

**ISB
Lubricant Performance Test**

Report Packet Version No.

ISB VERSION 20050124 BETA

Method

METHOD

Conducted For:

TSTSPON1

TSTSPON2

LABVALID	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.

TSTOIL	NR = Non-Reference Oil Test
	RO = Reference Oil Test

Test Number			
Stand: STAND	Stand Run: STRUN	Engine Serial Number: ENGINE	Engine Hours: ENHOURS
End Of Test Date: DTCOMP		End Of Test Time: EOTIME	
Oil Code: OILCODE		Formulation / Stand Code: FORM	
Alternate Codes:	ALTCODE1	ALTCODE2	ALTCODE3

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

Submitted By:

SUBLAB

Testing Laboratory

SUBSIGIM

Signature

SUBNAME

Typed Name

SUBTITLE

Title

**ISB Lubricant Performance Test
Form 2
Table of Contents**

1.	Final Report Cover Sheet	Form 1
2.	Table of Contents	Form 2
3.	Summary of Test Method	Form 3
4.	Test Results Summary	Form 4
5.	Operational Summary	Form 5
6.	Tappet Loss Summary	Form 6
7.	Crosshead Mass Loss Summary	Form 7
8.	Valve Adjusting Screw Mass Loss Summary	Form 8
9.	Rocker Lever Socket Mass Loss Summary	Form 9
10.	Valve Rocker Shaft Mass Loss Summary	Form 10
11.	Valve Push Rod Mass Loss Summary	Form 11
12.	Oil Analysis Summary	Form 12
13.	Unscheduled Downtime & Maintenance Summary	Form 13
14.	Test Fuel Analysis (Last Batch)	Form 14

**ISB Lubricant Performance Test
Form 3
Summary Of Test Method**

The ISB Lubricant Performance Test is an engine-dynamometer test which evaluates the ability of a lubricant to minimize valvetrain and camshaft wear. This test is a two-stage test. Stage A is 100 hours, steady state, and is run with retarded fuel injection timing to produce elevated soot levels in the oil. Stage B is 250 hours and is run under quick cyclic speed and load conditions to induce wear. The stages are run in sequence (Stage A followed by Stage B) twice for a total test length of 350 hours.

The test engine is a Cummins ISB diesel engine with EGR. It is an in-line six cylinder, four-stroke, turbocharged engine with electronically controlled fuel injection. The engine is re-used for multiple tests with new valvetrain parts for each test.

ISM Test Conditions

Parameter	Stage A	Stage B
Time, h	100	250
Injection Timing, °BTDC	15 nominal	Varies
Speed, r/min	1600	Varies
Fuel Flow, kg/h	20	Varies
Inlet Manifold Temp., °C	68	68
Coolant Out Temp., °C	99	99
Fuel In Temp., °C	40	40
Oil Sump Temp., °C	110	110
Intake Air Temp., °C	Record	Record
Intake Air Pressure, kPa absolute	Record	Record
Intake Manifold Pressure, kPa absolute	Record	Record
Exhaust Back Pressure, kPa absolute	107	Varies
Crankcase Pressure, kPa	Record	Record
Coolant System Pressure, kPa	99 - 107	99 - 107
Power, kW	Record	Record
Torque, Nm	Record	Record
Pre-turbine Exhaust Temp., °C	Record	Record
Tailpipe Exhaust Temp., °C	Record	Record
Oil Gallery Temp., °C	Record	Record
Inlet Air Dew Point, °C	Record	Record
Inlet Air Humidity, kg/kg	Record	Record
Oil Gallery Pressure, kPa	Record	Record
Oil Filter Delta P, kPa	Record	Record

**ISB Lubricant Performance Test
Test Results Summary
Form 4**

Laboratory: LAB	EOT Date: DTCOMP	EOT Time: EOTTIME
Test Number: TESTNUM		
Formulation/Stand Code: FORM		
Oil Code: OILCODE	Engine Kit S/N: ENKIT	

Date Test Started	DTSTRT
Start Time	STRTTIME
Test Length	TESTLEN
TMC Oil Code ^A	IND
Laboratory Oil Code	LABOCODE
SAE Viscosity	SAEVISC
TGA Soot % At 100 h	TGA100

