

PROBLEM SUMMARY

Sample Rating Trend

GLYCOL

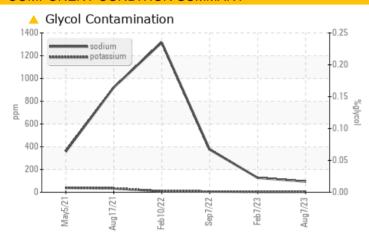




Machine Id
538M
Component
Diesel Engine
Fluid

PETRO CANADA DURON SHP 15W40 (--- GAL)

COMPONENT CONDITION SUMMARY



RECOMMENDATION

Oil and filter change at the time of sampling has been noted. Resample at the next service interval to monitor.

PROBLEMATIC TEST RESULTS								
Sample Status				ATTENTION	ATTENTION	ATTENTION		
Sodium	ppm	ASTM D5185m		4 94	<u>▲</u> 127	△ 375		

Customer Id: GFL415 Sample No.: GFL0086656 Lab Number: 05919632 Test Package: FLEET



To manage this report scan the QR code

To discuss the diagnosis or test data: Jonathan Hester +1 919-379-4092 x4092 jhester@wearcheckusa.com

To change component or sample information: Customer Service +1 1-800-237-1369 customerservice@wearcheck.com

RECOMMENDED ACTIONS

Action	Status	Date	Done By	Description
Change Fluid			?	Oil and filter change at the time of sampling has been noted.
Change Filter			?	Oil and filter change at the time of sampling has been noted.

HISTORICAL DIAGNOSIS

07 Feb 2023 Diag: Jonathan Hester

GLYCOL



Oil and filter change at the time of sampling has been noted. Resample at the next service interval to monitor. All component wear rates are normal. Sodium and/or potassium levels remain high. Test for glycol is negative. The BN result indicates that there is suitable alkalinity remaining in the oil. The condition of the oil is acceptable for the time in service.



07 Sep 2022 Diag: Jonathan Hester

GLYCOL



Oil and filter change at the time of sampling has been noted. Resample at the next service interval to monitor. All component wear rates are normal. Sodium and/or potassium levels remain high. Light fuel dilution occurring. Test for glycol is negative. The BN result indicates that there is suitable alkalinity remaining in the oil. The condition of the oil is suitable for further service.



10 Feb 2022 Diag: Jonathan Hester

DIRT



We advise that you check for possible coolant leak. We advise that you check the air filter, air induction system, and any areas where dirt may enter the component. We advise that you check the fuel injection system. Oil and filter change at the time of sampling has been noted. We recommend an early resample to monitor this condition. All component wear rates are normal. Sodium and/or potassium levels remain high. Elemental levels of silicon (Si) and aluminum (Al) indicate alumina-silicate (coarse dirt) ingress. There is a moderate amount of fuel present in the oil. The BN result indicates that there is suitable alkalinity remaining in the oil.





OIL ANALYSIS REPORT

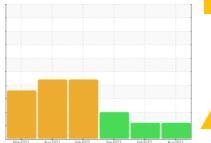
Sample Rating Trend

GLYCOL



Machine Id
538M
Component
Diesel Engine
Fluid

PETRO CANADA DURON SHP 15W40 (--- GAL)



DIAGNOSIS

Recommendation

Oil and filter change at the time of sampling has been noted. Resample at the next service interval to monitor.

Wear

All component wear rates are normal.

Contamination

Sodium and/or potassium levels remain high. Test for glycol is negative.

Fluid Condition

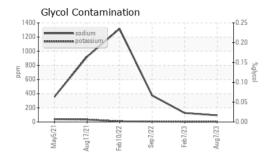
The BN result indicates that there is suitable alkalinity remaining in the oil. The condition of the oil is acceptable for the time in service.

