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Innovation & Technology Company Of The Year

Crystal Air PCM

thermal energy storage

Thermal Energy Storage

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PCM TES

6 letters you will want to become familiar with

Proven in Europe, the USA and the Middle East, PCM TES is a more efficient and cost effective way to deliver energy to chill air. By creating and storing energy during off-peak periods which can then be used in high-demand periods, it spreads the daytime requirement for energy to chill or heat air across 24 hours resulting in important cost and capacity benefits. Here are just some advantages of PCM Thermal Energy Storage:

- **Reduces cooling system costs by up to 40% by running on off-peak electricity rates.**
- **Provides waste heat storage during off-peak periods.**
- **Avoids peak demand charges or levies and utility charges by reducing peak-time loads.**
- **Results in a higher Energy Efficiency Rating for cooling system plant.**
- **Lowers capital costs because the system is designed to run at average load rather than max load.**
- **Offers higher scheme capacity than traditional air conditioning.**
- **Delivers high cooling system storage capacity**
- **TES bridges the gap between energy storage and energy use and is used within HVAC systems for cooling and heating schemes. TES schemes may offer full or partial storage.**

What are PCMs?

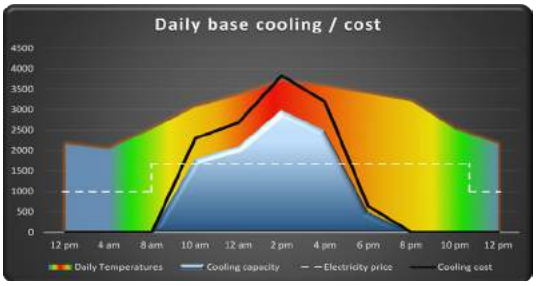
A Phase Change Material (PCM) is anything that releases energy when it changes state; say from liquid to solid or vice versa. PCMs act as latent thermal storage materials. Our Thermal Energy Storage systems use PCMs as the storage material in one of two forms: Crystal T-Paks or Crystal Spheres.

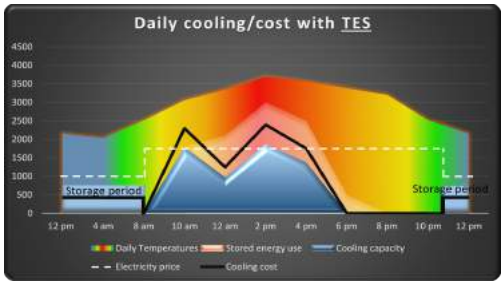
The PCMs we use are encapsulated in HDPE containers in battery format making them suitable for new projects and retrofits without the need for any major disruption of the system design or the need to select low temperature chillers and high glycol content installations.

Peak Lopping

PCM TES aims to store between 30% and 40% of the daily thermal requirement. This stored energy is at your disposal for peak lopping during the daily high-usage periods within the scheme design.

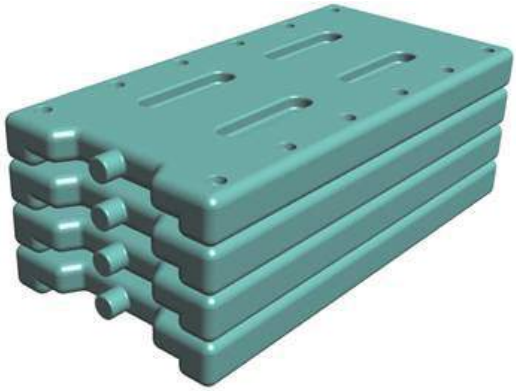
The diagram below shows typical daily heat-gain load profiles for an office. The graph on the left shows the base and the variable peak load elements normally accounted for by the cooling plant capacity, while the one on the right shows the potential for the delivery of the peak load requirement through the use of an off-peak generated thermal energy store.





Crystal T-Packs

The Crystal Air PCM Thermal Energy Storage solutions may use either T-Paks or Spheres to accommodate the phase change material within the overall storage arrangement. The phase change material is supplied encapsulated in specially designed triple sealed HDPE containers. In the case of the T-Paks the containers are designed to allow the creation of a battery effect in water and air systems for thermal storage within the temperature range of +1 deg C to a maximum of 90 deg C.

