

## Machine Id 46538 Diesel Engine DIESEL ENGINE OIL SAE 15W40 (--- QTS)

RECOMMENDATION

Resample at the next service interval to monitor. Please specify the component make and model with your next sample. Please specify the brand, type, and viscosity of the oil on your next sample.

## **WEAR**

Metal levels are typical for a new component breaking in.

## CONTAMINATION

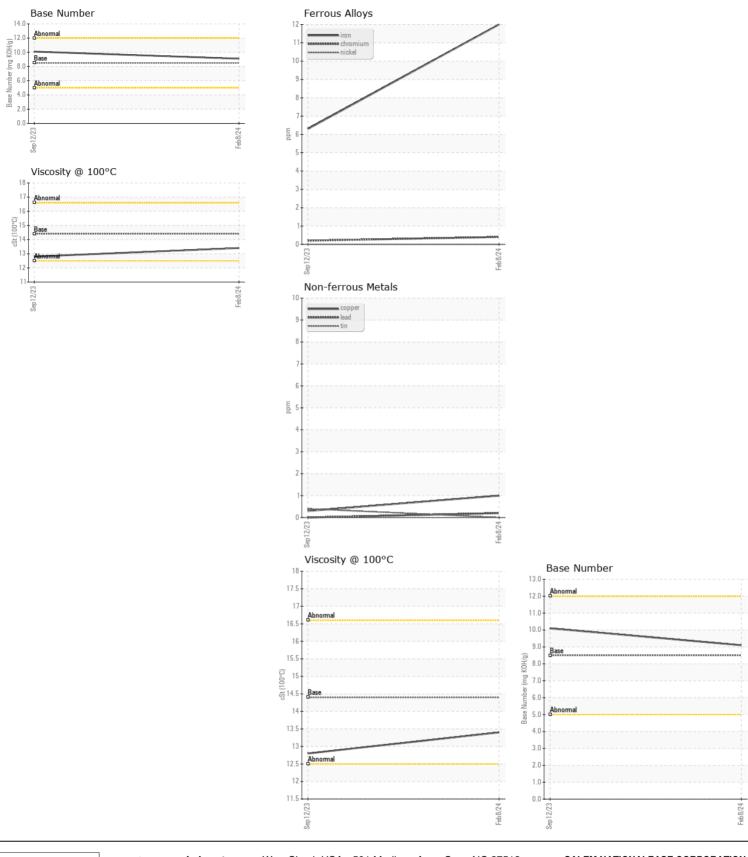
**FLUID CONDITION** 

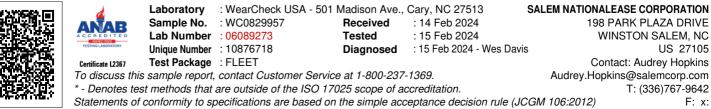
Elevated aluminum (AI) and/or lead (Pb) and potassium (K) levels in your metals analysis are likely a result of solder flux release into the lubricant and is common on new equipment/components. There is no indication of any contamination in the oil.

The BN result indicates that there is suitable alkalinity remaining in the

oil. The condition of the oil is suitable for further service.

Test         UOM         Method         LimitAbility         Plistory1         Filstory2           Sample Number         Client Info         WC840919            Machine Age         mis         Client Info         0         0            Machine Age         mis         Client Info         0         0            Oil Age         mis         Client Info         0         0            Oil Changed         Client Info         Changed         Changed          NORMAL            Sample Status         Client Info         Changed         Changed          NORMAL            Kron         ppm         ASTM D5185m         >100         12         6            Kron         ppm         ASTM D5185m         >100         0            Kickel         ppm         ASTM D5185m         >3         0         0            Aluminum         ppm         ASTM D5185m         >3         0         0            Aluminum         ppm         ASTM D5185m         >3         0         0            Vanadium	<b>-</b> .						
