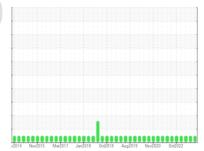


OIL ANALYSIS REPORT

Sample Rating Trend



NORMAL



Machine Id STERLING 48

Component

Diesel Engine

DIESEL ENGINE OIL SAE 15W40 (7 GAL)

DIAGNOSIS

Recommendation

Resample at the next service interval to monitor.

Wear

All component wear rates are normal.

Contamination

There is no indication of any contamination in the oil.

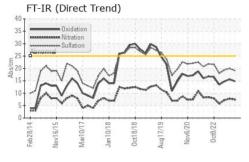
Fluid Condition

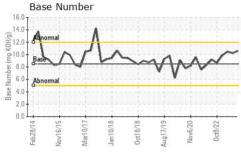
The BN result indicates that there is suitable alkalinity remaining in the oil. The condition of the oil is suitable for further service.

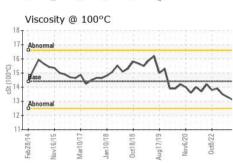
SAMPLE INFORMATION method limit/base current history1 history2			32014 Nov20	15 Mar2017 Jan2018	Oct2018 Aug2019 Nov2020	0ct2022	
Sample Date	SAMPLE INFORM	MATION	method	limit/base	current	history1	history2
Sample Date Client Info 4513 4210 3827 Machine Age hrs Client Info 4513 4210 3827 Oil Age hrs Client Info 4513 4210 3827 Oil Changed Instruction Changed <	Sample Number		Client Info		RW0005157	RW0004581	RW0004392
Oil Age hrs Client Info 303 383 356 Oil Changed Client Info Changed Changed<			Client Info		04 Apr 2024	28 Oct 2023	27 May 2023
Oil Age hrs Client Info 303 383 356 Oil Changed Client Info Changed Changed<	•	hrs	Client Info		-	4210	3827
Oil Changed Sample Status Client Info Changed NORMAL Changed NORMAL Changed NORMAL Changed NORMAL Changed NORMAL NORMAL	<u> </u>	hrs	Client Info		303	383	356
Sample Status	-		Client Info		Changed	Changed	Changed
Fuel	-				NORMAL	NORMAL	NORMAL
Water Glycol WC Method >0.2 NEG NEG NEG WEAR METALS method limit/base current history1 history2 Iron ppm ASTM D5185m >90 23 23 20 Chromium ppm ASTM D5185m >20 <1	CONTAMINATIO	N	method	limit/base	current	history1	history2
WEAR METALS	Fuel		WC Method	>3.0	<1.0	<1.0	<1.0
WEAR METALS method limit/base current history1 history2 Iron ppm ASTM D5185m >90 23 23 20 Chromium ppm ASTM D5185m >20 <1	Water		WC Method	>0.2	NEG	NEG	NEG
Iron	Glycol		WC Method		NEG	NEG	NEG
Chromium ppm ASTM D5185m >20 <1	WEAR METALS		method	limit/base	current	history1	history2
Nickel	Iron	ppm	ASTM D5185m	>90	23	23	20
Titanium ppm ASTM D5185m >2 0 0 0 Silver ppm ASTM D5185m >2 0 <1 0 Aluminum ppm ASTM D5185m >20 3 3 3 Lead ppm ASTM D5185m >40 3 3 <1 Copper ppm ASTM D5185m >330 <1 1 1 Tin ppm ASTM D5185m >15 <1 <1 <1 Vanadium ppm ASTM D5185m 0 0 0 0 Cadmium ppm ASTM D5185m 0 0 0 0 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 250 3 7 7 Barium ppm ASTM D5185m 10 0 0 0 Molybdenum ppm ASTM D5185m 10 0 0	Chromium	ppm	ASTM D5185m	>20	<1	1	1
Silver ppm ASTM D5185m >2 0 <1	Nickel	ppm	ASTM D5185m	>2	<1	<1	<1
Aluminum ppm ASTM D5185m >20 3 3 3 Lead ppm ASTM D5185m >40 3 3 <1 Copper ppm ASTM D5185m >330 <1 1 1 Tin ppm ASTM D5185m >15 <1 <1 <1 Vanadium ppm ASTM D5185m 0 0 0 0 Cadmium ppm ASTM D5185m 0 0 0 0 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 10 0 0 0 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 10 0 0 0 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 10 0 0 0	Titanium	ppm	ASTM D5185m	>2	0	0	0
Lead ppm ASTM D5185m >40 3 3 <1	Silver	ppm	ASTM D5185m	>2	0	<1	0
Copper ppm ASTM D5185m >330 <1	Aluminum	ppm	ASTM D5185m	>20	3	3	3
Trin	Lead	ppm	ASTM D5185m	>40	3	3	<1
