

Varnish Potential Rating

A wide range of fluid degradation issues can affect oil systems. One growing concern is the presence of varnish. This condition can occur in even the most well-maintained machines. Surprisingly, it can also arise when oils are not particularly old or contaminated, as well as in thermally robust synthetic lubricants and hydraulic fluids.

Varnish Defined

The products of lubricant degradation are called varnish. This product are generally unstable in the oil and, as such, are prone to form deposits or separate from the bulk oil. In certain instances, deposits form on machine surfaces at the exact location where the oil has degraded. In other cases, the oil degrades in one location but the insoluble degradation products are carried elsewhere by the moving fluid forming deposits on surfaces.

Over time, some deposits can thermally cure to a tough enamel-like coating. Other types of deposits, generally in cooler zones, remain soft or gummy, and may in some cases appear clear and grease-like. The following are examples of where varnish might occur in lube- and hydraulic oil systems:

- black crusty deposits on mechanical seals
- gold adherent films on valves
- charcoal-like deposits on sleeve bearings
- gooey-brown accumulations on oil filters
- black scabby deposits on mechanical seal surfaces thrust-bearing pads
- carbonaceous residue on mechanical surfaces

The deposits that form on sensitive machine surfaces interfere with the flow of fluid and the machine's mechanical movements, contribute to wear and corrosion.

GreenOil filter and Varnish

GreenOil was in 2013 contacted by a customer, which had continuous problems with varnish problems in the hydraulic oil, caused by high temperatures.

GreenOil installed in the end of September 2013 their filter unit WP1-B1-100, in order to remove the varnish from the oil. Results after just one week with filtration, the varnish potential rating was brought from CAUTION down to NORMAL.

Further particle contamination was lowered from 22/22/21 to 17/13/11 according to ISO 4406.

Oil sample test carried out before installation of GreenOil filter WP1-B1-100



VARNISH POTENTIAL REPORT



Oil
Unit No. VPR SAMPLE 1
Unit:
Make
Model
Serial No.
Site

Compartment:
Name Oil
Make
Model
Serial No.
Capacity:

Customer:
 GREEN OIL
 Julius Kajusvej 14
 DK-8400 Ebeltøft

DIAGNOSIS

Test results show MODERATE VARNISH POTENTIAL with the submitted sample. MPC and UC test results indicate an excessive amount of soft contaminants (varnish precursors) present in the sample. Recommend checking system for hot spots and adiabatic compression (micro-dieseling). When possible, it is recommended to inspect system components (especially in low flow areas and cool surfaces) for excessive varnish. Recommend appropriate filtration or other OEM approved method to reduce/remove excessive soft contaminants from the oil. Note: This is an amended report, please disregard previous issue - sample diagnosis updated.

ANALYST: Ed.Eckert

LEGEND

Caution	Severe	Abnormal	Caution	Normal

DATE SAMPLED	11-Oct-13
DATE RECEIVED	28-Oct-13
DATE REPORTED	
LAB NO.	43020465423
SIF NO.	14353910
TIME ON UNIT	
TIME ON OIL	
OIL BRAND	Unidentified
OIL TYPE	Unidentified
OIL GRADE	Unknown
OIL ADDED	
FILTER	Not Applicable
OIL CHANGED	
WO NUMBER	
Ruler	
Amine % (D6971)	100
Phenol % (D6971)	100
Physical / Chemical	
VP Pentane Insolubles	102
Color (D1500)	4.0
UC Sediment Rating (MM1169)	3
Blotter Test	1
Filter Patch Test	
Membrane Patch Colorimetry	24
Particle Count	
ISO 4406 Rating	22/22/21
> 4 Micron (particles/ml)	25387
> 6 Micron (particles/ml)	22837
> 14 Micron (particles/ml)	13017
> 23 Micron (particle/ml)	3143
> 50 Micron (particles/ml)	85
Varnish Potential	
Varnish Potential Rating	Moderate

Current Sample	Lab N°	Lab N°	Lab N°
 See Comments			

Oil sample test carried out after installation of GreenOil filter WP1-B1-100 and 7 days in operation



UIN: 036AC5D

VARNISH POTENTIAL REPORT



Oil
Unit No. VPR SAMPLE 2

Unit:
Make
Model
Serial No.
Site

Compartment:
Name Oil
Make
Model
Serial No.
Capacity:

Customer:
GREEN OIL
Julius Kajusvej 14
DK-8400 Ebeltoft

DIAGNOSIS

Test results show LOW VARNISH POTENTIAL with the submitted sample. All tests performed are within normal parameters. No recommended action at this time. Resample next service interval to further monitor. Note: This is an amended report, please disregard previous issue - sample diagnosis updated.

ANALYST: Ed Eckert

LEGEND

Normal	Severe	Abnormal	Caution	Normal

DATE SAMPLED	11-Oct-13
DATE RECEIVED	28-Oct-13
DATE REPORTED	
LAB NO.	43020465424
SIF NO.	14363012
TIME ON UNIT	
TIME ON OIL	
OIL BRAND	Unidentified
OIL TYPE	Unidentified
OIL GRADE	Unknown
OIL ADDED	
FILTER	Not Applicable
OIL CHANGED	
WO NUMBER	

Ruler	
Amine % (D6971)	100
Phenol % (D6971)	100

Physical / Chemical	
VP Pentane Insolubles	4
Color (D1500)	4.0
UC Sediment Rating (MM1169)	1
Blotter Test	1

Filter Patch Test	
Membrane Patch Colorimetry	3

Particle Count	
ISO 4406 Rating	17/13/11
> 4 Micron (particles/ml)	767
> 6 Micron (particles/ml)	80
> 14 Micron (particles/ml)	16
> 23 Micron (particle/ml)	2
> 50 Micron (particles/ml)	<1

Varnish Potential	
Varnish Potential Rating	Low

Current Sample See Comments	Lab N°	Lab N°	Lab N°
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