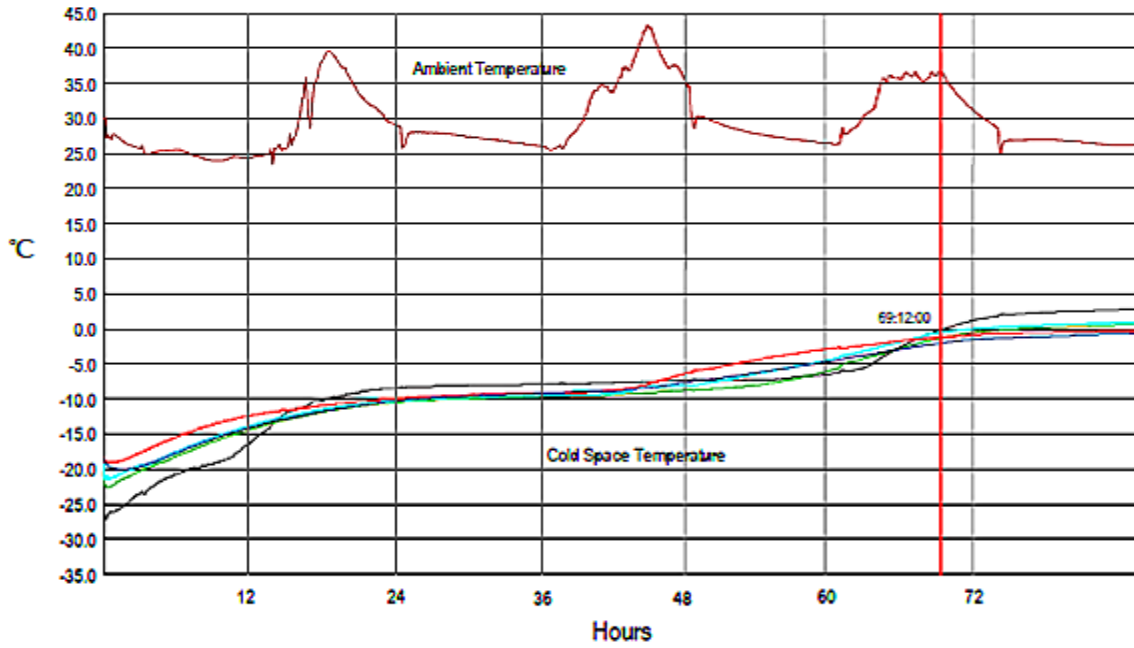


Figure 4.

The Benefits offered by The Nomad VPU Cold Chain Box are:

1. Longer Holding Times at more stable temperatures;
2. Light Weight;
3. Protected by an outer zipped cover, foam lined to guard against damage;
4. Square box, easy to load, transport and stack;
5. PCM refrigerant containers fit the box perfectly and are designed to have no gaps or wasted space.
6. Large range of PCM Refrigerant options are available to meet the needs of the customer.

Figure 5 is a laboratory test in a temperature and humidity controlled cabinet, of VPU-586 using a PCM Refrigerant with a Phase Change Point of -25°C . to maintain a holding temperature within the range of -30°C and 0°C for a minimum period of 60 hours, in an ambient temperature average of 30°C .

FIELD TEST VPU-586
Commenced 2015-08-08, 14:25, Completed 2015-08-11 PCM Phase Change Point -25°C

