Pentagon Lubricants (I) Private Limited

Recipient of 'Model 5s Company'
By ABK-AOTS DOSAKAI, Japan.
1st Company in India to be conferred in SSI category.

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an initiative
of
Pentagon Lubricants (India)
Private Limited,
Chennai,
India.

for the benefit of
its esteemed customers

to know more about us
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CUSTOMER EDUCATION PROGRAM

No.1, Appa Rao Colony, Tambaram Sanatorium, Chennai – 600 047, INDIA.
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Beyond Creating Great Products, We Are Here To Create More Educated Customers!

foreword by s.alex wilfred managing director

Dear All,

Greetings!

This is our 9th issue – December 2013 of our Customer Education program (CEP). With tremendous and positive response received from our customers about our earlier issues we are now going ahead with our next issue.

The topics covered in our last issue on the Do's and Dont's of Coolant Management Systems was appreciated by our readers/ Customers to a great extent.

In the current CEP issue we will cover topics on what is the possible cause on drop in viscosity of the oil in the circulation Oil systems ??

Through our CEP Issues, we are able reach to our customers and create awareness to them on Lubricants and by proper analysis and maintenance how they could maximize the system performance.

If you wish your friend or colleague in Purchase/ Commercial/Production/Quality/Maintenance department to be benefitted by our CEP please send us their contact details.

Cheers!
S. Alex Wilfred

Topics Covered In This Issue:

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Viscosity Grades of Lubricants ??

Viscosity is the measure of the oil's resistance to flow (shear stress) under certain conditions. Oil's viscosity represents the measure for which the oil wants to stay put when pushed (sheared) by moving mechanical components.

Through the years, lubricant users have been treated to a number of ways to designate viscosity grades of the lubricants used in manufacturing.

The purpose of the ISO system (International Standards Organization Viscosity Grade, ISO VG for short)of classifying viscosity grades is to establish a viscosity measurement method so that lubricant suppliers, equipment designers and users will have a common (standardized) basis for designating or selecting industrial liquid lubricants.

Viscosity is a measure of the fluid's resistance to flow. Water has a low viscosity of 1 cSt and honey has a very high viscosity, lets say 1,000 cSt.

If a machine is heavily loaded then the machine designer will use a lubricant that resists being pushed around, which would be heavy like honey. If the machine runs very fast then the machine designer will specify a lubricant that can get out of the way, and back into the way just as quickly.

Generally, machines will have either one or the other to be concerned about; sometimes both at the same time This ISO viscosity classification is consequently based on kinematic viscosity at 40ºC (104ºF).

If we raise and lower the temperature of a fluid, there is often a correlating change in the fluid's resistance to flow. The fluid gets thicker at lower temperatures and it gets thinner at higher temperatures.

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Measuring Viscosity ?

Viscosities are defined or assigned using a laboratory device called a viscometer.

For lubricating oils, viscometers tend to operate by gravity rather than pressure.

Think of a kinematic viscometer as a long glass tube that holds a volume of oil.

The measure of the fluid's viscosity is the measure of the amount of time that it takes for the designated amount of oil to flow through the tube under very specific conditions.

Because the conditions are repeatable, it is now possible to measure the amount of time that it takes for the fluid to flow through the tube, and it should be nearly the same each time.

This is similar to the amount of time it takes a specific volume of fluid at a specific temperature to drain through a funnel.

As the fluid gets thicker - a function of its increasing resistance to flow - then it takes progressively longer to move through the tube (funnel).

Water goes through in one second. The same amount of honey takes a thousand seconds (hypothetically).

It should also relate closely to other selected temperatures used to define properties such as viscosity index (VI), which can aid in defining a lubricant.

A study of possible temperatures indicated that 40ºC (104ºF) was suitable for the industrial-lubricant classification as well as for the lubricant-definition properties.

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Why an Oil's Viscosity Changes ?

There could be several reasons for a downward trend or even a sudden drop in viscosity of the oil in the circulating systems without warning. The most common cause is adding in a lower viscosity fluid than what is required

If you are using an ISO 220 viscosity gear oil, but a lower viscosity gear oil (such as ISO 68 of the same brand is added in – this can lead to a sudden drop in the viscosity.

Viscosity may also drop when non- lubricants like solvents and diesel fuel accidently get into the lubricants.

Lubricants could be losing its viscosity through the loss or shear down of the viscosity – index (VI) Improver. Eg :- if you are using a multigrade engine oil such as 10W-30, this oil contains an additive known as Viscosity- Index Improver. During use, the VI improvers can sheer down and break apart, causing the viscosity of the oil to decrease.

Exposure to high extreme temperature is the biggest factor in causing the breakdown of the Viscosity – Index improver. The high temperatures can crack the oil molecules into smaller molecules, which causes a decrease in Viscosity.

Moisture and fuel can both cause the viscosity to increase or decrease, depending on the contaminant and how long it has been present in the oil. Antifreeze often increases an oil's viscosity. Exposure to excessive heat – leaving the oil in use too long – engine over heating can also increase viscosity.

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What happens when Viscosity changes ?

A significant reduction in viscosity can result in:

- Loss of oil film causing excessive wear
- Increased mechanical friction causing excessive energy consumption n Heat generation due to mechanical friction n Internal or external leakage
- Increased sensitivity to particle contamination due to reduced oil film
- Oil film failure at high temperatures, high loads or during start-ups or coast-downs.

Likewise, too high a viscosity can cause:

- Excessive heat generation resulting in oil oxidation, sludge and varnish build-up
- Gaseous cavitation due to inadequate oil flow to pumps and bearings
- Lubrication starvation due to inadequate oil flow
- Oil whip in journal bearings
- Excess energy consumption to over- come fluid friction
- Poor air detrainment or demulsibility
- Poor cold-start pumpability.

Changes in viscosity can be the result of a change in the base oil chemistry (a change in the oil's molecular structure), or due to an ingressed contaminant.

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To Be Observed !!

Keep in Mind that viscosity can go up, down or remain unchanged.

Must determine what this means and why it happened.

The viscosity reading may be checked by sampling the oil. Viscosity has become such an information- rich measure of used oil condition.

If there is a decrease in viscosity , it is a good idea to change the oil .

If you are having trouble with a mineral oil losing viscosity at high temperatures, look at switching to a synthetic oil for the application.

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CONCLUSION

The below table denotes the common cause of Viscosity changes

	Decreases Viscosity	Increases Viscosity
Changes to base oil (molecular changes)	▼ Thermal cracking of oil molecules ▼ Shear thinning of VI improvers	▼ Polymerization ▼ Oxidation ▼ Evaporative losses ▼ Formation of carbon and oxide insolubles
Additions to base oil (contamination)	■ Fuel ■ Refrigerant ■ Solvents ▼ Wrong oil (low viscosity)	■ Water (emulsions) ■ Aeration ▼ Soot ▼ Antifreeze (glycol) ▼ Wrong oil (high viscosity)

▼ Noncorrectable change
■ Correctable by removal of the contaminant if feasible

Viscosity is an important physical property that must be monitored and controlled carefully because of its impact on the oil and the oil's impact on equipment life. Whether measuring viscosity onsite using one of many onsite oil analysis instruments capable of determining viscosity changes accurately, or whether sending samples routinely to an outside lab, it is important to learn how viscosity is determined, and how changes can impact equipment reliability. A proactive approach must be taken to determine the condition of the equipment's lifeblood - the oil!

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