

WEAR NORMAL CONTAMINATION ABNORMAL FLUID CONDITION ABNORMAL



RECOMMENDATION

LIEBHERR R954B MH-4 (S/N 015630-629)

Component Diesel Engine

DURAMAX 15W40 (10 GAL)

We advise that you check the fuel injection system. We recommend an early resample to monitor this condition. (Customer Sample Comment: Resample looking for fuel contamination)

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All component wear rates are normal.

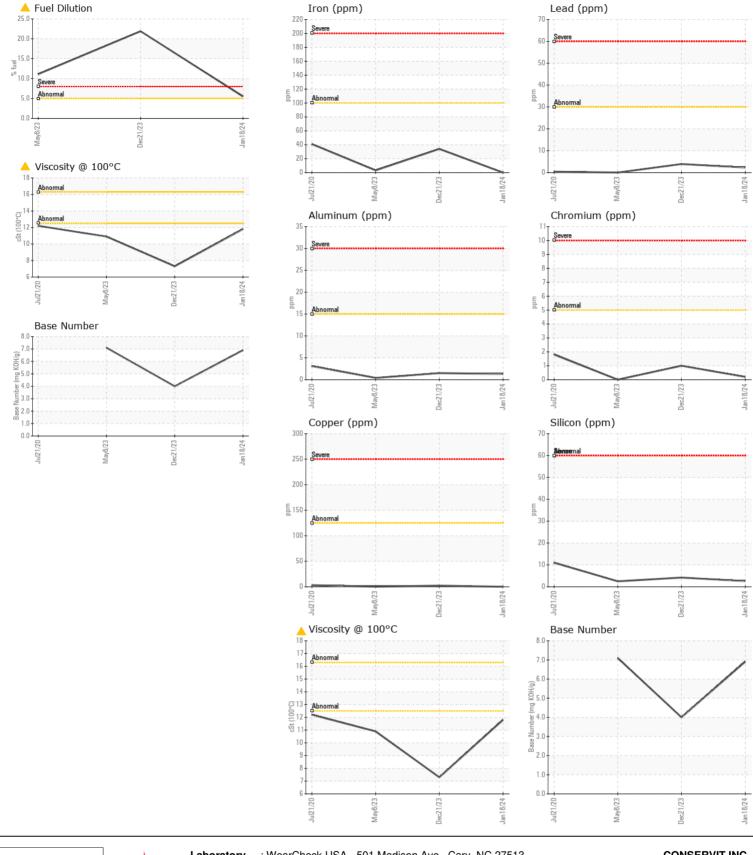
CONTAMINATION

There is a moderate amount of fuel present in the oil.

FLUID CONDITION

Fuel is present in the oil and is lowering the viscosity.

