

OIL ANALYSIS REPORT

Sample Rating Trend



Machine Id

KENWORTH 97

Component Diesel Engine

Fluid DIESEL ENGINE OIL SAE 15W40 (--- 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 INFORM	IATION	method	limit/base	current	history1	history2
Sample Number		Client Info		RW0005468	RW0005014	RW0004575
Sample Date		Client Info		06 Apr 2024	01 Feb 2024	13 Oct 2023
Machine Age	hrs	Client Info		4456	4146	3919
Oil Age	hrs	Client Info		310	227	357
Oil Changed		Client Info		Changed	Changed	Changed
Sample Status				NORMAL	NORMAL	NORMAL
			1			
CONTAMINATION	١	method	limit/base	current	nistory i	nistory2
Fuel		WC Method	>5	<1.0	<1.0	<1.0
Water		WC Method	>0.2	NEG	NEG	NEG
Glycol		WC Method		NEG	NEG	NEG
WEAR METALS		method	limit/base	current	history1	history2
Iron	ppm	ASTM D5185m	>100	14	5	16
Chromium	ppm	ASTM D5185m	>20	<1	<1	1
Nickel	ppm	ASTM D5185m	>4	0	0	0
Titanium	ppm	ASTM D5185m		0	0	0
Silver	ppm	ASTM D5185m	>3	0	0	0
Aluminum	ppm	ASTM D5185m	>20	2	2	2
Lead	ppm	ASTM D5185m	>40	<1	<1	0
Copper	ppm	ASTM D5185m	>330	<1	0	0
Tin	ppm	ASTM D5185m	>15	0	0	<1
Vanadium	ppm	ASTM D5185m		0	0	0
Cadmium	ppm	ASTM D5185m		0	0	0
		mathad	limit/base		history1	biotom/0
ADDITIVES		method			TIIStory I	riistoryz
Boron	ppm	ASTM D5185m	250	8	<1	nistory2 7
Boron Barium	ppm ppm	ASTM D5185m	250 10	8 0	<1 0	7 0
Boron Barium Molybdenum	ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m	250 10 100	8 0 68	<1 0 60	7 0 63
Boron Barium Molybdenum Manganese	ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	250 10 100	8 0 68 <1	<1 0 60 <1	7 0 63 <1
Boron Barium Molybdenum Manganese Magnesium	ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	250 10 100 450	8 0 68 <1 1121	<1 0 60 <1 926	7 0 63 <1 897
Boron Barium Molybdenum Manganese Magnesium Calcium	ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	250 10 100 450 3000	8 0 68 <1 1121 1432	<1 0 60 <1 926 1052	7 0 63 <1 897 1091
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus	ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	250 10 100 450 3000 1150	8 0 68 <1 1121 1432 1281	<1 0 60 <1 926 1052 971	7 0 63 <1 897 1091 1000
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc	ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	250 10 100 450 3000 1150 1350	8 0 68 <1 1121 1432 1281 1563	<1 0 60 <1 926 1052 971 1263	7 0 63 <1 897 1091 1000 1220
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur	ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	250 10 100 450 3000 1150 1350 4250	8 0 68 <1 1121 1432 1281 1563 4589	<pre></pre>	7 0 63 <1
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS	ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	250 10 100 450 3000 1150 1350 4250 Limit/base	8 0 68 <1 1121 1432 1281 1563 4589 current	<pre></pre>	7 0 63 <1 897 1091 1000 1220 2848 history2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon	ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	250 10 100 450 3000 1150 1350 4250 limit/base >25	8 0 68 <1 1121 1432 1281 1563 4589 current 4	<pre></pre>	7 0 63 <1 897 1091 1000 1220 2848 history2 4
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium	ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m	250 10 100 450 3000 1150 1350 4250 limit/base >25 >158	8 0 68 <1 1121 1432 1281 1563 4589 current 4 2	<pre></pre>	7 0 63 <1 897 1091 1000 1220 2848 history2 4 <1
