



# 2022 Land Rover Defender

EDGE PROFESSIONAL EC 0W20

VIN  
XXXXXXXXXX

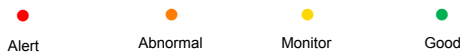
DIST./TIME ON ENGINE  
1,079 miles

DIST./TIME SINCE LAST OIL CHANGE  
1,079 miles



## Zengine Score Details

Your results indicate fuel is present in the oil, along with typical break-in materials. Fuel at low values can be due to a high amount of engine idle time. Fuel at higher levels can indicate a problem with fuel injectors, or worn engine components. In our experience this is fairly normal in new engines and should decrease once the rings have "bedded in". At this point, no real action is needed other than to simply be aware that these conditions are present. Under normal conditions, you can expect to see these values decrease when you sample again.



### Contamination

Simply put, this is how much non-oil elements are in your oil. The main concern in this column is fuel dilution, we want to be really low.



Contamination index %	0.2
● Silicon (Si) ppm	25
Sodium (Na) ppm	3
Potassium (K) ppm	2
Antimony (Sb) ppm	0
Manganese (Mn) ppm	89
Cadmium ppm	1
Water content %	<0.10
● Fuel Dilution %	7.7
Ethylene glycol %	0.0

### Wear Metals

All the metal parts in the engine are moving and rubbing, the oil helps keep everything smooth. If it shows high amounts of metals, we suggest a professional take a look.



Aluminium (Al) ppm	4
Iron (Fe) ppm	37
Chromium (Cr) ppm	1
● Copper (Cu) ppm	44
Lead (Pb) ppm	1
Tin (Sn) ppm	3
Vanadium (V) ppm	0
Nickel (Ni) ppm	0
● Silver (Ag) ppm	14
Titanium (Ti) ppm	25

### Lubricant & additives

This column provides an indication of the overall health of the oil. Poor oil health can easily lead to problems with the engine in terms of increased wear or excessive sludge build up.



Performance Rating	0
Dispersency	97
Viscosity 100°C cSt	7.1
Phosphorus (P) ppm	738
Zinc (Zn) ppm	866
Calcium (Ca) ppm	1726
Barium (Ba) ppm	1
Magnesium (Mg) ppm	11
Molybdenum (Mo) ppm	1
Boron (B) ppm	57

XXXXXXXXXX  
...  
USA

Date sampled  
04/20/2022

Date reported  
04/28/2022

Sample number  
10254262

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# Understanding the tests

## Viscosity

Viscosity is a measure of the resistance to flow at a certain temperature and is typically measured at 100°C on engine oils. A drop of the viscosity may indicate fuel dilution caused by blow-by, engine timing or injector problems. An increase in viscosity may indicate overheating, soot loading and/or oxidation caused by poor combustion or cooling. Changes in viscosity can also be due to product mixing or use of an improper fluid.

## Water

All samples are screened for water on a hot plate. If the sample crackles, this is an indication that there is water present in the sample. Sources of water include the cooling system, condensation or other outside contamination.

## Fuel Dilution

Fuel dilution is indicated by a low viscosity in combination with confirmation of fuel dilution by Gas Chromatograph (GC), FTIR or SETA Flash. Fuel dilution in an oil sample indicates an injector problem.

## Elemental Analysis

Inductively Coupled Plasma technique (ICP) measured very small particles (<3µm) for a variety of elements that determine the presence of wear metals, additives and contaminants such as dirt or coolant. These elements are measured in parts per million (ppm). The significance and acceptable limits of the elements are dependant on the lubricant type, make and model and application. Below are potential sources for these elements.

## Dispersancy

The property that allows oil to suspend and carry away pollutants of diverse sources such as soot from combustion, metallic particles from wear, corrosion of mechanical parts, and insoluble products resulting from the aging of the oil.

## Performance Rating

DP is a calculated combined performance rating (overall note), which is helpful for monitoring the performance of the lubricant

## Total Base Number

The Total Base Number (TBN) is the translation of the oil alkalinity. For a lubricant in use, too low a TBN means that the oil must be changed. The result must always be compared with the initial TBN of the oil. A significant change in the TBN value can be caused by several causes such as a consumption of additives or the contamination by another lubricant with a different TBN.

## Glycol / Coolant

High levels of Sodium and Potassium are indicators that coolant is present in the sample. Coolant in the engine compartment indicates an internal water leak. This is a serious problem that can result in severe engine damage.

## Element

## Symbol

## Possible sources

Aluminium	Al	Pistons, bearings, bushings, thrust washers, rings, cylinders, engine after-cooler, dust
Barium	Ba	Rust and oxidation inhibitor additive
Boron	B	Anti-corrosion additive in coolant, dust, water, oil additive
Calcium	Ca	Detergent/dispersant additive
Chromium	Cr	Piston rings, cylinder liners, valve, rods
Copper	Cu	Bearings, bushings, oil cooler
Iron	Fe	Bearings, shafts, cylinders, gears, piston rings
Lead	Pb	Bearings, bushings, anti-wear additive
Magnesium	Mg	Transmissions, detergent additive
Molybdenum	Mo	Piston rings, electric motors, oil additives
Nickel	Ni	Bearings, bushings, rings
Phosphorus	P	Anti-wear additive
Potassium	K	Coolant additive
Silicon	Si	Dust, dirt
Silver	Ag	Shafts and plating
Sodium	Na	Detergent or coolant additive, Salt
Tin	Sn	Bearings, bearing cages
Titanium	Ti	Bearing hub, coatings
Vanadium	V	Wear metal from alloys, coating, heavy fuel in marine applications
Zinc	Zn	Anti-wear additive

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about Zengine

