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Filtration Analysis Services Technology Ltd

How clean is your oil ?

Coolant Analysis Service

How Clean is your Oil?



Certificate Number 22484

FA-ST Coolant Analysis Service



Coolants are analysed in our independent ISO9001-2015 laboratory, using one of our PRE-PAID coolant sampling & analysis kits. This kit is supplied with everything needed to take and sample and to return for analysis. Postage is supplied PRE-PAID in the UK.

Once received in the laboratory it will be processed within 2-3 days and an email is issued with a PDF report.

The report will have details on factors such as Wear levels, Contamination, and the Chemical make-up of the coolant. If required our laboratory technicians will add comments and any recommended actions.



COOLKIT1 - FA-ST Coolant Analysis Kit

Why have Coolants Analysed?

With engines operating at higher temperatures with finer tolerances and cooling systems playing a more important role than ever before. Even though coolant make-up today is more advanced than ever, over 40% of premature engine failures can be traced back to the cooling systems' performance. If cooling systems are not performing correctly then engines will run at higher temperatures, causing oils to potentially oxidise and lose lubricity allowing increased wear to components.

Detect & Identify contamination

Contaminates in coolants make them less effective in transferring heat, allowing damage to occur and decreasing components life spans. All coolants sent into our independent laboratory will be tested for the glycol level, whether normal or long-life coolant, glycol is a vital factor and if the levels are incorrect for the cooling system it is used in then issues will begin to occur. An assessment of solids and sediment whether organic or inorganic will also be carried out. Finally to assess contamination levels, a visual inspection is carried out by the technicians. This will assess the general appearance and colour of the coolant as visual indicators can give a good indication of the condition of the coolant.

Coolant Chemical Make-up Analysis

The Chemical Make-up of a coolant is another important factor for ensuring the coolant is fit for use. When we analyse coolants, we will carry out several tests to ensure they are performing to the highest possible level. The pH of a coolant will be determined, as high or low pH levels can have detrimental effects, should these levels become too out of spec then the coolant itself can become an issue. Like any strong acid or alkali, it will cause damage to components and seals, potentially entering the oil causing more issues. Further assessments carried out on the chemical make-up of the coolant include an assessment of coolant foaming that can cause sluggish operation. We also assess the resistivity of the coolant, nitrite levels to determine that the coolant can provide the required iron protection, rust build up in the coolant as well as seeing if the coolant has any rust prevent inhibitors in the blend.

Wear analysis of Coolants

We also evaluate wear factors in a cooling system by assessing only the Ferrous Wear Index. This measurement provides valuable insight into rust buildup and the presence of ferrous metals in the coolant, indicating potential system corrosion.





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Coolant Wear Testing

Ferrous Wear / PQ Index

Using the 51FW meter

As the ICP analysis only covers particles up to 15 micron without becoming blocked, then a method of detecting larger particles is required. This is carried out via the Ferrous Wear Index (FW Idx). Ferrous particles are selected for this as in most common equipment ferrous metal tend to represent the most common metals in components, also the FW Idx can be quickly, and cost effectively measured.

No matter the test, trending is always the most useful method for identifying impending issues, however one additional correlation may be made between ferrous content and iron by elemental spectroscopy. If the iron by elemental spectroscopy is elevated, but ferrous wear concentration remains low, it may be surmised that the wear particles are small (<10 microns) and therefore from normal wear modes. When results from both tests are elevated, then the wear mode is likely transitioning from normal to abnormal; and if iron by elemental spectroscopy is low or consistent, but ferrous wear concentration is elevated or increasing, then the wear particles are likely large (>10 microns) and considered to be due to abnormal or severe wear modes.

Pros: Provides a count on total number of magnetic particles irrelevant of size.
When used in correlation with ICP analysis allows users to see if normal or abnormal wear is occurring.

Cons: Not all methods of calculating the FW Idx are the same.

Coolant Contamination Testing

Glycol Vol

Showing the concentration of Glycol of the sample, given as a percentage.

Glycol levels in coolants are an important factor as it prevents the water in the coolant freezing and also has good heat transfer properties. Water has a freezing point of 0°C and pure ethylene Glycol freezes at -12.9°C, however depending on the concentration of Glycol mixed with water these can change quite dramatically. The table below shows the percentage mixture of glycol and water and the point at which the solution freezes.

Glycol %	Water %	Freezing point
10%	90%	-3.4°C
30%	70%	-13.7°C
60%	40%	-52.8°C

As well as allowing the coolant to operate at low temperatures the glycol within a coolant also has good heat transfer properties and tends to discourage algae growth in the heat transfer equipment.

Typical Values of Flagging Limits Glycol level will vary depending on glycol type, application, and the pressure, elevation, and temperature at which the system operates.

