Castrol LABCHECK NEXTGENERATION

UNDERSTANDING CASTROL LABCHECK ANALYSIS RESULTS

WEAR METALS

ELEMENT	ENGINE	TRANSMISSION	DIFFERENTIAL	PLANETARY	TORQUE CONVERTER	HYDRAULIC POWER STEERING	FINAL DRIVE	SPEED REDUCER	AIR COMPRESSOR
IRON	Cylinder Block, Gear Train, Crankshaft, Wrist Pins, Rings, (cast), Camshaft, Valve Train, Oil Pump, Liners, Rust	Gears, Discs, Housing, Bearings, Brake Bands, Shaft Spools, Pumps, PTO	Gears, PTO Shafts, Bearings, Housing	Gears, Shafts, Bearings, Housing	Housing, Bearings, Shafts	Pump/Motor, Vanes, Gears, Pistons, Cylinder Bores & Rods, Bearings, Valves, Pump Housing	Gears, Shafts, Bearings, Housing	Gears, Bearings	Crankshaft, Block, Housing, Screws, Bearings, Shaft, Oil Pump, Piston Rings, Cylinders
CHROME	Rings, Roller/Taper Bearings (some), Exhaust Valves, Water Treatment	Roller Bearings, Shafts	Roller/Taper Bearings (some)	Roller/Taper Bearings (some)	Roller/Taper Bearings (some)	Rods, Spools, Roller/Taper Bearings (some)	Roller/Taper Bearings (some)	Bearings	Rings, Roller/Taper Bearings (some), Water Treatment (oil cooler)
NICKEL	Valves, Valve Guides, Bearings, Shafts	Bearings, Shafts	Bearings, Shafts	Bushings, Shafts	Bearings, Shafts	Bearings, Shafts	Bushings, Shafts	Bearings, Shafts	Bearings, Shafts
ALUMINUM	Pistons, Bearings, Bushings, Blocks (some), Housing, Oil Pump, Turbo	Pump Clutches (some), Thrust Washers, Bearings, Torque Converter	Thrust Washers, Pump Bearings (some)		Impeller, Turbine, Pump (some)	Pump/Motor Housing, Cylinder Gland (some)		Thrust Washers, Gears (some)	Rotors, Pistons, Bearings/Thrust Washers, Block & Housing
LEAD	Bearings, Gasoline Octane Improver	Bearings, Solder			N/A	N/A		N/A	Bearings
COPPER	Wrist Pin Bushings, Bearings - Main, Rod, Cam, Thrust Plates, Oil Pump, Oil Cooler Passivation	Clutches, Steering Discs, Bushing/ Thrust Washers, Oil Cooler Passivation	Bushings, Thrust Washers, Oil Pumps (where used)	Bushings, Thrust Washers	Bushings, Thrust Washers (where used)	Pump Thrust Plates, Pump Piston, Cylinder Gland Guides, Bushings, Oil Cooler (some)	Bushings, Thrust Washers	Gears, Bushings, Thrust Washers	Wear Plates, Bushings, Wrist Pin Bushings, Bearings (reciprocating), Thrust Washers
TIN	Bearings (overlay), Bushings	Oil Cooler, Journal Bearings		Bushings, Thrust Washers			Bushings, Thrust Washers	N/A	Pistons (overlay), Bearings (overlay), Bushings
SILVER	Bearings, Solder, Wrist Pins	Bearings, Solder			Bearings, Solder	Bearings, Solder		Bearings, Solder	Bearings, Solder

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ADDITIVES

ELEMENT	ENGINE	TRANSMISSION	DIFFERENTIAL	PLANETARY	TORQUE CONVERTER	HYDRAULIC POWER STEERING	FINAL DRIVE	SPEED REDUCER	AIR COMPRESSOR
SILICON	Anti-foam Additives, Ingested Dirt	Disc Lining, Ingested Dirt	Ingested Dirt	Ingested Dirt	Ingested Dirt	Ingested Dirt, Elastomeric Seals (some)	Ingested Dirt	Ingested Dirt	Ingested Dirt
BORON	Additives Coolant Leak	Additives Coolant Leak	Additives	Additives	Additives	Additives	Additives	Additives	Additives
SODIUM	Oil Additives (some), Antifreeze, Road Salt, Ingested Dirt	Oil Additives, Antifreeze, Road Salt, Ingested Dirt	Oil Additives, Ingested Dirt	Oil Additives, Ingested Dirt	Oil Additives, Ingested Dirt	Oil Additives, Antifreeze, Ingested Dirt	Oil Additives, Ingested Dirt	Oil Additives, Salt, Ingested Dirt	Oil Additives, Ingested Dirt, Antifreeze
POTASSIUM	Coolant Intrusion	Coolant Intrusion							
MOLYBDENUM	Rings, Additives	Additives	Additives	Additives	Additives	Additives	Additives	Additives	Additives
PHOSPHORUS	Oil Additives	Oil Additives	Oil Additives	Oil Additives	Oil Additives	Oil Additives	Oil Additives	Oil Additives	Oil Additives
ZINC	Oil Additives, Galvanized Piping	Oil Additives, Galvanized Piping	Oil Additives	Oil Additives	Oil Additives	Oil Additives	Oil Additives	Oil Additives	Oil Additives
CALCIUM	Additives, Ingested Road Salt	Additives, Ingested Road Salt	Additives, Ingested Road Salt	Additives, Ingested Road Salt	Additives, Ingested Road Salt	Additives, Ingested Road Salt	Additives, Ingested Road Salt	Additives, Ingested Road Salt	Additives, Ingested Road Salt
BARIUM	Oil Additives	Oil Additives	Oil Additives	Oil Additives	Oil Additives	Oil Additives	Oil Additives	Oil Additives	Oil Additives
MAGNESIUM	Additives, Some Castings	Additives, Some Castings	Additives, Some Castings	Additives, Some Castings	Additives, Some Castings	Additives, Some Castings	Additives, Some Castings	Additives, Some Castings	Additives, Some Castings
ANTIMONY	Oil Additives	Oil Additives	Oil Additives	Oil Additives	Oil Additives	Oil Additives	Oil Additives	Oil Additives	Oil Additives
VANADIUM	Oil Additives	Oil Additives	Oil Additives	Oil Additives	Oil Additives	Oil Additives	Oil Additives	Oil Additives	Oil Additives