Sample Date         Client Info         08 Feb 2024         12 Sep 2023            Machine Age         mis         Client Info         0         0            Oil Age         mis         Client Info         0         0            Oil Changed         Client Info         0         0            Filter Age         Client Info         Changed         Changed            Filter Changed         Client Info         Changed         Changed            Sample Status         VORMAL         NORMAL         NORMAL            Iron         ppm         ASTM D5185m         >100         12         6            Nickel         ppm         ASTM D5185m         >20         <1         <1            Nickel         ppm         ASTM D5185m         >20         9         2            Silver         ppm         ASTM D5185m         >20         9         2            Capper         ppm         ASTM D5185m         >20         10         <1            Valado mpm         ASTM D5185m         >25         10         4 <th>Test</th> <th>UOM</th> <th>Method</th> <th>Limit/Abn</th> <th>Current</th> <th>History1</th> <th>History2</th>	Test	UOM	Method	Limit/Abn	Current	History1	History2
Machine Age         mis         Client Info         38151         38080            Filter Age         mis         Client Info         0         0            Filter Age         mis         Client Info         Changed         Changed            Filter Changed         Client Info         Changed         Changed            Sample Status         VORMAL         NORMAL            Iron         ppm         ASTM D5185m         >100         12         6            Chromium         ppm         ASTM D5185m         >20         <1         <1            Nickel         ppm         ASTM D5185m         >20         <1         0            Aluminum         ppm         ASTM D5185m         >20         9         2            Copper         ppm         ASTM D5185m         >20         1         <1            Vanadium         ppm         ASTM D5185m         >20         16         4            Valadium         ppm         ASTM D5185m         >20         16         4            Vellow Metal         <							
Oil Age         mis         Client Info         0         0            Filter Age         mis         Client Info         Changed         Changed         Changed            Oil Changed         Client Info         Changed         Changed          NORMAL         NORMAL            Sample Status         NORMAL         NORMAL         NORMAL             Iron         ppm         ASTM D5185m         >100         12         6            Nickel         ppm         ASTM D5185m         >4         0         0            Silver         ppm         ASTM D5185m         >3         0         0            Lead         ppm         ASTM D5185m         >30         1         <1            Vanadium         ppm         ASTM D5185m         >30         1         <1            Vanadium         ppm         ASTM D5185m         >20         16         4            Vanadium         ppm         ASTM D5185m         >20         16         4            Veltow Metal         scalar         'Visual						1	
Filter Age         mis         Client Info         0         0            Gil Changed         Client Info         Changed         Changed         Changed            Sample Status         VIENTAL         NORMAL         NORMAL            Iron         ppm         ASTM D5185m         >100         12         6            Chromium         ppm         ASTM D5185m         >40         0         0            Titanium         ppm         ASTM D5185m         >4         0         0            Silver         ppm         ASTM D5185m         >30         0         0            Copper         ppm         ASTM D5185m         >20         9         2            Vanadium         ppm         ASTM D5185m         >20         9         0            Veltow Metal         scalar         "Visual         NONE         NONE         NONE            Veltow Metal         scalar         "Visual         NONE         NONE         NONE            Veltow Metal         scalar         "Visual         NONE         NONE	0						
Oil Changed         Client Info         Changed         Changed         Changed					-	-	
Filter Changed Sample Status         Client Info         Changed NORMAL NORMAL         Changed NORMAL         NONE         NONE         NONE NORMAL NORMAL NORMAL NORMAL NORMAL NORMAL NORMAL NORMAL NORMAL         NONE <t< th=""><th>-</th><th>mls</th><th></th><th></th><th>-</th><th>-</th><th></th></t<>	-	mls			-	-	
Sample Status         NORMAL         NORMAL         NORMAL					U U	0	
