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Oil Analysis Checklist for Basic Test Package

Series 1 Test	Problem	Potential Root Causes

Metals Analysis

- Detects metals in ppm.
- Sudden large increases in wear rates can lead to impending failure.
- Reduced additive levels lead to a reduction in oil and component life.
- Identifies contamination ie: dirt, coolant leaks, mixing of oils.

Problem

- Wear metals detected
- Foreign debris present
- Metal-containing additives used in lubrication detected

(For more detailed information refer to the Fluid Life Wear Metal Origins Chart)

Potential Root Causes

Wear Metal	Possible Sources of Wear Metal
Ni (Nickel)	Roller bearing metals, valve train, turbine blades, crankshafts.
Ag (Silver)	Silver-plated bearing cages, wrist pin bushings, soldered joints.
Mg (Magnesium)	Additives, component housings, hard water, road dust.
Ca (Calcium)	Additives, grease contamination, gypsum, road dust.
Zn (Zinc)	Additives, brass, seals, grease, galvanizing, plating.
Ba (Barium)	Additives, grease or water contamination.
P (Phosphorus)	Additives, coolants, cleaning detergents.
Mo (Molybdenum)	Additives, some piston rings, grease.
Va (Vanadium)	Fuel oils, turbine blades, valves.
K (Potassium)	Coolant, fuel dilution, potash, paper mill dust, road dust.
Li (Lithium)	Grease contamination.
Sb (Antimony)	Grease, bearings, alloy steel, paint, ceramic products.
Ti (Titanium)	Dirt, metal alloys, turbine bearings.
Be (Beryllium)	Bearings, dirt, alloy steel.
B (Boron)	Coolant, additives, water treatment.

Viscosity

- Resistance of oil's flow.
- Measured as Kinematic Viscosity in Centistokes @ 40 and 100°C.
- Changes in oil viscosity can result in increased component wear and related system malfunction.

Problem	Potential Root Causes
Viscosity increase and resulting oil thickening	• Excessive contamination such as soot or glycol. • Oil oxidation and/or nitration.
Viscosity decrease and resulting oil thinning	• Fuel dilution or mixing with lighter oils. • Shearing of multi-grade oils from high speed operation.

Water

- Detects the presence of free and emulsified water in oil and reports it as: "Reportable", "Unacceptable" and "Severe".
- Reduces oil's lubrication qualities and causes metal corrosion.

Problem	Potential Root Causes
Condensation	• Low temperature operation. • Inadequate ventilation. • Improper maintenance practices.
Cooler core leak	• Corroded core.
High blow-by	• Worn rings or liners.

Fuel Dilution

- Detects presence of fuel in oil and reports it as a %.
- Excessive and prolonged fuel contamination in engine oils can lead to high wear and premature failure.

Problem	Potential Root Causes
Over-fuelling	• Oversize or dribbling injectors. • Restricted fuel return line. • Ring sticking or breakage. • Improperly adjusted air/fuel ratio.
Poor combustion	• Poor injector spray pattern. • Worn rings and liners. • Restricted air supply or exhaust system.
Cracked or broken fuel line fittings	• Ruptured fuel pump diaphragm. • Engine vibration problems.

Glycol

- Detects presence of ethylene glycol in crankcase oil and reports it as a %.
- Glycol forms sludges that coat internal parts and failures can occur as a result of insufficient lubrication.

Problem	Potential Root Causes
Coolant leakage	• Defective or blown head gasket. • Improperly torqued cylinder head. • Defective seals on wet liners. • Cracked block or cylinder head (from freezing of engine coolant; or overheating caused by insufficient coolant or stuck thermostat.

Soot / Suspended Solids

- Total amount of carbon soot and other combustion-related contamination as % of the oil volume.
- High level of suspended solids will cause premature wear to engine components.

Problem	Potential Root Causes
Incomplete combustion	• Over-fuelling. • Restricted air intake system. • Plugged or failed oil filter. • Oil nitration or oxidation. • Fuel of poor quality and/or high sulphur content. • Low turbo boost pressures.

Oxidation / Nitration

- Determination of chemical by-products that indicate oil degradation.
- Measured in absorption units per cm.
- These processes can threaten engine performance and longevity.

Problem	Potential Root Causes
Higher engine operating temperature	• Inadequate cooling. • Improper air/fuel ratio. • Excessive peak-power operation.
End of oil life	• Over-extended oil drain interval.

If you have any questions about this chart, please call your Fluid Life Corporation Regional Account Manager Toll Free at: 1-877-962-2400