Castrol LABCHECK NEXTGENERATION

UNDERSTANDING CASTROL LABCHECK ANALYSIS RESULTS

PHYSICAL TEST RESULTS

PROBLEM	CAUSE	EFFECT
HIGH VISCOSITY	• Contamination soot/solids • Incomplete combustion – incorrect air/fuel ratio • Oil oxidation/nitration • Over-extended oil drains • High operating temperatures/ oxidation or nitration • Improper oil grade/type • Coolant intrusion	• Increased operating costs, possible abrasive wear • Engine overheating, loss of power, Increased fuel consumption • Improper lubrication, increased oil acidity • Accelerated wear • Oil thickening, oil filter goes in to bypass mode, decreased lubricity • Harmful deposits/sludge, increased wear, catastrophic failure • Oil thickening, increased oil acidity-corrosion
LOW VISCOSITY	• Polymer shear-down • Fuel dilution • Improper oil grade/type	• Improper lubrication, engine overheating • Poor lubrication, abrasive wear • Metal-to-metal contact • Increased operating costs • Accelerated wear
FUEL DILUTION	• Incorrect air/fuel ratio • Extended idle • Stop-and-go driving • Defective injectors • Leaking fuel pumps or lines • Incomplete combustion • Incorrect timing	• Metal-to-metal contact • Poor lubrication; oil thinning • Increased overall wear • Liner, piston, ring and bearing wear • Decreased additive effectiveness • Risk of fire or explosion • Reduced engine performance • Higher operating costs • Shortened engine life
FUEL SOOT	• Incorrect air/fuel ratio • Improper fuel injector/pump adjustment • Poor-quality fuel • Incomplete combustion • Defective injectors • Improper equipment operation • Low compression • Worn engine parts	• Poor engine performance • Poor fuel economy • Increased operating costs • Harmful deposits and/or sludge • Increased wear • Shortened oil life; poor lubrication • Lacquer formation • Carbon deposits • Clogged filters

PROBLEM	CAUSE	EFFECT
WATER/ COOLANT	• Low operating temperature • Defective seals • Coolant leaks • Improper lubricant storage • Cracked head • Weather/moisture • Product of combustion • Oil cooler leak • EGR cooler leak • Improper vent on component or storage tank	• Engine failure • High viscosity • Poor lubrication • Corrosion • Increased engine temperatures • Acid formation • Weld points • Reduced additive effectiveness • Harmful sludge and deposits
OXIDATION	• Overheating • Over-extended oil drains • Improper oil type/inhibitor additives • Combustion by-products/blowby	• Shortened equipment life • Lacquer deposits • Oil filter plugging • Increased oil viscosity • Corrosion of softer metal parts • Increased operating costs • Decreased engine performance • Increased acidity in oil • Restricted oil flow
NITRATION	• Incorrect air/fuel ratio • High operating temperatures • Defective seals • Abnormal blowby • Improper timing • Faulty crankcase ventilation • Engine overload • Insufficient cooling • Over-extended oil drains	• Oil thickening, increased oil acidity-corrosion • Acidic by-products formed • Increased cylinder and valve train wear • Oil thickening • Combustion area deposit • Increased acidity in oil
HIGH ACID NUMBER	• Overheating • Excessive blowby • Improper oil type • High sulfur fuel • Over-extended oil drain interval • Coolant intrusion	• Corrosion of metallic components • Promotes oxidation • Oil degradation • Causes additive depletion • Leads to lower base number
LOW BASE NUMBER	• Overheating • Excessive blowby • Improper oil type • High sulfur fuel • Over-extended oil drain interval • Coolant intrusion	• Corrosion of metallic components • Promotes oxidation • Oil degradation • Causes additive depletion • Leads to high acid number