INS KIT

WEAR CHECK

OIL ANALYSIS REPORT

WEAR	ABNORMAL
CONTAMINANTS	ABNORMAL
OIL CONDITION	NORMAL

Machine Id
BMW Y0418A
Component
Gasoline Engine
Fluid
GASOLINE ENGINE OIL SAE 10W30 (--- GAL)

RECOMMENDATION

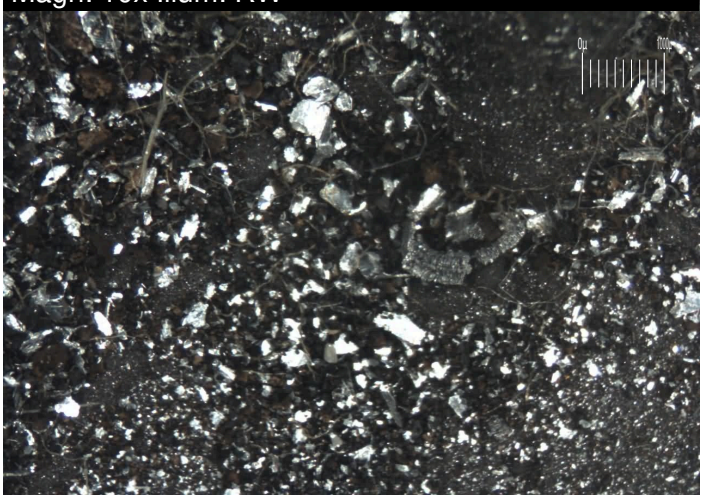
We understand that this sample is for warranty/insurance purposes. Diagnostician`s Note: The filter contained moderate amounts of non-ferrous sliding and rolling fatigue wear (aluminum - bearing/piston). The oil condition does not indicate oil over-extension, however the oil does have a faint odor of ethane/butane indicating the possible use of an engine starter spray.

WEAR

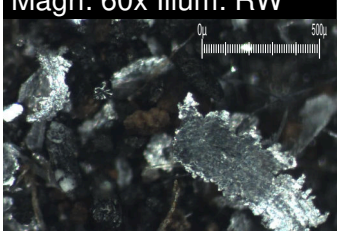
Aluminum ppm levels are abnormal. Wear particle analysis indicates that the nonferrous rolling and nonferrous sliding particles are marginal. Piston wear is indicated.

Test	UOM	Method	Limit/Abn	Current	History1	History2
Sample Number		Client Info		PP0001075	---	---
Sample Date		Client Info		08 May 2024	---	---
Machine Age	kms	Client Info		97878	---	---
Oil Age	kms	Client Info		0	---	---
Filter Age	kms	Client Info		0	---	---
Oil Changed		Client Info		N/A	---	---
Filter Changed		Client Info		N/A	---	---
Sample Status				ABNORMAL	---	---
Iron	ppm	ASTM D5185(m)	>150	16	---	---
Chromium	ppm	ASTM D5185(m)	>20	<1	---	---
Nickel	ppm	ASTM D5185(m)	>5	<1	---	---
Titanium	ppm	ASTM D5185(m)		28	---	---
Silver	ppm	ASTM D5185(m)	>2	0	---	---
Aluminum	ppm	ASTM D5185(m)	>40	▲ 58	---	---
Lead	ppm	ASTM D5185(m)	>50	0	---	---
Copper	ppm	ASTM D5185(m)	>155	4	---	---
Tin	ppm	ASTM D5185(m)	>10	0	---	---
Vanadium	ppm	ASTM D5185(m)		0	---	---
White Metal	scalar	Visual*	NONE	NONE	---	---
Yellow Metal	scalar	Visual*	NONE	NONE	---	---
Ferrous Rubbing	Scale 0-10	ASTM D7684*		3		
Ferrous Sliding	Scale 0-10	ASTM D7684*		1		
Ferrous Cutting	Scale 0-10	ASTM D7684*				
Ferrous Rolling	Scale 0-10	ASTM D7684*		1		
Ferrous Break-in	Scale 0-10	ASTM D7684*				
Ferrous Spheres	Scale 0-10	ASTM D7684*				
Ferrous Black Oxides	Scale 0-10	ASTM D7684*				
Ferrous Red Oxides	Scale 0-10	ASTM D7684*				
Ferrous Corrosive	Scale 0-10	ASTM D7684*				
Ferrous Other	Scale 0-10	ASTM D7684*				
Nonferrous Rubbing	Scale 0-10	ASTM D7684*		2		
Nonferrous Sliding	Scale 0-10	ASTM D7684*		▲ 2		
Nonferrous Cutting	Scale 0-10	ASTM D7684*				
Nonferrous Rolling	Scale 0-10	ASTM D7684*		▲ 2		
Nonferrous Other	Scale 0-10	ASTM D7684*				
Patch Weight	mg	ASTM D7684*		277	---	---