SAMPLE INFORMATION method Imit/base current history1 history2	N SHP 15W40 (•	May2021	Aug2021 Feb2022	Sep2022 Feb2023	Aug2023	
Sample Date Client Info 07 Aug 2023 07 Feb 2023 07 Sep 2022 Machine Age hrs Client Info 22427 21941 21367 21106	SAMPLE INFOR	MATION	method	limit/base	current	history1	history2
Machine Age hrs Client Info 22427 21941 21367 21106 Oil Age hrs Client Info 21941 21367 21106 Oil Changed Client Info Changed Changed Changed Changed ATTENTION ATTENTION <th< td=""><td>Sample Number</td><td></td><td>Client Info</td><td></td><td>GFL0086656</td><td>GFL0068677</td><td>GFL0057210</td></th<>	Sample Number		Client Info		GFL0086656	GFL0068677	GFL0057210
Oil Age hrs Client Info 21941 21367 21106 Oil Changed Sample Status Client Info Changed Cha	Sample Date		Client Info		07 Aug 2023	07 Feb 2023	07 Sep 2022
Client Info	Machine Age	hrs	Client Info		22427	21941	21367
ATTENTION ATTENTION ATTENTION ATTENTION ATTENTION ATTENTION CONTAMINATION method imit/base current history1 history2	Oil Age	hrs	Client Info		21941	21367	21106
Fuel	Oil Changed		Client Info		Changed	Changed	Changed
WEAR METALS	Sample Status				ATTENTION	ATTENTION	ATTENTION
WEAR METALS method limit/base current history1 history2 Iron ppm ASTM D5185m >80 93 57 77 Chromium ppm ASTM D5185m >5 5 3 4 Nickel ppm ASTM D5185m >2 <1	CONTAMINAT	ION	method	limit/base	current	history1	history2
Description	Fuel		WC Method	>5	<1.0	<1.0	▲ 4.5
Chromium ppm ASTM D5185m >5 5 3 4 Nickel ppm ASTM D5185m >2 <1	WEAR METAL	S	method	limit/base	current	history1	history2
Nicke ppm ASTM D5185m >2 <1 1 0	Iron	ppm	ASTM D5185m	>80	93	57	77
Titanium	Chromium	ppm	ASTM D5185m	>5	5	3	4
Silver	Nickel	ppm	ASTM D5185m	>2	<1	1	0
Aluminum ppm ASTM D5185m >30 10 4 7 Lead ppm ASTM D5185m >30 2 2 1 Copper ppm ASTM D5185m >150 4 2 2 Tin ppm ASTM D5185m >5 1 <1 <1 <1 Antimony ppm ASTM D5185m > Vanadium ppm ASTM D5185m 0 0 0 0 Cadmium ppm ASTM D5185m 0 0 0 0 Cadmium ppm ASTM D5185m 0 0 0 0 ADDITIVES method limit/base current history1 history2 Barium ppm ASTM D5185m 0 0 0 0 ADDITIVES 0 0 0 0 ADDITIVES 0 0 0 0 0 ADDITIVES 0 0 0 0 0 ADDITIVES 0 0 0 0 0 0 ADDITIVES 0 0 0 0 0 0 0 ADDITIVES 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Titanium	ppm	ASTM D5185m		<1	<1	<1
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Tin ppm ASTM D5185m >5 1 <1 <1 <1 <1 Antimony ppm ASTM D5185m >5 1 <1 <1 <1 <1 <1 Antimony ppm ASTM D5185m	Copper	ppm	ASTM D5185m	>150	4	2	2
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Boron	Cadmium	ppm	ASTM D5185m		0	0	0
Barium ppm ASTM D5185m 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	ADDITIVES		method	limit/base	current	history1	history2
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Calcium ppm ASTM D5185m 1070 1076 1127 1196 Phosphorus ppm ASTM D5185m 1150 1014 971 1118 Zinc ppm ASTM D5185m 1270 1273 1233 1349 Sulfur ppm ASTM D5185m 2060 3152 2965 2983 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >20 18 10 13 Sodium ppm ASTM D5185m >20 4 3 6 Glycol % *ASTM D5185m >20 <td>Barium</td> <td>ppm</td> <td>ASTM D5185m</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td>	Barium	ppm	ASTM D5185m	0	0	0	0
Phosphorus ppm ASTM D5185m 1150 1014 971 1118 Zinc ppm ASTM D5185m 1270 1273 1233 1349 Sulfur ppm ASTM D5185m 2060 3152 2965 2983 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >20 18 10 13 Sodium ppm ASTM D5185m >20 4 3 6 Glycol % *ASTM D5185m >20 4 3 6 Glycol % *ASTM D5185m >20 4 3 6 Rilycol % *ASTM D5185m >20 4 3 6 Rilycol % *ASTM D5185m >20 4 3 6 Rilycol % *ASTM D5285m >20 4 3 1 0 9 INFRA-RED method	Barium Molybdenum	ppm ppm	ASTM D5185m ASTM D5185m	0	0 62	0 62	0 81
Zinc ppm ASTM D5185m 1270 1273 1233 1349 Sulfur ppm ASTM D5185m 2060 3152 2965 2983 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >20 18 10 13 Sodium ppm ASTM D5185m >20 4 3 6 Potassium ppm ASTM D5185m >20 4 3 6 Glycol % *ASTM D5185m >20 4 3 6 Rilycol % *ASTM D5185m >20 4 3 6 Rilycol % *ASTM D5185m >20 4 3 6 Rilycol % *ASTM D5282 NEG NEG NEG INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 1.5 <	Barium Molybdenum Manganese	ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m	0 60 0	0 62 1	0 62 <1	0 81 <1
