

#### Machine Id LIEBHERR 31241 Component Left Final Drive Fluid CHEVRON DELO GEAR ESI OIL 80W90 (--- GAL)

## RECOMMENDATION

We advise that you check for the source of water entry. We advise that you check all areas where dirt can enter the system. The oil change at the time of sampling has been noted. We advise that you inspect for the source(s) of wear. We recommend an early resample to monitor this condition.

## WEAR

Moderate concentration of visible metal present. Gear wear is indicated.

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# CONTAMINATION

There is a light concentration of water present in the oil. Elemental levels of silicon (Si) and aluminum (Al) indicate alumina-silicate (coarse dirt) ingress.

Test	UOM	Method	Limit/Abn	Cι	urrent	Hi	story1	Hi	story2
Sample Number		Client Info		WC	0882607	W	C0733672	W	C0671615
Sample Date		Client Info		11	Jan 2024	27	Sep 2022	27	Apr 2022
Machine Age	hrs	Client Info		63	11	47	'59	42	211
Oil Age	hrs	Client Info		20	00	54	8	58	32
Filter Age	hrs	Client Info		20	00	0		0	
Oil Changed		Client Info		Cł	nanged	Cł	nanged	CI	nanged
Filter Changed		Client Info		Cł	nanged	N/	A	N	A
Sample Status				SE	EVERE	AE	NORMAL	AE	BNORMAL
							005		0.45
Iron	ppm	ASTM D5185m	>500		5211		805		645
Chromium	ppm	ASTM D5185m	>10		58		10		/
NICKEI	ppm	ASTM D5185m	>10		21		3		2
Litanium	ppm	ASTM D5185m			34		2		2
Silver	ppm	ASTM D5185m	0.5		0		0		<1
Aluminum	ppm	ASTM D5185m	>25		708		37		52
Lead	ppm	ASTM D5185m	>25		1		0		0
Copper	ppm	ASTM D5185m	>50		4		<1		<1
Tin	ppm	ASTM D5185m	>10		0		0		0
Vanadium	ppm	ASTM D5185m			2		<1		<1
White Metal	scalar	*Visual	NONE		NONE		MODER		NONE
Yellow Metal	scalar	*Visual	NONE		NONE		NONE		NONE
Silicon	maa	ASTM D5185m	>75		2096		120		161
Silicon Potassium	ppm ppm	ASTM D5185m ASTM D5185m	>75 >20	٠	2096 142		120 7		161 9
Silicon Potassium Water	ppm ppm %	ASTM D5185m ASTM D5185m ASTM D6304	>75 >20 >0.2		2096 142 0.254		120 7		161 9
Silicon Potassium Water ppm Water	ppm ppm % ppm	ASTM D5185m ASTM D5185m ASTM D6304 ASTM D6304	>75 >20 >0.2 >2000		2096 142 0.254 2540		120 7 		161 9 
Silicon Potassium Water ppm Water Silt	ppm ppm % ppm scalar	ASTM D5185m ASTM D5185m ASTM D6304 ASTM D6304 *Visual	>75 >20 >0.2 >2000 NONE		2096 142 0.254 2540 NONE		120 7  NONE		161 9  NONE
Silicon Potassium Water ppm Water Silt Debris	ppm ppm % ppm scalar scalar	ASTM D5185m ASTM D5185m ASTM D6304 ASTM D6304 *Visual *Visual	>75 >20 >0.2 >2000 NONE NONE		2096 142 0.254 2540 NONE NONE		120 7  NONE NONE		161 9  NONE NONE
Silicon Potassium Water ppm Water Silt Debris Sand/Dirt	ppm ppm % ppm scalar scalar scalar	ASTM D5185m ASTM D5185m ASTM D6304 ASTM D6304 *Visual *Visual *Visual	>75 >20 >0.2 >2000 NONE NONE NONE		2096 142 0.254 2540 NONE NONE		120 7  NONE NONE NONE		161 9  NONE NONE NONE
Silicon Potassium Water ppm Water Silt Debris Sand/Dirt Appearance	ppm ppm % ppm scalar scalar scalar scalar	ASTM D5185m ASTM D5185m ASTM D6304 ASTM D6304 *Visual *Visual *Visual *Visual	>75 >20 >0.2 >2000 NONE NONE NONE NORML		2096 142 0.254 2540 NONE NONE NONE NORE		120 7  NONE NONE NONE NORML		161 9  NONE NONE NONE NORML
Silicon Potassium Water ppm Water Silt Debris Sand/Dirt Appearance Odor	ppm ppm % ppm scalar scalar scalar scalar scalar	ASTM D5185m ASTM D5185m ASTM D6304 *Visual *Visual *Visual *Visual *Visual	>75 >20 >0.2 >2000 NONE NONE NONE NONE NORML		2096 142 0.254 2540 NONE NONE NONE NORML		120 7  NONE NONE NONE NORML		161 9  NONE NONE NONE NORML NORML