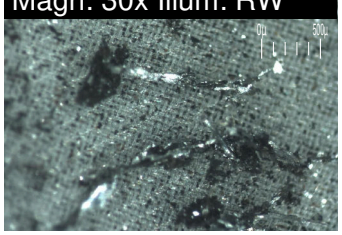
Magn: 10x Illum: RW



Magn: 60x Illum: RW



Magn: 30x Illum: RW



CONTAMINANTS

The oil has an odor like ethane / butane. It's possible that an engine starter spray was used.

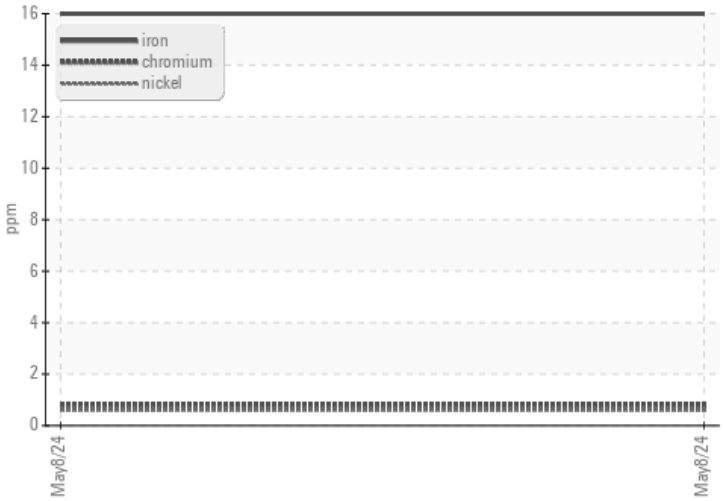
Silicon	ppm	ASTM D5185(m)	>30	**24**	---	---
Potassium	ppm	ASTM D5185(m)	>20	**1**	---	---
Fuel		WC Method	>4.0	**<1.0**	---	---
Water		WC Method	>0.2	**NEG**	---	---
Glycol		WC Method		**NEG**	---	---
Soot %	%	ASTM D7844*		**0**	---	---
Nitration	Abs/cm	ASTM D7624*	>20	**11.4**	---	---
Sulfation	Abs/.1mm	ASTM D7415*	>30	**15.9**	---	---
Silt	scalar	Visual*	NONE	**NONE**	---	---
Debris	scalar	Visual*	NONE	**VLITE**	---	---
Sand/Dirt	scalar	Visual*	NONE	**NONE**	---	---
Appearance	scalar	Visual*	NORML	**NORML**	---	---
Odor	scalar	Visual*	NORML	**NORML**	---	---
Emulsified Water	scalar	Visual*	>0.2	**NEG**	---	---
Sand/Dirt	Scale 0-10	ASTM D7684*		**4**		
Fibres	Scale 0-10	ASTM D7684*		**2**		
Spheres	Scale 0-10	ASTM D7684*				
Other	Scale 0-10	ASTM D7684*				

OIL CONDITION

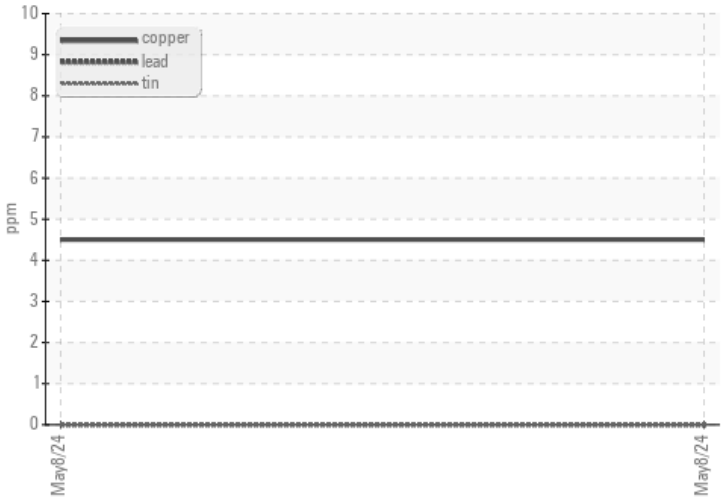
The BN result indicates that there is suitable alkalinity remaining in the oil. The AN level is acceptable for this fluid. The oil is no longer serviceable as a result of the abnormal and/or severe wear.