Vanadium ppm ASTM D5185m 0 0 0 0 Cadmium ppm ASTM D5185m 0 0 0 0 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 250 3 7 7 Barium ppm ASTM D5185m 10 0 0 0 Molybdenum ppm ASTM D5185m 100 66 57 63 Manganese ppm ASTM D5185m 100 66 57 63 Magnesium ppm ASTM D5185m 450 1112 893 983 Calcium ppm ASTM D5185m 3000 1312 1064 1166 Phosphorus ppm ASTM D5185m 1150 1218 963 1071 Zinc ppm ASTM D5185m 4250 4357 2848 3888 CONTAMINANTS method limit/base curr	Copper	ppm	ASTM D5185m	>330	<1	1	1
Cadmium ppm ASTM D5185m 0 0 0 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 250 3 7 7 Barium ppm ASTM D5185m 10 0 0 0 Molybdenum ppm ASTM D5185m 100 66 57 63 Manganese ppm ASTM D5185m 100 66 57 63 Manganesium ppm ASTM D5185m 450 1112 893 983 Calcium ppm ASTM D5185m 3000 1312 1064 1166 Phosphorus ppm ASTM D5185m 150 1218 963 1071 Zinc ppm ASTM D5185m 1350 1489 1227 1339 Sulfur ppm ASTM D5185m 250 4357 2848 3888 CONTAMINANTS method limit/base current	Tin	ppm	ASTM D5185m	>15	<1	<1	<1
ADDITIVES	Vanadium	ppm	ASTM D5185m		0	0	0
Boron	Cadmium	ppm	ASTM D5185m		0	0	0
Barium ppm ASTM D5185m 10 0 0 0 Molybdenum ppm ASTM D5185m 100 66 57 63 Manganese ppm ASTM D5185m 100 45 1112 893 983 Calcium ppm ASTM D5185m 3000 1312 1064 1166 1166 1166 1166 1166 1166 1166 1166 1166 1166 1166 1166 1166 1166 1166 1166 1166 1166 1166 1166 1166 1166 1166 1166 1166 1166 1166 1166 1166 1166 1166 1166 1166 1166 1166 1166 1166 1166 1166 1166 1166 1166 1166 1160 1171 1160 1171 1171 1171 1171 1171 1171 1171 1171 1171 1171 1171 1171 1171 1171 1171	ADDITIVES		method	limit/base	current	history1	history2
Molybdenum ppm ASTM D5185m 100 66 57 63 Manganese ppm ASTM D5185m <1	Boron	ppm	ASTM D5185m	250	3	7	7
Manganese ppm ASTM D5185m <1	Barium	ppm	ASTM D5185m	10	0	0	0
Magnesium ppm ASTM D5185m 450 1112 893 983 Calcium ppm ASTM D5185m 3000 1312 1064 1166 Phosphorus ppm ASTM D5185m 1150 1218 963 1071 Zinc ppm ASTM D5185m 1350 1489 1227 1339 Sulfur ppm ASTM D5185m 4250 4357 2848 3888 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 3 3 4 Sodium ppm ASTM D5185m >158 1 1 2 Potassium ppm ASTM D5185m >20 1 0 1 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >6 0.4 0.5 0.4 Nitration Abs/cm *ASTM D7415	Molybdenum	ppm	ASTM D5185m	100	66	57	63
Calcium ppm ASTM D5185m 3000 1312 1064 1166 Phosphorus ppm ASTM D5185m 1150 1218 963 1071 Zinc ppm ASTM D5185m 1350 1489 1227 1339 Sulfur ppm ASTM D5185m 4250 4357 2848 3888 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 3 3 4 Sodium ppm ASTM D5185m >158 1 1 2 Potassium ppm ASTM D5185m >20 1 0 1 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >6 0.4 0.5 0.4 Nitration Abs/:1mm *ASTM D7415 >30 19.1 20.0 19.4 FLUID DEGRADATION metho	Manganese	ppm	ASTM D5185m		<1	<1	<1
Phosphorus ppm ASTM D5185m 1150 1218 963 1071 Zinc ppm ASTM D5185m 1350 1489 1227 1339 Sulfur ppm ASTM D5185m 4250 4357 2848 3888 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 3 3 4 Sodium ppm ASTM D5185m >158 1 1 2 Potassium ppm ASTM D5185m >20 1 0 1 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >6 0.4 0.5 0.4 Nitration Abs/cm *ASTM D7624 >20 7.4 7.8 7.2 Sulfation Abs/.1mm *ASTM D7415 >30 19.1 20.0 19.4 FLUID DEGRADATION meth	Magnesium	ppm	ASTM D5185m	450	1112	893	983
Zinc ppm ASTM D5185m 1350 1489 1227 1339 Sulfur ppm ASTM D5185m 4250 4357 2848 3888 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 3 3 4 Sodium ppm ASTM D5185m >158 1 1 2 Potassium ppm ASTM D5185m >20 1 0 1 INFRA-RED method limit/base current history1 history2 Soot % % "ASTM D7844 >6 0.4 0.5 0.4 Nitration Abs/cm "ASTM D7624 >20 7.4 7.8 7.2 Sulfation Abs/.1mm "ASTM D7415 >30 19.1 20.0 19.4 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm	Calcium	ppm	ASTM D5185m	3000	1312	1064	1166
