TECHNICAL BULLETIN

The importance of viscocity in equipment lubricants

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Viscosity is the most important physical property of a fluid lubricant.

Viscosity is a measure of an oil's resistance to flow, decreasing with increasing temperature and vice versa. It slowly increases with time due to aging and oxidation of the oil, but rapid changes in viscosity signal significant problems. Many laboratories do not offer viscosity measurement or will only perform the measurement at 40°C, rather than 100°C for engines and 40°C for non-engine compartments, which is the internationally recognized standard. ALS offers viscosity measurement at both temperatures as needed.

Optimal viscosity selection maximizes reduced friction by creating and maintaining a proper fluid film which separates moving parts or minimizes metal contact, depending on design and application. Several variables will come into play, including startup and operating temperatures, the load on the fluid film and equipment operating speed. Temperature, load, and speed interplay, affect whether a higher or lower viscosity lubricant is required.

One basic rule of thumb is to follow equipment manufacture recommendations and warranty requirements. Under certain situations lubrication challenges arise where your equipment and lubricant supplier may need to adjust viscosity requirements. In these situations, there are some relevant points to consider.

Generally, a lubricant is used with a viscosity as low as possible that is known to provide ample protection under operating conditions by maintaining a proper fluid film thickness and keep moving parts separated. Lower viscosity oils will also provide better protection at startup and improved energy efficiency. When there is a level of doubt a higher viscosity oil can create a margin of safety, but this is compromised by higher operating temperatures, greater startup and pump wear, and susceptibility to viscosity decrease due to shearing.

The speed of one moving surface to another in operating equipment affects viscosity requirements and performance. Higher speeds may require a lower viscosity oil for the fluid to continue to flow sufficiently as well as carry away heat. Higher speeds allow lower viscosity oils to carry a higher load. The slower the speed,

the higher the viscosity requirement required to maintain a fluid film. Higher viscosity oil at slow speeds generally does not contribute to noticeable heat generation. As the load decreases at a given speed, the viscosity will generally decrease. As loads increase at a given speed the viscosity will generally increase.

Higher operating temperatures will also necessitate higher viscosity lubrication, so that the fluid does not thin down too much. But as noted, higher viscosity oils will also create more heat, so this should be taken into consideration. When testing for viscosity, changes can indicate depletion of the lubricant's service life or contamination. Increases in viscosity can be due to extended drain intervals, contamination, forms of oxidation and oxidation materials, product mixture, and buildup of soot or solids. Viscosity decrease can be attributed to contamination (such as fuel dilution or solvents), shearing, product mixture, and, in some cases, hydrocracking. Checking viscosity is a primary parameter in monitoring a lubricant's service life. Changes in viscosity can be correlated with other tests results for contaminants, oxidation or acid number. For further information about having viscosity testing performed on your oil, please contact: reliability@alsglobal.com.