

# [WO 25489]

#### 5608 Component Diesel Engine Fluid DIESEL ENGINE OIL SAE 10W30 (--- GAL)

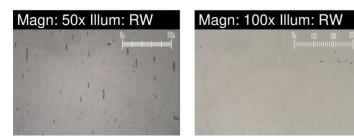
#### RECOMMENDATION

We advise that you check the air filter, air induction system, and any areas where dirt may enter the component. We recommend that you drain the oil from the component if this has not already been done. Oil and filter change at the time of sampling has been noted. We recommend an early resample to monitor this condition. Please specify the component make and model with your next sample.

### WEAR

Copper ppm levels are abnormal. Lead ppm levels are noted. A sharp increase in the copper level is noted. Bearing wear is indicated. The ferrography results are normal indicating no abnormal wear in the system.

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Test UOM l imit/Abn Current History2 Method History1 Sample Number Client Info WC0916682 WC0907677 WC0308093 Client Info 04 Apr 2024 05 Mar 2024 04 Apr 2019 Sample Date Machine Age **Client Info** 696992 8 182280 kms 24000 0 0 Oil Age kms Client Info Filter Age **Client Info** 24000 0 0 kms Oil Changed Client Info Changed Changed Changed Filter Changed Client Info Changed Changed Changed Sample Status ABNORMAL SEVERE NORMAL PQ ASTM D8184\* 0 0 23 Iron ASTM D5185(m) >100 6 15 ppm Chromium ASTM D5185(m) >20 1 0 <1 ppm Nickel ASTM D5185(m) >4 0 0 ppm <1 Titanium ASTM D5185(m) 0 0 0 ppm Silver 0 0 0 ASTM D5185(m) >3 ppm Aluminum >20 2 2 ASTM D5185(m) 1 ppm 4 0 Lead >40 ppm ASTM D5185(m) 1 Copper ASTM D5185(m) >330 132 3 2 ppm 0 Tin ppm ASTM D5185(m) >15 <1 0 0 0 Vanadium 0 ppm ASTM D5185(m) White Metal scalar Visual\* NONE NONE ▲ LTMOD NONE NONE Yellow Metal scalar Visual\* NONE Large Particles DR-Ferr\* 2.7 55.6 Small Particles DR-Ferr' 1.8 13.5 **Total Particles** DR-Ferr\* 4.5 69.1 Large Particles Percentage % DR-Ferr' 20 60.9 Severity Index DR-Ferr\* 2 2341 2 Ferrous Rubbing Scale 0-10 ASTM D7684\* 4 Ferrous Sliding Scale 0-10 ASTM D7684\* Ferrous Cutting Scale 0-10 ASTM D7684' Ferrous Rolling Scale 0-10 ASTM D7684\* Ferrous Break-in Scale 0-10 ASTM D7684' Ferrous Spheres Scale 0-10 ASTM D7684\* Ferrous Black Oxides Scale 0-10 ASTM D7684 1 Ferrous Red Oxides Scale 0-10 ASTM D7684\* Ferrous Corrosive Scale 0-10 ASTM D7684\* Ferrous Other Scale 0-10 ASTM D7684\* Nonferrous Rubbing Scale 0-10 ASTM D7684\* Nonferrous Sliding Scale 0-10 ASTM D7684\* Nonferrous Cutting Scale 0-10 ASTM D7684\* Nonferrous Rolling ASTM D7684\* Scale 0-10 Nonferrous Other Scale 0-10 ASTM D7684\*

CONTAMINANTS ABNORMAL OIL CONDITION NORMAL

WEAR

**ABNORMAL** 

Report Id: ONT567NOR [WCAMIS] 02628335 (Generated: 04/19/2024 11:29:45) Rev: 1

### CONTAMINANTS

There is a moderate concentration of dirt present in the oil. High amount of ingressed dirt has caused abrasive wear to the component.