Iron         ppm         ASTM D5185m         >100         12         6            Chromium         ppm         ASTM D5185m         >20         <1         <1            Nickel         ppm         ASTM D5185m         >4         0         0            Titanium         ppm         ASTM D5185m         >3         0         0            Silver         ppm         ASTM D5185m         >30         0         0            Aluminum         ppm         ASTM D5185m         >20         9         2            Copper         ppm         ASTM D5185m         >30         1         <1            Vanadium         ppm         ASTM D5185m         >10         <1            Vanadium         ppm         ASTM D5185m         >25         10         4            Vellow Metal         scalar         *Visual         NONE         NONE         NONE            Silicon         ppm         ASTM D5185m         >25         10         4            Solicon         ppm         ASTM D5185m         >20         16 <th>Ū</th> <th></th> <th>Client Info</th> <th></th> <th></th> <th>-</th> <th></th>	Ū		Client Info			-	
Chromium         ppm         ASTM D5185m         >20         <1	Sample Status				NORMAL	NORMAL	
Chromium         ppm         ASTM D5185m         >20         <1	lran			. 100	10	C	
Nickel         ppm         ASTM D5185m         >4         0         0            Titanium         ppm         ASTM D5185m         >3         0         0            Silver         ppm         ASTM D5185m         >20         9         2            Lead         ppm         ASTM D5185m         >20         9         2            Copper         ppm         ASTM D5185m         >40         <1         0            Vanadium         ppm         ASTM D5185m         >15         0         <1            Vanadium         ppm         ASTM D5185m         >10         NONE         NONE            Vanadium         ppm         ASTM D5185m         >25         10         4            Vanadium         ppm         ASTM D5185m         >20         16         4            Vallow Metal         scalar         "Visual         NONE         NONE            Solicon         pp         ASTM D5185m         >20         16         4            Fuel         WC Method         >0.2         NEG	-						
Titanium         ppm         ASTM D5185m         0         0            Silver         ppm         ASTM D5185m         >3         0         0            Aluminum         ppm         ASTM D5185m         >20         9         2            Lead         ppm         ASTM D5185m         >40         <1         0            Copper         ppm         ASTM D5185m         >40         <1             Vanadium         ppm         ASTM D5185m         >10         <1             Wante         scalar         *Visual         NONE         NONE         NONE            Vanadium         ppm         ASTM D5185m         >20         16         4            Valite Metal         scalar         *Visual         NONE         NONE            Vallow         >0.2         NEG         NEG            Fuel         WC Method         >0.2         NEG         NEG            Glycol         WC Method         >0.2         NEG         NEG            Sotif         Asclan							
Silver         ppm         ASTM D5185m         >3         0         0            Aluminum         ppm         ASTM D5185m         >20         9         2            Lead         ppm         ASTM D5185m         >20         9         2            Copper         ppm         ASTM D5185m         >330         1         <1				>4			
Aluminum         ppm         ASTM D5185m         >20         9         2            Lead         ppm         ASTM D5185m         >40         <1         0            Copper         ppm         ASTM D5185m         >330         1         <1            Vanadium         ppm         ASTM D5185m         >15         0         <1            Vanadium         ppm         ASTM D5185m         >15         0         <1            Vanadium         ppm         ASTM D5185m         >15         0         <1            Vanadium         ppm         ASTM D5185m         >25         10         4            Yellow Metal         scalar         *Visual         NONE         NONE         NONE            Solicon         ppm         ASTM D5185m         >20         16         4            Water         WC Method         >0.2         NEG         NEG            Glycol         WC Method         >0.2         7.3         5.6            Soto %         %         *ASTM D7624         >20         7.3         5.6				0	-		
Lead         ppm         ASTM D5185m         >40         <1					-		