Sample Date Client Info 18 Jan 2024 21 Dec 2023 08 May 2023 Machine Age hrs Client Info 12377 12300 11818 Oil Age hrs Client Info 77 482 401 Filter Age hrs Client Info 77 482 401 Oil Changed Client Info Not Changd Changed Changed Filter Changed Client Info Not Changd Changed Changed Sample Status Vision ASTM D5185m >100 0 34 3 Chromium ppm ASTM D5185m >55 0 0 0 0 Nickel ppm ASTM D5185m >55 0 0 0 0 Aluminum ppm ASTM D5185m >30 0 0 0 0 Aluminum ppm ASTM D5185m >30 2 <1 0 Vanadium ppm ASTM D5185m >30 21 0 <					~~~~		
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Machine Age hrs Client Info 12377 12300 11818 Oil Age hrs Client Info 77 482 401 Filter Age Nrs Client Info Not Changed Changed Changed Filter Changed Client Info Not Changed Changed Changed Changed Sample Status Client Info Not Changed Changed Changed Changed Iron ppm ASTM D5185m >100 0 34 3 Chromium ppm ASTM D5185m >5 0 0 0 Nickel ppm ASTM D5185m >50 0 0 0 Aluminum ppm ASTM D5185m >30 2 4 0 Copper ppm ASTM D5185m >11 2 1 0 Vanadium ppm ASTM D5185m >60 3 4 2 Vanadium ppm ASTM D5185m >60 3 4	Sample Number		Client Info		DC0028669	DC0028811	DC0021536
Oil Age hrs Client Info 77 482 401 Filter Age hrs Client Info Not Changed SEVERE	Sample Date		Client Info		18 Jan 2024	21 Dec 2023	08 May 2023
Filter Age Oil ChangedIresClient Info77482401Oil ChangedClient InfoNot ChangedCh	Machine Age	hrs	Client Info		12377	12300	11818
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Filter Changed Sample StatusClient InfoNot Changed ABNORMALChanged SEVEREChanged SEVEREIronppmASTM D5185m>1000343ChromiumppmASTM D5185m>5000NickelppmASTM D5185m>5000NickelppmASTM D5185m>3000SilverppmASTM D5185m>312<1LeadppmASTM D5185m>30240CopperppmASTM D5185m>500<10VanadiumppmASTM D5185m>50000Vinte Metalscalar'VisualNONENONENONENONEVellow Metalscalar'VisualNONENONENONENONENONESiliconppmASTM D5185m>603422PotassiumppmASTM D5185m>6034211.1WaterWC Method>0.2NEGNEGNEGNEGSoot %'ASTM D5185m>3015.919.615.255SulfationAbs/Imm'ASTM D5185m>3015.919.615.2Sitescalar'VisualNONENONENONENONESoot %'ASTM D5185m>3015.919.615.2Sitescalar'VisualNONENONENONENONE </th <th>Filter Age</th> <th>hrs</th> <th>Client Info</th> <th></th> <th>77</th> <th>482</th> <th>401</th>	Filter Age	hrs	Client Info		77	482	401
Sample StatusABNORMASEVERESEVEREIronppmASTM D5185>1003.43.0ChromiumppmASTM D5185>5000NickelppmASTM D5185>500.00TitaniumppmASTM D5185>500.00SilverppmASTM D5185>1512.00.1LeadppmASTM D5185>30240CopperppmASTM D5185>50-10VanadiumppmASTM D5185>50-10VanadiumppmASTM D5185>50-10VanadiumppmASTM D5185>50-10VanadiumppmASTM D5185>50342PotassiumppmASTM D5185>60342PotassiumppmASTM D5185>60342PotassiumppmASTM D5185>60342Soto %%YASTM D5185>60342Soto %%YASTM D5185>20ASTNONENONESiltoppmASTM D5185>20ASTNORENORESoto %%YASTM D784>300.20.11.1NitrationAbs/tmYASTM D784>20AST5.6SultscalarYisualNORENONE <t< th=""><th>Oil Changed</th><th></th><th>Client Info</th><th></th><th>Not Changd</th><th>Changed</th><th>Changed</th></t<>	Oil Changed		Client Info		Not Changd	Changed	Changed
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Iron ppm ASTM D5185m >100 0 34 3 Chromium ppm ASTM D5185m >5 0 0 0 Nickel ppm ASTM D5185m >5 0 0 0 Titanium ppm ASTM D5185m >3 0 0 0 Aluminum ppm ASTM D5185m >30 2 4 0 Copper ppm ASTM D5185m >30 2 4 0 Copper ppm ASTM D5185m >1 1 0 0 Vanadium ppm ASTM D5185m >5 0 <1 0 Vanadium ppm ASTM D5185m >60 3 4 2 Vellow Metal scalar *Visual NONE NONE NONE NONE Silicon ppm ASTM D5185m >60 3 4 2 Potassium ppm ASTM D5185m >20 2 2<	Sample Status				ABNORMAL	SEVERE	-
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Nickel ppm ASTM D5185m >5 0 0 0 Titanium ppm ASTM D5185m >3 0 0 0 Silver ppm ASTM D5185m >3 0 0 0 Aluminum ppm ASTM D5185m >15 1 2 <1 Lead ppm ASTM D5185m >30 2 4 0 Copper ppm ASTM D5185m >30 2 <1 0 Vanadium ppm ASTM D5185m >60 <1 0 0 White Metal scalar "Visual NONE NONE NONE NONE Yellow Metal scalar "Visual NONE NONE NONE NONE NONE Yellow Metal scalar "Visual NONE NONE NONE NONE NONE Soliton pp ASTM D5185m >20 2 2 11.1 Water WC Method <	Iron	ppm	ASTM D5185m	>100	0	34	3
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Silver ppm ASTM D5185m >3 0 0 0 Aluminum ppm ASTM D5185m >15 1 2 <1	Nickel	ppm	ASTM D5185m	>5	0	0	0
