ISB Viscosity – 156 Hour Test
D XXXX - Engine Oil Test

Report Packet Version No.

Conducted For

	V =	Valid; The reference oil/non-reference oil was evaluated in accordance with the test procedure.
	I =	Invalid; The reference oil/non-reference oil was not evaluated in accordance with the test procedure.
	N =	Results cannot be interpreted as representative of oil performance (non-reference oil) and shall not be used in determining an average test result using multiple test criteria.

	NR = Non Reference Oil Test
	RO = Reference Oil Test

Test Number		
Stand:	Stand Run No.:	Engine:
Hours of 108 Hr Test Run in Cal Period:	Hours of 156 Hr Test Run in Cal Period:	
End Of Test Date:	End Of Test Time:	
Oil Code/Test Key[A]:		
Formulation/Stand Code[B]:		
Altcode1[C]:	Altcode2[C]:	Altcode3[C]:

In my opinion this test been conducted in a valid manner in accordance with the Test Method D XXXX and the appropriate amendments through the information letter system. The remarks included in this report describe the anomalies associated with this test.

[A] Testkey or Non-Reference Oil Code
[B] Registered Tests Only
[C] When provided or required

Submitted By: _____
Testing Laboratory

_____
Signature

_____
Typed Name

_____
Title

ISB Viscosity– 156 Hour Test
D XXXX - Engine Oil Test
Form 2

Table of Contents

ISB Viscosity– 156 Hour Test
D XXXX - Engine Oil Test
Form 3
Summary of Test Method

The ISB Viscosity Engine Oil Test is a fuel engine-dynamometer test which evaluates diesel engine oils for performance characteristics including viscosity increase and soot concentrations (loading). This test is a single-phase, steady state test (constant speed and load). The test is up to 156 hours and is run with retarded fuel injection timing to produce elevated soot levels in the oil.

The test engine is a Cummins 5.9L diesel engine. It is an in-line six cylinder, four-stroke, turbocharged engine. It has electronically controlled fuel injection with a common rail fuel system.

ISB Viscosity Test Conditions

Parameter	Value
Time, h	156
Injection Timing, ˚BTDC	Variable
Speed, r/min	1600
Fuel Flow, kg/h	25
Intake CO_2, %	0.6 +/- 0.25
Exhaust CO_2, %	Record
Inlet Manifold Temp., ˚C	68
Coolant Out Temp., ˚C	66
Fuel In Temp., ˚C	40
Oil Gallery Temp., ˚C	88
Intake Air Temp., ˚C	30
Intake Air Restriction, kPa	2.0
Inlet Manifold Pressure, kPaA	200-230
Exhaust Back Pressure, kPa	7.0
Crankcase Pressure, kPa	0.75-2.75
Power, kW	Record
Torque, Nm	Record
Tailpipe Exhaust Temp., ˚C	Record
Oil Sump Temp., ˚C	Record
Inlet Air Dew Point, ˚C	Record
Fuel Pressure, kPa	Record
Main Gallery Oil Pressure, kPa	Record
Oil Filter Delta P, kPa	Record

ISB Viscosity– 156 Hour Test
D XXXX - Engine Oil Test
Form 4
Test Results Summary

Laboratory:	**EOT Date:**	**EOT Time:**
Test Number:		
Oil Code:		
Formulation/Stand Code:		

Test Results				
Date Test Started:	**Start Time:**			
SAE Viscosity:	**Test Length:**			
TMC Oil Code:[A]	**Laboratory Oil Code:**			
TGA Soot % at 108 h				
TGA Soot % at 156 h				
Oil Filter Delta P, kPa				
EOT Delta Viscosity				
Oil Consumption, g/hr				
MRV Yield Stress, Pa				
	Soot at 4 cSt (%)	**Soot at 12 cSt (%)**	**Soot at 15 cSt (%)**	**MRV (cP)**
Original Result				
Transformed Result				
Correction Factor				
Corrected Transformed Result				
Severity Adjustment				
Final Transformed Result				
Final Original Unit Result				