	Average Camshaft Wear (μm)	Average Tappet Height Loss (μm)	Average Tappet Mass Loss (mg)	Average Crosshead Mass Loss (mg)	Average Valve Adjusting Screw Mass Loss (mg)
Original Result	ACSW	ATHL	ATWL	ACWL	VASL
Transformed Result	TRNACSW	TRNATHL	TRNATWL	TRNACWL	TRNVASL
Correction Factor	ACSWCF	ATHLCF	ATWLCF	ACWLCF	VASLCF
Corrected Transformed Result	ACSWCOR	ATHLCOR	ATWLCOR	ACWLCOR	VASLCOR
Severity Adjustment	ACSW_SA	ATHL_SA	ATWL_SA	ACWL_SA	VASL_SA
Final Transformed Result	TACSWFNL	TATHLFNL	TATWLFNL	TACWLFNL	TVASLFNL
Final Result	ACSWFNL	ATHLFNL	ATWLFNL	ACWLFNL	VASLFNL

Last Stand Reference Results					
Reference Test Number:		RTESTNUM			
Oil Code	ROILCODE				
Test Length	RTESTLEN				
TMC Oil Code	RIND				
EOT Date	RDTCOMP				
EOT Time	REOTTIME				
Stand Calibration Expiration Date	DTCALEXP				
TGA Soot % AT 100 h	RTGA100				
	Average Camshaft Wear (μm)	Average Tappet Height Loss (μm)	Average Tappet Mass Loss (mg)	Average Crosshead Mass Loss (mg)	Average Valve Adjusting Screw Mass Loss (mg)
Final Result	RACSWFNL	RATHLFNL	RATWLFNL	RACWLFNL	RVASLFNL

^A Reference Tests Only

**ISB Lubricant Performance Test
Form 5
Operational Summary**

Laboratory: LAB	EOT Date: DTCOMP	EOT Time: EOTIME	
Test Number: TESTNUM			
Formulation/Stand Code: FORM			
Oil Code: OILCODE			

Parameter	Units	Typical Values ^E	Target	Average		Samples ^B	System Response ^F
Speed	r/min		1600	Varies	ARPM1	ARPM2	RPMYSYSR
Fuel Flow	kg/h		20	Varies	AFFLO1	AFFLO2	FFLOSYSR
Coolant Out	°C		99	99	ACOLOUT1	ACOLOUT2	COTSYSR
Fuel In	°C		40	40	AFUELT1	AFUELT2	FTEMSYSR
Oil Sump	°C		110	110	AOILST1	AOILST2	OTEMSYSR
Intake Manifold	°C		68	68	AINMANT1	AINMANT2	IMANSYSR
Exhaust	kPa		107	varies	AEXHSTP1	AEXHSTP1	EXPRSYSR
Parameter	Units	Typical Values^E	Average				
Torque	N-m	TBD	ALOAD1			ALOAD2	
Intake Air Temperature	°C	TBD	AINAIRT1			AINAIRT2	
Intake Air Restriction	kPa	TBD	AINAIRR1			AINAIRR2	
Intake Manifold Pressure	kPa	TBD	AINMANP1			AINMANP2	
Crankcase Pressure	Kpa	TBD	ACCASEP1			ACCASEP2	
Pre-Turbine Front	°C	TBD	APTURFT1			APTURFT2	
Pre-Turbine Rear	°C	TBD	APTURRT1			APTURRT2	
Tailpipe	°C	TBD	ATAILPT				
Oil Gallery Temperature	°C	TBD	AOILGT				
Blowby	L/min	TBD	ABLOBY				
Coolant Pressure	kPa	99 - 107	ACOLOUP				
Main Oil Gallery Press.	kPa	TBD	AOILPRS				
Fuel Inlet Restriction	kPa	TBD	AFPMP				
Fuel Return Restriction	kPa	TBD	AFUELRP				

^A QI values above the threshold are acceptable by the Cummins Surveillance Panel. QI values below the threshold may not be considered acceptable based on an engineering review. See the comments section of this report.

^B Total number of data points taken

^C Number of Bad Quality Data points not used in the calculation of the statistical measures

^D Number of points clipped by over/under range limits

^E Typical values determined from reference oil test database

^F Time for the output to reach 63.2% of final value for step change at input

**ISB Lubricant Performance Test
Form 6
Tappet Loss Summary**

Laboratory:	LAB	EOT Date:	DTCOMP	EOT Time:	EOTTIME
Test Number:	TESTNUM				
Formulation / Stand Code:	FORM				
Oil Code:	OILCODE				