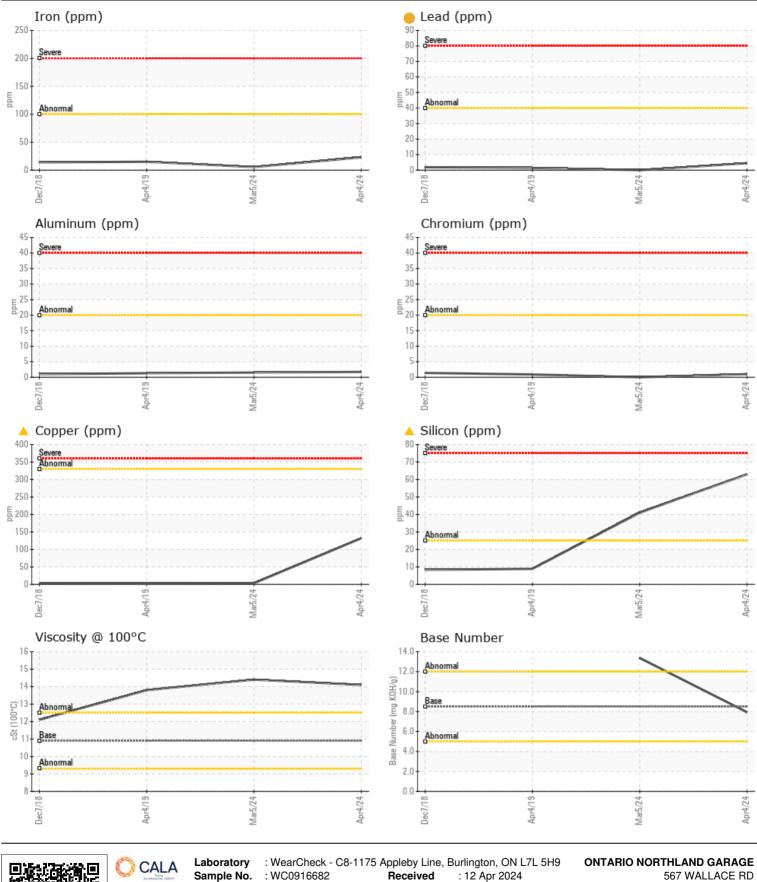
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Picasium       pm       ARIM 05860       >I       I	Silicon	ppm	ASTM D5185(m)	>25	<b>6</b> 3	41	9
Water       Image: Participant of the part of the	Potassium	ppm	ASTM D5185(m)	>20	3	2	3
Aig of the set	Fuel		WC Method	>5	<1.0	<1.0	<1.0
York	Water		WC Method	>0.2	NEG	NEG	NEG
Niration       Abs:r       ATM 07424       >CO       J <th>Glycol</th> <th></th> <th>WC Method</th> <th></th> <th>NEG</th> <th>NEG</th> <th>NEG</th>	Glycol		WC Method		NEG	NEG	NEG
Sulfation         Abs/m         ATM D744         >300         J	Soot %	%	ASTM D7844*	>3	0.2	0	0.2
Norma       Norma <t< th=""><th>Nitration</th><th>Abs/cm</th><th>ASTM D7624*</th><th>&gt;20</th><th>7.9</th><th>5.3</th><th>10.9</th></t<>	Nitration	Abs/cm	ASTM D7624*	>20	7.9	5.3	10.9
Debris scalar Visual* NONE I<	Sulfation	Abs/.1mm	ASTM D7415*	>30	19.6	16.2	25.5
Yand	Silt	scalar	Visual*	NONE	NONE	NONE	
Appearance scalar Visual* NORML I <	Debris	scalar	Visual*	NONE	NONE	NONE	
And Norma	Sand/Dirt	scalar	Visual*	NONE	NONE	NONE	
Find Sitting Water         Scalar         Visual*         >0.2         NEG         I         NEG         NEG         NEG           Carbonaccous Materia         Scale 0:1         ASTM D7684*         I <t< th=""><th>Appearance</th><th>scalar</th><th>Visual*</th><th>NORML</th><th>NORML</th><th>NORML</th><th></th></t<>	Appearance	scalar	Visual*	NORML	NORML	NORML	
rot open cond       rot open cond <thr></thr> rot open cond <thr< th=""><th>Odor</th><th>scalar</th><th>Visual*</th><th>NORML</th><th>NORML</th><th>NORML</th><th></th></thr<>	Odor	scalar	Visual*	NORML	NORML	NORML	
Sand/Dirt         Sale 0:1         ATM D7684         I	Emulsified Water	scalar	Visual*	>0.2	NEG	NEG	NEG
Fibres Scale 0:1 ASTM D7684 I <td< th=""><th>Carbonaceous Material</th><th>Scale 0-10</th><th>ASTM D7684*</th><th></th><th></th><th></th><th></th></td<>	Carbonaceous Material	Scale 0-10	ASTM D7684*				
SpheresScale 0:10ASTM D7684'II <th>Sand/Dirt</th> <th>Scale 0-10</th> <th>ASTM D7684*</th> <th></th> <th>1</th> <th>1</th> <th></th>	Sand/Dirt	Scale 0-10	ASTM D7684*		1	1	
YYIYIYYSodiumppmSTM D7684*III <th>Fibres</th> <th>Scale 0-10</th> <th>ASTM D7684*</th> <th></th> <th></th> <th></th> <th></th>	Fibres	Scale 0-10	ASTM D7684*				
SodiumppmASTM D5185(m)323BoronppmASTM D5185(m)2506655BariumppmASTM D5185(m)10330MolybdenumppmASTM D5185(m)100764ManganeseppmASTM D5185(m)100764MagnesiumppmASTM D5185(m)10010106777MagnesiumppmASTM D5185(m)3000232422081419PhosphorusppmASTM D5185(m)1300286438441027SulfurppmASTM D5185(m)1350104298111215SulfurppmASTM D5185(m)25212449.6620.1SulfurppmASTM D5185(m)25512.49.620.1SulfurppmASTM D5185(m)25512.49.620.1SulfurppmASTM D5185(m)25512.49.620.1SulfurppmASTM D5185(m)25512.49.620.1SulfurppmASTM D7141*25512.49.620.1SulfurmarkASTM D218968.57.9313.381SulfurmarkASTM D228910.914.113.81.3SulfurmarkASTM D228910.914.413.8Sulfurmarkmarkmarkmark14.413.8	Spheres	Scale 0-10	ASTM D7684*				
