Fluid Analysis Reference Guide

Oil Analysis Test Categories

Xx Name — **Wear Metals** | **Xx** Name — **Additives** | **Xx** Name — **Contaminants**

	Wear Metals	Additives	Contaminants
Al Aluminum	Bearings Blocks Blowers Bushings Clutches Cylinders Housings Pistons Pump Bearings Motor Housings Rotors Thrust Bearings Thrust Washers		Alumina Bauxite Catalyst Coal Fly Ash Foundry Dust Granite Grease Thickener Paint Road Dust
Sb Antimony	Alloy Steel		Ceramic Products Paint
Ba Barium		Fuel Additive Grease Thickener Oil Additive: Detergent	
Be Beryllium	Alloy Steel		
B Boron		Coolant Inhibitor Oil Additive: Anti Wear	Oil Additive: Ext Pressure Oil Additive: Detergent
Cd Cadmium	Journal Bearings Plating		
Ca Calcium		Cement Dust Fuller's Earth Grease Thickener Gypsum Hard Water Lignite	Hard Rock Dust Oil Additive: Detergent Oil Additive: Rust Inhibitor Road Dust Rubber Salt Water Slag
Cr Chromium	Exhaust Valves Sleeve Liners Low Alloy Steel Oil Coolers Rings Rods		Roller Bearings Stainless Steel Taper Bearings Water Treatment Paint
Cu Copper	Babbitt Bearings (Underlay) Bearing Cage Brass Bronze Cam Bushings Clutches Governors Guides Oil Coolers		Oil Pumps Pump Piston & Thrust Plate Steering Disc Valve Train Bushings Wear Plates Wrist Pin Bushings Oil Additive: Anti Wear Paint
Fe Iron	Bearings Blocks Brake Pads Cam Shaft Cast Iron Crankshafts Cylinders Discs Gears Housings		Hydraulic Pump Vanes Gears Pistons Liners Oil Pump Power Take Off (PTO) Rings Screws Shafts

Predictor Source of Spectrometry Metals

Wear Metals | **Contaminants & Abrasives**

	Wear Metals	Contaminants & Abrasives
Pb Lead	Babbitt Journal Bearing (Overlay) Bronze Alloy Solder Balancing Weights	Gasoline Additives Paint Road Dust
Mg Magnesium	Turbine Metallurgy	Hard Water Oil Additive: Detergent Road Dust Sea Water Fuller's Earth
Mo Molybdenum	Alloy Steel Ring	Oil Additive: Ext Pressure Grease
Ni Nickel	Hardened Steels Stainless Steel Plating	
P Phosphorous		Oil Additive: Anti Wear Oil Additive: Ext Pressure
K Potassium	Coolant Inhibitor Fly Ash Fuel Element	Granite Paper Dust Road Dust
Si Silicon	Alloy Steel Asbestos Cement Dust Fly Ash Road Dust Glass	Granite Grease Limestone Oil Additive: Antifoam Synthetic Lubricant Sealant
Ag Silver	Bearing (Overlay) Needle Bearings	Oil Cooler (Solder) Wrist Pin Bushings
Na Sodium	Activated Alumina Coolant Inhibitor Dirt Fly Ash	Grease Oil Additives Paper Mill Dust Road Salt
Sn Tin	Bearing Cage Babbitt Bearing Flashing	Piston Overlay Solder
Ti Titanium	Gas Turbine Bearings Turbine Blades	Paint
V Vanadium	Turbine Blades Valves	Bunker Oil
Zn Zinc	Brass Plating	Cathodic Protection Galvanizing Grease Oil Additive: Anti Wear

HY-PRO

Fluid Analysis Reference Guide

Industrial Oil Viscosities - ISO 3448

ISO 3448 established common viscosity classifications for industrial lubricants that are widely accepted and used across the globe. Your oils each fall under a specific category of ISO VG classification which you can obtain from the manufacturer and are often listed on test reports you will receive from fluid sample analyses.

The table below outlines the viscosity measurements per ISO 3448 along with common minimum and optimum viscosities for various systems you'll likely find operating in your facility.

On the following page are contaminants found on fluid analysis test reports listed according to their chemical symbol (often how they'll be listed on the reports) and the various sources from which they are known to occur.

Viscosity Range

ISO 3448 Viscosity Class	Kinematic Viscosity Mid-point cSt @ 40°C	Kinematic Viscosity Minimum cSt @ 40°C	Kinematic Viscosity Maximum cSt @ 40°C
ISO VG 32	32	28.8	35.2
ISO VG 46	46	41.4	50.6
ISO VG 68	68	61.2	74.8
ISO VG 100	100	90	110
ISO VG 150	150	135	165
ISO VG 220	220	198	242
ISO VG 320	320	288	352
ISO VG 460	460	414	506
ISO VG 680	680	612	748

Minimum Viscosities

Application	Viscosity cSt @ 40°C
Gearbox Reducers	33
Gear Pumps	30
Spherical Roller Bearings	21
Other Roller Bearings	13
Hydraulic Systems	13
Plain Bearings	13
To Support Dynamic Load	4

Optimum Viscosities (at Operating Temp)

Application	Viscosity cSt @ 40°C
Hydraulic Systems	25
Plain Bearings	30
Spur & Helical Gears	40
Hypoid Gears	60
Worm Gears	75