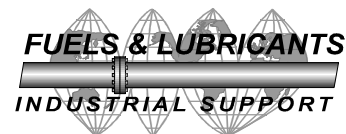


Alberta Innovates - Technology Futures ~ Fuels & Lubricants

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Report of Analysis

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Reported: 16-Sep-2016
Revision: 2016-1

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Order Id: FL16_1199

Contract #:

PO#:

Report To:

Invoice To:

Discovery Mining Services
Box 2248
Yellowknife, NT X1A 2P7

Discovery Mining Services
Box 2248
Yellowknife, NT X1A 2P7

Attention: Mathieu Beaudoin

Attention: DMS Accounts Payable

E-mail: mathieu.beaudoin@discoverymining.ca

E-mail:

Fax:

Fax:

Laboratory Sample Number: FL16_1199-001

Sample Source

Sample Notes

Product: Diesel

Reference: LUP MTF# 15

1

Specification: CAN/CGSB-3.517-2015 A

Location:

Date Received: 13-Sep-2016

Tag Number:

Tank Number:

Specification Details

Analysis	Test Name	Specifications		Results	Units	Test Notes
		Minimum	Maximum			
Copper Corrosion - Classification	ASTM D130		No. 1	1a		
Water and Sediment	ASTM D1796 (modified)		0.02	<0.005	% (v/v)	2
Electrical Conductivity	ASTM D2624	25		308	pS/m	
Kinematic Viscosity	ASTM D445 @ 40°C	1.30	3.60	1.401	mm ² /s (cSt)	
Ash Content	ASTM D482		0.010	0.002	Mass %	
Carbon Residue, 10% Bottoms	ASTM D524		0.1	0.07	%	
Cetane Number	ASTM D613	40.0		40.3		
Total Sulfur	ASTM D7039		15	57.6	mg/kg	3
Wear Scar Diameter	ASTM D7688		460	660	um	4
Distillation 90% Recovered (corr)	ASTM D86		290.0	249.3	°C	
Corrected Flash Point	ASTM D93	40.0		50.0	°C	
Acid Number	ASTM D974		0.10	<0.02	mg KOH/g	

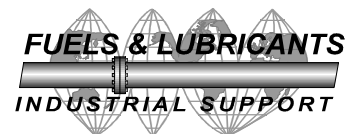
Tested Parameters (Note: Parameters in Specification Detail will also appear in complete listing)

Analysis	Test Name	Results	Units	Test Notes
Copper Corrosion - Test Duration	ASTM D130	3	hours	
Copper Corrosion - Test Temperature	ASTM D130	50	°C	
Copper Corrosion - Classification	ASTM D130	1a		
Water and Sediment	ASTM D1796 (modified)	<0.005	% (v/v)	2
Electrical Conductivity	ASTM D2624	308	pS/m	
Temperature of Sample	ASTM D2624	20.0	°C	
Density @ 15°C	ASTM D4052	820.4	kg/m ³	
Kinematic Viscosity	ASTM D445 @ 40°C	1.401	mm ² /s (cSt)	
Ash Content	ASTM D482	0.002	Mass %	
Carbon Residue, 10% Bottoms	ASTM D524	0.07	%	
Cloud Point	ASTM D5773	-65.3	°C	
Cetane Number	ASTM D613	40.3		
Total Sulfur	ASTM D7039	57.6	mg/kg	3
Major Axis	ASTM D7688	0.67	mm	4
Minor Axis	ASTM D7688	0.66	mm	4
Wear Scar Diameter	ASTM D7688	660	um	4
Distillation IBP	ASTM D86	155.4	°C	
Distillation 5% Recovered (corr)	ASTM D86	172.8	°C	
Distillation 10% Recovered (corr)	ASTM D86	175.9	°C	
Distillation 20% Recovered (corr)	ASTM D86	181.8	°C	
Distillation 30% Recovered (corr)	ASTM D86	188.2	°C	

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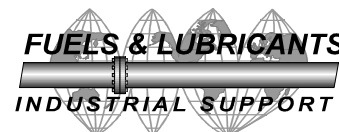
Tested Parameters (Note: Parameters in Specification Detail will also appear in complete listing)

Analysis	Test Name	Results	Units	Test Notes
Distillation 40% Recovered (corr)	ASTM D86	195.2	°C	
Distillation 50% Recovered (corr)	ASTM D86	202.9	°C	
Distillation 60% Recovered (corr)	ASTM D86	211.8	°C	
Distillation 70% Recovered (corr)	ASTM D86	221.6	°C	
Distillation 80% Recovered (corr)	ASTM D86	233.3	°C	
Distillation 90% Recovered (corr)	ASTM D86	249.3	°C	
Distillation FBP	ASTM D86	279.7	°C	
Distillation Residue	ASTM D86	0.9	%	
Distillation Loss	ASTM D86	0.3	%	
Corrected Flash Point	ASTM D93	50.0	°C	
Acid Number	ASTM D974	<0.02	mg KOH/g	

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Notes and Remarks

1. With the exception of total sulfur and lubricity (wear scar diameter), the results obtained on your sample comply with the requirements Canadian General Standards Board (C.G.S.B.) specification for Diesel Fuel (CAN/CGSB-3.517-2015 Type A) for areas of Canada which do not require lower flow properties than displayed by the cloud point result.
2. CAN/CGSB-3.517-2015 states that the referee test method for water and sediment shall be ASTM D1796 (modified). The test is modified by substituting the centrifuge tube specified in ASTM D2273 for the centrifuge tube in ASTM D1796.
3. The Canadian General Standards Board (CGSB) specification for Diesel Fuel (CAN/CGSB-3.517-2015) states that the sulfur content shall not be greater than 15 mg/kg.
4. The High Frequency Reciprocating Rig (HFRR) analysis can be used as an indicator of base fuel lubricity. The Canadian General Standards Board (C.G.S.B.) specification for Diesel Fuel CAN/CGSB-3.517-2015 states that an acceptable test result is defined as a wear scar diameter of less than or equal to 460 μm at 60°C. Some fuels with higher wear scar diameter may still provide adequate lubricity. The HFRR test does not always show the improved lubricity performance of lubricity additives in diesel fuel. The HFRR is one of five criteria that can be used to determine lubricity requirements.

Approved by:

Susan Brown

Specification Analytical Coordinator

Results relate only to items tested.

Contact Information

Business Unit Manager: Dan Wispinski

Phone: (780) 450-5108

Email: dan.wispinski@albertainnovates.ca

FM 037-001