Last Stand Reference Results				
Test Number:				
Oil Code:				
Test Length:	**TMC Oil Code:**			
EOT Date:	**EOT Time:**			
Stand Calibration Expiration Date:				
TGA Soot % at 108 h				
TGA Soot % at 156 h				
Oil Consumption, g/hr				
	Soot at 4 cSt (%)	**Soot at 12 cSt (%)**	**Soot at 15 cSt (%)**	**MRV (cP)**
Final Original Unit Result				

[A] ***Reference Tests only.***

ISB Viscosity– 156 Hour Test
D XXXX - Engine Oil Test
Form 5
Operational Summary

Laboratory:	**EOT Date:**	**EOT Time:**
Test Number:		
Oil Code:		
Formulation/Stand Code:		

	Parameter	Units	QI Threshold	EOT QI [A]	Target	Average	Samples [B]	BQD [C]
Controlled/Ranged Parameters	Speed	r/min	0.000		1600			
	Fuel Flow	kg/h	0.000		25			
	Inlet Manifold Temp.	°C	0.000		68			
	Coolant Out Temp.	°C	0.000		66			
	Fuel In Temp.	°C	0.000		40			
	Oil Gallery Temp.	°C	0.000		88			
	Inlet Air Temp.	°C	0.000		30			
	Inlet Air Restriction	kPa	0.000		2.0			
	Inlet Man. Pressure	kPaA			200 - 300			
	Exh. Back Pressure	kPa	0.000		7.0			
	Crankcase Pressure	kPa			0.75 - 2.75			
	Intake CO_2	%			0.6+/- 0.25			
	Coolant System Pressure	kPa			99 minimum			
Non-controlled	Parameter	Units	Typical Values[D]		Average			
	Power	kW	TBD					
	Torque	Nm	TBD					
	Exhaust CO_2	%	TBD					
	Tailpipe Temp.	°C	TBD					
	Oil Sump Temp.	°C	TBD					
	Blowby	L/min	TBD					
	Inlet Air Dew Point	°C	TBD					
	Fuel Pressure	kPa	TBD					
	Main Gallery Oil Press.	kPa	TBD					

A QI values above the threshold are acceptable by the Mack Surveillance Panel. QI values below the threshold may not be considered acceptable based on an engineering review. Refer to Annex A3
B Total number of data points taken.
C Number of Bad Quality Data points not used in the calculation of the statistical measures.
D Typical values determined from reference oil test database

ISB Viscosity– 156 Hour Test
D XXXX - Engine Oil Test
Form 6
Oil Analysis Summary

Laboratory:	**EOT Date:**	**EOT Time:**
Test Number:		
Oil Code:		
Formulation/Stand Code:		

Hours	**Soot (Wt. %) D 5967 Annex 4**	**Viscosity at 100°C (cSt) D 5967 Annex A3**	**Viscosity Increase (cSt)**	**TBN D 4739**	**TAN D 664**	**Peak IR Oxidation**

D 6278 or D 7109 30-Pass Shear Viscosity (cSt) at 0 h	**D 7109 90-Pass Shear Viscosity (cSt) at 0 h**	**D 6896 MRV Viscosity (cP) at 108 h[A]**

[A] The maximum reported value allowed is 400,000 cP. Use this value if the results are TVTM or solid.

