Ecol Sp. z o.o.
Laboratorium
Podmiejska 71A
44-207 Rybnik
tel (32) 450 31 11
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LAB REPORT

P000000

Ecol internal number 00000

PCA Polskie Centrum Akredytacji BADANIA AB 1564

Unit ID: * **SK 00000**

Date: 28.10.2024

Ecol Sp. z o.o.
ul. Podmiejska 71A
Rybnik 44-207

sample rating

ACTION

Purpose of analysis: *	Routine control
Sample taken by:	Ecol
Sampling method/point: *	Oil pan
Sample reception date:	01.10.2024
Delivered by:	Ecol
Sample condition:	500 ml; opaque
Subject of anaysis:	**Industrial lubricating oils**

Component: *	Engine diesel / Fuel:* -
Type: *	Peugeot Boxer
Manufacturer: *	Peugeot
Serial no.: *	-
Year of manu.: *	2022
Application:*	Dolna Odra SD
System capacity [l]: *	6,60
Name: *	**b.d.**

Opinion and interpretation

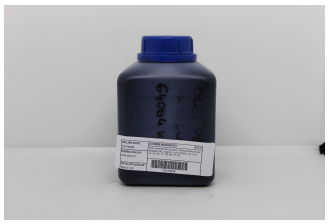
Measured viscosity in accordance with the SAE 30. Flash point in in the normal range. Alkaline reserve (ratio of base number and acid number) critically decreased. i-pH value significantly decreased. Silicon content slightly increased. FTIR infrared spectrum unreadable, indicating a high soot content in the oil. Iron content significantly increased. The level of other metallic wear products determined in the elemental test (particles <5 microns in size) significantly increased. PQ index informing about the content of ferromagnetic particles (regardless of particle size) in the acceptable range.

Conclusions and recommendations:

The oil is not suitable for further use. Key parameters ensuring proper engine protection have been exceeded, the oil has been working for too long, the recommended safe period from change to change is estimated at 15,000 km. Such a low alkaline reserve may cause the engine to lack the ability of the oil to neutralize acidic products, lack of anticorrosion properties or lack of detergent-dispersant properties. Based on the statistics, the values of wear parameters exceed the permissible limits (taking into account the oil's operating time and the number of top-ups), this may indicate increased wear processes of the engine.

The presented opinion / interpretation was developed based on the results of non-accredited and accredited analysis.

ANALYSIS RESULTS		*Current sample*					
Sample number:		*P2416848*	*P2401096*				
SAMPLE RATING							
Analysis completed date		***04.10.2024***	*25.01.2024*				
*Date of sampling**		***18.09.2024***	*17.01.2024*				
*Date of last oil change**		***18.01.2024***					
Top-up since change [l]*	*[l]*		*3,00*				
Operating time since change [h]*	*[km]*	***22551***	*43465*				
Total operating time [h]*	*[km]*	***66054***	*43465*				



Sample view

	Unit	U					Standard	S.m.
Appearance		**opaque**		opaque				
WEAR								
Iron	mg/kg	**298**		490			ASTM D5185-18	
Chrome	mg/kg	**4,7**	±1.3	10			ASTM D5185-18	A
Tin	mg/kg	**3,3**	±1.6	5,9			ASTM D5185-18	
Aluminium	mg/kg	**11**	±3	23			ASTM D5185-18	A
Nickel	mg/kg	**<1,0**		2,8			ASTM D5185-18	
Copper	mg/kg	**8,4**	±1.3	26			ASTM D5185-18	A
Lead	mg/kg	**<1,0**		<1,0			ASTM D5185-18	
Antimony	mg/kg	**<1,0**		<1,0			ASTM D5185-18	
Manganese	mg/kg	**4,4**	±1.1	17			ASTM D5185-18	
Vanadium	mg/kg	**<1,0**		<1,0			ASTM D5185-18	
Silver	mg/kg	**<1,0**		<1,0			ASTM D5185-18	
PQ index	-	**28**		55			ASTM D8184-18	

