



Aluminum plate-fin heat exchanger for energy storage

Recent studies have focused on improving the thermal performance of PCM HXs by optimizing the spacing and geometry of fins to maximize the energy storage capacity of the system [54, 55] one study, PCM HX performance was numerically and experimentally investigated for rectangular-type and fractal-type metal fins [54].The HX system incorporated a 50 °C phase ...

Average heat transfer coefficient for finned LHTES with different fin numbers; the tube without fins is set as the comparison basis. ... A comparison of heat transfer enhancement in a medium temperature thermal energy storage heat exchanger using fins. *Sol Energy*, 83 (2009), pp. 1509-1520. View PDF View article View in Scopus Google Scholar [13]

Many excellent reviews have been performed on TES, PCM and its heat transfer enhancement technologies. Zhang et al. [8] presented a comprehensive review on the development and practical aspects of TES, focusing on latent and thermo-chemical heat storages. Ibrahim et al. [9] presented a review on heat transfer and thermal conductivity ...

Aluminum-Heat-Exchangers o Industrial Equipment Service | Chart Lifecycle Inc o ALPEMA home ALPEMA Manual o GPA Midstream GPA Midstream Technical Bulletin - Brazed Aluminum Heat Exchangers, GPA- TB-001, December 2020 o API API Standard 668, "Brazed Aluminum Plate -fin Heat Exchangers"

What is a plate-fin heat exchanger? The secondary heat transfer surface is provided by the fins. PFHEs can treat many process streams in one single unit thanks to the flexibility of layer ...

Plate fin . In a plate fin heat exchanger, tubes are inserted through a series of metallic "fins." These fins are made using a continuous roll of (0.004" to 0.032") metal - copper or aluminum, for example - which is fed through a press that punches holes for ...

Relatively low temperature plate fin heat exchangers are traditionally fabricated from aluminum. Initial designs for the compact heat exchanger were comprised of a hybrid fabrication using diffusion bonded stainless steel plates for the CO₂-side, brazed to the aluminum formed fins. Prototype fabrication trials were successful for this hybrid ...

A modification of a commercial aluminum plate-fin heat sink, where the lower portion of the space between the fins was filled with PCM, was employed as the prototype hybrid cooler. An elastomer coating was used to ...

PCMs have been extensively used in solar energy utilization [14], waste heat recovery [15], and thermal management of energy storage batteries [16], [17] due to their properties of isothermal phase change and high



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latent heat capacity. PCMs can also suppress the temperature rise during power surges, making them highly attractive for transient thermal ...

What is a plate-fin heat exchanger? The secondary heat transfer surface is provided by the fins. PFHEs can treat many process streams in one single unit thanks to the flexibility of layer stacking. They can be used to vaporise and condense both single- and mixed-component liquid and gaseous streams, supporting counter-flow and cross-flow ...

This study explores the use of Multi-Objective Genetic Algorithm (MOGA) for thermodynamic characteristics of serrated plate-fin heat exchanger (PFHE) under numerical simulation method. Numerical investigations on the important structural parameters of the serrated fin and the j factor and the f factor of PFHE are conducted, and the experimental ...

Important innovations in coil-wound and plate-fin heat exchanger design and simulation methods are reviewed among others, while special attention is given to regenerators as a ...

1. Introduction. Thermal energy storage systems using solid-liquid phase change materials (PCM's) have gained increasing interest. A comparison of heat exchanger (HEX) designs and concepts as a way to circumvent heat transfer limitations of latent heat thermal energy storages (LHTES) was recently presented by Delgado-Diaz et al. [1]. With a focus on ...

Heat exchangers are frequently installed at an inclined angle to reduce the height of the air-conditioning unit. The inclination may deteriorate the thermal performance of the heat exchanger, and the effect will be more severe for an aluminum heat exchanger compared with a conventional fin-and-tube heat exchanger. However, the literature shows very limited ...

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This paper investigates the flow field and turbulent flow heat transfer around an array of plain and perforated fin using Fluent software within the range of 20,000-50,000 Reynolds. Regarding the turbulent flow, the k - ϵ RNG turbulence model was implemented, and SIMPLE algorithm was used for solving the equations of three-dimensional, steady, and ...

A large test rig has been put into operation [6, 7] for experimental investigation of aluminum plate-fin heat exchangers (PFHEs), which are commonly applied as main heat exchangers of ASUs [8]. In ...

