

**ISB Viscosity – 108 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

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

<p>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.</p>
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<sup>A</sup> Testkey or Non-Reference Oil Code

<sup>B</sup> Registered Tests Only

<sup>C</sup> When provided or required

Submitted By: \_\_\_\_\_  
Testing Laboratory

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Typed Name

\_\_\_\_\_  
Title

**ISB Viscosity– 108 Hour Test  
D XXXX - Engine Oil Test  
Form 2**

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**ISB Viscosity– 108 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	108
Injection Timing, °BTDC	Variable
Speed, r/min	1600
Fuel Flow, kg/h	25
Intake CO <sub>2</sub> , %	0.6 +/- 0.25
Exhaust CO <sub>2</sub> , %	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– 108 Hour Test  
D XXXX - Engine Oil Test  
Form 4  
Test Results Summary**

<b>Laboratory:</b>	<b>EOT Date:</b>	<b>EOT Time:</b>
<b>Test Number:</b>		
<b>Oil Code:</b>		
<b>Formulation/Stand Code:</b>		

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

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

<sup>4</sup> Reference Tests only.

**ISB Viscosity– 108 Hour Test  
D XXXX - Engine Oil Test  
Form 5  
Operational Summary**

<b>Laboratory:</b>	<b>EOT Date:</b>	<b>EOT Time:</b>
<b>Test Number:</b>		
<b>Oil Code:</b>		
<b>Formulation/Stand Code:</b>		

Controlled/Ranged Parameters	Parameter	Units	QI Threshold	EOT QI <sup>A</sup>	Target	Average	Samples <sup>B</sup>	BQD <sup>C</sup>
	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			200-230				
Exh. Back Pressure	kPa	0.000		7.0				
Crankcase Pressure	kPa			0.75-2.75				
Intake CO <sub>2</sub>	%			0.6+/- 0.25				
Coolant System Pressure	kPa			99 minimum				
Non-controlled	Parameter	Units	Typical Values <sup>D</sup>		Average			
	Power	kW	TBD					
	Torque	Nm	TBD					
	Exhaust CO <sub>2</sub>	%	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						

<sup>A</sup> 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

<sup>B</sup> Total number of data points taken.

<sup>C</sup> Number of Bad Quality Data points not used in the calculation of the statistical measures.

<sup>D</sup> Typical values determined from reference oil test database

**ISB Viscosity– 108 Hour Test  
D XXXX - Engine Oil Test  
Form 6  
Oil Analysis Summary**

<b>Laboratory:</b>	<b>EOT Date:</b>	<b>EOT Time:</b>
<b>Test Number:</b>		
<b>Oil Code:</b>		
<b>Formulation/Stand Code:</b>		

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

<b>D 6278 or D 7109 30-Pass Shear Viscosity (cSt) at 0 h</b>	<b>D 7109 90-Pass Shear Viscosity (cSt) at 0 h</b>	<b>D 6896 MRV Viscosity (cP) at 108 h<sup>4</sup></b>

<sup>4</sup> The maximum reported value allowed is 400,000 cP. Use this value if the results are TVTM or solid.



**ISB Viscosity– 108 Hour Test  
D XXXX - Engine Oil Test  
Form 8  
Test Fuel Analysis (Last Batch)**

<b>Laboratory:</b>	<b>EOT Date:</b>	<b>EOT Time:</b>
<b>Test Number:</b>		
<b>Oil Code:</b>		
<b>Formulation/Stand Code:</b>		
<b>Supplier:</b>		<b>Batch Identifiers:</b>

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

\* see DXXXX section 11.2 for alternate methods







**ISB Viscosity– 108 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.*

<b>Comments</b>

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Typed Name

\_\_\_\_\_  
Title