

MICRONAL[®] DS 5040 X



Description

Micronal DS 5040 X is a purified paraffin, microencapsulated with highly crosslinked polymethylmethacrylate polymer wall. It is primarily used as a functional component in building materials, textiles, foams, and thermal management systems for temperature regulation.

Properties

Physical form	Powder; >98% SC
Particle size	ca. 50 – 300 µm
Bulk density	ca. 300-400 kg/m ³
Solubility in water	Insoluble- Dispersible in water
Phase Change (Melting)	23 °C ± 1°C (main peak)
Phase Change (Crystallization)	22 °C ± 1°C (main peak)
Heat of Fusion (Int. 10-35 °C)	≥ 95 J/g

Applications

Phase Change Materials (PCMs) are widely used in building and construction, textiles, medical applications, transport containers, coatings, and in flexible and rigid foams. The different types of PCMs available vary considerably, but all work on the same principle of latent heat storage and release. Latent heat storage and release occurs when there is an absorption and release of energy, in the form of heat, during a change in phase (solid <-> liquid) of the PCM material. The use of phase change materials for passive thermal energy storage is particularly attractive due to their ability to provide high storage density of energy and thermal regulation at a constant temperature around the phase transition temperature of the material.

Microtek's Micronal DS 5040 X material consists of polymer microspheres that create a secure containment system for the high-purity paraffin wax core. This makes the direct use of microencapsulated PCMs in materials such as conventional and thick-layer plasters, plasterboard, fillers, floor screeds and concrete, possible. Micronal DS 5040 X can also be incorporated in wood products such as MDF and OSB, and in coatings such as acrylic paints. The distinguishing features of Micronal DS 5040 X are that it is acrylic based, low dusting and free of formaldehyde*, making it favorable for a wide range of applications.

As an example, Micronal DS 5040 X can be employed passively or in conjunction with an active cooling system. The maximum loads on heating and cooling systems can be reduced through the application of Micronal PCMs making buildings more energy-efficient. Micronal can be used in interior applications to maintain a more constant temperature in the range of -24 °C- 25 °C. This leads to a significant increase in comfort inside of the room and reduces peak demands for heating and cooling systems throughout the year.

Processing

Because Micronal DS 5040 X is a dry powder, it can be handled like most solids in processes.

The easiest way to incorporate Micronal PCM is to pre-mix it with system materials and directly add it to the product stream. It is recommended to add Micronal phase change materials to cementitious systems at up to ~ 15% v/v and to plaster-based systems at up to ~ 30% v/v. Thickeners may be added to formulations to help with structural viscosity.

The following points should be considered when cementitious formulations and plaster-based products are being developed:

- Formulations may require the use of more water when using Micronal PCMs
- Plasticizers can be used to counteract thickening effects
- Curing accelerators may be added as necessary, although Micronal PCM causes little delay to the curing process
- Defoamers may be added to reduce air that may become entrapped in the system
- Micronal PCMs can be considered filler particles with an individual capsule diameter of 1-5 µm which are agglomerated to 50-300 µm powder particles. Reduction in the proportion of additional filler particles in mixtures may be helpful for processing



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The following formulas can be used to calculate the total system heat:

$$Q_{PCM} = m_{PCM} \times \Delta H$$

$$Q_{Matrix} = m_{Matrix} \times c_p \times \Delta T$$

$$Q_{Total} = Q_{PCM} + Q_{Matrix}$$

$$\Delta H = 96 \text{ kJ/kg}$$

c_p = Specific heat capacity of the matrix

m = Mass fraction of PCM or matrix

ΔT = Change in temperature

Packaging

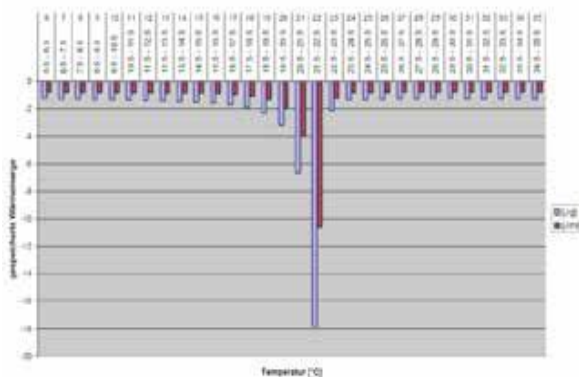
Micronal DS 5040 X is available in sample bottles (1 kg), paper bags (12.5 kg) or super sacks (300 kg).

Health and Safety

When using this product, the information and advice given in our Safety Data Sheet should be observed. Due attention should also be given to the precautions necessary for handling chemicals.

All of our Micronal PCM grades possess a highly durable, plasticizer free acrylic polymer shell. The core consists of highly purified n-alkanes. Chemical and Mechanical aging of the material is limited.

Testing and Quality



Typical values for the enthalpy of fusion of a phase-change building product with the RAL certification mark

