OIL ANALYSIS

BASIC TESTING INTERPRETATION GUIDE

TEST	TEST INFORMATION	PROBLEM	POTENTIAL ROOT CAUSES
Metals Analysis (Spectrometry by ICP)	• Detects metals in the 0 – 10 micron size range. Reports metal concentration in parts per million (ppm) • Early detection of wear problems can prevent more serious damage. Addressing the root causes of problems can greatly improve component life.	1. Wear metals detected 2. Contamination present 3. Metal-containing additives used in lubrication detected	1. Sudden large increases in wear rates can indicate that a significant failure mode is in progress. In general, metal concentration will increase with oil service and a normal rate of wear is slow and consistent. 2. Contamination may include: dirt, coolant leaks, mixing of oils. 3. Additive levels that are not relatively close to that of the new oil reference can signify a mixture of oils or the wrong oil is in use. Reduced additive levels can lead to a reduction in oil and component life. For more detailed information, refer to the Fluid Life Wear Metal Origins or Spectrometry Metals charts.
Viscosity	• Resistance of oil's flow. • Measured as kinematic viscosity in centistokes @ 40°C and 100°C. • Changes in oil viscosity can result in increased component wear and related system malfunction.	1. Viscosity increase and resulting oil thickening 2. Viscosity decrease and resulting oil thinning	1. Excessive contamination such as soot or glycol, oil oxidation and/or nitration. 2. Fuel dilution or mixing with lighter oils. Shearing of multi-grade oils from high speed operation. Oil breakdown.
Water	• Detects the presence of free and emulsified water in oil and reports it as: "Reportable", "Unacceptable" and "Severe". • Reduces oil's lubrication qualities, accelerates oil oxidation, and causes metal corrosion.	1. Condensation 2. Cooler core leak 3. High blow-by	1. Low temperature operation, inadequate ventilation, improper maintenance practices. 2. Corroded core, coolant leaking into oil gallery. 3. Worn rings, liners or seals.
Fuel Dilution (Engines)	• Detects the presence of fuel in oil and reports it as a percentage. • Fuel contamination reduces oil viscosity and leads to increased wear from metal-to-metal contact.	1. Over-fueling 2. Poor combustion 3. Fuel leak	1. Oversize or failing injectors. Restricted fuel return line. Ring sticking or breakage. Improperly adjusted air/fuel ratio. 2. Poor injector spray pattern. Restricted air supply or exhaust system. 3. Cracked or broken fuel line fittings. Worn or broken rings and liners.

FLUID LIFE
EQUIPMENT RELIABILITY SERVICES

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Glycol/ Coolant (Engines)* * Coolant detection method depends on test package.	• Sodium and Potassium in the oil are often indicators of coolant contamination. The presence of these elements may trigger a Glycol detection test that reports as a percentage. • Coolant in oil can increase oil viscosity and result in sludge formation or oil aeration and foam which leads to insufficient lubrication and failures.	1. Coolant leak	1. Defective or blown head gasket, improperly torqued cylinder head, defective seals on wet liners. Cracked block or cylinder head (from freezing or engine coolant or overheating caused by insufficient coolant or stuck thermostat). Defective water pump or worn seals.
Soot/ Suspended Solids (Diesel Engines)	• Soot contamination is detected and is reported as a percentage. • High level of soot/suspended solids will lead to premature wear to engine components.	1. Incomplete combustion	1. Restricted engine air flow. Excessive idling, cold running or blow-by. Emissions control system fault (older engines). Worn or broken rings or liners. Defective or blown head gasket. Improperly torqued cylinder head. Cracked block or cylinder head (from coolant freezing or overheating caused by insufficient coolant or stuck thermostat). Defective seals or wet liners.
Oxidation/ Nitration/ Sulfation* (Engines only) * Select test packages	• Reported in absorption units per cm. • Caused by reactions with oxygen, nitrogen, or sulfur. • Oil degradation, oil thickening, formation of acidic by-products, varnish, and sludge can threaten engine performance and longevity. • Oxidation/Nitration/Sulfation may indicate an over-extended oil drain interval.	1. Oxidation Increase 2. Nitration Increase 3. Sulfation Increase	1. Higher operating temperature from inadequate cooling, improper air/fuel ratio, excessive peak-power operation. Oil oxidation can be accelerated by water and other contaminants in oil. 2. Commonly associated with natural gas engines, generally related to air/ fuel ratio and heat. 3. Sulfur from diesel fuel or base oil can create sulfurous compounds including sulfur based acids. Sulfurous compounds are normally expelled through exhaust but can come in to contact with oil during lower operating temperatures and engine start-up.

Basic oil analysis is best suited to engine applications when operating according to OEM guidelines. While still providing valuable information for other components, basic analysis alone may not provide all the information vital to effective condition monitoring and your reliability goals. If you are unsure what package is right for you, please contact us at info@fluidlife.com to learn more.

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