Sulfur ppm ASTM D5185m 4250 4357 2848 3888 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 3 3 4 Sodium ppm ASTM D5185m >158 1 1 2 Potassium ppm ASTM D5185m >20 1 0 1 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >6 0.4 0.5 0.4 Nitration Abs/cm *ASTM D7624 >20 7.4 7.8 7.2 Sulfation Abs/.1mm *ASTM D7415 >30 19.1 20.0 19.4 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 14.8 15.6 14.8	Phosphorus	ppm	ASTM D5185m	1150	1218	963	1071
CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 3 3 4 Sodium ppm ASTM D5185m >158 1 1 2 Potassium ppm ASTM D5185m >20 1 0 1 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >6 0.4 0.5 0.4 Nitration Abs/cm *ASTM D7624 >20 7.4 7.8 7.2 Sulfation Abs/.1mm *ASTM D7415 >30 19.1 20.0 19.4 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 14.8 15.6 14.8	Zinc	ppm	ASTM D5185m	1350	1489	1227	1339
Silicon ppm ASTM D5185m >25 3 3 4 Sodium ppm ASTM D5185m >158 1 1 2 Potassium ppm ASTM D5185m >20 1 0 1 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >6 0.4 0.5 0.4 Nitration Abs/cm *ASTM D7624 >20 7.4 7.8 7.2 Sulfation Abs/.1mm *ASTM D7415 >30 19.1 20.0 19.4 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 14.8 15.6 14.8	Sulfur	ppm	ASTM D5185m	4250	4357	2848	3888
Sodium ppm ASTM D5185m >158 1 1 2 Potassium ppm ASTM D5185m >20 1 0 1 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >6 0.4 0.5 0.4 Nitration Abs/cm *ASTM D7624 >20 7.4 7.8 7.2 Sulfation Abs/.1mm *ASTM D7415 >30 19.1 20.0 19.4 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 14.8 15.6 14.8	CONTAMINANTS	3	method	limit/base	current	history1	history2
Potassium ppm ASTM D5185m >20 1 0 1 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >6 0.4 0.5 0.4 Nitration Abs/cm *ASTM D7624 >20 7.4 7.8 7.2 Sulfation Abs/.1mm *ASTM D7415 >30 19.1 20.0 19.4 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 14.8 15.6 14.8		ppm			3	3	
INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >6 0.4 0.5 0.4 Nitration Abs/cm *ASTM D7624 >20 7.4 7.8 7.2 Sulfation Abs/.1mm *ASTM D7415 >30 19.1 20.0 19.4 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 14.8 15.6 14.8		ppm	ASTM D5185m	>158	1	1	2
Soot % % *ASTM D7844 >6 0.4 0.5 0.4 Nitration Abs/cm *ASTM D7624 >20 7.4 7.8 7.2 Sulfation Abs/.1mm *ASTM D7415 >30 19.1 20.0 19.4 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 14.8 15.6 14.8	Potassium	ppm	ASTM D5185m	>20	1	0	1
Nitration Abs/cm *ASTM D7624 >20 7.4 7.8 7.2 Sulfation Abs/.1mm *ASTM D7415 >30 19.1 20.0 19.4 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 14.8 15.6 14.8	INFRA-RED		method	limit/base	current	history1	history2
Sulfation Abs/.1mm *ASTM D7415 >30 19.1 20.0 19.4 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 14.8 15.6 14.8	Soot %	%	*ASTM D7844	>6	0.4	0.5	0.4
FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 14.8 15.6 14.8	Nitration	Abs/cm	*ASTM D7624	>20	7.4	7.8	7.2
Oxidation Abs/.1mm *ASTM D7414 >25 14.8 15.6 14.8	Sulfation	Abs/.1mm	*ASTM D7415	>30	19.1	20.0	19.4
	FLUID DEGRADA	ATION	method	limit/base	current	history1	history2
Base Number (BN) mg KOH/g ASTM D2896 8.5 10.62 10.25 10.46	Oxidation	Abs/.1mm	*ASTM D7414	>25	14.8	15.6	14.8
	Base Number (BN)	mg KOH/g	ASTM D2896	8.5	10.62	10.25	10.46