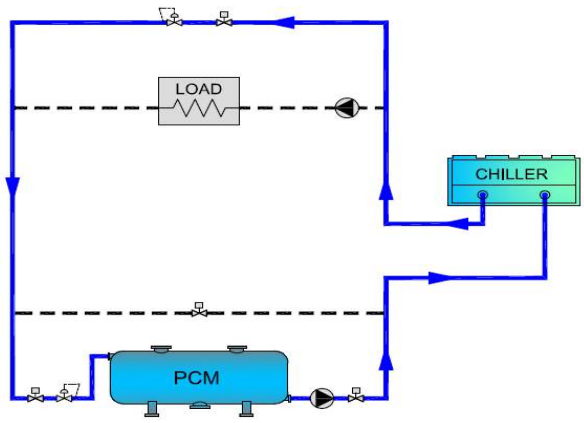


The T-Pak, as per below, is a fully sealed HDPE cassette containing the phase change material. The containers are designed to allow stacking in battery format within the overall thermal energy storage tank up to a maximum height of 2,500mm. The cassette design allows for a small gap between each cassette to ensure for water flow between and around the cassettes to allow for full thermal transfer in either the

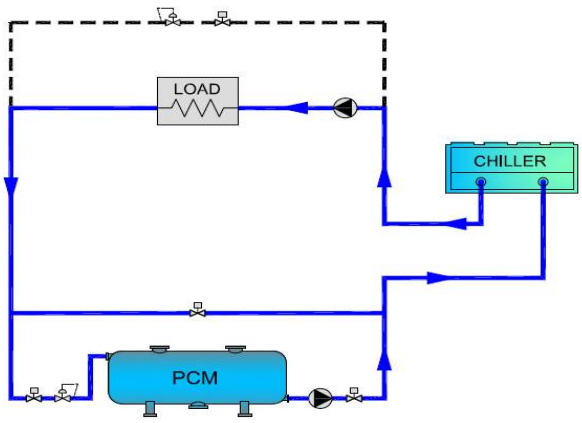
Crystal Spheres

The Crystal Air PCM Thermal Energy Storage solutions may use either T-Paks or Spheres to accommodate the phase change material within the overall storage arrangement. In the case of the spheres the phase change material is supplied encapsulated in fully sealed HDPE moulding. The spheres are available in two sizes 80mm to 100mm diameter.

Charge and Discharge Cycles



PARTIAL SCHEME STORAGE
CHARGING MODE



PARTIAL SCHEME STORAGE
DISCHARGE MODE

Crystal Air PCM

thermal energy storage

Properties	Contents	Operating Range (°C)	Latent Heat (kJ/kg)
HS 33N	Inorganic Salts	-38 to -28	250
HS 26N	Inorganic Salts	-31 to -21	210
HS 23N	Inorganic Salts	-28 to -18	210
HS 18N	Inorganic Salts	-23 to -13	242
HS 15N	Inorganic Salts	-20 to -10	280
HS 10N	Inorganic Salts	-5 to -18	230
HS 7N	Inorganic Salts	-12 to -2	230
Frost® / HS 01	Inorganic Salts	-5 to 5	290
HS 01I	Inorganic Salts	-5 to 5	290
OM 03	Organic Materials	-2 to 8	240
FS 03	Form Stable Mixture	-2 to 8	214
OM 05	Organic Materials	0 to 10	130
FS 05	Form Stable Mixture	0 to 10	110
OM 08	Organic Materials	2 to 13	220
OM 11	Organic Materials	5 to 16	240
OM 21	Organic Materials	16 to 26	250
FS 21R	Form Stable Mixture	16 to 26	183
FS 21	Form Stable Mixture	16 to 26	130
HS 21	Inorganic Salts	16 to 26	185
HS 22	Inorganic Salts	17 to 27	185
HS 24	Inorganic Salts	19 to 29	185
HS 29	Inorganic Salts	24 to 34	190
OM 29	Organic Materials	24 to 34	229
FS 29	Form Stable Mixture	24 to 34	189
OM 30	Organic Materials	25 to 35	200
FS 30	Form Stable Mixture	25 to 35	170
OM 32	Organic Materials	28 to 37	200
HS 34	Inorganic Salts	29 to 39	150
OM 35	Organic Materials	30 to 40	197
OM 37	Organic Materials	32 to 42	210
OM 46	Organic Materials	41 to 51	250
OM 48	Organic Materials	43 to 53	275
OM 50	Organic Materials	45 to 50	250
OM 55	Organic Materials	50 to 60	210
OM 65	Organic Materials	60 to 70	183
FSM 65	Form Stable Mixture (Microwavable)	60 to 70	150
HS 89	Inorganic Salts	84 to 94	180

***Note:** Capacities and details are subject to change as part of our continuous product and data improvement. Crystal Air PCM Ltd. reserve the right to make design and specification changes without notice.