Copper         ppm         ASTM D5185m         >330         1         <1					-		
Tin         ppm         ASTM D5185m         >15         0         <1							
Vanadium         ppm         ASTM D5185m         0         0							
White Metal         scalar         *Visual         NONE         NONE         NONE         NONE            Yellow Metal         scalar         *Visual         NONE         NONE         NONE            Silicon         ppm         ASTM D5185m         >25         10         4            Potassium         ppm         ASTM D5185m         >20         16         4            Water         WC Method         >5         <1.0         <1.0            Glycol         WC Method         >0.2         NEG         NEG            Soot %         %         *ASTM D7844         >3         0.8         0.1            Nitration         Abs/cm<*ASTM D7624         >20         7.3         5.6            Sulfation         Abs/cm<*ASTM D7624         >20         7.3         5.6            Sulfation         Abs/cm<*ASTM D7624         >20         7.3         5.6            Sulfation         Abs/cm<*Visual         NONE         NONE         NONE            Debris         scalar         *Visual         NORE         NORML         NORHL				>15	-		
Yellow Metal         scalar         'Visual         NONE         NONE         NONE            Silicon         ppm         ASTM D5185m         >20         10         4            Potassium         ppm         ASTM D5185m         >20         16         4            Fuel         WC Method         >5         <1.0         <1.0            Water         WC Method         >0.2         NEG         NEG            Glycol         WC Method         >0.8         0.1            Soot %         %         *ASTM D7824         >20         7.3         5.6            Sulfation         Abs/.tmm         *ASTM D7415         >30         23.5         18.3            Silt         scalar         *Visual         NONE         NONE         NONE            Debris         scalar         *Visual         NONE         NONE         NORML            Appearance         scalar         *Visual         NORML         NORML         NORML            Appearance         scalar         *Visual         NORML         NORML         NORM				NIGNE			
Silicon         ppm         ASTM D5185m         >25         10         4            Potassium         ppm         ASTM D5185m         >20         16         4            Fuel         WC Method         >5         <1.0         <1.0            Water         WC Method         >0.2         NEG         NEG            Glycol         WC Method         >0.2         NEG         NEG            Soot %         %         "ASTM D7844         >3         0.8         0.1            Soot %         %         "ASTM D7624         >20         7.3         5.6            Sulfation         Abs/.mm         "ASTM D715         >30         23.5         18.3            Sulfation         Abs/.mm         "ASTM D7145         >30         23.5         18.3            Sulfation         Abs/.mm         "ASTM D7145         >30         23.5         18.3            Sulfation         Abs/.mm         "ASTM D7145         >30         23.5         18.3            Sulfation         scalar         "Visual         NONE         NONE <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th>							
Potassium         ppm         ASTM D5185m         >20         16         4            Fuel         WC Method         >5         <1.0         <1.0            Water         WC Method         >0.2         NEG         NEG            Glycol         WC Method         >0.2         NEG         NEG            Soot %         %         *ASTM D7844         >3         0.8         0.1            Nitration         Abs/.mm         *ASTM D7624         >20         7.3         5.6            Sulfation         Abs/.mm         *ASTM D7624         >20         7.3         5.6            Sulfation         Abs/.mm         *ASTM D7624         >20         7.3         5.6            Sulfation         Abs/.mm         *ASTM D7624         >20         7.3         18.3            Debris         scalar         *Visual         NONE         NONE         NONE            Appearance         scalar         *Visual         NORML         NORML         NORML            Appearance         scalar         *Visual         >0.2 <t< th=""><th>Yellow Metal</th><th>scalar</th><th>*Visual</th><th>NONE</th><th>NONE</th><th>NONE</th><th></th></t<>	Yellow Metal	scalar	*Visual	NONE	NONE	NONE	
