COILED CONCENTRIC TUBE HEAT EXCHANGER
H102H

Year 1
study

Features

- An example of an industrial coiled concentric tube heat exchanger with turbulence enhancing tubes.
- The heat exchanger is fully instrumented using the Heat Exchanger Service Un it H102 with thermocouples on the inlet and outlet of both the hot and cold streams.
- The heat exchanger can be arranged so that either hot or cold streams are in the inner tube.
- Co-current and counter-current flow can be established.
- The heat exchanger is deliberately not insulated so that heat losses in all of the configurations can be investigated.

Description

The H102H heat exchanger is mounted on a metal plate and secured on the H102 panel fascia by brass threaded plastic screws.

In normal operation, hot water from the heating tank and pump passes through the ‘HOT OUT’ braided hose and self-sealing coupling into the inner tube. It then flows through the heat exchanger and leaves. Cold water flows from the ‘COLD OUT’ hose through the annulus between the larger outer tube and the smaller inner tube. With the hot water in the inner tube, losses from the system to the outside are minimised while still allowing students to see the construction of the unit. As the cold stream warms above the ambient temperature however there will be some external losses.

The hot hose terminates with a socket and the cold hose a plug to prevent cross-connection. Flow direction may be arranged for co-current (parallel) or counter-current (opposite direction) of the Hot/Cold streams. Self-sealing couplings retain the water in both the hoses and the heat

exchangers. Changeover may be performed without stopping the pump or cold flow, but operators should wear gloves for protection from hot surfaces. Reversing the cold flow direction is the only recommended option.

Related laws

- Mechanical Engineering
- Nuclear Engineering
- Chemical Engineering
- Control and Instrumentation
- Plant and Process Engineering
- Building Services
- Engineering Physics
- Refrigeration
- Marine Engineering

Learning capabilities

- To demonstrate indirect heating or cooling by transfer of heat from one fluid stream to another when separated by a solid wall (fluid to fluid heat transfer).
- To perform an energy balance across a concentric tube heat exchanger and calculate the overall efficiency at different fluid flow rates.
- To demonstrate the differences between counter-current flow (flows in opposing directions) and co-current flows (flows in the same direction) and the effect on heat transferred, temperature efficiencies and temperature profiles through a concentric tube heat exchanger.
- To determine the overall heat transfer coefficient for a concentric tube heat exchanger using the logarithmic mean temperature difference to perform the calculations (for counter-current and co-current flows).
- To investigate the effect of changes in hot fluid and cold fluid flow rate on the temperature efficiencies and overall heat transfer coefficient.
- To investigate the effect of driving force (difference between hot stream and cold stream temperature) with counter-current and co-current flow.

Technical Specification

- Inner Tube Material: Copper
- Inner Tube Outside Diameter: Ø21.4mm
- Inner Tube Wall Thickness: 1mm
- Outer Tube Material: Steel
- Outer Tube Inside Diameter: Ø19.4mm
- Outer Tube Wall Thickness: 1mm
- Active Heat Transfer Section: 1610 (L) mm x 108000mm2

Essential Ancillaries

- H102

What's in the Box?

- 1 x H102H
- Instruction manual
- Packing List
- Test sheet

Essential Services

- H102

Ordering information

To order this product, please call PA Hilton quoting the following code:
H102H