Understanding Coolant Sample Results

Elemental Analysis:

Elemental analysis, or spectroscopy, identifies the type and amount of wear particles, contamination and fluid additives. Determining metal content can alert you to the type of severity of wear occurring in the unit. Measurements are expressed in parts per million (ppm).

ASTM D5185 Wear Metals by ICP-OES (PPM)													
Cu	Fe	Al	Pb	Sn	Si	Ca	Mg	Zn	P	Mo	B	Na	K

Wear Metals: Combinations of these metals can identify components within the machine that are wearing. Knowing what metal a unit is made of influences the recommendations and determine the value of elemental analysis. Corrosion occurs when the buffers are no longer able to balance out the acid formation due to thermal degradation.

Contaminant Metals: Knowledge of the enviromental conditions under which a unit operates can explain varying levels of contaminant metals. Excessive levels of dust/dirt or heat can be abrasive and accelerate wear. Calcium and Magnesium are generally contaminates that are found in most coolants causing scale build up.

Additive Metals: Knowledge of the enviromental conditions under which a unit operates can explain varying levels of contaminant metals. Excessive levels of dust/dirt or heat can be abrasive and accelerate wear.

NITRITES
This is present in most formulations of coolants. Some include a combination of nitrite and molybdenum. The maximum acceptable level by itself or in combination is 1200-2600 ppm. Higher levels can lead to solder corrosion.

ANTIFREEZE %
This must be maintained at levels to ensure that the Freeze Point and Boiling Point have sufficient protection. High glycol can cause additive dropout and decrease coolant life. A proper range should be 45% to 55% for most formulations.

pH LEVELS
An adequate pH range should remain between 8.0-11.0 for conventional coolants. 7.0-9.5 for extended life coolants. Proper pH levels are necessary for optimum corrosion inhibitor performance.

Fluid Properties & Contaminants														
Nitrites (ppm)	Color	Clarity	D1287 pH	Boil Pt.	TDS	Antifreeze %	Freeze Pt.	ELC	Hardness	Odor	Mag Precip	Non-Mag Precip	Fuel	Foam	Oil

Advanced Fluid Properties & Contaminants (ppm)								
Nitrates	Phosphate	Sulfate	Oxalate	Acetate	Formate	Glycolate	Fluoride	Chloride

Overall Severity of Sample

0	1	2	3
Normal	Reportable	Abnormal	Critical

Severity 0 (Normal) = Continue maintainence and sampling at normal intervals.

Severity 1 (Reportable) Continue maintainence and sampling at normal internals. Observe for trends in future testing.

Severity 2 (Abnormal) Sampling and maintainence of fluid should be shortened to half internals.

Severity 3 (Critical) Fluid should be changed, filtered or serviced along with filters.

Corrosion Inhibitors
Silicon, boron, molybdenum, phosphoruous are inhibitors found in coolants for metal protection and pH control. Inhibitors presents are dependant upon the formulation for the product and can be typlically added with an SCA charge.

Glycolate/Formate/Acetate/Oxalate - are the evidence of glycol breaking down in its basic form. This forms these acids which are corrosive elements and can be caused primarily by the over-heating of glycol. These acids do not go away until a system is flushed and refilled with new fluid. The normal range for these is typically below 1000 ppm.

Sulfates are the acid build up of break-down of the glycol to a severe level. This forms sulfuric acid and is very corrosive to most components in cooling systems. These acids do not go away until a system is flushed and refilled with new fluid.

Chloride/Fluoride are normally found in a water source that is made for drinking. If found in coolant can be indicators of a poor water source and generally cause further issues down the road with overall longevity and corrosion protection. High amounts of this can cause hydrochloric acid. The normal rang for these is below 75 ppm.

Phosphate is an inhibitor used to help coat the components to prevent scale build up. Some formulations do not contain phosphate and should not be mixed. Too much phosphate cause additive drop out and form sludge in the system.

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