



avoiding-oxidation-and-thermal-degradation



AVOIDING OXIDATION AND THERMAL DEGRADATION

Oxidative Degradation (Most Common)

Oxidation occurs when a fluid comes in contact with air at elevated temperatures. It is one of the most common forms of degradation a heat transfer fluid can suffer from and usually results in sludge formation within the system. While the various heat transfer fluid chemistries are affected at different temperatures, the most common petroleum based fluids will normally experience oxidation at temperatures above 93°C (200°F). In fact it's generally accepted that for every 15°C (27°F) increase in temperature above 93°C (200°F), the rate of oxidation doubles.

Thermal Degradation

Thermal degradation or thermal cracking is the breaking of carbon-carbon bonds in the fluid molecules by adding heat in excess of the fluid's recommended maximum bulk temperature. The reaction may either stop at that point – resulting in smaller molecules than previously existed being formed, or the fragments may react with each other to form polymeric molecules larger than those that previously existed in the fluid.

So What To Do About It?

Weak points, with respect to oxidation, can easily be identified by looking for any point in the system where the fluid comes into contact with air. Once these points are identified, measure the average fluid temperature in this area – usually the expansion tank or reservoir – during normal operation.

If the fluid temperature is below 93°C (200°F), the system should be sufficiently guarded against excessive oxidation. If however, the fluid temperature is above 93°C (200°F), there are a few quick steps that might help:

1. If the system does not have an external expansion tank or fluid reservoir, consider adding one at the high point of the system. Generally placing a reservoir of 'cold' fluid at the point of air contact will significantly reduce oxidation.
2. If the system has an external reservoir but it is running hot, examine the flow path. If the fluid is flowing through the reservoir, consider plumbing it so that the reservoir is "T'd" into the system and is not part of the circulation loop.
3. If the expansion tank is not part of the circulation loop but it is still running hot, you might try moving it further away from the main system or you may consider adding a nitrogen blanket to buffer the fluid from contact with air.



avoiding-oxidation-and-thermal-degradation

Caption:

Description:

Dimensions: x