Aluminum ppm ASTM D5185m >15 1 2 <1 Lead ppm ASTM D5185m >30 2 4 0 Copper ppm ASTM D5185m >125 0 21 <1	Titanium	ppm	ASTM D5185m		0	<1	<1
Lead ppm ASTM D5185m >30 2 4 0 Copper ppm ASTM D5185m >125 0 2 <1	Silver	ppm	ASTM D5185m	>3	0	0	0
Copper ppm ASTM D5185m >125 0 2 <1	Aluminum	ppm	ASTM D5185m	>15	1	2	<1
Tin ppm ASTM D5185m >5 0 <1	Lead	ppm	ASTM D5185m	>30	2	4	0
Vanadium ppm ASTM D5185m <1	Copper	ppm	ASTM D5185m	>125	0	2	<1
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Yellow Metal scalar *Visual NONE NONE NONE NONE Silicon ppm ASTM D5185m<>60 3 4 2 Potassium ppm ASTM D5185m<>20 2 2 1 Fuel % ASTM D5185m<>20 ▲ 5.5 ▲ 21.9 ▲ 11.1 Water WC Method >0.2 NEG NEG NEG NEG Glycol WC Method >0.2 NEG NEG NEG NEG Soot % % *ASTM D7844 >3 0.2 0.7 0.1 Nitration Abs/cm< *ASTM D7624 >20 6.2 8.2 5.6 Sulfation Abs/tm< *ASTM D715 >30 15.9 19.6 15.2 Silt scalar *Visual NONE NONE NONE NONE Debris scalar *Visual NORM NORM NORM NORM NORM Appearance scalar *Visual	Vanadium	ppm	ASTM D5185m		<1	0	0
Silicon ppm ASTM D5185m >60 3 4 2 Potassium ppm ASTM D5185m >20 2 2 1 Fuel % ASTM D5185m >20 2 2 1 Water WC Method >0.2 NEG NEG NEG Glycol WC Method >0.2 NEG NEG NEG Soot % % *ASTM D7844 >3 0.2 0.7 0.1 Nitration Abs/cm *ASTM D7624 >20 6.2 8.2 5.6 Sulfation Abs/tm *ASTM D7614 >30 15.9 19.6 15.2 Silt scalar *Visual NONE NONE NONE NONE Debris scalar *Visual NONE NONE NONE NORM NORM Appearance scalar *Visual NORM NORML NORML NORM NORM Boron ppm ASTM D5185m	White Metal	scalar	*Visual	NONE	NONE	NONE	NONE
Potassium ppm ASTM D5185m >20 2 2 1 Fuel % ASTM D3524 >5 ▲ 5.5 ▲ 21.9 ▲ 11.1 Water WC Method >0.2 NEG NEG NEG NEG Glycol WC Method O.2 NEG NEG NEG NEG Soot % % *ASTM D7624 >20 6.2 8.2 5.6 Sulfation Abs/.mm *ASTM D7624 >20 6.2 8.2 5.6 Sulfation Scalar *Visual NONE NONE NONE NORM Appearance scalar	Yellow Metal	scalar	*Visual	NONE	NONE	NONE	NONE
Potassium ppm ASTM D5185m >20 2 2 1 Fuel % ASTM D3524 >5 ▲ 5.5 ▲ 21.9 ▲ 11.1 Water WC Method >0.2 NEG NEG NEG NEG Glycol WC Method O.2 NEG NEG NEG NEG Soot % % *ASTM D7624 >20 6.2 8.2 5.6 Sulfation Abs/.mm *ASTM D7624 >20 6.2 8.2 5.6 Sulfation Scalar *Visual NONE NONE NONE NORM Appearance scalar							
Fuel % ASTM D3524 >5 5.5 21.9 11.1 Water WC Method >0.2 NEG NEG NEG NEG Glycol WC Method >0.2 NEG NEG NEG NEG Soot % % *ASTM D7844 >3 0.2 0.7 0.1 Nitration Abs/.mm *ASTM D7624 >20 6.2 8.2 5.6 Sulfation Abs/.mm *ASTM D7624 >20 NONE NONE NONE Debris scalar *Visual NORE NORM NORM NORM NORM Odor	Silicon	ppm	ASTM D5185m	>60	3	4	
Water WC Method >0.2 NEG NEG NEG Glycol WC Method NEG NEG NEG NEG Soot % % *ASTM D7844 >3 0.2 0.7 0.1 Nitration Abs/cm *ASTM D7824 >20 6.2 8.2 5.6 Sulfation Abs/tmm *ASTM D7824 >20 6.2 8.2 5.6 Sulfation Abs/tmm *ASTM D7815 >30 15.9 19.6 15.2 Silt scalar *Visual NONE NONE NONE NONE Debris scalar *Visual NONE NONE NONE NONE Sand/Dirt scalar *Visual NORM NORML NORML NORML Appearance scalar *Visual NORM NORML NORML NORML Odor scalar *Visual NORM NORML NORML NORML Emulsified Water scalar *Visual	Potassium	ppm	ASTM D5185m	>20	2	2	1
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Soot % % *ASTM D7844 >3 0.2 0.7 0.1 Nitration Abs/cm *ASTM D7624 >20 6.2 8.2 5.6 Sulfation Abs/cm *ASTM D7624 >20 15.9 19.6 15.2 Silt scalar *Visual NONE NONE NONE NONE NONE Debris scalar *Visual NONE NONE NONE NONE NONE Sand/Dirt scalar *Visual NOR NORE NORE NORM NORE Appearance scalar *Visual NOR NORML	Water		WC Method	>0.2	NEG	NEG	NEG
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Appearance scalar *Visual NORML Str Str	Debris	scalar	*Visual	NONE	NONE	NONE	NONE
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Sodium ppm ASTM D5185m 2 0 <1	Odor	scalar	*Visual	NORML	NORML	NORML	NORM
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Molybdenum ppm ASTM D5185m 2 2 2 Manganese ppm ASTM D5185m <1 <1 <1 Magnesium ppm ASTM D5185m 76 23 30 Calcium ppm ASTM D5185m 2117 1521 2126 Phosphorus ppm ASTM D5185m 899 625 800 Zinc ppm ASTM D5185m 1047 689 1013 Sulfur ppm ASTM D5185m 3610 2573 4182 Oxidation Abs/.1mm<*ASTM D7414<>25 9.1 12.6 8.6 Base Number (BN) mg KOH/g ASTM D2896 6.9 4.0 7.1							
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Base Number (BN) mg KOH/g ASTM D2896 6.9 4.0 7.1				0-			
				>25			
Visc @ 100°C cSt ASTM D445	()						
	Vísc @ 100°C	cSt	ASTM D445		11.8	A 7.3	10.9



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