

Fluid Properties Explained 1 – Debunking Rhetoric

There is a lot of confusion and misinformation about what makes one heat transfer fluid better or more efficient than another. And once the salesman begins to brag about how his fluid's conductivity will reduce degradation or the low density makes for low pressure drop, you may as well get the shovel out and start cleaning up.

Comparing 1 or 2 properties of fluids can be very misleading. For example, low viscosity improves heat transfer but low density reduces it. High thermal conductivity makes water efficient but most non-aqueous fluids have very low conductivity. The only way to compare thermal performance of 2 fluids is to calculate the fluid heat transfer coefficient (also known as the inside film coefficient) using some variation of the Seider-Tate equation. The way the math works in this equation, Viscosity has the most influence on heat transfer, followed by Density, Specific Heat and least of all Thermal Conductivity.

Vapour pressure doesn't count for heat transfer but more on that later.