BoronppmASTM D5185(m)250665BariumppmASTM D5185(m)10330MolybdenumppmASTM D5185(m)100764ManganeseppmASTM D5185(m)100764MagnesiumppmASTM D5185(m)4501061016777CalciumppmASTM D5185(m)30002324422081419PhosphorusppmASTM D5185(m)1350104298141027ZincppmASTM D5185(m)1350104298141215SulfurppmASTM D5185(m)25512.49.620.1DxidationMs M0H9ASTM D2896*8.57.9313.38Visc @ 100°CcstASTM D279(m)10.914.114.413.8	Other	Scale 0-10	ASTM D7684*		1	2	
RariumppmASTM D5185(m)10330MolybdenumppmASTM D5185(m)100764ManganeseppmASTM D5185(m)100764MagnesiumppmASTM D5185(m)450303-1CalciumppmASTM D5185(m)30002324422081419PhosphorusppmASTM D5185(m)1050104298141027ZincppmASTM D5185(m)1350104298141215SulfurppmASTM D5185(m)25512.49.620.1DxidationMs M0H9ASTM D2896*8.57.9313.38Visc @ 100°CcstASTM D770(m)10.914.114.413.8	Sodium	ppm	ASTM D5185(m)		3	2	3
MolybdenumppmASTM D5185(m)100764ManganeseppmASTM D5185(m)53<1<1MagnesiumppmASTM D5185(m)4501061016677CalciumppmASTM D5185(m)300023244220801419PhosphorusppmASTM D5185(m)1150864485441027ZincppmASTM D5185(m)1350104298111215SulfurppmASTM D5185(m)425028020287203042OxidationMs/1mmASTM D7414*>2512.49.620.1Nisc @ 100°CcstASTM D279(m)10.914.114.413.8	Boron	ppm	ASTM D5185(m)	250	6	6	55
NanganeseppmASTM D5185(m)GGCMagnesiumppmASTM D5185(m)450106101677CalciumppmASTM D5185(m)30002324422081419PhosphorusppmASTM D5185(m)1150864485441027ZincppmASTM D5185(m)1350104298111215SulfurppmASTM D5185(m)4250280228723042OxidationAbs/1mmASTM D7414*>2512.49.620.1Base Number (BN)mg KOHgASTM D2896*8.57.9313.38Visc @ 100°CcstASTM D779(m)10.914.114.413.8	Barium	ppm	ASTM D5185(m)	10	3	3	0
Magnesium         ppm         ASTM D5185(m)         450         106         101         677           Calcium         ppm         ASTM D5185(m)         3000         2324         2208         1419           Phosphorus         ppm         ASTM D5185(m)         1150         8644         8544         1027           Zinc         ppm         ASTM D5185(m)         1350         1042         9811         1215           Sulfur         ppm         ASTM D5185(m)         4250         28022         28722         3042           Oxidation         Abs/1mm         ASTM D7414*         >25         12.4         9.6         20.1           Base Number (BN)         mg KOH9         ASTM D2896*         8.5         7.93         13.38            Visc @ 100°C         cSt         ASTM D779(m)         10.9         14.1         14.4         13.8	Molybdenum	ppm	ASTM D5185(m)	100	7	6	4
No.         Prime         No.         No. </th <th>Manganese</th> <th>ppm</th> <th>ASTM D5185(m)</th> <th></th> <th>3</th> <th>&lt;1</th> <th>&lt;1</th>	Manganese	ppm	ASTM D5185(m)		3	<1	<1
Phosphorus         ppm         ASTM D5185(m)         1150         864         854         1027           Zinc         ppm         ASTM D5185(m)         1350         1042         981         1215           Sulfur         ppm         ASTM D5185(m)         4250         2802         2872         3042           Oxidation         Abs/1mm         ASTM D7414*         >25         12.4         9.6         20.1           Base Number (BN)         mg KOH9         ASTM D2896*         8.5         7.93         13.38            Visc @ 100°C         cSt         ASTM D779(m)         10.9         14.1         14.4         13.8	Magnesium	ppm	ASTM D5185(m)	450	106	101	677
