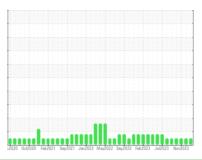


OIL ANALYSIS REPORT

Kenova [Kenova] Oil - Starboard Main Engine

Starboard Main Engine

DIESEL ENGINE OIL SAE 15W40 (150 GAL)



Sample Rating Trend



Recommendation

Resample at the next service interval to monitor.

All component wear rates are normal.

Contamination

There is no indication of any contamination in the

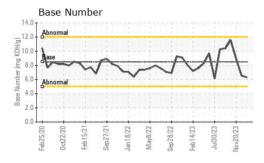
Fluid Condition

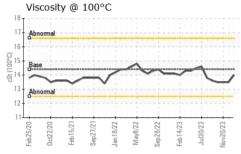
The BN result indicates that there is suitable alkalinity remaining in the oil. The condition of the oil is suitable for further service.

SAMPLE INFORM	MATION	method	limit/base	current	history1	history2
Sample Number		Client Info		WC0859754	WC0805207	WC0805220
Sample Date		Client Info		11 Mar 2024	16 Jan 2024	20 Nov 2023
Machine Age	hrs	Client Info		40128	39022	37876
Oil Age	hrs	Client Info		3831	2724	1578
Oil Changed		Client Info		Not Changd	Not Changd	Not Changd
Sample Status				NORMAL	NORMAL	NORMAL
CONTAMINATION	V	method	limit/base	current	history1	history2
Fuel		WC Method	>4.0	<1.0	<1.0	<1.0
Glycol		WC Method		NEG	NEG	NEG
WEAR METALS		method	limit/base	current	history1	history2
Iron	ppm	ASTM D5185m	>75	25	16	7
Chromium	ppm	ASTM D5185m	>8	0	<1	0
Nickel	ppm	ASTM D5185m	>2	0	<1	0
Titanium	ppm	ASTM D5185m	>3	0	<1	0
Silver	ppm	ASTM D5185m	>2	0	<1	0
Aluminum	ppm	ASTM D5185m	>15	<1	3	2
Lead	ppm	ASTM D5185m	>18	6	5	0
Copper	ppm	ASTM D5185m	>80	40	35	26
Tin	ppm	ASTM D5185m	>14	0	1	0
Vanadium	ppm	ASTM D5185m	717	0	<1	0
Cadmium	ppm	ASTM D5185m		0	<1	0
Cadillium	ррпп	AOTIVI DOTOSIII			<u> </u>	
			limit/base			hiotory
ADDITIVES		method		current	history1	history2
ADDITIVES Boron	ppm	ASTM D5185m	250	105	153	156
Boron Barium	ppm ppm		250 10	105 0	153 0	156 0
Boron		ASTM D5185m	250	105 0 82	153	156
Boron Barium Molybdenum Manganese	ppm	ASTM D5185m ASTM D5185m	250 10 100	105 0	153 0	156 0 76 <1
Boron Barium Molybdenum	ppm	ASTM D5185m ASTM D5185m ASTM D5185m	250 10	105 0 82	153 0 83	156 0 76
Boron Barium Molybdenum Manganese	ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	250 10 100	105 0 82 0	153 0 83 2	156 0 76 <1
Boron Barium Molybdenum Manganese Magnesium	ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	250 10 100 450	105 0 82 0 599	153 0 83 2 574	156 0 76 <1 561
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc	ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	250 10 100 450 3000	105 0 82 0 599 1727	153 0 83 2 574 1586 641 789	156 0 76 <1 561 1568 656 797
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	105 0 82 0 599 1727 587	153 0 83 2 574 1586 641	156 0 76 <1 561 1568 656
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	105 0 82 0 599 1727 587 768	153 0 83 2 574 1586 641 789	156 0 76 <1 561 1568 656 797
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur	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	105 0 82 0 599 1727 587 768 2744	153 0 83 2 574 1586 641 789 2411	156 0 76 <1 561 1568 656 797 2502
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS	ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m	250 10 100 450 3000 1150 1350 4250 limit/base	105 0 82 0 599 1727 587 768 2744 current	153 0 83 2 574 1586 641 789 2411 history1	156 0 76 <1 561 1568 656 797 2502 history2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS	ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m	250 10 100 450 3000 1150 1350 4250 limit/base	105 0 82 0 599 1727 587 768 2744 current	153 0 83 2 574 1586 641 789 2411 history1	156 0 76 <1 561 1568 656 797 2502 history2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium	ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m	250 10 100 450 3000 1150 1350 4250 limit/base >20 >158	105 0 82 0 599 1727 587 768 2744 current 3	153 0 83 2 574 1586 641 789 2411 history1 4	156 0 76 <1 561 1568 656 797 2502 history2 4
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium	ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m	250 10 100 450 3000 1150 1350 4250 limit/base >20 >158 >20	105 0 82 0 599 1727 587 768 2744 current 3 2	153 0 83 2 574 1586 641 789 2411 history1 4 6 3	156 0 76 <1 561 1568 656 797 2502 history2 4 2 <1
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium Water	ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m	250 10 100 450 3000 1150 1350 4250 limit/base >20 >158 >20 >0.1	105 0 82 0 599 1727 587 768 2744 current 3 2 0 NEG	153 0 83 2 574 1586 641 789 2411 history1 4 6 3 NEG	156 0 76 <1 561 1568 656 797 2502 history2 4 2 <1 NEG
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium Water INFRA-RED	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D6304	250 10 100 450 3000 1150 1350 4250 limit/base >20 >158 >20 >0.1 limit/base	105 0 82 0 599 1727 587 768 2744 current 3 2 0 NEG current 0.6	153 0 83 2 574 1586 641 789 2411 history1 4 6 3 NEG history1	156 0 76 <1 561 1568 656 797 2502 history2 4 2 <1 NEG
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium Water INFRA-RED Soot %	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m	250 10 100 450 3000 1150 1350 4250 limit/base >20 >158 >20 >0.1 limit/base	105 0 82 0 599 1727 587 768 2744 current 3 2 0 NEG current	153 0 83 2 574 1586 641 789 2411 history1 4 6 3 NEG	156 0 76 <1 561 1568 656 797 2502 history2 4 2 <1 NEG history2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium Water INFRA-RED Soot % Nitration	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D6304 method *ASTM D7844 *ASTM D7844	250 10 100 450 3000 1150 1350 4250 limit/base >20 >158 >20 >0.1 limit/base	105 0 82 0 599 1727 587 768 2744 current 3 2 0 NEG current 0.6 11.8	153 0 83 2 574 1586 641 789 2411 history1 4 6 3 NEG history1 0.5 10.0	156 0 76 <1 561 1568 656 797 2502 history2 4 2 <1 NEG history2 0.4 8.2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium Water INFRA-RED Soot % Nitration Sulfation FLUID DEGRADA	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D6304 method *ASTM D7844 *ASTM D7624 *ASTM D7415 method	250 10 100 450 3000 1150 1350 4250 limit/base >20 >158 >20 >0.1 limit/base	105 0 82 0 599 1727 587 768 2744 current 3 2 0 NEG current 0.6 11.8 25.2 current	153 0 83 2 574 1586 641 789 2411 history1 4 6 3 NEG history1 0.5 10.0 23.8 history1	156 0 76 <1 561 1568 656 797 2502 history2 4 2 <1 NEG history2 0.4 8.2 23.3 history2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium Water INFRA-RED Soot % Nitration Sulfation	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D6304 method *ASTM D7844 *ASTM D7624 *ASTM D76145	250 10 100 450 3000 1150 1350 4250 limit/base >20 >158 >20 >0.1 limit/base >20 >30 limit/base	105 0 82 0 599 1727 587 768 2744 current 3 2 0 NEG current 0.6 11.8 25.2	153 0 83 2 574 1586 641 789 2411 history1 4 6 3 NEG history1 0.5 10.0 23.8	156 0 76 <1 561 1568 656 797 2502 history2 4 2 <1 NEG history2 0.4 8.2 23.3