Sulfur ppm ASTM D5185m 2060 3152 2965 2983 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >20 18 10 13 Sodium ppm ASTM D5185m >20 4 3 6 Potassium ppm ASTM D5185m >20 4 3 6 Glycol % *ASTM D5185m >20 4 3 6 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 1.5 1 0.9 Nitration Abs/cm *ASTM D7624 >20 15.3 13.8 14.6 Sulfation Abs/.1mm *ASTM D7415 >30 25.9 23.8 24.9 FLUID DEGRADATION method limit/base current history1	Barium Molybdenum Manganese Magnesium	ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	0 60 0 1010	0 62 1 959	0 62 <1 947	0 81 <1 968
CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >20 18 10 13 Sodium ppm ASTM D5185m A 94 127 A 375 Potassium ppm ASTM D5185m >20 4 3 6 Glycol % *ASTM D5185m >20 4 3 6 MEG NEG NEG NEG NEG INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 1.5 1 0.9 Nitration Abs/cm *ASTM D7624 >20 15.3 13.8 14.6 Sulfation Abs/.1mm *ASTM D7415 >30 25.9 23.8 24.9 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 27.6 23.1	Barium Molybdenum Manganese Magnesium Calcium	ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	0 60 0 1010 1070	0 62 1 959 1076	0 62 <1 947 1127	0 81 <1 968 1196
Silicon ppm ASTM D5185m >20 18 10 13 Sodium ppm ASTM D5185m ▲ 94 ▲ 127 ▲ 375 Potassium ppm ASTM D5185m >20 4 3 6 Glycol % *ASTM D2982 NEG NEG NEG INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 1.5 1 0.9 Nitration Abs/cm *ASTM D7624 >20 15.3 13.8 14.6 Sulfation Abs/.1mm *ASTM D7415 >30 25.9 23.8 24.9 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 27.6 23.1 22.7	Barium Molybdenum Manganese Magnesium Calcium Phosphorus	ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	0 60 0 1010 1070 1150	0 62 1 959 1076 1014	0 62 <1 947 1127 971	0 81 <1 968 1196 1118
Sodium ppm ASTM D5185m ▲ 94 ▲ 127 ▲ 375 Potassium ppm ASTM D5185m >20 4 3 6 Glycol % *ASTM D2982 NEG NEG NEG INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 1.5 1 0.9 Nitration Abs/cm *ASTM D7624 >20 15.3 13.8 14.6 Sulfation Abs/.1mm *ASTM D7415 >30 25.9 23.8 24.9 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 27.6 23.1 22.7	Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc	ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	0 60 0 1010 1070 1150 1270	0 62 1 959 1076 1014 1273	0 62 <1 947 1127 971 1233	0 81 <1 968 1196 1118
Potassium ppm ASTM D5185m >20 4 3 6 Glycol % *ASTM D2982 NEG NEG NEG INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 1.5 1 0.9 Nitration Abs/cm *ASTM D7624 >20 15.3 13.8 14.6 Sulfation Abs/.1mm *ASTM D7415 >30 25.9 23.8 24.9 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 27.6 23.1 22.7	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	0 60 0 1010 1070 1150 1270 2060	0 62 1 959 1076 1014 1273 3152	0 62 <1 947 1127 971 1233 2965	0 81 <1 968 1196 1118 1349 2983
NEG NEG	Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINAN	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	0 60 0 1010 1070 1150 1270 2060	0 62 1 959 1076 1014 1273 3152 current	0 62 <1 947 1127 971 1233 2965 history1	0 81 <1 968 1196 1118 1349 2983 history2
INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 1.5 1 0.9 Nitration Abs/cm *ASTM D7624 >20 15.3 13.8 14.6 Sulfation Abs/.1mm *ASTM D7415 >30 25.9 23.8 24.9 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 27.6 23.1 22.7	Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINAN Silicon	ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m	0 60 0 1010 1070 1150 1270 2060	0 62 1 959 1076 1014 1273 3152 current	0 62 <1 947 1127 971 1233 2965 history1	0 81 <1 968 1196 1118 1349 2983 history2