The overall heat transfer coefficient of the plate-fin heat exchanger $U_h A_h$ can be as [25]: (11) $U_h A_h = [1$



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$(N R f i n) + h e (N - 1) T f L + C f k s L f W f] - 1$ where $L f$, $W f$ is the total length and width of the plate-fin heat exchanger, respectively; N is the fins number; $T f$ represent the channel width, m; $C f$ is the thickness of ...

Brazed aluminum heat exchangers are at the heart of our standard and modular plant solutions for small- and mid-scale LNG and cryogenic nitrogen rejection. Chart's Brazed Aluminum Heat ...

Latent heat storage has always received extensive attention from scholars because of the high energy storage and stable heat transfer rate during phase transition [1]. Phase change materials (PCMs) in latent heat storage units ... MHPA with a 14 mm pitch aluminum plate fin (26.5 mm in height, 1 mm in thickness, and cast on a 1.5 mm fin base ...

Another approach to enhance heat transfer is the incorporation of a vortex generator into the PFHE. Mohammad [19] discovered that rectangular vortex generators could improve heat transfer performance by 7%, with an optimal angle of attack 45° . Karima [20] suggested that circular holes exhibited the best heat transfer performance, followed by ...

Liquefied natural gas (LNG) aluminum plate-fin heat exchangers have been widely used in the field of natural gas liquefaction due to their advantages of large transfer area and high heat transfer efficiency (Ref 1,2,3). At present, the head structure is an important inlet logistics distribution component of plate-fin heat exchangers, and its force is very complex.

While most of the heat exchangers used are cylindrical in shape, Oi et al. demonstrated the enhancement in heat transfer characteristics using a plate-fin heat exchanger [39]. Botzung et al. improvised the plate fin heat exchanger by including aluminum foam with the metal hydride heat exchanger [40]. However, plate-fin heat exchangers may be ...

The size of a brazed aluminum plate-fin heat exchanger shall be specified by width W , stacking height H , and length L of the rectangular block. ... The plate-fin heat exchanger (PFHE), which is a crucial part of the design of air separation units, is the subject of the current study. In order to reduce energy consumption, the air entering this ...

alternating plate fin construction offers multiple stream capability and simplifies a series of shell and tube units to a single compact structure. Chart BAHX = Reduced Capital, Installation and Operating Cost o All aluminum construction for maximum heat transfer and thermal conductivity o High performance heat transfer fins

A modification of a commercial aluminum plate-fin heat sink, where the lower portion of the space between the fins was filled with PCM, was employed as the prototype hybrid cooler. An elastomer coating was used to encapsulate the PCM, and the heat source was bonded to the underside of the base plate.



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Three non-uniformities are produced when a plate is placed 10 cm above the exchanger; one is for the exchanger's right side, the upper half portion of the heat exchanger is covered by the second, and the third obstacle is a circular void in the centre of the plate with a diameter of 150 mm. CFD tools are further used to implement the above cases.

o All aluminum construction for maximum heat transfer and thermal conductivity o High performance heat transfer fins o Custom design for optimized thermal and hydraulic ...

In this paper, the heat exchanger structure and HTF parameters of a plate-type latent heat thermal energy storage (LHTES) heat exchanger were investigated through experiments and simulations. From the experimental tests, it was observed that thermocouples accelerated the melting process of paraffin by 6 % on average for a single LHTES plate.

Renewable energy sources are more acceptable and reliable by using efficient and well-design thermal storage. Therefore, enhancing the thermal performance of thermal storage is extensively studied. In the current work, the latent heat storage is a shell and a finned tube heat exchanger, the end of the fins being connected by a coiled spiral. Numerical ...

At the heart of most Thermofin heat exchanger's technology, like in our famous line of generator and motor coolers, lies Thermofin's aluminum extruded finned tubes, the lead actors on which rests the efficiency and longevity of our units. Their particular design, mono or bimetal, provides great resistance (fin stiffness) as well as exceptional heat transfer characteristics (longevity ...

An experimental study of the air-side thermal hydraulic performance of the aluminum wavy fin in heat exchanger was performed. A series of tests were conducted for 16 wavy fin samples with...

Energy Storage is a new journal for innovative energy storage research, covering ranging storage methods and their integration with conventional & renewable systems. ... The cooling plates and fins are made of aluminum and are of the size 113 mm × 42 mm × 65 mm. The length and width of the cross-section of the internal channel are 63 and 2 mm ...

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