Potassium         ppm         ASTM D5185m         >20         16         4            Fuel         WC Method         >5         <1.0         <1.0            Water         WC Method         >0.2         NEG         NEG            Glycol         WC Method         >0.2         NEG         NEG            Soot %         %         *ASTM D7844         >3         0.8         0.1            Nitration         Abs/.mm         *ASTM D7624         >20         7.3         5.6            Sulfation         Abs/.mm         *ASTM D7624         >20         7.3         5.6            Sulfation         Abs/.mm         *ASTM D7624         >20         7.3         5.6            Sulfation         Abs/.mm         *ASTM D7624         >20         7.3         18.3            Debris         scalar         *Visual         NONE         NONE         NONE            Appearance         scalar         *Visual         NORML         NORML         NORML            Appearance         scalar         *Visual         >0.2 <t< th=""><th>Silicon</th><th>nom</th><th>ASTM D5185m</th><th><u>\</u>25</th><th>10</th><th>1</th><th></th></t<>	Silicon	nom	ASTM D5185m	<u>\</u> 25	10	1	
Fuel         WC Method         >5         <1.0					-		
Water         WC Method         >0.2         NEG         NEG           Glycol         WC Method         NEG         NEG            Soot %         %         *ASTM D7844         >3         0.8         0.1            Nitration         Abs/cm         *ASTM D7844         >3         0.8         0.1            Sulfation         Abs/.1mm         *ASTM D7624         >20         7.3         5.6            Sulfation         Abs/.1mm         *ASTM D7618         >0         23.5         18.3            Debris         scalar         *Visual         NONE         NONE         NONE            Sand/Dirt         scalar         *Visual         NORML         NORML         NORML            Appearance         scalar         *Visual         NORML         N		ppin					
Glycol         WC Method         NEG         NEG            Soot %         %         *ASTM D7844         >3         0.8         0.1            Nitration         Abs/cm         *ASTM D7624         >20         7.3         5.6            Sulfation         Abs/cm         *ASTM D7624         >20         7.3         18.3            Sulfation         Abs/cm         *Visual         NONE         NONE         NONE            Debris         scalar         *Visual         NOR         NORML         NORML            Appearance         scalar         *Visual         NORML         NORML         NORML            Odor         scalar         *Visual         >0.2         NEG             Sodium         ppm         ASTM D5185m							
Soot %         %         *ASTM D7844         >3         0.8         0.1            Nitration         Abs/cm         *ASTM D7624         >20         7.3         5.6            Sulfation         Abs/cm         *ASTM D7624         >20         7.3         5.6            Sulfation         Abs/cm         *ASTM D7624         >20         7.3         5.6            Sulfation         Abs/cm         *Visual         NONE         NONE         NONE            Debris         scalar         *Visual         NONE         NONE         NONE            Sand/Dirt         scalar         *Visual         NOR         NORML         NOR            Appearance         scalar         *Visual         NORML         NORML         NORML            Odor         scalar         *Visual         NOR         NORML         NORML            Godium         ppm         ASTM D5185m         >158         <1         0            Boron         ppm         ASTM D5185m         100         0         0            Maganese         ppm				20.2			
NitrationAbs/cm*ASTM D7624>207.35.6SulfationAbs/.1mm*ASTM D7415>3023.518.3Siltscalar*VisualNONENONENONEDebrisscalar*VisualNONENONENONESand/Dirtscalar*VisualNONENONENONEAppearancescalar*VisualNORMLNORMLNORMLOdorscalar*VisualNORMLNORMLNORMLOdorscalar*Visual>0.2NEGSodiumppmASTM D5185m>158<10BoronppmASTM D5185m2502437BariumppmASTM D5185m10000MagnesiumppmASTM D5185m10012260MagnesiumppmASTM D5185m300014481109PhosphorusppmASTM D5185m13509141260ZincppmASTM D5185m13509141260SulfurppmASTM D5185m425026213329OxidationAbs/.1mm*ASTM D5185m425026213329Base Number (BN)mg KOHgASTM D28968.59.110.1	,	0/_		<u>\</u> 3			
SulfationAbs/.1mm*ASTM D7415>3023.518.3Siltscalar*VisualNONENONENONENONEDebrisscalar*VisualNONENONENONENONESand/Dirtscalar*VisualNONENONENONEAppearancescalar*VisualNORMLNORMLNORMLOdorscalar*VisualNORMLNORMLNORMLEmulsified Waterscalar*Visual>0.2NEGSodiumppmASTM D5185m>158<10BoronppmASTM D5185m2502437BariumppmASTM D5185m10000MagnesiumppmASTM D5185m100122600MagnesiumppmASTM D5185m300014481109PhosphorusppmASTM D5185m11507011034ZincppmASTM D5185m13509141260SulfurppmASTM D5185m425026213329OxidationAbs/.1mm*ASTM D2868.59.110.1							