Soot % % *ASTM D7844 >3 1.5 1 0.9 Nitration Abs/cm *ASTM D7624 >20 15.3 13.8 14.6 Sulfation Abs/.1mm *ASTM D7415 >30 25.9 23.8 24.9 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 27.6 23.1 22.7	Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINAN Silicon Sodium	ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m	0 60 0 1010 1070 1150 1270 2060 limit/base >20	0 62 1 959 1076 1014 1273 3152 current 18 94	0 62 <1 947 1127 971 1233 2965 history1 10 ▲ 127	0 81 <1 968 1196 1118 1349 2983 history2 13 ▲ 375
Nitration Abs/cm *ASTM D7624 >20 15.3 13.8 14.6 Sulfation Abs/.1mm *ASTM D7415 >30 25.9 23.8 24.9 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 27.6 23.1 22.7	Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINAN Silicon Sodium Potassium	ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m	0 60 0 1010 1070 1150 1270 2060 limit/base >20	0 62 1 959 1076 1014 1273 3152 current 18 94 4	0 62 <1 947 1127 971 1233 2965 history1 10 ▲ 127 3	0 81 <1 968 1196 1118 1349 2983 history2 13 ▲ 375 6
Sulfation Abs/.1mm *ASTM D7415 >30 25.9 23.8 24.9 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 27.6 23.1 22.7	Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINAN Silicon Sodium Potassium Glycol	ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m Method ASTM D5185m	0 60 0 1010 1070 1150 1270 2060 limit/base >20	0 62 1 959 1076 1014 1273 3152 current 18 94 4 NEG	0 62 <1 947 1127 971 1233 2965 history1 10 ▲ 127 3 NEG	0 81 <1 968 1196 1118 1349 2983 history2 13 • 375 6 NEG
Sulfation Abs/.1mm *ASTM D7415 >30 25.9 23.8 24.9 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 27.6 23.1 22.7	Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINAN Silicon Sodium Potassium Glycol INFRA-RED	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m *ASTM D2982	0 60 0 1010 1070 1150 1270 2060 limit/base >20	0 62 1 959 1076 1014 1273 3152 current 18 ▲ 94 4 NEG	0 62 <1 947 1127 971 1233 2965 history1 10 ▲ 127 3 NEG	0 81 <1 968 1196 1118 1349 2983 history2 13 ▲ 375 6 NEG
Oxidation	Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINAN Silicon Sodium Potassium Glycol INFRA-RED Soot %	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m *ASTM D5185m	0 60 0 1010 1070 1150 1270 2060 limit/base >20 >20	0 62 1 959 1076 1014 1273 3152 current 18 ▲ 94 4 NEG current	0 62 <1 947 1127 971 1233 2965 history1 10 ▲ 127 3 NEG history1	0 81 <1 968 1196 1118 1349 2983 history2 13 ▲ 375 6 NEG history2
	Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINAN Silicon Sodium Potassium Glycol INFRA-RED Soot % Nitration	ppm	ASTM D5185m *ASTM D7844 *ASTM D7844	0 60 0 1010 1070 1150 1270 2060 limit/base >20 	0 62 1 959 1076 1014 1273 3152 current 18 94 4 NEG current 1.5 15.3	0 62 <1 947 1127 971 1233 2965 history1 10 ▲ 127 3 NEG history1 1 13.8	0 81 <1 968 1196 1118 1349 2983 history2 13 ▲ 375 6 NEG history2 0.9
	Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINAN Silicon Sodium Potassium Glycol INFRA-RED Soot % Nitration Sulfation	ppm	ASTM D5185m *ASTM D7844 *ASTM D7624 *ASTM D76145	0 60 0 1010 1070 1150 1270 2060 limit/base >20 >20 >3 >20 >3	0 62 1 959 1076 1014 1273 3152 current 18 ▲ 94 4 NEG current 1.5 15.3 25.9	0 62 <1 947 1127 971 1233 2965 history1 10 ▲ 127 3 NEG history1 1 13.8 23.8	0 81 <1 968 1196 1118 1349 2983 history2 13 ▲ 375 6 NEG history2 0.9 14.6 24.9
	Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINAN Silicon Sodium Potassium Glycol INFRA-RED Soot % Nitration Sulfation FLUID DEGRAI	ppm	ASTM D5185m Method ASTM D5185m *ASTM D5185m *ASTM D5185m *ASTM D5185m *ASTM D5185m *ASTM D5185m *ASTM D5185m *ASTM D5185m *ASTM D7844 *ASTM D7844 *ASTM D7844 *ASTM D7844 *ASTM D7844 *ASTM D7844 *ASTM D7844	0 60 0 1010 1070 1150 1270 2060 limit/base >20 >3 >20 >30 limit/base	0 62 1 959 1076 1014 1273 3152 current 18 94 4 NEG current 1.5 15.3 25.9 current	0 62 <1 947 1127 971 1233 2965 history1 10 ▲ 127 3 NEG history1 1 13.8 23.8 history1	0 81 <1 968 1196 1118 1349 2983 history2 13 ▲ 375 6 NEG history2 0.9 14.6 24.9