Sodium	ppm	ASTM D5185(m)	>400	**8**	---	---
Boron	ppm	ASTM D5185(m)	75	**60**	---	---
Barium	ppm	ASTM D5185(m)	5	**0**	---	---
Molybdenum	ppm	ASTM D5185(m)	100	**9**	---	---
Manganese	ppm	ASTM D5185(m)		**<1**	---	---
Magnesium	ppm	ASTM D5185(m)	12	**107**	---	---
Calcium	ppm	ASTM D5185(m)	2100	**2499**	---	---
Phosphorus	ppm	ASTM D5185(m)	650	**816**	---	---
Zinc	ppm	ASTM D5185(m)	850	**993**	---	---
Sulfur	ppm	ASTM D5185(m)	2500	**1828**	---	---
Oxidation	Abs/.1mm	ASTM D7414*	>25	**11.3**	---	---
Acid Number (AN)	mg KOH/g	ASTM D974*		**2.42**	---	---
Base Number (BN)	mg KOH/g	ASTM D2896*		**9.48**	---	---
Visc @ 40°C	cSt	ASTM D7279(m)	73	**60.9**	---	---
Visc @ 100°C	cSt	ASTM D7279(m)	10.9	**9.7**	---	---
Viscosity Index (VI)	Scale	ASTM D2270*	138	**142**	---	---

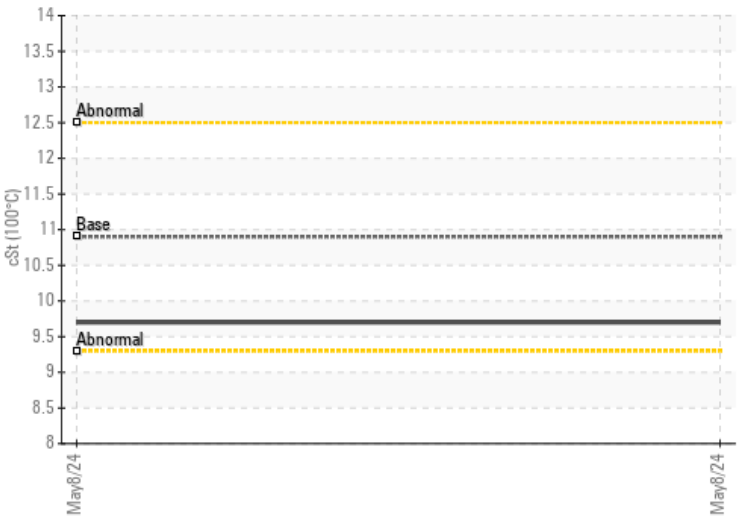
Ferrous Alloys



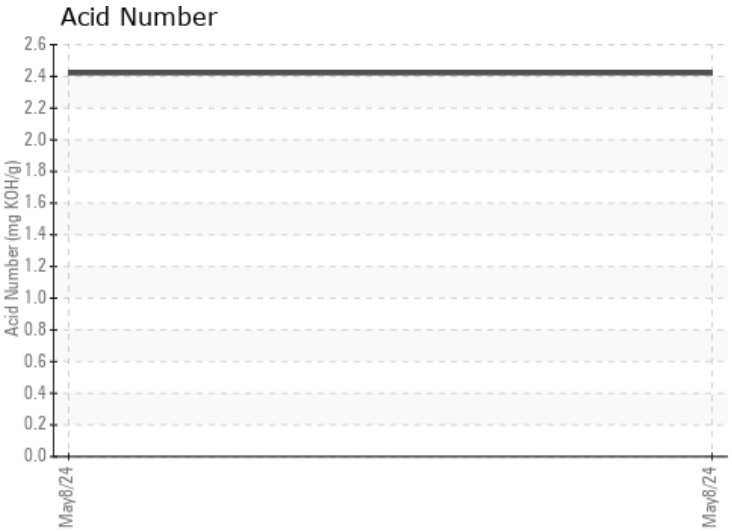
Non-ferrous Metals



Viscosity @ 100°C



Acid Number



ISO 17025:2017 Accredited Laboratory

Laboratory : WearCheck - C8-1175 Appleby Line, Burlington, ON L7L 5H9
Sample No. : PP0001075 **Received** : 10 May 2024
Lab Number : 02634536 **Tested** : 16 May 2024
Unique Number : 5775689 **Diagnosed** : 16 May 2024 - Bill Quesnel
Test Package : INS (Additional Tests: FT-IR, TAN Man, VI)

To discuss this sample report, contact Customer Service at 1-800-268-2131.
Test denoted (*) outside scope of accreditation, (m) method modified, (e) tested at external lab.
Validity of results and interpretation are based on the sample and information as supplied.

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