Silicon Potassium Water ppm Water Silt Debris Sand/Dirt Appearance Odor Emulsified Water	ppm % ppm scalar scalar scalar scalar scalar scalar	ASTM D5185m ASTM D5185m ASTM D6304 ASTM D6304 *Visual *Visual *Visual *Visual *Visual *Visual *Visual	>75 >20 >0.2 >2000 NONE NONE NORML NORML >0.2		2096 142 0.254 2540 NONE NONE NORE NORML 0.2%		120 7  NONE NONE NONE NORML NORML NEG		161 9  NONE NONE NORML NORML NEG
Silicon Potassium Water ppm Water Silt Debris Sand/Dirt Appearance Odor Emulsified Water	ppm % ppm scalar scalar scalar scalar scalar scalar	ASTM D5185m ASTM D5185m ASTM D6304 *Visual *Visual *Visual *Visual *Visual *Visual *Visual	>75 >20 >0.2 >2000 NONE NONE NORML NORML >0.2		2096 142 0.254 2540 NONE NONE NONE NORML NORML 0.2%		120 7  NONE NONE NORML NORML NEG		161 9  NONE NONE NORML NORML NEG
Silicon Potassium Water ppm Water Silt Debris Sand/Dirt Appearance Odor Emulsified Water Sodium	ppm % ppm scalar scalar scalar scalar scalar scalar	ASTM D5185m ASTM D5185m ASTM D6304 *Visual *Visual *Visual *Visual *Visual *Visual *Visual	>75 >20 >0.2 >2000 NONE NONE NONE NORML >0.2		2096 142 0.254 2540 NONE NONE NONE NORML 0.2%		120 7  NONE NONE NORML NORML NEG		161 9  NONE NONE NONE NORML NORML NEG
Silicon Potassium Water ppm Water Silt Debris Sand/Dirt Appearance Odor Emulsified Water Sodium	ppm % ppm scalar scalar scalar scalar scalar scalar scalar	ASTM D5185m ASTM D5185m ASTM D6304 *Visual *Visual *Visual *Visual *Visual *Visual *Visual *Visual ASTM D5185m	>75 >20 >0.2 >2000 NONE NONE NORML NORML >0.2		2096 142 0.254 2540 NONE NONE NORML 0.2% 83 129		120 7  NONE NONE NORML NORML NORML NEG 4 126		161 9  NONE NONE NORML NORML NEG 4 144
Silicon Potassium Water ppm Water Silt Debris Sand/Dirt Appearance Odor Emulsified Water Sodium Boron Barium	ppm % ppm scalar scalar scalar scalar scalar scalar ppm	ASTM D5185m ASTM D5185m ASTM D6304 *Visual *Visual *Visual *Visual *Visual *Visual *Visual ASTM D5185m ASTM D5185m	>75 >20 >0.2 >2000 NONE NONE NORML NORML >0.2		2096 142 0.254 2540 NONE NONE NORE NORML 0.2% 83 129 0		120 7  NONE NONE NORML NORML NORML NEG 4 126 2		161 9  NONE NONE NORML NORML NEG 4 144
Silicon Potassium Water ppm Water Silt Debris Sand/Dirt Appearance Odor Emulsified Water Sodium Boron Barium	ppm % ppm scalar scalar scalar scalar scalar scalar gpm ppm	ASTM D5185m ASTM D5185m ASTM D6304 *Visual *Visual *Visual *Visual *Visual *Visual ASTM D5185m ASTM D5185m ASTM D5185m	>75 >20 >0.2 >2000 NONE NONE NORML NORML >0.2 15 0		2096 142 0.254 2540 NONE NONE NORE NORE NORE 0.2% 83 129 0 13		120 7  NONE NONE NORML NORML NEG 126 2 7		161 9  NONE NONE NORML NORML NEG 4 144 0 5
Silicon Potassium Water ppm Water Silt Debris Sand/Dirt Appearance Odor Emulsified Water Sodium Boron Barium Molybdenum Manganese	ppm % ppm scalar scalar scalar scalar scalar scalar ppm ppm	ASTM D5185m ASTM D5185m ASTM D6304 *Visual *Visual *Visual *Visual *Visual *Visual ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	>75 >20 >0.2 >2000 NONE NONE NONE NORML >0.2		2096 142 0.254 2540 NONE NONE NORE NORML 0.2% 83 129 0 13 46		120 7  NONE NONE NORML NORML NORML 126 2 7 6		161 9  NONE NONE NONE NORML NORML NEG 4 144 0 5 5
