

# 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

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## Oil Analysis Test Categories

**Wear Metals**  
Name

**Additives**  
Name

**Contaminants**  
Name

<b>Al</b> 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
<b>Sb</b> Antimony	Alloy Steel	Ceramic Products Paint
<b>Ba</b> Barium	Fuel Additive Grease Thickener Oil Additive: Detergent	
<b>Be</b> Beryllium	Alloy Steel	
<b>B</b> Boron		Coolant Inhibitor Oil Additive: Anti Wear Oil Additive: Ext Pressure Oil Additive: Detergent
<b>Cd</b> Cadmium	Journal Bearings Plating	
<b>Ca</b> 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
<b>Cr</b> Chromium	Exhaust Valves Sleeve Liners Low Alloy Steel Oil Coolers Rings Rods	Roller Bearings Stainless Steel Taper Bearings Water Treatment Paint
<b>Cu</b> 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
<b>Fe</b> Iron	Bearings Blocks Brake Pads Cam Shaft Cast Iron Crankshafts Cylinders Discs Gears Housings	Hydraulic Pump Vaness Gears Pistons Liners Oil Pump Power Take Off (PTO) Rings Screws Shafts

## Predictor Source of Spectrometry Metals

Wear Metals

Contaminants & Abrasives

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