Zinc         ppm         ASTM D5185(m)         1350         1042         981         1215           Sulfur         ppm         ASTM D5185(m)         4250         2802         2872         3042           Oxidation         Abs/1mm         ASTM D7414*         >25         12.4         9.6         20.1           Base Number (BN)         mg KOHg         ASTM D2896*         8.5         7.93         13.38            Visc @ 100°C         cSt         ASTM D7279(m)         10.9         14.1         14.4         13.8	Calcium	ppm	ASTM D5185(m)	3000	2324	2208	1419
Sulfur         ppm         ASTM D5185(m)         4250         2802         2872         3042           Oxidation         Abs/.1mm         ASTM D7414*         >25         12.4         9.6         20.1           Base Number (BN)         mg KOH/g         ASTM D2896*         8.5         7.93         13.38            Visc @ 100°C         cSt         ASTM D7279(m)         10.9         14.1         14.4         13.8	Phosphorus	ppm	ASTM D5185(m)	1150	864	854	1027
Oxidation         Abs/.1mm         ASTM D7414*         >25         12.4         9.6         20.1           Base Number (BN)         mg KOH/g         ASTM D2896*         8.5         7.93         13.38            Visc @ 100°C         cSt         ASTM D7279(m)         10.9         14.1         14.4         13.8	Zinc	ppm	ASTM D5185(m)	1350	1042	981	1215
Base Number (BN)         mg KOH/g         ASTM D2896*         8.5         7.93         13.38            Visc @ 100°C         cSt         ASTM D7279(m)         10.9         14.1         14.4         13.8	Sulfur	ppm	ASTM D5185(m)	4250	2802	2872	3042
Visc @ 100°C cSt ASTM D7279(m) 10.9 14.1 14.4 13.8	Oxidation	Abs/.1mm	ASTM D7414*	>25	12.4	9.6	20.1
	Base Number (BN)	mg KOH/g	ASTM D2896*	8.5	7.93	13.38	
Lubricant Degradation Scale 0-10 ASTM D7684*	Visc @ 100°C	cSt	ASTM D7279(m)	10.9	14.1	14.4	13.8
	Lubricant Degradation	Scale 0-10	ASTM D7684*				

## OIL CONDITION

The BN result indicates that there is suitable alkalinity remaining in the oil. Viscosity of sample indicates oil is within SAE 40 range, advise investigate. The oil is no longer serviceable as a result of the abnormal and/or severe wear.

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Tested

Diagnosed

: 19 Apr 2024

: 19 Apr 2024 - Kevin Marson

567 WALLACE RD NORTH BAY, ON CA P1A 3T3 Contact: Scott Curran scott.curran@ontarionorthland.ca T: (705)499-5184 F:

Report Id: ONT567NOR [WCAMIS] 02628335 (Generated: 04/19/2024 11:29:48) Rev: 1

ISO 17025:2017 Accredited

Laboratory

Lab Number : 02628335

To discuss this sample report, contact Customer Service at 1-800-268-2131.

Test denoted (\*) outside scope of accreditation, (m) method modified, (e) tested at external lab.

Validity of results and interpretation are based on the sample and information as supplied.

Unique Number : 5761467

Test Package : MOB 3

Submitted By: Ed Violette Page 3 of 4 This page left intentionally blank