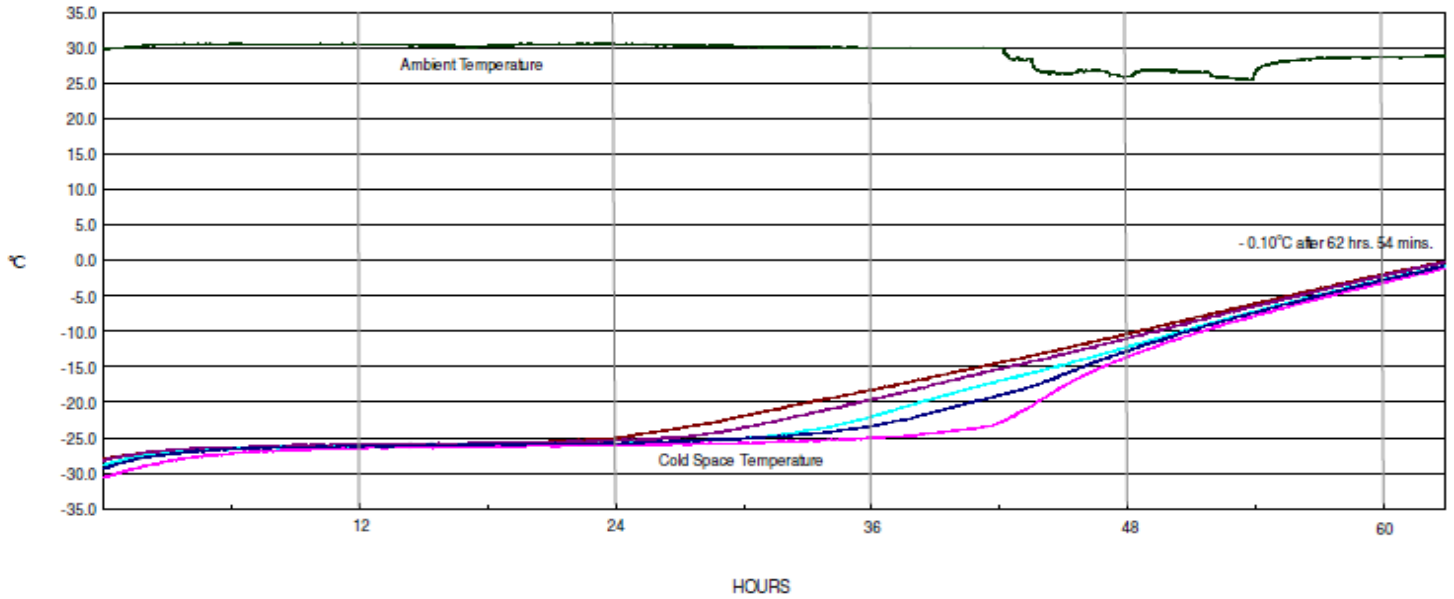


Figure 5

Nomad VPU Cold Chain Box Parameters:

Product	Volume (L)	Basic Holding Time (Hrs)	Dimension	Length (mm)	Width (mm)	Depth (mm)
VPU-124	12	48	Inside	230	230	230
			Outside	310	310	310
VPU-584	58	48	Inside	388	388	388
			Outside	468	468	468
VPU-586	58	72	Inside	388	388	388
			Outside	508	508	508
VPU-786	78	72	Inside	528	388	388
			Outside	648	508	508
VPU-1586	158	72	Inside	540	540	540
			Outside	660	660	660

Comparative Holding Time Performance for Different Insulation Systems:

Figure 6 compares the performance of the VPU system of insulation with five other common cold chain box insulation systems. The Graph shows that by using the VPU insulation system, a much longer holding time and more stable temperature is the result.

