Paratherm™
HEAT TRANSFER FLUIDS
A Division of Lubrizol

Analyzing Your Fluid

Rev. 716

Routine fluid analysis is a critical part of any preventive maintenance program. Not only do the results indicate what condition the fluid is in, they also provide an early warning of system or equipment problems that can eventually shut down the process.

How Often to Test the Fluid

Compared to other process heating systems such as direct fire, electric resistance or steam, thermal fluid systems require very little care or supervision for a number of years after start-up. But this "set it and forget it" feature can backfire if it results in surprises like reduced throughput or an unscheduled outage. At that point, it's too late to test the fluid to see if it has "gone bad". Thermal fluids very seldom "go bad" without help—95% of fluid degradation is caused by equipment malfunctions, poor design and/or operating errors. Most of these problems can be identified early on if the fluid is tested within the first 6 to 12 months after start-up and at most once a year after that. Early identification and correction of these problems can prevent surprises.

Taking the Sample

Samples should be taken directly into the sample container with the pump running and the fluid temperature at a minimum of l80°F (82°C). Samples taken cold or from a stagnant loop or from the expansion tank will not be representative of the entire fluid charge. If the system cannot be cooled below 270°F (135°C), install a two-foot length of metal tubing on the sample point to cool the sample; this will prevent the glass sample container from breaking. Some good locations to take the sample include the blow-down valve mounted on a Y-strainer or any low-point drain or pressure gauge tap near the pump or heater inlet. Purge the sample line with at least one full jar of fluid.

Inspection

Many fluid problems can be detected by appearance and smell. Fine black sediment in the bottom of the jar usually indicates solids are accumulating. Liquid contaminants (such as water or hydraulic fluid) can show up as a separate layer in the bottom of the sample. Contaminants that are soluble in the fluid (such as aromatic-based "synthetic" fluids) will affect the sample odor.

Laboratory Testing

Because thermal fluids operate in closed-loop systems (no continuous exposure to air), they require different tests and testing frequency than lubricating oils or hydraulic fluid which operate in open systems (continuous exposure to air). Thermal fluids usually only need to be tested once a year since there are no additive packages that need to be monitored and controlled or water contamination to worry about (water in a thermal—fluid system makes itself known pretty quickly). And since thermal—fluid pump clearances are not critical, metals analysis and particle counts are meaningless. In decreasing order of importance, the three tests that are run on the sample are as follows:

Acid Number (ASTM D-664) measures the amount of acid present in the fluid which in turn is an indication of the amount of oxidation that has occurred. The higher the number the more oxidation has occurred.

Because thermal fluids are blended from multiple components each with its own boiling point, the fluid will boil over a range of temperatures which is called the Distillation Range (ASTM D-2887). The difference in temperature between the new fluid baseline and the test results are averaged and shown as the "Low Boilers—% change" or "High Boilers—% change". The higher the number, the more degradation has occurred.

Viscosity (ASTM D-445) measures how easily the fluid flows. The data is compared to new fluid and the results are shown as a "% change" from new. A positive % indicates that the viscosity has increased (become thicker) while a negative % indicates that the fluid is thinner than new.

Analyzing the Results

Comparing the used fluid to new fluid is usually sufficient to determine whether the fluid has degraded enough to require change out. However, as noted above, 95% of fluid degradation is caused by external forces. Unless the equipment or process conditions that are causing accelerated degradation are corrected, fluid change out could become an annual routine. Properly analyzed and interpreted, the test results can provide the information necessary to identify and correct these undetected problems. Even more valuable are the trends that are evident when samples have been taken at routine intervals. Knowledge of the equipment is also necessary to properly interpret the results and identify the source of the degradation.

Questions? We'd like to hear from you. Call toll-free, +1 800-222-3611, or fax or e-mail us,

2009 Renaissance Boulevard ▪ King of Prussia, PA 19406 USA ▪ +1 610-941-4900 ▪ +1 **800-222-3611** ▪ FAX +1 610-941-9191
E-mail: info@paratherm.com ▪ Web: www.paratherm.com