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium	ppm 1 ppm 2 ppm 2 ppm 2 ppm 2 ppm 2 ppm 3 ppm 4 ppm 4 ppm 4 ppm 1	ASTM D5185m ASTM D5185m	250 10 100 450 3000 1150 1350 4250 limit/base >25 >158 >20	8 0 68 <1 1121 1432 1281 1563 4589 current 4 2 4 2 4 2 4	<pre> History 1 </pre> <pre> </pre>	7 0 63 <1 897 1091 1000 1220 2848 history2 4 <1 5
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium INFRA-RED	ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m	250 10 100 450 3000 1150 1350 4250 limit/base >25 >158 >20	8 0 68 <1 1121 1432 1281 1563 4589 current 4 2 4 2 4 2 4 2 4 2 4 2 4 2 4 2 4 2 4	<pre></pre>	7 0 63 <1 897 1091 1000 1220 2848 history2 4 <1 5 history2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium INFRA-RED Soot %	ppm 1 ppm 2 ppm 2 ppm 2 ppm 4 ppm 4	ASTM D5185m ASTM D5185m	250 10 100 450 3000 1150 1350 4250 limit/base >25 >158 >20 limit/base >3	8 0 68 <1 1121 1432 1281 1563 4589 current 4 2 4 2 4 0 0	<pre></pre>	7 0 63 <1 897 1091 1000 1220 2848 history2 4 <1 5 history2 0.4
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium INFRA-RED Soot % Nitration	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m	250 10 100 450 3000 1150 1350 4250 limit/base >25 >158 >20 limit/base >3 >20	8 0 68 <1 1121 1432 1281 1563 4589 current 4 2 4 2 4 0.4 8.9	<pre> History 1 </pre> <pre> </pre>	7 0 63 <1 897 1091 1000 1220 2848 history2 4 <1 5 history2 0.4 8.7
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium INFRA-RED Soot % Nitration Sulfation	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m	250 10 100 450 3000 1150 1350 4250 limit/base >25 >158 >20 limit/base >3 >20 >30	8 0 68 <1 1121 1432 1281 1563 4589 current 4 2 4 2 4 0.4 8.9 20.1	Instory 1 <1 0 60 <1 926 1052 971 1263 3031 history 1 4 0 0 history 1 0.3 7.4 18.6	7 0 63 <1 897 1091 1000 1220 2848 history2 4 <1 5 history2 0.4 8.7 20.0
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium INFRA-RED Soot % Nitration Sulfation FLUID DEGRADA	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m	250 10 100 450 3000 1150 1350 4250 limit/base >25 >158 >20 limit/base >3 >20 >30	8 0 68 <1 1121 1432 1281 1563 4589 current 4 2 4 2 4 0.4 8.9 20.1	<pre> History 1 </pre> <pre> <pre></pre></pre>	7 0 63 <1 897 1091 1000 1220 2848 history2 4 <1 5 history2 0.4 8.7 20.0 history2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium INFRA-RED Soot % Nitration Sulfation FLUID DEGRADA	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D7844 *ASTM D7415 method	250 10 100 450 3000 1150 1350 4250 imit/base >25 >158 >20 imit/base >3 >20 >30 imit/base	8 0 68 <1 1121 1432 1281 1563 4589 current 4 2 4 0.4 8.9 20.1 current	<pre> History 1 </pre> <pre> <pre> <pre> <pre></pre></pre></pre></pre>	7 0 63 <1 897 1091 1000 1220 2848 history2 4 <1 5 history2 0.4 8.7 20.0 history2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium INFRA-RED Soot % Nitration Sulfation FLUID DEGRADA Oxidation	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D7844 *ASTM D7415 method *ASTM D7414	250 10 100 450 3000 1150 1350 4250 imit/base >25 >3 >20 imit/base >3 >20 >30 imit/base >25 >3 >0 imit/base >25	8 0 68 <1 1121 1432 1281 1563 4589 current 4 2 4 2 4 2 4 20.1 current 15.9 10.02	<pre> History 1 </pre> <pre> <pre></pre></pre>	7 0 63 <1 897 1091 1000 1220 2848 history2 4 <1 5 history2 0.4 8.7 20.0 history2 15.3



