

# CONTAMINATION NORMAL

WEAR

**ABNORMAL** 

# [43802798]

### R274

# Diesel Engine

CHEVRON DELO 400 SAE 10W30 (--- LTR)

### RECOMMENDATION

The oil change at the time of sampling has been noted. We recommend an early resample to monitor this condition.

Iron ppm levels are abnormal. Cylinder, crank, or cam shaft wear is indicated.

#### CONTAMINATION

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.

## FLUID CONDITION

The oil is no longer serviceable as a result of the abnormal and/or severe wear.

TestUOMMethodLini/AnCurrentHistory1History1Sample NumberClient InfoWC0553863aSample DatClient InfoIs Mar 202430 Aug 2021Machine AgekmaClient InfoIs Mar 202478536aDil AgekmaClient InfoO78536aFilter AgekmaClient InfoO78536aFilter ChangedClient InfoChangedChangedaFilter ChangedClient InfoChangedChangedaFample StatusClient InfoABNORMALNORMALaForASTM D5185>20AaForASTM D5185>20AaFinonpmASTM D5185>20AaNickelpmASTM D5185>20AaSilverppmASTM D5185>20AaAluminmppmASTM D5185>20AaAluminmppmASTM D5185>20AaSilconppmASTM D5185>30AaFuelppmASTM D5185>20AaSilconppmASTM D5185>20AaSilconppmASTM D5185>20AaSilconppmASTM D5185>20AaSilconppmASTM D5185>20AaSilconppm							
Sample DateClient InfoI8 Mar 202430 Aug 2021Machine AgeKmsClient Info25407478536Oil AgekmsClient Info4430178536Filter AgekmsClient InfoCAfbangedChangedOil ChangedClient InfoCChangedChangedFilter ChangedClient InfoCChangedChangedSample StatusClient InfoMChangedChangedPQASTM D8184*OIronpmASTM D51850>2036NickelpmASTM D51850>2036NickelpmASTM D51850>200SilverpmASTM D51850>2017AluminumpmASTM D51850>2017AluminumpmASTM D51850>2013SiliconpmASTM D51850>201312SiliconpmASTM D51850>201312SiliconpmASTM D51850>201312SultariumpmASTM D51850>2012.613SultariumpmASTM D51850>2012.613SultariumpmASTM D51850>2012.613	Test	UOM	Method	Limit/Abn	Current	History1	History2
Machine AgekmsClient Info25407478536Oil AgekmsClient Info4430178536Filter AgekmsClient InfoChangedChangedOil ChangedClient InfoChangedChangedFilter ChangedClient InfoChangedChangedSample StatusClient InfoChangedChangedPQASTM D8184*0IronppmASTM D8184*P062ChromiumppmASTM D8186>2036NickelppmASTM D8186>2036NickelppmASTM D8186>200SilverppmASTM D8186>201517AluminumppmASTM D8186>30312AgedppmASTM D8186>30312VanadiumppmASTM D8186>30312SiliconppmASTM D8186>10<1.0SiliconppmASTM D8186>201513SuitonppmASTM D8186>202943SiliconppmASTM D8186>20REGNEGSuitonppmASTM D8186>20REGSuitonppmASTM D784>20REG10.0	Sample Number		Client Info		WC0553864	WC0553633	
Oil AgekmsClient Info4430178536Filter AgekmsClient Info078536Oil ChangedClient InfoChangedChangedFilter ChangedMClient InfoChangedChangedSample StatusSTM D8184'NORMALPQASTM D8184'0622IronppmASTM D5186'>2036NickelppmASTM D5186'>2036NickelppmASTM D5186'>200SilverppmASTM D5186'>201517AluminumppmASTM D5186'>201517LeadppmASTM D5186'>201517SilconppmASTM D5186'>2016SilconppmASTM D5186'>2013SilconppmASTM D5186'2021SilconppmASTM D5186''2016.0SilconppmASTM D5186''2016.0SilconppmASTM D5186''2016.0SilconppmASTM D5186''2016.0SilconppmASTM D5186''2016.0Silconppm<	Sample Date		Client Info		18 Mar 2024	30 Aug 2021	
Filter Age Oli ChangedKiller InfoO78536Cilert InfoChangedChangedChangedFilter ChangedOClient InfoChangedChangedSample StatusASTM D8184'OPQASTM D8184'OIronppmASTM D8186''20A662ChromiumppmASTM D8186''2036NickelppmASTM D8186''2036NickelppmASTM D8186''2011SilverppmASTM D8186''2011AuminumppmASTM D8186''201517LeadppmASTM D8186''2011SiliconppmASTM D8186''2011SiliconppmASTM D8186''2013SiliconppmASTM D8186''2013.0GycolwC Method3.01.01SiliconppmASTM D8186''2010.0SiliconppmASTM D8186''201.01SuifationAbc/mASTM D8186''201.01SiliconppmASTM D5186''201.01SiliconppmAST	Machine Age	kms	Client Info		254074	78536	
