



Heat transfer breakthrough! Nano Fluid Technology: A more efficient fluid for heat transfer

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For decades, water has been the heat transfer medium of choice in heating, cooling, many hydronic solar systems and virtually everything that heats or cools by a fluid. That is because it is inexpensive, readily available and easily managed. However, water is not the best conductor of heat, water is corrosive to most metals and therefore needs to be treated with inhibitors, and, water has a limited temperature range meaning it will freeze at 32° F. and boil at 212° F. Almost all liquids contract as they cool and freeze, however, water is one of few liquids that will expand and burst when it freezes. Therefore, certain applications need glycol (usually propylene glycol) mixed with water to lower its freezing point, to protect equipment and piping systems. The downside is that glycol inhibits heat transfer making water even less efficient and increasing energy consumed by 15 to 20%! In addition, the glycol/water mixture will derate equipment and system capacity and output by the same percentage. To put this into perspective, you would need a 6,000 MBTU boiler to do the same job as a 5,000 MBTU boiler using a glycol/water mixture, regardless of the fuel used. In addition, pump, pipe and coil sizing will need to be recalculated and upsized for the same reason. This increased first cost, added to a 15 to 20% energy increase, has a huge impact when calculating life cycle cost of a system. Yes, there have been improvements in heating and cooling equipment efficiency this is largely in the form of boiler combustion efficiency or refrigeration compressor efficiency but little in terms of actual heat transfer improvement of a fluid. Attempts to improve heat transfer were in the form of thinner wall copper tubing in coils and heat exchangers or in boiler construction, but we are still using water. That is until now.

Enter, Nano Fluid Technology! For decades, scientists around the world have been trying to find a more efficient fluid to improve heat transfer. Why? Because improving heat transfer, in addition to saving energy, will have a positive and dramatic impact on virtually every industry, home and business that uses energy. Nano Fluids are engineered to contain nano particles. Nano particles are 1-100 nanometers in size. It is hard to imagine the size of a nanoparticle, but there are about 25.4 million nanometers to an inch, or your fingernail grows about 1 nanometer every second!

It is well-known that metal is a more efficient conductor of heat than water. Copper, for example, conducts heat up to 600 times faster than water. So, how do we get water to behave like a metal? Suspend nano particles, such as copper, in a fluid and heat transfer will be increased. In the past, the challenge has been to keep these particles in suspension within the fluid and increase thermal conductivity with little increase in fluid viscosity. Now for the first time a successful nano fluid is available for the HVAC industry! This nano fluid, marketed under the name of Hydromx, is quite remarkable. It is organic, non-corrosive and non-flammable; it replaces water or glycol and has an operating temperature range of between -30° F. and 250° F. Even more important is that Hydromx will not burst, even at -109° F! Laboratory testing and real world applications have shown this fluid

can reduce energy consumption by up to 30% while providing corrosion, scale and freeze protection!

Products using nanotechnology are being developed in many countries and for industries such as electronics, health care, pharmaceuticals, transportation, energy and more. Research is currently underway by Argonne National Labs, funded by the DOE, to develop engine oil, using nanotechnology, that will not break down and provide better lubrication. And, Caterpillar is working to develop a more efficient engine coolant using nanotechnology. More efficient coolants, among other benefits, can reduce the size of the radiator which will mean less weight and better performance. If you would like to learn more about this revolutionary heat transfer fluid, check out Green Way Solutions at www.greenwaysolutionsco.com.

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