OIL ANALYSIS REPORT







VISUAL		method	limit/base	current	history1	history2		
White Metal	scalar	*Visual	NONE	NONE	NONE	NONE		
Yellow Metal	scalar	*Visual	NONE	NONE	NONE	NONE		
Precipitate	scalar	*Visual	NONE	NONE	NONE	NONE		
Silt	scalar	*Visual	NONE	NONE	NONE	NONE		
Debris	scalar	*Visual	NONE	NONE	NONE	NONE		
Sand/Dirt	scalar	*Visual	NONE	NONE	NONE	NONE		
Appearance	scalar	*Visual	NORML	NORML	NORML	NORML		
Odor	scalar	*Visual	NORML	NORML	NORML	NORML		
Emulsified Water	scalar	*Visual	>0.2	NEG	NEG	NEG		
Free Water	scalar	*Visual		NEG	NEG	NEG		

FLUID PROPER	HES	method			history1	history2
Visc @ 100°C	cSt	ASTM D445	14.4	13.1	13.3	13.5

roi	n (ppi	m)							Lea	d (pp	m)					
Seve	re							100	Sma	re						
								0.0	1111							
Abno	ormal							E 40	Abno	ormal						
-	1	~		N	^	~	~~	20		~	~	لـ				
107001	Nov16/15	Mar10/17	Jan10/18	Oct18/18	Aug17/19	Nov6/20	0ct8/22	0	Feb28/14	Nov16/15	Mar10/17	Jan10/18	Oct18/18	Aug17/19	Nov6/20	
lu	minu	n (pp	m)							omiu	m (pp	om)				
Seve	re		1177					50 40	Seve	re	11 11	1177				
								20								
Abno	ormal							E 20	Abno	ormal						
	~			_		~		10	11.						~	
	Nov16/15	Mar10/17	Jan 10/18	Oct18/18	Aug17/19	Nov6/20	Oct8/22	0	Feb28/14	Nov16/15	Mar10/17	Jan 10/18	Oct18/18	Aug17/19	Nov6/20	
	Nov	Mar	Jan	Oct	Aug	Nov	0					Janj	Oct	Aug	Nov	
	per (ppm)					80		con (p	opm)					
bm	re ormal							60								
					Ш			Hd 40								
								20	Abno	ormal						
						$V_{\mathbf{L}}$		0		~	-	_	~~		~	_
	Nov16/15	Mar10/17	Jan 10/18	Oct18/18	Aug17/19	Nov6/20	Oct8/22		Feb28/14	Nov16/15	Mar10/17	Jan10/18	Oct18/18	Aug17/19	Nov6/20	
	≗ cosity			ŏ	Au	Z				≗ se Nu		e,	Ö	Au	Z	
	ormal	<u></u> ,					11711111	€ 15.0	_		A					
1	-			<u>~</u>	1			Base Number (mg KOH/g)	Ball	ormai	7	1				
ase	ormal	_			-	~~	~~	mber (m	Abno	ormal	V		~	1	M	1
NOTICE STATE	untidi							5.0	- 6							
11	-5	1		00	6		2	0.0		2	1			6		
10700	Nov16/15	Mar10/17	Jan 10/18	Oct18/18	Aug17/19.	Nov6/20	Oct8/22		Feb28/14	Nov16/15	Mar10/17	Jan 10/18	Oct18/18	Aug17/19	Nov6/20	





Certificate 12367

Sample No. : RW0005157 Lab Number : 06161017

Unique Number : 10996440 Test Package : MOB 2

: WearCheck USA - 501 Madison Ave., Cary, NC 27513 Received : 25 Apr 2024

Tested

: 26 Apr 2024 : 26 Apr 2024 - Wes Davis Diagnosed

HALLACK CONTRACTING, INC. 4223 W POLK HART, MI US 49420

Contact: DAN HALLACK KARL BUTCHER shop@hallackcontracting.com

To discuss this sample report, contact Customer Service at 1-800-237-1369. * - Denotes test methods that are outside of the ISO 17025 scope of accreditation. Statements of conformity to specifications are based on the simple acceptance decision rule (JCGM 106:2012)

T: (231)873-5081 F: (231)873-2889

Report Id: HALHAR [WUSCAR] 06161017 (Generated: 04/26/2024 14:39:10) Rev: 1

Contact/Location: DAN HALLACK KARL BUTCHER - HALHAR