

What is a latent heat thermal energy storage (LHTES) unit?

We present the experimental analysis and numerical modeling of a lab-scale shell and tube latent heat thermal energy storage (LHTES) unit with a (latent) storage capacity of about 10-15 kWh. The phase change material (PCM) is a high density polyethylene (HD-PE) with phase change temperatures between 120 and 135 °C.

What are the three types of thermal energy storage?

Thermal Energy Storage (TES) is constituted by three main categories: sensible, thermo-chemical, and latent heat storage [3]. Latent Heat Thermal Storage (LHTS) uses PCMs, which undergo melting or solidification when energy is exchanged with a heat transfer medium.

Can a latent heat thermal storage reactor be optimized for demand-side management?

This work investigates the optimized design of a latent heat thermal storage reactor, integrated in an existing building supplied by district heating, for demand-side management applications. The storage reactor was designed as a tube bundle heat exchanger in which a commercial-grade paraffin was used as the phase change material.

What is latent heat thermal storage?

By changing tubes pitch and fins, the use of phase change material was optimized. Latent heat thermal storage offers a flexible service to members of a heat district grid as the stored heat can be used to reduce the morning peak demand, limiting the consequences for the production facilities.

What is a 2D computational domain of a staggered tube bundle heat exchanger?

Fig. 5. 2D computational domain of a staggered tube bundle heat exchanger. The scope of this type of result visualization is to observe the behaviour of the PCM in the most critical region, that is, the outlet section where the fluid exits and completes the heat transportation.

How does a heat exchanger work?

A steel tube, 1800 mm long with 15 mm outer diameter, is used as heat exchanger between the heat transfer fluid (HTF) water and the PCM. It is installed coaxial to the storage shell. To allow the visual detection of the melting process, the shell is divided into an inner glass cylinder with 170 mm inner diameter and an outer acrylic glass cylinder.

Energies. The container shape and arrangement of the thermal storage systems (TES) play a vital role in enhancing thermal performance. In the current investigation, the impact of inner tube ...

Parsazadeh and Duan provided a CFD model to study a shell and tube thermal energy storage unit with circular plate fins on the outer surface of the heat transfer fluid (HTF) tube and highly conductive

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Downloadable (with restrictions)! The air conditioning market is in constant growth, which can lead to peak loads in electricity grids during summertime. To overcome such problems, Latent Heat ...

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What is a Tube Bundle? The tube bundle is the heart of a shell and tube heat exchanger. It consists of a series of tubes, typically made of copper, stainless steel, or other materials, arranged in a cylindrical shape ...

By optimizing the configuration of the tube bundle, the heat energy discharged-charged ratio could be improved by 39.6%. Tay et al. [38] ... Investigation on optimal shell-to ...

The model of multi row tube bundle phase change heat storage unit is developed, and the effects of a varying number of tubes in the square cavity, as well as various arrangement approaches ...

An elastic tube bundle heat exchanger can enhance heat transfer by inducing elastic tube bundle vibration with fluid. Still, tube bundle vibration will cause fatigue damage, ...

The TES unit suggested is formed of a tube-bundle heat exchanger identical to the one proposed previously by Liu et al. [45], as Fig. (1) depicts consists of N alternately ...

A new heat transfer correlation for MS appropriate for helical-coil tube bundles with OPTS SG's configuration is proposed. ... Recently, considerable attention has been made ...

It is pointed out in [12] that, due to the rectification of tube banks in the straight tube bundle, when the number of tubes is more than 10, the heat transfer capacity of the rear ...

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