Client InfoChanged ChangedClient InfoChanged ChangedFilter ChangedClient InfoChangedChangedSample StatusASTM DS184''0PQASTM DS186''20A 10662IronppmASTM DS186''2036NickelppmASTM DS186''2036NickelppmASTM DS186''2036SilverppmASTM DS186''201517AluminumppmASTM DS186''201517LeadppmASTM DS186''201517VanadiumppmASTM DS186''2012SiliconppmASTM DS186''2013SiliconppmASTM DS186''2013SulfacionppmASTM DS186''2013SulfacionppmASTM DS186''2013SulfacionppmASTM DS186''2013SulfacionppmASTM DS186''2013SulfacionppmASTM DS186''2013SulfacionppmASTM DS186''2013SulfacionppmASTM DS186''20<	Oil Age	kms	Client Info		44301	78536	
Filter Changed Sample Status       Client Info       Changed ABNORMAL       Changed NORMAL          PQ       ASTM D8184'       0           Iron       ppm       ASTM D8184'       0           Iron       ppm       ASTM D8185(m)       >00       AC          Nickel       ppm       ASTM D5185(m)       >20       3       6          Nickel       ppm       ASTM D5185(m)       >20       0       0          Silver       ppm       ASTM D5185(m)       >20       0           Aluminum       ppm       ASTM D5185(m)       >20       15       17          Lead       ppm       ASTM D5185(m)       >30       3       12          Vanadium       ppm       ASTM D5185(m)       >10       -1       2          Silicon       ppm       ASTM D5185(m)       >20       29       43          Silicon       ppm       ASTM D5185(m)       >20       29       43          Solicon       ppm       ASTM D5185(m)       >20       NEG       NLO	Filter Age	kms	Client Info		0	78536	
Sample StatusABNORMALNORMALPQASTM D8184'0IronppmASTM D81850>90▲ 106622ChromiumppmASTM D51850>2036NickelppmASTM D51850>200TitaniumppmASTM D51850>200SilverppmASTM D51850>20<1AluminumppmASTM D51850>201517LeadppmASTM D51850>30312YanadiumppmASTM D51850>30312YanadiumppmASTM D51850>25513SiliconppmASTM D51850>2029433YanadiumppmASTM D51850>2029433SuliconppmASTM D51850>20213WaterVC Method>.2NEG0.0GlycolVC Method>.2NEG0.10SulfationAbs/:mASTM D51850>3025.725.4SulfationAbs/:mASTM D5185032SulfationAbs/:mASTM D5185032SulfationAbs/:mASTM D5185032Barumppm <th>Oil Changed</th> <th></th> <th>Client Info</th> <th></th> <th>Changed</th> <th>Changed</th> <th></th>	Oil Changed		Client Info		Changed	Changed	
PQASTM D8184'0IronpmASTM D5185/m>90▲ 106622ChromiumpmASTM D5185/m>2036NickelpmASTM D5185/m>200TitaniumpmASTM D5185/m>200SilverpmASTM D5185/m>20<11AluminumpmASTM D5185/m>2015177LeadpmASTM D5185/m>303122CopperpmASTM D5185/m>303122YanadiumpmASTM D5185/m>5133SiliconppmASTM D5185/m>2029433SuiliconppmASTM D5185/m>2029433FuelWC Method>3.0<-1.0<-1.0WaterWC Method>.0NEGNEGGlycolWC Method>.0NEG10.0Soot %%ASTM D5185/m>.025.725.4SuilfationAbs/:mASTM D5185/m>.02077SodiumppmASTM D5185/m>.02077SodiumppmASTM D5185/m>.032MaterppmASTM D5185/mNEG10.0Mater	Filter Changed		Client Info		Changed	Changed	
Iron         ppm         ASTM D5185(m)         >90         ▲ 106         662            Chromium         ppm         ASTM D5185(m)         >20         3         6            Nickel         ppm         ASTM D5185(m)         >2         0         0            Titanium         ppm         ASTM D5185(m)         >2         0         <1            Aluminum         ppm         ASTM D5185(m)         >20         15         17            Aluminum         ppm         ASTM D5185(m)         >300         3         12            Lead         ppm         ASTM D5185(m)         >330         3         12            Vanadium         ppm         ASTM D5185(m)         >25         5         13            Silicon         ppm         ASTM D5185(m)         >20         29         43            Vanadium         ppm         ASTM D5185(m)         >20         29         43            Silicon         ppm         ASTM D5185(m)         >20         NEG         NEG            Fuel         WC Method         >0.2 <th>Sample Status</th> <th></th> <th></th> <th></th> <th>ABNORMAL</th> <th>NORMAL</th> <th></th>	Sample Status				ABNORMAL	NORMAL	
