TECHNICAL DATA SHEET OF savE® HS29

savE® Phase Change Materials (PCM) are organic or inorganic chemical compound that have large amount of heat energy stored in the form of Latent Heat which is absorbed or released when the materials change state from solid to liquid or liquid to solid. The PCM retains its latent heat without any change in physical or chemical properties over thousands of cycles. Various specific temperature PCM's are commercially available in the market (varying between-35^{0}C to 90^{0}C) depending upon the applications.

Applications

PCM provides energy efficient solutions for many industries including:

- Insulation for Building and Piping Products
- Biopharmaceutical Transportation
- Telecommunications and Heat Sinks
- Hot and Cold Storage
- Food / Poultry / Milk Products Transportation
- Boiler and Hot Water Systems Industry looking to exploit Off-Peak Electricity Tariffs / Reducing Chilling Equipment Costs by Storing Energy at Off-Peak Hours

However there is no limit as to who can apply PCM technology to their operation, to improve thermal management, cost and energy efficiencies.

PLUSS® Encapsulation

PLUSS® pioneered the use of HDPE panels as encapsulation for PCMs in India. Our calculations for total heat transfer across thin membranes show that HDPE / PP is as good as aluminum, stainless steel, etc. Pluss® encapsulations are thin enough to give good overall heat transfer coefficient as good as many metals with better mechanical strength.

savE® HS29

savE® HS29 is an inorganic chemical based PCM having a nominal melting and freezing temperature of 29^{0}C. It stores thermal energy as latent heat in its crystalline form. On changing phase this latent heat is released or absorbed, allowing the ambient temperature within the system to be maintained. HS29 is constituted of the right mix of various additives allowing equilibrium between solid and liquid phases to be attained at the melting point.

Why savE® HS29?

savE® HS29 has nominal freezing temperature of 29^{0}C, a temperature that makes it ideal for many

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heating/cooling thermal energy applications. Some of its salient features include:

- HS29 is chemically and thermally stable by using Pluss® proprietary additives.
- This is a blend of various inorganic salts

Technical Specification:

Product : *savE®*
Series : HS29
Description : Inorganic material
Appearance : Off White to pale yellow solid below 30^0 C

T-History Test

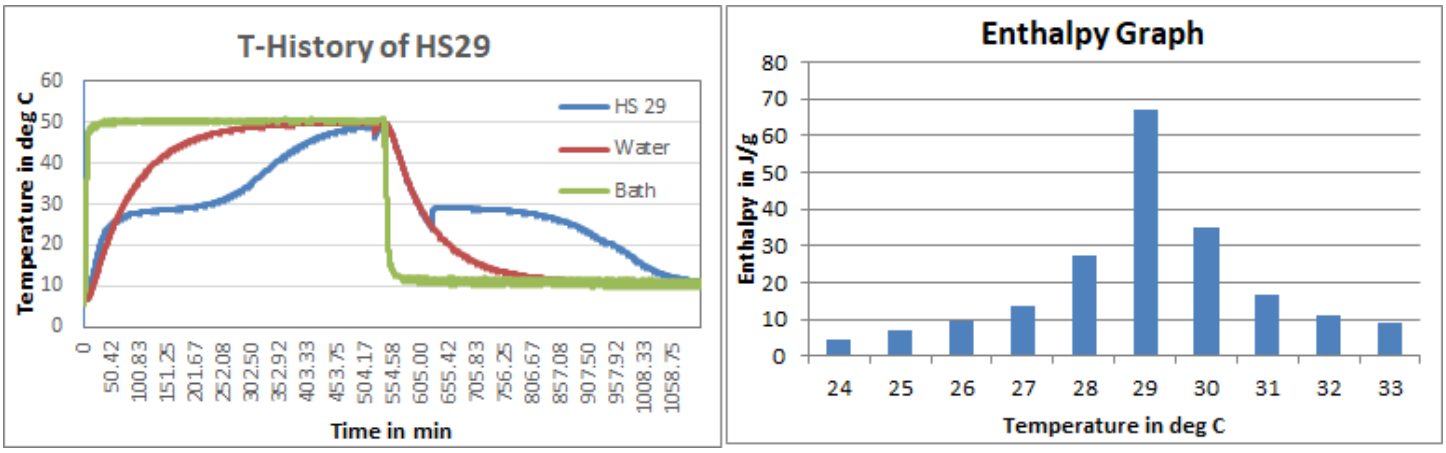

Fig1: T-History graph for HS29 done in air bath

A 20g sample is taken in a test tube in molten condition and placed in a temperature controlled bath. A temperature sensor is placed in the test tube and bath to record the temperatures using a data logger. The bath is maintained at 24°C during the freezing cycle and at around 44°C during the melting cycle.

Property	Value*	Test Method	Test Conditions (if any)
Melting Temp (°C)	29.0	PLUSS® T-History	@ 39°C Liquid Bath
Freezing Temp (°C)	29.0	PLUSS® T-History	@ 19°C Liquid Bath
Latent Heat (kJ/kg)	190	PLUSS® T-History	@ 24 to 34°C
Liquid Density (kg/m³)	1530	ASTM D891-95	@ 39°C
Solid Density (kg/m³)	1681	ASTM D792-08	@ 20°C
Liquid Specific Heat (kJ/kgK)	2.62	PLUSS® T-History	@ 40°C
Solid Specific Heat (kJ/kgK)	1.51	PLUSS® T-History	@ 20°C
Liquid Thermal Conductivity (W/mK)	0.382	KD2Pro	@ 30°C
Solid Thermal Conductivity (W/mK)	0.478	KD2Pro	@ 15°C
Base Material	Inorganic		
Congruent Melting	Yes		
Flammability	No		
Thermal Stability (Cycles)	~2000	PLUSS® Internal	
Maximum Operating Temperature (°C)	~80		
Flash Point (°C)	NA		

* Nominal Values. Actual values mentioned in Test Certificate