

## Application Bulletin

### Operating Fluid Maintenance Guidelines

### Fyrquel® EH Product Series

1. Keep the system as dry as possible by changing reservoir desiccant breather on a regular schedule, tightly seal the reservoir and keep filled to its maximum capacity to minimize the air space above the fluid line where condensation occurs.
2. Avoid high, above 71 C, temperature conditions for fluid held in static or low flow conditions.
3. Add new Fyrquel® fluid to a clean or cleaned hydraulic system so that the original or replacement fluid is not inadvertently contaminated by contact with dirty transfer equipment, a dirty system or mixing with excessive old fluid residues. The operator should always sample the new fluid after it has first circulated throughout the system for 2-4 days in order to establish the true starting or baseline operating fluid condition. Ideally the baseline fluid condition should be the same or similar to the condition of new fluid. Using new clean fluid is very important, as is using good breathers to prevent moisture in tanks. However, making sure that everything that comes into contact with the fluid is relatively clean is just as important.
4. Monitor the condition of the operating fluid by periodic fluid analysis for fluid acidity, viscosity, water content, resistivity, particulates and chlorine values. Recommended frequency of fluid analysis is every 3 months. Contact your Fyrquel® product representative for complimentary Fyr-check® fluid analysis, or for assistance interpreting other fluid analysis results. Particle counts measure particulates in the 5-10 and 10-25 micron size ranges. As a point of reference 40 microns is the smallest particle visible to the naked eye. As a result, it is important to practice good sampling technique to avoid contaminating the sample with particles. Keep the sample container closed while flushing the sample port to drain particles that might have been trapped within the sample line, open the sample bottle, place under the stream to collect a clean sample. Cap and clean the bottle. Record the Fyrquel® product name, equipment identification, equipment OEM if needed, example Siemens or GE Energy, and the date sampled when submitting the sample for this routine fluid analysis.
5. All type fluids develop acidity as a consequence of thermal, oxidative and hydrolytic fluid breakdown and need to be controlled. Phosphate ester fluids like Fyrquel® control preventing the increase in fluid acidity by OEM or after market off line chemical filtration using acid removing filter media. Selexsorb® GT and Fullers Earth adsorptive media should be replaced every 3-6 months to avoid circulating fluid through depleted filter media. If using other media types, get a recommendation from your reputable filter media supplier as to when the filter material should be periodically replaced.
6. Note that unlike other depth type filters that will alert operators by too high pressure differential that the filter is in need of replacement in advance of schedule, acid removing filter media will never provide too high-pressure differential indication. The only signal that an operator will get that these type filters are depleted is when fluid acidity increases +0.03 Total Acid Number (TAN). Monitoring acidity condition is very important.
7. Like all types of hydraulic fluids that are used in operating critical equipment systems, fluids may have to be replaced if ever severely contaminated by liquids or solids, or if the fluid ever reaches a severely degraded condition. Operating Fyrquel® EH series products like Fyrquel® EHC, EHC N, EHC S and EHC Plus are considered degraded if fluid acidity exceeds 0.20 mg KOH/g. Severely contaminated or degraded fluid should be drained and replaced with new fluid added to a clean system. Contact your Fyrquel® representative for recommended corrective actions. While the original equipment continuous filtration operated correctly, changing filters cartridges on schedule will normally help to keep the operating fluid in satisfactory clean, dry and low, less than 0.10 TAN Acidity, condition, this same filtration equipment will not be effective attempting to correct for severely liquid contaminated or degraded fluid. Severely contaminated and degraded fluid should always be quickly replaced.

8. If operating fluid ever reaches greater than 0.20 TAN acidity degraded condition during a run period, that is when the unit cannot be shut down to fully replace the degraded fluid, the high acidity of the degraded operating fluid should be corrected immediately by a dilution solution, performing a single or more partial fluid replacements, each minimum 20% volume, with the objective to dilute the excessive operating fluid acidity to no greater than 0.10 or 0.15 TAN. It is important to document the TAN both before and after each fluid dilution fluid correction. It is also important to understand that this step is only a temporary correction to help the operator avoid operating fluid problems until such time that the operating fluid can be totally replaced at the soonest scheduled maintenance opportunity. Depending on the fluid condition, the cleanliness of the equipment, the needed reliability of the equipment, the operator may have to perform additional partial fluid changes before reaching a scheduled outage when the degraded fluid can be replaced and the system cleaned as needed. If an operator decides to continue operating with unsatisfactory fluid condition, the frequency of fluid analysis should be increased and avoiding operating with greater than 0.20 degraded fluid.
9. Factors such as how badly degraded, how dirty the operating fluid was allowed above recommended limits are all factors that should be considered when deciding whether to perform a quick fluid change on the run, a simple fluid rinsing/flushing or special system cleaning. Contact your Fyrquel<sup>®</sup> representative for a recommendation and review System Cleaning Guideline Options bulletin available on [www.fyrquel.com](http://www.fyrquel.com).
10. When replacing old fluid, drain it hot to minimize holdup, clean the reservoir and the pump suction screens of any solid debris using lint free rags. If there is evidence of filter plugging or valve sticking, we recommend flushing, rinsing or cleaning the reservoir and flow path to make sure that damaging system contamination is removed before the new fluid fill is added. As mentioned above it is important to do a fluid analysis of new fluid fill after the first 2-4 days circulation in order to determine the baseline condition for the new fluid fill. The baseline result will demonstrate if old fluid residues or system contamination significantly contaminates the new fluid fill.
11. Consult the SDS for fluid handling recommendation.
12. Visit [www.fyrquel.com](http://www.fyrquel.com) to self-serve for product and application literature and bulletins.
13. ICL-IP offers a full range of 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> generation fluids, all OEM approved, and introduced over time in response to industry needs. Consult with a Fyrquel<sup>®</sup> Fluid Representative to learn the benefits changing to more modern Fyrquel<sup>®</sup> product, or other assistance.

#### Other General Comments

1. Unlike standard oils which deteriorate in service typically due to thermal or oxidative breakdown of additives, Fyrquel<sup>®</sup> phosphate ester fluids are highly thermally stable synthetic fluids and will typically deteriorate due to high acidity caused by hydrolysis over a long period of time. Water is needed for the hydrolysis and heat accelerates the process. The mild acid that is produced from the breakdown reaction catalyzes further hydrolysis and over time may lead to excessive greater than 0.20 TAN fluid acidity condition.
2. Continuous acid and water filtration is accomplished using an off line filter system. The system consists of a dedicated pump and two filter housing connected in series that operates independently from the main hydraulic system. Alternatively fluid is supplied via a flow controlled orifice. The primary filter housing is designed for acidity absorbing media filter cartridges, typically BASF Selexsorb<sup>®</sup> GT or Fullers Earth media. The second filter housing uses standard particulate filter cartridges. Ion exchange cartridges are also used. It is important to purchase filters and filter cartridges from reputable suppliers.
3. It is important to know that the acid controlling filter cartridges will not be effective correcting for excessive greater than 0.20 TAN high acidity fluid. This is because high acidity TAN operating fluid has already severely deteriorated, undergoing chemical changes which cannot be safely reversed by filtration. The function of the off line acid and water absorbing filters is to maintain new fluid in serviceable condition not to try to remediate or to correct for degraded fluid.
4. If the hydraulic system is dirty or compromised by fluid breakdown contaminants, the reservoir and flow path should be cleaned prior to returning new fluid to the system. See the Fyrquel<sup>®</sup> Fluid System Cleaning technical bulletin for general options and recommendations and consult with your Fyrquel<sup>®</sup> Representative.