Chromium         ppm         ASTM D5185(m)         >20         3         6            Nickel         ppm         ASTM D5185(m)         >2         <1	PQ		ASTM D8184*		0		
Chromium         ppm         ASTM D5185(m)         >20         3         6            Nickel         ppm         ASTM D5185(m)         >2         <1	Iron	ppm	ASTM D5185(m)	>90	<b>1</b> 06	62	
Nickel         ppm         ASTM D5185(m)         >2         <1	Chromium		ASTM D5185(m)	>20	3	6	
Titanium         ppm         ASTM D5185(m)         >2         0         0            Silver         ppm         ASTM D5185(m)         >2         0         <1	Nickel		ASTM D5185(m)	>2	<1	<1	
Aluminum         ppm         ASTM D5185(m)         >20         15         17            Lead         ppm         ASTM D5185(m)         >40         2         8            Copper         ppm         ASTM D5185(m)         >330         3         12            Tin         ppm         ASTM D5185(m)         >15         <1	Titanium	ppm	ASTM D5185(m)	>2	0	0	
LeadppmASTM D5185(m)>4028CopperppmASTM D5185(m)>330312TinppmASTM D5185(m)>15<1	Silver	ppm	ASTM D5185(m)	>2	0	<1	
Copper         ppm         ASTM D5185(m)         >330         3         12            Tin         ppm         ASTM D5185(m)         >15         <1	Aluminum	ppm	ASTM D5185(m)	>20	15	17	
Tin         ppm         ASTM D5185(m)         >15         <1	Lead	ppm	ASTM D5185(m)	>40	2	8	
Vanadium         ppm         ASTM D5185(m) $>25$ $0$ $<1$ $$ Silicon         ppm         ASTM D5185(m) $>25$ $5$ $13$ $$ Potassium         ppm         ASTM D5185(m) $>20$ $29$ $43$ $$ Fuel         WC Method $>3.0$ $<1.0$ $<1.0$ $$ Water         Q         WC Method $>0.2$ NEG $0.0$ $$ Glycol         WC Method $>0.2$ NEG $0.0$ $$ Soot %         %         ASTM D7844* $>6$ $0.8$ $0.3$ $$ Soot %         %         ASTM D7844* $>6$ $0.8$ $0.3$ $$ Soot %         %         ASTM D7844* $>6$ $0.8$ $0.3$ $$ Soot %         %         ASTM D7844* $>6$ $0.8$ $0.3$ $2.5$ $2.5$ $2.5$ $2.5$ $2.5$ $2.5$ $2.5$ $2.5$ $2.5$ $2.5$ $2.5$ $2.5$ <	Copper	ppm	ASTM D5185(m)	>330	3	12	
Silicon         ppm         ASTM D5185(m)         >25         5         13            Potassium         ppm         ASTM D5185(m)         >20         29         43            Fuel         WC Method         >3.0         <1.0	Tin	ppm	ASTM D5185(m)	>15	<1	2	
Potassium         ppm         ASTM D5185(m)         >20         29         43            Fuel         WC Method         >3.0         <1.0         <1.0         <           Water         VC Method         >0.2         NEG         NEG         <           Glycol         WC Method         >0.2         NEG         0.0         <           Soot %         %         ASTM D7844'         >6         0.8         0.3         <           Soot %         %         ASTM D7844'         >6         0.8         0.3         <           Soot %         %         ASTM D7624'         >20         12.6         10.7         <           Sulfation         Abs/.nm         ASTM D7624'         >20         NEG         NEG            Sulfation         Abs/.nm         ASTM D7624'         >20         NEG         NEG            Sulfation         ppm         ASTM D7624'         >0         20         777            Boron         ppm         ASTM D5185(m)         I         6         100            Molybdenum         ppm         ASTM D5185(m)         I         1         <	Vanadium	ppm	ASTM D5185(m)		0	<1	
