DURATHERM

BASIC CONSIDERATIONS FOR FLUID SELECTION

There are numerous, high-temperature heat transfer fluids formulations on the market today. Some are recommended for open-to-atmosphere systems, while others are not. Some are rated for use at operating temperatures as high as 350°C and some as low as only 100°C.

When selecting a thermal fluid, there are many important factors you need to consider. Beyond simply matching a fluid's thermal and physical properties to your application, you should into consideration the following:

Operating Temperature Range

It's essential to select a fluid that can handle both your maximum and minimum operating temperatures. Thermal fluids flow easily when warm but the viscosity of a fluid will increase as the temperature drops. At lower start-up and operating temperatures, a thermal fluid can be very thick so it's important to make sure your pumps can move it effectively at these lower temperatures. This is especially important for outdoor applications in cooler climates.

Also, if the application calls for any low-temperature cooling cycles, you should consider the thermal fluid's performance at those required temperatures as well.

Specific Application Requirements

Some applications have special requirements that will require a thermal fluid formulated and or certified for a specific use.

- Food-grade applications require fluids to meet USDA or other food ratings
- Some regulators and insurance carriers require the use of fluids with flash points above operating temperatures
- Open bath applications need a fluid with extreme oxidation resistance

Types Of Thermal Fluids Available

There are four basic types of high temperature heat transfer fluids: mineral oils; white or paraffinic oils; silicones; and chemical aromatics.

Mineral oils are generally available from major refineries and tend to be low in cost with no or very little additives for extra protection. These products are lightly refined and as a result, often retain aromatic hydrocarbons like naphthalene, xylene, toluene, and benzene along with sulfur, waxes and other components. They tend to have a limited service life when operated at higher temperatures.

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White or paraffinic oils have been around for over 20 years. They are highly refined, extremely pure and free of aromatic hydrocarbons making them more thermally stable than mineral oils.

Silicones are highly resistant to oxidation and are thermally stable up to about 350°C (in closed systems). Careful consideration is required when considering their use in an application because they can contaminate any surface they come in contact with and may cause an issue with product finishing.

Chemical aromatics are typically comprised of benzene-based chemical structures. They have wide ranging temperature characteristics and can often be used up to 398°C in closed system applications. They do offer good thermal characteristics but they tend to be costly and toxic to both the environment and plant personnel. They are often also not recommended for use in open systems.

Fluid Cost Vs. Service Life

Weigh your options based on the service life you need or expect vs. the initial cost of the fluid you are considering. Look at the long-term picture. Initially a cheaper fluid does save you money but over time, unplanned downtime and its associated costs including lost production, maintenance labor, and even disposal fees can add up to more than what a better quality fluid would have cost in the first place.

Also, be sure to consider the costs associated with disposing of any used or contaminated thermal fluid you have chosen for your application – some can be considered hazardous waste.

White oils and mineral oils are generally considered to be the cleanest thermal fluids. They can be easily disposed of along with other waste oils.

Silicones offer similar environmental properties to white oil and mineral oil; however, choosing to dispose of them with other mixed waste oils should be investigated further as segregation may be required.

Chemical aromatic fluids are normally considered hazardous waste at the time of disposal. Additional costs associated with the handling and disposal of these fluids can be substantial and should be taken into consideration when initially evaluating and ultimately choosing them for your thermal fluid application.