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Sand/Dirtscalar*VisualNONENONEAppearancescalar*VisualNORMLNORMLNORMLNORMLOdorscalar*VisualNORMLNORMLNORMLNORMLEmulsified Waterscalar*Visual>0.2NEGNEGSodiumppmASTM D5185m>158<10BoronppmASTM D5185m2502437BariumppmASTM D5185m10000MolybdenumppmASTM D5185m10012260MagneseppmASTM D5185m450727943CalciumppmASTM D5185m11507011034ZincppmASTM D5185m13509141260SulfurppmASTM D5185m425026213329OxidationAbs/.1mm*ASTM D2868.59.110.1							
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Odor         scalar         *Visual         NORML         NORML         NORML            Emulsified Water         scalar         *Visual         >0.2         NEG         NEG            Sodium         ppm         ASTM D5185m         >158         <1         0            Boron         ppm         ASTM D5185m         250         243         7            Barium         ppm         ASTM D5185m         10         0         0            Molybdenum         ppm         ASTM D5185m         100         122         60            Manganese         ppm         ASTM D5185m         450         727         943            Magnesium         ppm         ASTM D5185m         3000         1448         1109            Phosphorus         ppm         ASTM D5185m         1350         914         1260            Sulfur         ppm         ASTM D5185m         4250         2621         3329            Oxidation         Abs/.1mm         *ASTM D5185m         4250         2621         3329            Base Number (BN)         mg KOH					_		
Emulsified Water         scalar         *Visual         >0.2         NEG         NEG            Sodium         ppm         ASTM D5185m         >158         <1         0            Boron         ppm         ASTM D5185m         250         243         7            Barium         ppm         ASTM D5185m         10         0         0            Molybdenum         ppm         ASTM D5185m         100         122         60            Manganese         ppm         ASTM D5185m         100         122         60            Magnesium         ppm         ASTM D5185m         450         727         943            Calcium         ppm         ASTM D5185m         3000         1448         1109            Phosphorus         ppm         ASTM D5185m         1350         914         1260            Sulfur         ppm         ASTM D5185m         4250         2621         3329            Oxidation         Abs/.1mm<*ASTM D7414         >25         16.1         14.0       Base Number (BN)         mg KOH/g							
Sodium         ppm         ASTM D5185m         >158         <1					-		
Boron         ppm         ASTM D5185m         250         243         7            Barium         ppm         ASTM D5185m         10         0         0            Molybdenum         ppm         ASTM D5185m         100         122         60            Manganese         ppm         ASTM D5185m         100         122         60            Magnesium         ppm         ASTM D5185m         450         727         943            Calcium         ppm         ASTM D5185m         3000         1448         1109            Phosphorus         ppm         ASTM D5185m         1350         914         1260            Sulfur         ppm         ASTM D5185m         4250         2621         3329            Oxidation         Abs/.1mm<*ASTM D7414         >25         16.1         14.0            Base Number (BN)         mg KOH/g         ASTM D2896         8.5         9.1         10.1		304141	visual	20.2		NLG	
Boron         ppm         ASTM D5185m         250         243         7            Barium         ppm         ASTM D5185m         10         0         0            Molybdenum         ppm         ASTM D5185m         100         122         60            Manganese         ppm         ASTM D5185m         100         122         60            Magnesium         ppm         ASTM D5185m         450         727         943            Calcium         ppm         ASTM D5185m         3000         1448         1109            Phosphorus         ppm         ASTM D5185m         1350         701         1034            Zinc         ppm         ASTM D5185m         1350         914         1260            Sulfur         ppm         ASTM D5185m         4250         2621         3329            Oxidation         Abs/.1mm<*ASTM D7414         >25         16.1         14.0            Base Number (BN)         mg KOH/g         ASTM D2896         8.5         9.1         10.1	Sodium	ppm	ASTM D5185m	>158	<1	0	