Silicon Potassium Water ppm Water Silt Debris Sand/Dirt Appearance Odor Emulsified Water Sodium Boron Barium Molybdenum Manganese Magnesium	ppm % ppm scalar scalar scalar scalar scalar scalar ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D6304 *Visual *Visual *Visual *Visual *Visual *Visual *Visual ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	>75 >20 >2000 NONE NONE NORML NORML >0.2		2096 142 0.254 2540 NONE NONE NORML 0.2% 83 129 0 13 46 81		120 7  NONE NONE NORML NORML NORML 126 2 7 6 2 2 7		161 9  NONE NONE NORML NORML NORML NEG 4 144 0 5 5 5 5
Silicon Potassium Water ppm Water Silt Debris Sand/Dirt Appearance Odor Emulsified Water Sodium Boron Barium Molybdenum Manganese Magnesium Calcium	ppm % ppm scalar scalar scalar scalar scalar scalar ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D6304 *Visual *Visual *Visual *Visual *Visual *Visual ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	>75 >20 >0.2 >2000 NONE NONE NORML NORML >0.2 15 0 0 0 5 5		2096 142 0.254 2540 NONE NONE NORE NORE NORE NORE 102% 13 46 81 166		120 7  NONE NONE NORML NORML NORML 126 2 7 6 27 6 27 119		161 9  NONE NONE NONE NORML NORML NEG 4 144 0 5 5 5 15 47
Silicon Potassium Water ppm Water Silt Debris Sand/Dirt Appearance Odor Emulsified Water Sodium Boron Barium Molybdenum Manganese Magnesium Calcium	ppm % ppm scalar scalar scalar scalar scalar scalar ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D6304 *Visual *Visual *Visual *Visual *Visual *Visual ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	>75 >20 >0.2 >2000 NONE NONE NONE NORML >0.2 15 0 0 0 5 5 600		2096 142 0.254 2540 NONE NONE NORE NORE 0.2% 83 129 0.2% 13 46 81 166 2410		120 7  NONE NONE NORML NORML NORML 126 2 7 6 2 7 126 2 7 119		161 9  NONE NONE NONE NORML NORML NEG 144 0 5 5 5 15 47 1521
Silicon Potassium Water ppm Water Silt Debris Sand/Dirt Appearance Odor Emulsified Water Sodium Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc	ppm % ppm scalar scalar scalar scalar scalar scalar ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D6304 ASTM D6304 *Visual *Visual *Visual *Visual *Visual *Visual ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	>75 >20 >2000 NONE NONE NORML NORML >0.2 15 0 0 0 5 600 0 0		2096 142 0.254 NONE NONE NORML 0.2% 83 129 0 13 46 81 166 2410 52		120 7  NONE NONE NORML NORML NORML 2 126 2 7 6 2 27 119 3489 84		161 9  NONE NONE NONE NORML NORML NORML 144 0 5 5 144 144 0 5 5 15 15 47 1521 30
Silicon Potassium Water ppm Water Silt Debris Sand/Dirt Appearance Odor Emulsified Water Sodium Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur	ppm % ppm scalar scalar scalar scalar scalar scalar ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D6304 *Visual *Visual *Visual *Visual *Visual *Visual ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	>75 >20 >2000 NONE NONE NORML NORML >0.2 15 0 0 0 5 600 0 22000		2096 142 0.254 2540 NONE NONE NORE NORE NORE NORE 102 13 46 81 166 2410 52 30584		120 7  NONE NONE NORML NORML NORML 126 2 4 126 2 7 6 2 7 6 2 7 119 3489 84 20780		161 9  NONE NONE NONE NORML NORML NEG 4 144 0 5 5 5 15 15 47 1521 30 17020

#### FLUID CONDITION

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The oil is no longer serviceable due to the presence of contaminants.

Contact/Location: CHRIS CALTON - MSCDURLH



SULLIVAN EASTERN INC-LIEBHERR 2860 C SLATER RD MORRISVILLE, NC US 27560 Contact: CHRIS CALTON



:06061535

: 10832917

Lab Number

Unique Number

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

Diagnosed

: 18 Jan 2024

Diagnostician : Angela Borella

T: F: (919)484-2136

Contact/Location: CHRIS CALTON - MSCDURLH