Solids Vol

Measured in Parts Per Million (PPM)

Total Dissolved Solids examines the combined content of all inorganic and organic substances contained in Coolant.

Sediment

Measured on 0 (No) – 1 (Yes) scale.

Sediments that entre a cooling system has the tendency to blog filters, carburettors, and injectors



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Appearance & Colour

Measured on a 0 – 3 scale

The Appearance and Colour of a coolant can provide information on the coolants condition. This test is done visually by our laboratory technicians, the test sees whether the coolant is in good clean condition.

Appearance scale: 0 – Clear / 1 – Cloudy/hazy / 2 – Very Cloudy / 3 – Opaque

Colour scale: 0 – Colourless / 1 – Turquoise / 2 – Blue / 3 – Other

Coolant Chemical Make-Up Testing

Foaming

Measured on 0-3 scale

Foaming of a coolant can be a serious problem in systems, foaming can result from excessive agitation, improper fluid levels, air leaks, contamination, or cavitation's - the pitting or wearing a way of a solid surface is because of the collapse of a vapor bubble. Foaming can cause sluggish hydraulic operation, air binding in oil pumps and tank or sump overflow.

Foaming Scale: 0 – None / 1 – Slight / 2 – Moderate / 3 – Heavy

pH

Measured on the pH scale

pH is a measure of the coolant's acidity or alkalinity. Whereas a coolant's neutralization number is related to the quantity of acid- or base-forming materials in a solution, pH indicates their intensity. Coolant pH range should remain between 7.5 and 11 to provide adequate corrosion protection. Lower levels of pH can allow corrosion to build up within a system, whereas higher levels can lead to damage occurring on gaskets and other softer metal components.

Typical Values or Flagging Limits

Conventional Coolant Between 8.5 – 11 Long

Life Coolant Between 7 – 9

Resistivity

Measured in micro-Siemens per centimetre ($\mu\text{S}/\text{cm}$)

The resistivity of a liquid is a measure of its electrical insulating properties under conditions comparable to those of the test. High resistivity reflects low content of free ions and ion forming particles and normally indicates a low concentration of conductive contaminants.

Typical Values or Flagging Limits, 6600 Reportable, 7500 Unacceptable, 8000 Severe

Function or Effect ($\mu\text{S}/\text{cm}$) Measure of the coolants ability to resist carrying an electrical charge. High conductivity can reduce to effectiveness of inhibitors and lead to cooling system corrosion.

Rust

Measured on 0-1 scale

Rust builds up in cooling systems and can lead to the system not performing to the highest levels, we test coolants for any potential rust build up in systems.

Rust Scale: 0 – None / 1 - Yes



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Nitrite

Measured in Milligrams Per Litre, the unit is mg l⁻¹

Nitrite is an inhibitor for cast iron, steel and liner cavitation's protection. Excessive levels can lead to solder corrosion, precipitate formation and water pump failure. Nitrite is the Primary inhibitor for iron protection, used to prevent cavitation of wet sleeve liners. Rapid depletion of Nitrite and an increase in glycolate indicates general overheating of the coolant system or localized hot spot. Rapid depletion of Nitrite without increase in Glycolates indicates Nitrite oxidation by a positive stray current.

Rust Prevent

Measured on 0-1 scale

Coolant corrosion inhibitors help decrease the corrosion rate of metals within your equipment and help maintain other coolant properties. The coolant manufacturers will determine the type of coolant corrosion inhibitors utilized in their product.





