Fyrquel® Fire-Resistant Fluid Maintenance

supresTA™ BUILT-IN DEFENSE

Understanding Acid Formation

Fyrquel® Fyrquel®

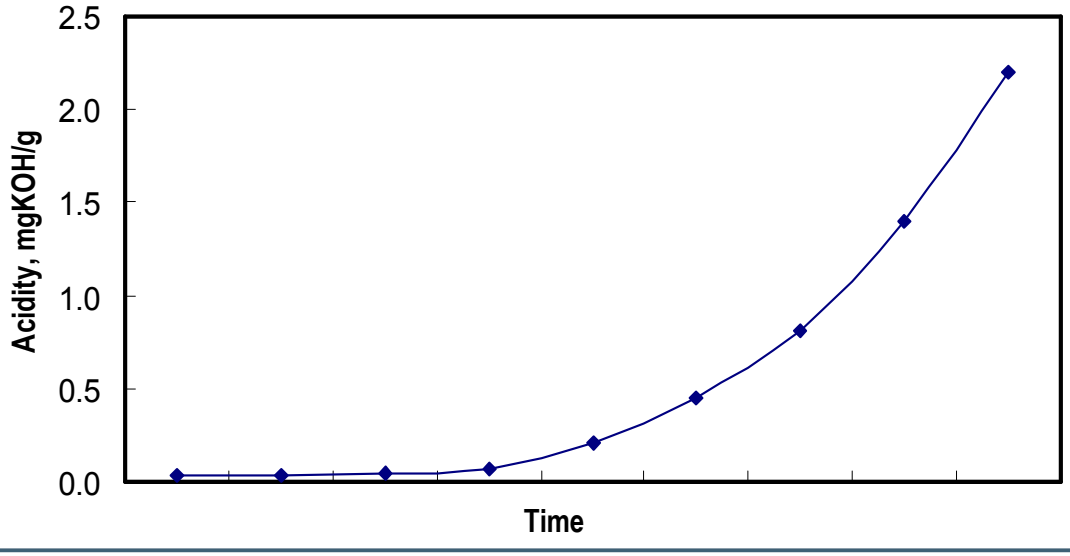
Fyrquel® triaryl phosphate ester fire-resistant hydraulic fluids and lubricants are unsurpassed in reducing the risks of lubricant related fires in critical high temperature operations in the power generation, gas pipeline compression, and basic metals industries. Phosphate esters provide oxidation stability benefits over conventional lubricants in addition to fire safety by limiting flame spread without the use of additives or water.

An understanding of acid formation and methods to control it provides the basis for maintaining Fyrquel® fluid systems in excellent operating condition. Hydrolysis is the primary way phosphate esters breakdown in service. The main points to keep in mind are that:

- water is needed for hydrolysis;
- heat accelerates this process; and
- acid catalyzes further hydrolysis.

The first two points are easy to understand. Phosphate esters cannot combine with water if it is not present. Also, heat accelerates chemical reactions. Hydraulic and lubricating fluid systems are open systems and moisture is present in small amounts. The third point requires some discussion since it is the most important factor for maintaining Fyrquel® systems. The formation of acid in phosphate esters fall into the category of auto-catalytic reactions. If we graph the formation of acid from phosphate esters over time, you can observe a rising rate of acid formation beyond 0.10mgKOH/g. The rate of acid formation correlates to the slope of the curve.

Most users today are easily maintaining their operating fluid at <0.10 mgKOH/g acidity by the continuous use of conditioning filter systems, which contain acid absorbing



filter media. The typical limit set by OEMs for corrective action is 0.20 mgKOH/g acidity. This level represents high acidity condition and degraded fluid conditions may result. Whenever operating fluids reach a 0.20 mgKOH/g acidity, the fluid should be replaced and the system rinsed, flushed, or cleaned as appropriate. Contact your Supresta representative for system maintenance recommendations. When removing used system fluids, it is important to drain as much of the old fluid as possible. New Fyrquel® fluid has an acidity of <0.05 mgKOH/g. If a sample from the new Fyrquel® fluid system exceeds 0.05 mgKOH/g acidity, the system may not have been adequately cleaned beforehand.

The key to maintaining Fyrquel® system fluids in peak serviceable condition is to keep fluid acidity low. The graph shows that it is much easier to maintain a fluid at a low acidity than at a higher acidity. Maintaining a fluid at high acid number is much more difficult because acid is forming more rapidly. It is much easier to maintain fluid at a low acidity than to allow it to increase up to a higher level, for example 0.20 mg KOH/g, and then attempt acid filtration to reduce it. Remediation, by reducing acidity from an elevated level, is not effective in restoring the system fluid to a suitable condition for reliable unit operations. Current industry practice is to use continuously operated off-line conditioning filter systems, containing acid absorbing filter media followed by a fine mechanical filter, to maintain the fluid in near original condition for reliable operations.

In summary, the best way to keep your Fyrquel® phosphate ester in top condition is to:

- keep the system as dry as possible;
- avoid unnecessary high temperature conditions; and
- most importantly maintain a low acid number through a comprehensive fluid maintenance program.

Supresta offers FyrCheck® for Fyrquel® EHC, GT Check® for Fyrquel® GT and Fluid-Check® for Fyrquel® fluids.

For more information about our products and to place an order, please contact one of Supresta's regional sales offices.

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