



**THE FOLLOWING INFORMATION HAS BEEN PROVIDED TO ASSIST IN THE INTERPRETATION OF YOUR OIL ANALYSIS.**

**WEAR METALS**

These metals indicate wear on particular components of an individual unit. The particles of these metals will indicate a wear problem on the microscopic level before the problem can be detected by conventional means. The existence of a wear problem is determined not only by absolute values of metals, but more importantly by a relative increase or trend in one or more of these metals.

**WEAR METAL SOURCES**

- Iron .....Cylinders, Gears, Rings, Crankshafts, Liners, Bearings, Housings, Rust.
- Chromium .....Rings, Roller/Taper Bearing, Rods, Platings.
- Lead .....Bearing Overlays, additive in gear oil and gasoline.
- Copper .....Bushings, Bearings, Thrust-Washers, Friction Plates, oil Cooler, additive in oil.
- Tin .....Bearings, Bushings, Pistons' Platings.
- Aluminum .....Pistons, Bearings, Pumps, Blowers, Rotors, Thrust-Washers.
- Nickel.....Valves.
- Silver .....Bearings, Bushings, Platings.
- Manganese .....Trace elements in liners and rings, additive in gasoline.
- Titanium.....Trace element.
- Vanadium .....Trace element.

**CONTAMINANTS**

These elements can be an indicator of both internal and external contamination. The source and amount of contamination can be determined by comparison to a previously normal sample or to a new oil reference. Specific tests for some contaminants can supplement the analysis.

**CONTAMINANT SOURCES**

- Silicon .....Element used to determine the level of airborne dirt and abrasives in the oil (sometimes used as an anti-foam agent).
- Boron .....Present in most permanent anti-freeze systems and cooling system inhibitors (sometimes used as an additive).
- Sodium .....Present in most permanent anti-freeze systems and cooling system inhibitors (sometimes used as an additive).
- Potassium .....Present in most permanent anti-freeze systems and cooling system inhibitors (sometimes used as an additive in gear oil).

**WATER**

Reports percent water and percent insolubles (ASTM D-91).

**GLYCOL**

A specific test for the presence of Glycol (Antifreeze) in an oil (ASTM D-2982).

**ADDITIVES**

These elements are blended into the oil in different forms and quantities by the manufacturer. The additive package in an oil will vary depending on the type of oil.

**ADDITIVE FUNCTIONS**

- Magnesium .....Dispersant/Detergent additive.
- Calcium .....Dispersant/Detergent additive.
- Barium .....Dispersant/Detergent additive.
- Phosphorus .....Anti-Wear additive.
- Zinc .....Anti-Wear additive.
- Molybdenum .....Anti-Wear additive.

**FUEL DILUTION**

Unburned fuel in the oil may signal fuel system leaks or incomplete combustion.

**FUEL SOOT**

A result of incomplete combustion, blow-by. High levels may indicate combustion problems or overextended drain intervals.

**VISCOSITY**

The kinematic viscosity (ASTM D-445) determined at 40° C and/or 100° C is a measure of the flow rate of an oil in relation to time. This data is used to assign an SAE grade to an oil.

SAE GRADE	MIN-cSt-100° C-	MAX-cSt
10W	4.10	
20	5.60	9.29
30	9.30	12.49
40	12.50	16.29
50	16.30	21.89

**ENGINE OIL VISCOSITY CLASSIFICATION CHART**

**SEVERITY CODE CONDITIONS**

5 (C)	EXCESSIVE/UNACCEPTABLE	Must take corrective action before further use. Contact lab to discuss
4	MODERATELY HIGH Abnormal/Unacceptable	Monitor closely or take corrective action. Send half interval recheck to monitor rate of increase and determine seriousness of abnormality.
3 (A)	MILD/ACCEPTABLE	Monitor by sending recheck sample as requested so that the rate of increase may be monitored for its seriousness.
2	MODERATE	Lab will monitor. Follow normal operation and sampling. The sample Normal/Acceptable shows minor trend change since last report.
1 (N)	SATISFACTORY	Lab will monitor. Follow normal operation and sampling.

**ADDITIONAL TESTS**

CL	Chlorine	VI	Viscosity Index (ASTM D-2270)
IR	Infrared Spectrophotometric Analysis	pH	pH Range
TBN	Total Base Number (ASTM D-4739)	POURPT	Pour Point (ASTM D-97)
TAN	Total Acid Number (ASTM D-664)	SUGAR	Sugar in Lubricating Oils
PC	Particle Count	SULFUR	Sulfur Determination (ASTM D-4294 or D-1552)

**COMPLETE COOLANT & FUEL TESTING AVAILABLE  
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