OIL ANALYSIS REPORT



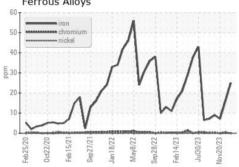


VISUAL		method	limit/base	current	history1	history2
White Metal	scalar	*Visual	NONE	LIGHT	NONE	NONE
Yellow Metal	scalar	*Visual	NONE	NONE	NONE	NONE
Precipitate	scalar	*Visual	NONE	NONE	NONE	NONE
Silt	scalar	*Visual	NONE	NONE	NONE	NONE
Debris	scalar	*Visual	NONE	NONE	NONE	NONE
Sand/Dirt	scalar	*Visual	NONE	NONE	NONE	NONE
Appearance	scalar	*Visual	NORML	NORML	NORML	NORML
Odor	scalar	*Visual	NORML	NORML	NORML	NORML
Emulsified Water	scalar	*Visual	>0.1	NEG	NEG	NEG
Free Water	scalar	*Visual		NEG	NEG	NEG

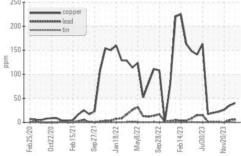
FLUID PROPERTIES		method				history2
Visc @ 100°C	cSt	ASTM D445	14.4	14.0	13.5	13.5

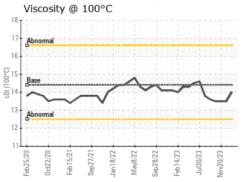
GRAPHS

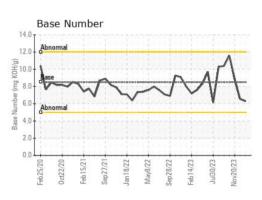
















Laboratory Sample No.

Lab Number : 06122622 Unique Number: 10936773

: WearCheck USA - 501 Madison Ave., Cary, NC 27513 : WC0859754

Received **Tested** Diagnosed

: 21 Mar 2024 : 21 Mar 2024 - Jonathan Hester

: 19 Mar 2024

MARATHON PETROLEUM CO.

101 12TH ST CATLETTSBURG, KY US 41169

Test Package : IND 2 (Additional Tests: KF) Certificate L2367 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.

Contact: CORY GUMBERT cagumbert@marathonpetroleum.com T: (606)585-3950

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

F: x: Submitted By: M/V KENOVA