Potassium         ppm         ASTM D5185(m)         >20         29         43            Fuel         WC Method         >3.0         <1.0         <1.0         <           Water         VC Method         >0.2         NEG         NEG         <           Glycol         WC Method         >0.2         NEG         0.0         <           Soot %         %         ASTM D7844'         >6         0.8         0.3         <           Soot %         %         ASTM D7624'         >20         12.6         10.7         <           Sulfation         Abs/.m         ASTM D7624'         >20         12.6         10.7         <           Sulfation         Abs/.m         ASTM D7624'         >20         NEG         NEG         <           Sulfation         Abs/.m         ASTM D7624'         >20         NEG         <         <           Sodium         ppm         ASTM D7624'         >0         20         777         <           Boron         ppm         ASTM D5185(m)         I         6         100            Molybdenum         ppm         ASTM D5185(m)         I         12 <th>Silicon</th> <th>mag</th> <th>ASTM D5185(m)</th> <th>&gt;25</th> <th>5</th> <th>13</th> <th></th>	Silicon	mag	ASTM D5185(m)	>25	5	13	
Fuel       WC Method       >3.0       <1.0	Potassium		ASTM D5185(m)	>20	29	43	
Glycol         WC Method         NEG $0.0$ $$ Soot %         %         ASTM D7844*         >6 $0.8$ $0.3$ $$ Nitration         Abs/cm         ASTM D7624*         >20 $12.6$ $10.7$ $$ Sulfation         Abs/cm         ASTM D7624*         >20 $25.7$ $25.4$ $$ Emulsified Water         scalar         Visual*         >0.2         NEG         NEG $$ Sodium         ppm         ASTM D5185(m) $$ $$ $$ $$ Boron         ppm         ASTM D5185(m) $$ $$ $$ $$ Barium         ppm         ASTM D5185(m) $$ $$ $$ Molybdenum         ppm         ASTM D5185(m) $$ $$ $$ Magnesium         ppm         ASTM D5185(m) $$ $$ $$ Phosphorus         ppm         ASTM D5185(m) $$ $$ $ $	Fuel		WC Method	>3.0	<1.0	<1.0	
Soot %         %         ASTM D7844*         >6         0.8         0.3            Nitration         Abs/cm         ASTM D7624*         >20         12.6         10.7            Sulfation         Abs/.1mm         ASTM D7624*         >20         12.6         10.7            Sulfation         Abs/.1mm         ASTM D7415*         >30         25.7         25.4            Emulsified Water         scalar         Visual*         >0.2         NEG         NEG            Sodium         ppm         ASTM D5185(m)         3         2             Boron         ppm         ASTM D5185(m)         I         20         77            Barium         ppm         ASTM D5185(m)         I         0         <10            Molybdenum         ppm         ASTM D5185(m)         I         1         2            Magnesium         ppm         ASTM D5185(m)         I         1682            Phosphorus         ppm         ASTM D5185(m)         1406         1682            Sulfur         ppm         ASTM D5185(m)	Water		WC Method	>0.2	NEG	NEG	
NitrationAbs/cmASTM D7624*>2012.610.7SulfationAbs/1mASTM D7415*>3025.725.4Emulsified WaterscalarVisual*>0.2NEGNEGSodiumppmASTM D5185(m)-32BoronppmASTM D5185(m)-32BariumppmASTM D5185(m)-0<1	Glycol		WC Method		NEG	0.0	