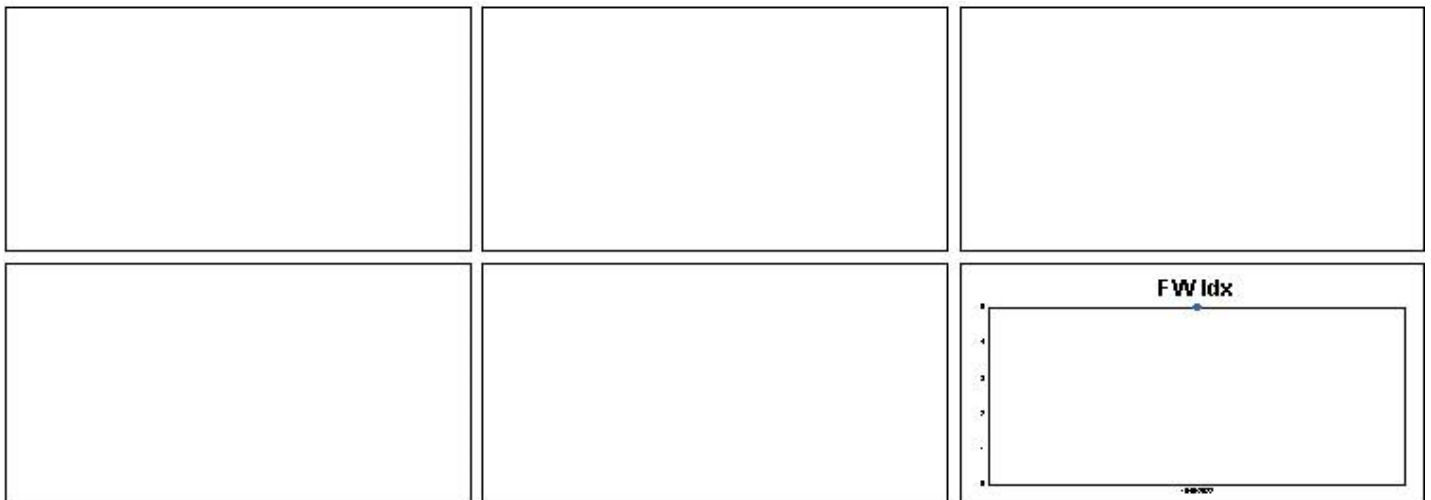
Sample Num: ****30	Sample Date: 01/01/2022	Database: FAST
Area:	FA-ST Database	
Equipment:	FA-ST Coolant	
Point:	Coolant	
Comments:	COOLANT COLOUR GREEN, THE COOLANT COLOUR LOOKS NORMAL AND THE COOLANT IS IN OK CONDITION. FREEZING POINT IS -34°C. HEAVY FOAMING FOUND IN THE SHAKEN SAMPLE, WE WOULD EXPECT TO SEE VERY LITTLE. A LITTLE FINE NON-FERROUS SEDIMENT WAS FOUND. A FEW SMALL RUST PARTICLES WERE PRESENT. GLYCOL CONTENT SEEMS LOW AT 39%, LAB RECOMMENDS TO AIM FOR 50%.	

Sample Num	****30	Sample Number is Very important, use this if contacting FA-ST so we can find your sample
Sample Date	01/01/2022	Date Sample is taken
Unit Usage	400	Total Equipment Usage
Oil Usage		Equipment usage since previous sample
Oil Added		Amount of fluid added

Wear		
FW Idx	35	Total Magnetic Metal Index
A Ferrous Wear (FW Idx) is also carried out to identify magnetic particles in the oil. The ICP will only detect particles up to 15 in size. The FW Idx will provide a total count on magnetic particles irrelevant of size		

Contamination		
Glycol Vol	39	Percentage
Solids Vol	1677	Parts Per Million (PPM)
Sediment	1	Number Scale (1-3)
Appearance	2	Number Scale (1-3)
Colour (Visual)	1	Number Scale (1-3)
The Glycol Test determines the percentage of Glycol to Distilled water Total Dissolved Solids examines the combined content of all inorganic and organic substances contained in Coolant. Appearance and Colour observation.		

Chemistry		
Foaming	3	Number Scale (1-3)
pH	8.8	pH Scale
Resistivity	2620	Number Scale (1-3)
Rust	1	Number Scale (1-3)
Nitrite	0	Milligrams Per Litre
Rust Prevention	0	Number Scale (1-3)
Foaming Measurement for shaken sample PH Test for acidity and alkalinity Measurement for any rust in Coolant To test for Inhibitor levels to protect against corrosion		



Oil & Fuel Sampling



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Filtration Analysis Services Technology Ltd
How clean is your oil ?

With our wide range of sample bottles and containers our customers can take a wide range of samples including oils, diesel fuel, coolants, glycols and a selection of chemicals and other fluids. Supplying our customers with:

Vacuum Sampling Pumps Sample Bottles Sample Tubing Complete Oil & Fuel Sampling Kits



Oil Analysis

FA-ST provide a comprehensive range of oil testing allowing you to determine the cleanliness, contamination, chemistry and identify wear particles in lubrication oils, diesel fuel, coolants, and greases etc. at our independent oil analysis laboratory.

With the support of the FA-ST oil analysis program you can consistently monitor the quality of the fluids used on your machinery & equipment, detect potential component failure, reduce maintenance costs and help decide the correct oil change intervals.



Oil Filtration

FA-ST have an extensive range of oil filtration equipment especially designed to remove particulate, water and magnetic particles from oils, diesel fuel, coolants & glycols. Working with some of the industries leading businesses we aim to bring you the finest filtration equipment on the market including:

Oil, Diesel & Glycol Filtration Systems Filter Cartridges for a wide range of fluids Magnetic Pre-Filters Bypass Filter Systems



How Clean is your Oil?



For all your oil sampling, filtration & Analysis needs contact FA-ST:

Phone +44(0)1246268900
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