OIL ANALYSIS REPORT





iu)			VISUAL		method	limit/base	current	history1	histor	ry2
			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			
And the other designed and the second s		Debris	scalar	*Visual	NONE	NONE	NONE	NONE		
		Sand/Dirt	scalar	*Visual	NONE	NONE	NONE	NONE		
8/22 - 6/23 - 3/23 - 6/24 -		Appearance	scalar	*Visual	NORML	NORML	NORML	NORM	L	
Jun1 Jan	Jun1	Oct1 Apr	Odor	scalar	*Visual	NORML	NORML	NORML	NORM	L
	Emulsified Water	scalar	*Visual	>0.2	NEG	NEG	NEG			
			Free Water	scalar	*Visual		NEG	NEG	NEG	
					un atla a d	line it //s a a a		la la tanan d	bisto	
	\wedge	\sim	FLUID PROPER	TIES	method	limit/base	current	nistory i	nistoi	ry∠
			Visc @ 100°C	cSt	ASTM D445	14.4	12.9	13.1	12.7	
			GRAPHS							
			Iron (ppm)			10	Lead (ppm)			
3 5			250 Severe				Severe			
n18/23	10/2:	t13/2	200			8	0 - 0		,	
ur r	Jur	00	Abnormal			E E	Abnormal			
C			100 - 0			4	0 + 0			
			50		~~~~	2	0			
			2/21	3/22	3/23 +	3/24 +	5/21	3/22	3/23 -	\$/24
			Apr1 Aug	Jun 18 Jan 6	Jun10 Oct13	Apr6	Apr1! Aug	Jun 18 Jan6	Jun10 Oct13	Apr6
			Aluminum (ppm))			Chromium (pp	m)		
\sim		-	50 Severe			5				
			40 - Severe			4	0 - Severe			
3 13	5	e 1	E 30			E 3	0 Abnormal			
in 18/2 Jan 6/2	in10/2	ct13/2	20-			¹¹ 2				
n L	ηΓ	ō	10			1	0-			
			2 2 2 1 0	22	23	24	21	22	23	24
			Apr15, Aug7,	un18/ Jan6/	un10/ Dct13/	Apr6/	Apr15, Aug7, Jov22,	un18/ Jan6/	un10/ 0ct13/	Apr6/
			Copper (ppm)	7			Silicon (nnm)	7	- U	
			400 Severe			8	⁰ Severe			
			300			6	0-			
			E 200-			E 4	0			
			d 200			dd	Anormal			
			100-			2				
				22	23	24	21	22	23	24
			Apr15. Aug7.	un18/ Jan6/	un10/ Det13/	Apr6/	Apr15. Aug7. Vov22	un18/ Jan6/	un10/ Oct13/	Apr6/
			Viscosity @ 100°	°C	-, -		Base Number	7		
			¹⁸ L	-		15.				
			16			KOH	Abnormal			
			Base			E ^{10.}	Bese		\sim	
			to Abnormal				Abnormal			
			12 -			ase				
			10	3 2				3 2		4
			pr15// kug7//	n 18/2 lan 6/2	n10/2 ct13/2	Apr6/2	pr15// \ug7//	n 18/2 lan 6/2	n10/2 ct13/2	Apr6/2
			A A M	nr ,	nn o		A /		nn o	
Certificate L2367	Lat Sar Lat Unic Tes	poratory mple No. o Numbe que Numbe st Package	ory : WearCheck USA - 501 M No. : RW0005468 mber : 06161027 umber : 10996450 :kage : MOB 2		on Ave., Cary ived : 29 ed : 20 nosed : 26	7, NC 27513 5 Apr 2024 6 Apr 2024 6 Apr 2024 - N	HALLACK CONTRACTING, INC. 4223 W POLK HART, MI es Davis US 49420 Contact: DAN HALLACK KARL BUTCHER			
To discuss t	this san	nple repo	rt, contact Customer Sei	rvice at 1-8	300-237-136	9.		shop@hallack	contracting	.com
* - Denotes	test me	thods tha	at are outside of the ISO	17025 scc	pe of accred	ditation.		Т	: (231)873-	5081

Statements of conformity to specifications are based on the simple acceptance decision rule (JCGM 106:2012)

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Contact/Location: DAN HALLACK KARL BUTCHER - HALHAR

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F: (231)873-2889