

# Energy-Efficient Configuration (EE) vs Micro-channels

www.kalehvac.com

Hemant D Kale, PE

Following are some of the basic and more obvious considerations that favor EE Configuration technology over the Micro-channel Heat Exchanger technology.

- Basic Cost – The micro-channels are made from extruded aluminum non-circular fluid channels of extremely small width (hence the name micro), about 1/8<sup>th</sup> of inch. Fan folded ribbon-type fin material is squeezed between the tubes. The fin material is then brazed to the tubes in large ovens. Similarly, the fluid channel tubes are brazed to the header. This precision manufacturing process is inherently expensive and transcends into higher basic cost relative to EE Configuration.
- Long Production Volumes – Micro-channels require large volume production runs, making it unsuitable for small volume items or for frequent engineering design changes. It is suitable only for large manufacturers with established matured product lines. It will not be viable option for specialty manufacturers, in retail consumer, light commercial, industrial and scientific markets
- Limited Flexibility in Refrigerant/Fluid Circuitry – Unlike the EE Configuration, due to its nature, micro-channels provide very little flexibility in fluid circuitry to achieve the desired velocities. Velocities can be significant in both refrigerant and glycol-water mix to maintain non-laminar flow. It can be important consideration in two phase fluids common in refrigeration.
- Prone to Icing – The narrow air channels inherent in the micro-channels are prone to icing in the evaporator or heat pump application. Whereas, the EE Configuration provides wide fin and tube spacing providing far fewer crevices where condensate may stagnate and form ice.
- High Shipping Cost – The micro-channels are often single row heat exchangers, which results in large face area. To make the end product compact these coils are often bent into “U” or “G” shape. This increases the shipping volume, and, consequently the cost. Whereas, the EE Configurations will always have flat configuration and can be shipped relatively at much smaller cost.
- Rigid Design & Manufacturing Constraints - Not Suitable for niche Markets.
- Large Capital Needs - Given the enormous capital needs, the micro-channels are made by few large manufacturers. They are not a viable option to medium, or start-up manufacturers. For small or medium size end-product OEMs, the size disparity creates supply chain constraints.
- Not Suitable In Evaporator App. – Extremely narrow passages within fan-fold fins and tiny nooks and crannies makes the coil prone to icing, mold development and condensate blow-over.
- Counter Flow – Inherently incapable of providing “counter flow” – the most powerful and unprecedented EE Configuration attribute. Counter Flow guarantees complete heat rejection at minimum fan power, over wide range of ambient temperatures.
- No Meaningful Energy-Efficiency Gains – Considering the cost and other constraints, EE Configuration provides net energy-efficiency or OEM cost gains. The EE Configuration technology provides up to 50% gains in fan power and compressor power consumption, concurrent with OEM cost savings and operating cost savings to the consumer from day 1.