Sulfation         Abs/.1mm         ASTM D7415*         >30         25.7         25.4            Emulsified Water         scalar         Visual*         >0.2         NEG         NEG            Sodium         ppm         ASTM D5185(m)         3         2            Boron         ppm         ASTM D5185(m)         3         2            Barium         ppm         ASTM D5185(m)         0         <1            Molybdenum         ppm         ASTM D5185(m)         0         <1            Magnese         ppm         ASTM D5185(m)         1         2            Magnesium         ppm         ASTM D5185(m)         1         2            Phosphorus         ppm         ASTM D5185(m)         1         2            Phosphorus         ppm         ASTM D5185(m)         1         1682            Zinc         ppm         ASTM D5185(m)         1260         679         788            Sulfur         ppm         ASTM D5185(m)         1400         786         906            Sulfur         pp	Soot %	%	ASTM D7844*	>6	0.8	0.3	
Emulsified Water         scalar         Visual*         >0.2         NEG         NEG            Sodium         ppm         ASTM D5185(m)         3         2            Boron         ppm         ASTM D5185(m)         120         777            Barium         ppm         ASTM D5185(m)         0         <10            Molybdenum         ppm         ASTM D5185(m)         6         100            Manganese         ppm         ASTM D5185(m)         1         2            Magnesium         ppm         ASTM D5185(m)         1         2            Phosphorus         ppm         ASTM D5185(m)         1         2            Phosphorus         ppm         ASTM D5185(m)         1         1682            Zinc         ppm         ASTM D5185(m)         1260         679         788            Sulfur         ppm         ASTM D5185(m)         1400         786         906            Sulfur         ppm         ASTM D5185(m)         20.0         21.65	Nitration	Abs/cm	ASTM D7624*	>20	12.6	10.7	
Sodium         ppm         ASTM D5185(m)         3         2            Boron         ppm         ASTM D5185(m)         20         77            Barium         ppm         ASTM D5185(m)         0         <1            Barium         ppm         ASTM D5185(m)         0         <1            Molybdenum         ppm         ASTM D5185(m)         0         <100            Manganese         ppm         ASTM D5185(m)         1         2            Magnesium         ppm         ASTM D5185(m)         1         2            Calcium         ppm         ASTM D5185(m)         1         2            Phosphorus         ppm         ASTM D5185(m)         1406         1682            Zinc         ppm         ASTM D5185(m)         1400         786         906            Sulfur         ppm         ASTM D5185(m)         1         2412         2165            Oxidation         Abs./.1mm         ASTM D7414*<>25         20.0         21.2	Sulfation	Abs/.1mm	ASTM D7415*	>30	25.7	25.4	
Boron         ppm         ASTM D5185(m)         20         77            Barium         ppm         ASTM D5185(m)         0         <1            Molybdenum         ppm         ASTM D5185(m)         0         <1            Manganese         ppm         ASTM D5185(m)         1         2            Magnesium         ppm         ASTM D5185(m)         11         2            Calcium         ppm         ASTM D5185(m)         731         582            Phosphorus         ppm         ASTM D5185(m)         1406         1682            Zinc         ppm         ASTM D5185(m)         1260         679         788            Sulfur         ppm         ASTM D5185(m)         1400         786         906            Oxidation         Abs./1mm         ASTM D5185(m)         20.0         21.2	Emulsified Water	scalar	Visual*	>0.2	NEG	NEG	