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Form 7
Oil Analysis Summary

Laboratory:	**EOT Date:**	**EOT Time:**
Test Number:		
Oil Code:		
Formulation/Stand Code:		

Hours	**Fuel Dilution D 3524**	**Metal Elements (ppm) D 5185**							
		Fe	**Pb**	**Cu**	**Cr**	**Al**	**Si**	**Sn**	**Na**

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Form 8
Test Fuel Analysis (Last Batch)

Laboratory:	**EOT Date:**	**EOT Time:**
Test Number:		
Oil Code:		
Formulation/Stand Code:		
Supplier:	**Batch Identifiers:**	

Measurement	Specs.	Analysis		Test Method
		NEW	EOT	
Total Sulfur, ppm	400 – 500			D 2622*
Gravity, °API	34.5 – 36.5			D 287 or D 4052
Hydrocarbon Composition				
Aromatics % Vol.	28 – 33			D 1319
Olefin	Report			D 1319
Cetane Index	Report			D 976 & D 4737
Cetane No.	42 – 48			D 613
Copper Strip Corrosion	1 Maximum			D 130
Flash Point, °C	54 Minimum			D 93
Pour Point, °C	-18 Maximum			D 97
Carbon Residue on 10% Residuum, %	0.35 Maximum			D 524 (10% Bottoms)
Water & Sediment, % Vol.	0.05 Maximum			D 2709
Viscosity, cSt @ 40°C	2.4 – 5.0			D 445
Total Acid Number	0.05 Maximum			D 664
Strong Acid Number	0.00 Maximum			D 664
Accelerated Stability	tbd			D 2274
Distillation, °C				
IBP	Report			D 86
10%	Report			D 86
50%	Report			D 86
90%	282 – 338			D 86
EP	Report			D 86
Particulate Matter, mg/L	Report			D 6217

*** see DXXXX section 11.2 for alternate methods**

ISB Viscosity– 156 Hour Test
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Form 9
Build-up and Hardware Information

Laboratory:	**EOT Date:**	**EOT Time:**
Test Number:		
Oil Code:		
Formulation/Stand Code:		

Injection Timing

Timing Hours	Timing (Deg)
	Total Timing Changes

Hardware

Part	Part Number
Turbocharger	
Cylinder Head	
Pistons	
Injection Nozzles	
Rod Bearings	
Ring Set	
Engine Block	
Oil Adder Pump	

Oil Filter Change

Test Hour of Filter Change	

Engine Block Hour Information

Cumulative Hours on Engine Block	
Hours on Engine Block Since Last Rebuild	

ISB Viscosity– 156 Hour Test
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Form 10
Unscheduled Downtime and Maintenance Summary

Laboratory:	**EOT Date:**	**EOT Time:**
Test Number:		
Oil Code:		
Formulation/Stand Code:		

Number of Downtime Occurrences				
Test Hours	**Date**	**Downtime**	**Reasons**	
			Total Downtime	

Other Comments		
Number of Comment Lines		

ISB Viscosity– 156 Hour Test
D XXXX - Engine Oil Test
Form 11
American Chemistry Council Code of Practice
Test Laboratory Conformance Statement

Test Laboratory					
Test Sponsor					
Formulation / Stand Code					
Test Number					
Start Date		Start Time		Time Zone	

Declarations

No. 1 All requirements of the ACC Code of Practice for which the test laboratory is responsible were met in the conduct of this test. Yes _____ No_____ *

No. 2 The laboratory ran this test for the full duration following all procedural requirements; and all operational validity requirements of the latest version of the applicable test procedure (ASTM or other), including all updates issued by the organization responsible for the test, were met.
Yes _____ No_____*

If the response to this Declaration is "No", does the test engineer consider the deviations from operational validity requirements that occurred to be beyond the control of the laboratory?
Yes _____* No_____

No. 3 A deviation occurred for one of the test parameters identified by the organization responsible for the test as being a special case. Yes _____* No_____ *(This currently applies only to specific deviations identified in the ASTM Information Letter System)*

Check the Appropriate Conclusion

	Operational review of this test indicates that the results should be included in the Multiple Test Acceptance Criteria calculations.
	*Operational review of this test indicates that the results should not be included in the Multiple Test Acceptance Criteria calculations.

Note: *Supporting comments are required for all responses identified with an asterisk.*

Comments

_____ _____
Signature Date

_____ _____
Typed Name Title