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ADDITIVES									
Calcium	mg/kg	**1272**	±127	1252				ASTM D5185-18	A
Magnesium	mg/kg	**10,2**	±1.8	17,6				ASTM D5185-18	A
Boron	mg/kg	**59**	±24	29				ASTM D5185-18	
Zinc	mg/kg	**894**	±98	652				ASTM D5185-18	A
Phosphorus	mg/kg	**786**	±212	448				ASTM D5185-18	A
Barium	mg/kg	**<1,00**		2,08				ASTM D5185-18	
Molybdenum	mg/kg	**554**		448				ASTM D5185-18	
Sulphur	mg/kg	**2266**	±407	1774				ASTM D5185-18	A
CONTAMINATION									
Silicon	mg/kg	**21**	±7	46				ASTM D5185-18	A
Potassium	mg/kg	**4,5**	±0.9	19				ASTM D5185-18	
Sodium	mg/kg	**4,6**	±0.5	9,6				ASTM D5185-18	
Lithium	mg/kg	**<1,0**		<1,0				ASTM D5185-18	
Titanium	mg/kg	**<5,0**		<5,0				ASTM D5185-18	
Water K. F.	mg/kg	**185**	±38	934				PB 07.31.00/01	A
Glycol IR	-	**-**		-				ASTM E2412-23a	
Soot	%	**-**		-				ASTM E2412-23a	
PHYSICOCHEMICAL PROPERTIES									
Viscosity at 40°C	cSt	**58,08**	±0.29	61,14				PN-EN ISO 3104:2021-03 (**)	A
Viscosity at 100°C	cSt	**10,97**	±0.05	11,13				PN-EN ISO 3104:2021-03 (**)	A
Viscosity index	-	**184**	±4	177				PN-ISO 2909:2009+ Ap1:2010	A
Acid number	mgKOH/g	**5,06**		4,66				ASTM D664-18e2 (**)	
Base Number (BN)	mgKOH/g	**2,11**	±0.31	0,99				PN-ISO 3771:2012	
Spectrum FTIR	-	**Diagram_FTIR**		Diagram_FTIR				ASTM E2412-23a	
ipH Value	-	**3,7**		3,1				PB 07.32.00_01	
Oxidation	A/cm	**-**		-				ASTM E2412-23a	
Nitration	A/cm	**-**		-				ASTM E2412-23a	
Sulfation	A/cm	**-**		-				ASTM E2412-23a	
Flash Point, closed cup	°C	**195,0**	±12	222,5				PN-EN ISO 2719:2016-08+A1:2021-06	A

(**) Standard ASTM D664-18e2 has been withdrawn and replaced by ASTM D664-24
(**) Standard PN-EN ISO 3104:2021-03 has been withdrawn and replaced by PN-EN ISO 3104:2024-01

Sample view

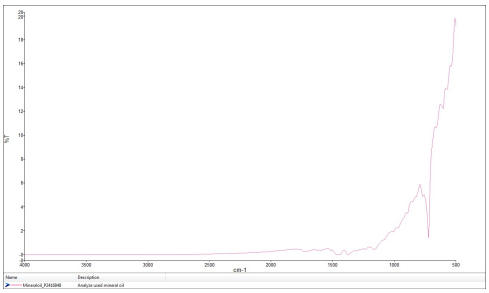
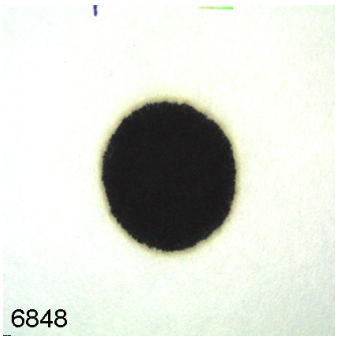


Diagram FTIR



Dispersing properties

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