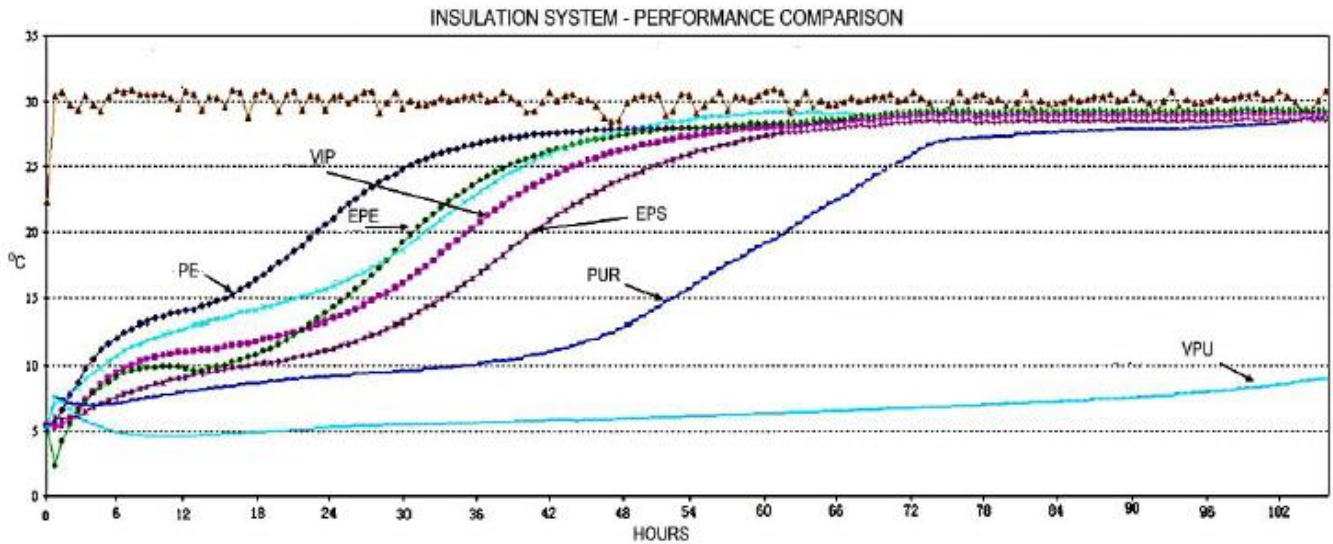


Figure 6





Three Colour PCM Refrigerant Series:

Product	Colour Series	Thickness (mm)	Length (mm)	Width (mm)	Application Remarks	
HTNH-215	1. Phase Change = 0°C, Colour = Blue	20	215	215	Flexible packs sealed by RF welding	
HTBH-260		15	260	180	Flexible packs sealed by RF welding	
HTBH-300	2. Phase Change = -25°C Colour = Green	15	300	200	Flexible packs sealed by RF welding	
HTBH-330		20	330	230	Flexible packs sealed by RF welding	
HTBH-380	3. Phase Change = +5°C Colour = Pink	20	380	380	Flexible packs sealed by RF welding	
HTBH-160		30	160	92	Rigid packs with a screw top filler	
HTBH-175		26	175	130	Rigid packs with a screw top filler	
HTBH-280		26	280	172	Rigid packs with a screw top filler	
HTBH-410		Phase Change = +18°C Colour = Pink	28	410	258	Rigid packs with a screw top filler
			28	410	258	Rigid packs with a screw top filler
	Phase Change = +70°C Colour = Pink					

Identification System for PCM:

To facilitate tracking of each product through our ISO9001 Quality Management System, and to assist Customers in selecting the appropriate refrigerant, our PCM Refrigerants are identified by –

1. Colour (colour pigments are added to identify the type of PCM)
2. Phase Change temperature (marked on each pack, upper RH corner +x°C & lower LH corner –x°C)

Refrigerant	Colour	Illustration	Freezer Temperature	Phase Change Temperature	Some Applications	Remarks
Inorganic	Green		-30°C	-20°C	Fresh frozen blood plasma. Some vaccines (ie. OPV). Icecream. Meat & some fish.	Must be conditioned in a low temperature deep freezer
Frozen Gel	Blue		-18°C	-5°C	Some biological specimens. Some fish. Some prepared foods. Some vaccines.	Can be conditioned in a domestic freezer
Water Based	White		-5°C	0°C	Some medical products. Chilled meat. Some prepared foods.	Can be conditioned in a domestic freezer.
Organic	Pink		2°C	5°C	Most vaccines. Some medical products. Citrus, sub-tropical fruits & fruit type vegs.	Can be conditioned in a refrigerator

Optional : Fast Low Temperature Storage Deep Freezer :

Capacity: 800 litres

Outside Dimensions	Inside Dimensions	Temperature Range	Mains Voltage	Rated Power	Refrigerant
1800*940*1170	1030*780*900	-40°C ~ -10°C	220 Vac @ 50Hz	1.8 kW	R404a