Boron         ppm         ASTM D5185(m)         20         77            Barium         ppm         ASTM D5185(m)         0         <1            Molybdenum         ppm         ASTM D5185(m)         0         <1            Manganese         ppm         ASTM D5185(m)         6         100            Magnesium         ppm         ASTM D5185(m)         1         2            Calcium         ppm         ASTM D5185(m)         731         582            Phosphorus         ppm         ASTM D5185(m)         1406         1682            Zinc         ppm         ASTM D5185(m)         1260         679         788            Sulfur         ppm         ASTM D5185(m)         1400         786         906            Oxidation         Abs./1mm         ASTM D5185(m)         20.0         21.2	Sodium	ppm	ASTM D5185(m)		3	2	
Barium         ppm         ASTM D5185(m)         0         <1	Boron	ppm	ASTM D5185(m)		20	77	
Manganese         ppm         ASTM D5185(m)         1         2            Magnesium         ppm         ASTM D5185(m)         C         731         582            Calcium         ppm         ASTM D5185(m)         I         1406         1682            Phosphorus         ppm         ASTM D5185(m)         1260         679         788            Zinc         ppm         ASTM D5185(m)         1400         786         906            Sulfur         ppm         ASTM D5185(m)         22         2165            Oxidation         Abs/.1mm         ASTM D7414*         >25         20.0         21.2	Barium		ASTM D5185(m)		0	<1	
Magnesium         ppm         ASTM D5185(m)         731         582            Calcium         ppm         ASTM D5185(m)         1406         1682            Phosphorus         ppm         ASTM D5185(m)         1260         679         788            Zinc         ppm         ASTM D5185(m)         1400         786         906            Sulfur         ppm         ASTM D5185(m)         2412         2165            Oxidation         Abs./.1mm         ASTM D7414*<>25         20.0         21.2	Molybdenum	ppm	ASTM D5185(m)		6	100	
Calcium         ppm         ASTM D5185(m)         1406         1682            Phosphorus         ppm         ASTM D5185(m)         1260         679         788            Zinc         ppm         ASTM D5185(m)         1400         786         906            Sulfur         ppm         ASTM D5185(m)         4         2412         2165            Oxidation         Abs/.1mm         ASTM D7414*         >25         20.0         21.2	Manganese	ppm	ASTM D5185(m)		1	2	
Phosphorus         ppm         ASTM D5185(m)         1260         679         788            Zinc         ppm         ASTM D5185(m)         1400         786         906            Sulfur         ppm         ASTM D5185(m)         400         2412         2165            Oxidation         Abs/.1mm         ASTM D7414*         >25         20.0         21.2	Magnesium	ppm	ASTM D5185(m)		731	582	
Zinc         ppm         ASTM D5185(m)         1400 <b>786</b> 906            Sulfur         ppm         ASTM D5185(m)         0 <b>2412</b> 2165            Oxidation         Abs/.1mm         ASTM D7414*         >25 <b>20.0</b> 21.2	Calcium	ppm	ASTM D5185(m)		1406	1682	
Sulfur         ppm         ASTM D5185(m)         2412         2165            Oxidation         Abs/.1mm         ASTM D7414*         >25         20.0         21.2	Phosphorus	ppm	ASTM D5185(m)	1260	679	788	
Oxidation         Abs/.1mm         ASTM D7414*         >25         20.0         21.2	Zinc	ppm	ASTM D5185(m)	1400	786	906	
	Sulfur	ppm	ASTM D5185(m)		2412	2165	
Visc @ 100°C cSt ASTM D7279(m) 11.1 11.2 13.1	Oxidation	Abs/.1mm	ASTM D7414*	>25	20.0	21.2	
	Visc @ 100°C	cSt	ASTM D7279(m)	11.1	11.2	13.1	

Contact/Location: Service Manager - RUS175COR