Barium         ppm         ASTM D5185m         10         0         0            Molybdenum         ppm         ASTM D5185m         100         122         60            Manganese         ppm         ASTM D5185m         100         122         60            Magnesium         ppm         ASTM D5185m         100         122         60            Magnesium         ppm         ASTM D5185m         450         727         943            Calcium         ppm         ASTM D5185m         3000         1448         1109            Phosphorus         ppm         ASTM D5185m         1150         701         1034            Zinc         ppm         ASTM D5185m         1350         914         1260            Sulfur         ppm         ASTM D5185m         4250         2621         3329            Oxidation         Abs/.1mm         *ASTM D7414         >25         16.1         14.0            Base Number (BN)         mg KOH/g         ASTM D2896         8.5         9.1         10.1	Boron		ASTM D5185m	250	243	7	
Manganese         ppm         ASTM D5185m         <1	Barium		ASTM D5185m	10	0	0	
Magnesium         ppm         ASTM D5185m         450         727         943            Calcium         ppm         ASTM D5185m         3000         1448         1109            Phosphorus         ppm         ASTM D5185m         1150         701         1034            Zinc         ppm         ASTM D5185m         1350         914         1260            Sulfur         ppm         ASTM D5185m         4250         2621         3329            Oxidation         Abs/.1mm         *ASTM D7414         >25         16.1         14.0            Base Number (BN)         mg KOH/g         ASTM D2896         8.5         9.1         10.1	Molybdenum	ppm	ASTM D5185m	100	122	60	
Calcium         ppm         ASTM D5185m         3000         1448         1109            Phosphorus         ppm         ASTM D5185m         1150         701         1034            Zinc         ppm         ASTM D5185m         1350         914         1260            Sulfur         ppm         ASTM D5185m         4250         2621         3329            Oxidation         Abs/.1mm         *ASTM D7414         >25         16.1         14.0            Base Number (BN)         mg KOH/g         ASTM D2896         8.5         9.1         10.1	Manganese	ppm	ASTM D5185m		<1	<1	
Calcium         ppm         ASTM D5185m         3000         1448         1109            Phosphorus         ppm         ASTM D5185m         1150         701         1034            Zinc         ppm         ASTM D5185m         1350         914         1260            Sulfur         ppm         ASTM D5185m         4250         2621         3329            Oxidation         Abs/.1mm         *ASTM D7414         >25         16.1         14.0            Base Number (BN)         mg KOH/g         ASTM D2896         8.5         9.1         10.1	-		ASTM D5185m	450		943	
Phosphorus         ppm         ASTM D5185m         1150         701         1034            Zinc         ppm         ASTM D5185m         1350         914         1260            Sulfur         ppm         ASTM D5185m         4250         2621         3329            Oxidation         Abs/.1mm         *ASTM D7414         >25         16.1         14.0            Base Number (BN)         mg KOH/g         ASTM D2896         8.5         9.1         10.1	-		ASTM D5185m	3000	1448	1109	
Zinc         ppm         ASTM D5185m         1350         914         1260            Sulfur         ppm         ASTM D5185m         4250         2621         3329            Oxidation         Abs/.1mm         *ASTM D7144         >25         16.1         14.0            Base Number (BN)         mg KOH/g         ASTM D2896         8.5         9.1         10.1	Phosphorus		ASTM D5185m	1150	701	1034	
Sulfur         ppm         ASTM D5185m         4250         2621         3329            Oxidation         Abs/.1mm         *ASTM D7414         >25         16.1         14.0            Base Number (BN)         mg KOH/g         ASTM D2896         8.5         9.1         10.1			ASTM D5185m		914	1260	
Oxidation         Abs/.1mm         *ASTM D7414         >25         16.1         14.0            Base Number (BN)         mg KOH/g         ASTM D2896         8.5         9.1         10.1	Sulfur		ASTM D5185m	4250	2621	3329	
	Oxidation		*ASTM D7414			14.0	
	Base Number (BN)	mg KOH/g	ASTM D2896	8.5	9.1	10.1	
	Visc @ 100°C	cSt	ASTM D445	14.4	13.4	12.8	





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Contact/Location: Audrey Hopkins - SALWIN