DURATHERM
EXTENDED LIFE FLUIDS

TECHNICAL PAPER

UNDERSTANDING FLASH, FIRE AND AUTO IGNITION POINTS

Heat transfer fluids are exceptionally safe if specified correctly for the application and some basic guidelines are followed with respect to their use and handling.

First off, it's important to understand your fluid's fire safety ratings.

Flash Point

The temperature at which the vapors produced from a fluid will ignite (flash off) with the presence of an ignition source (the fluid will not burn at this point). While some applications might require a high flashpoint fluid, it is quite common to operate systems at temperatures above the flash point of the fluid.

Fire Point

The temperature at which the fluid will sustain a fire if ignited by an outside ignition source. Heat transfer systems are commonly run at temperatures above a fluid's fire point as the fluid is contained within the system, far removed from ignition sources.

Auto ignition

The minimum temperature at which a fluid will spontaneously ignite without an external ignition source, such as a flame or spark. Never operate a system above a fluid's auto ignition temperature.

In summary, fluids are intended to be used above their flash and fire points but never above their auto ignition temperatures.

How do these terms apply to heat transfer systems?

In a properly designed system, fluids can be used right up to their maximum bulk fluid temperature rating. This is usually much higher than the fluid's flash and fire points. To understand how you can heat past a flash or fire point, you need to consider how flash and fire points relate to a heat transfer system.

In the case of the flash point, vapors would need to collect or become trapped in a relatively confined space AND have an ignition source to cause a 'flash'. This combination is very unlikely to happen within a properly engineered/constructed system and a workplace operating with even only a moderate degree of safety.

In the case of the fire point, again through proper system design there should be no air/oxygen contact (needed for a fire) at the heat source (boiler, electric immersion heater). Also, during normal operation the fluid is contained within the system and well away from external ignition sources.

Extenuating Circumstances - Leaks

In the 'real world' however , there are circumstances that can pose potential fire hazards that you should be aware of, namely from leaks. When a system leaks it could result in a few potentially hazardous scenarios.

1. The fluid drips onto a hot surface or open ignition source where it could potentially ignite;

2. If a fluid leaks and collects within the system's pipe/reactor jacket insulation, it is of particular concern. This is especially true with open cell insulation and for this reason closed cell insulation is recommended. If the fluid becomes trapped within the insulation it can oxidize. The fluid produces heat as it oxidizes, which remains trapped between the process piping or reactor jacket and the insulation. As the fluid continues to degrade, its fire safety points are reduced and, compounded with the heat created from its degradation, the fluid can start to smolder. This could result in an auto ignition-type fire should air be introduced to the mix.*

* It is extremely important to remember that should any part of your heat transfer system start to leak or smoke that you approach it with caution and have proper fire extinguishing media close at hand, particularly if you see smoldering insulation. Instinctively workers will often cut away the insulation to investigate the smoke which introduces air and could potentially could cause an auto ignition fire.