TECHNOLOGY

Microchannel Heat Exchanger with Built In Header Subcooler

OVERVIEW

The two basic demands for air-conditioning and refrigeration systems are improving the efficiency and reducing the size of the equipment. As manufacturing technology advances and has allowed for much smaller heat exchanger tubes, the use of many parallel tubes has led to refrigerant flow malfunction when the microchannel heat exchanger is used as an evaporator. Refrigerant maldistribution causes an overall deterioration of the heat exchanger performance. While near the inlet the vapor quality is very good, by the third or fourth tube groups the vapor quality and the vapor mass flow drop off, resulting in up to 15% performance degradation as compared to a uniform distribution.

Researchers at the University of Maryland have determined that by utilizing an expansion device, the refrigerant enters the manifold, travels to the opposite side of the dividing manifold, and is expanded to the low pressure level through the expansion device. The expanded refrigerant then travels backward while exchanging heat with the refrigerant entering the manifold. Since low vapor quality refrigerant is fed to the microchannel tubes, the distribution is enhanced. Moreover, as two-phase refrigerant is heated while traveling further from the expansion device, the vapor distribution among microchannel tubes is also improved and the vapor refrigerant is preferably fed to the first several channels.

Applications:
· Improvements to current heat-pumps and air-conditioning systems.
Advantages:
· Provides uniform two-phase refrigerant distribution among parallel tubes of a microchannel evaporator.
· Enhances microchannel heat transfer performance 4 – 15%.

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Additional Information

INSTITUTION

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PATENT STATUS

Patent(s) pending

LICENSE STATUS

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CATEGORIES

- Industrial Processing

EXTERNAL RESOURCES

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