Submitted By: Frank Wolak



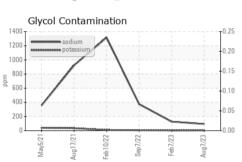
OIL ANALYSIS REPORT



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
	DTIEO		11 11 11		1111	111 0

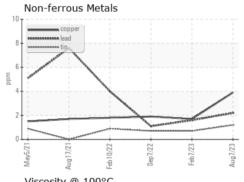
Viscos	ity @ 10	00°C			
18 Abnorma					
⊖ 16 - Base					
Abnorma					
10					
8					
May5/21	Aug17/21	Feb10/22	Sep7/22	Feb7/23	

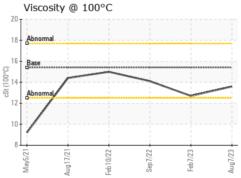
FLUID PROPE	ERTIES	method	limit/base	current	history1	history2
Visc @ 100°C	cSt	ASTM D445	15.4	13.6	12.7	14.1

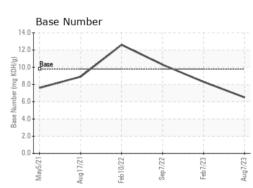


Ferrous Alloys 100

GRAPHS











Certificate L2367

Laboratory Sample No. Lab Number Unique Number : 10591546

: WearCheck USA - 501 Madison Ave., Cary, NC 27513 : GFL0086656 : 05919632

Received Diagnosed

: 09 Aug 2023 : 10 Aug 2023

Diagnostician : Jonathan Hester

Test Package : FLEET (Additional Tests: Glycol) 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)

GFL Environmental - 415 - Michigan East

6200 Elmridge Sterling Heights, MI US 48313 Contact: Frank Wolak fwolak@gflenv.com

T: (586)825-9514