Tappet Wear						
Location	Heights			Weights		
	SOT Height (mm)	EOT Height (mm)	Height Loss (µm)	SOT Mass (g)	EOT Mass (g)	Mass Loss (mg)
1E	TWPTHW1E	TWEHW1E	TWEHL1E	TWPTWW1E	TWEWW1E	TWEWL1E
1I	TWPTHW1I	TWEHW1I	TWEHL1I	TWPTWW1I	TWEWW1I	TWEWL1I
2I	TWPTHW2I	TWEHW2I	TWEHL2I	TWPTWW2I	TWEWW2I	TWEWL2I
2E	TWPTHW2E	TWEHW2E	TWEHL2E	TWPTWW2E	TWEWW2E	TWEWL2E
3E	TWPTHW3E	TWEHW3E	TWEHL3E	TWPTWW3E	TWEWW3E	TWEWL3E
3I	TWPTHW3I	TWEHW3I	TWEHL3I	TWPTWW3I	TWEWW3I	TWEWL3I
4I	TWPTHW4I	TWEHW4I	TWEHL4I	TWPTWW4I	TWEWW4I	TWEWL4I
4E	TWPTHW4E	TWEHW4E	TWEHL4E	TWPTWW4E	TWEWW4E	TWEWL4E
5E	TWPTHW5E	TWEHW5E	TWEHL5E	TWPTWW5E	TWEWW5E	TWEWL5E
5I	TWPTHW5I	TWEHW5I	TWEHL5I	TWPTWW5I	TWEWW5I	TWEWL5I
6I	TWPTHW6I	TWEHW6I	TWEHL6I	TWPTWW6I	TWEWW6I	TWEWL6I
6E	TWPTHW6E	TWEHW6E	TWEHL6E	TWPTWW6E	TWEWW6E	TWEWL6E

Intake / Exhaust Summary	Heights (µm)		Weights (mg)	
	Intake	Exhaust	Intake	Exhaust
Average Loss	ATWHLI	ATWHLE	ATWWLI	ATWWLE
Minimum Loss	ITWHLI	ITWHLE	ITWWLI	ITWWLE
Maximum Loss	XTWHLI	XTWHLE	XTWWLI	XTWWLE
Standard Deviation	STWHLI	STWHLE	STWWLI	STWWLE

Overall Summary	Heights (µm)	Weights (mg)
Average Loss	ATHL	ATWL
Minimum Loss	ITHL	ITWL
Maximum Loss	XTHL	XTWL
Standard Deviation	STHL	STWL

**ISB Lubricant Performance Test
Form 7
Crosshead Mass Loss Summary**

Laboratory: LAB	EOT Date: DTCOMP	EOT Time: EOTTIME
Test Number: TESTNUM		
Formulation / Stand Code: FORM		
Oil Code: OILCODE		

Location	Serial No.	Pretest Mass (g)	EOT Mass (g)	Mass Loss (mg)
1E	CHDSN1E	CHDPTW1E	CHDEW1E	CHDEWL1E
1I	CHDSN1I	CHDPTW1I	CHDEW1I	CHDEWL1I
2I	CHDSN2I	CHDPTW2I	CHDEW2I	CHDEWL2I
2E	CHDSN2E	CHDPTW2E	CHDEW2E	CHDEWL2E
3E	CHDSN3E	CHDPTW3E	CHDEW3E	CHDEWL3E
3I	CHDSN3I	CHDPTW3I	CHDEW3I	CHDEWL3I
4I	CHDSN4I	CHDPTW4I	CHDEW4I	CHDEWL4I
4E	CHDSN4E	CHDPTW4E	CHDEW4E	CHDEWL4E
5E	CHDSN5E	CHDPTW5E	CHDEW5E	CHDEWL5E
5I	CHDSN5I	CHDPTW5I	CHDEW5I	CHDEWL5I
6I	CHDSN6I	CHDPTW6I	CHDEW6I	CHDEWL6I
6E	CHDSN6E	CHDPTW6E	CHDEW6E	CHDEWL6E

Intake / Exhaust Summary	Intake		Exhaust	
	As Measured	Outlier Screened	As Measured	Outlier Screened
Average Crosshead Mass Loss (mg)	ACHDWLI	OACHDWLI	ACHDWLE	OACHDWLE
Minimum Crosshead Mass Loss (mg)	ICHDWLI	OICHDWLI	ICHDWLE	OICHDWLE
Maximum Crosshead Mass Loss (mg)	XCHDWLI	OXCHDWLI	XCHDWLE	OXCHDWLE
Standard Deviation (mg)	SCHDWLI	OSCHDWLI	SCHDWLE	OSCHDWLE
Outlier Crossheads Locations ^A	CHDOUTI		CHDOUTE	

^A Location Designation. Example: 3E

Overall Summary	As Measured	Outlier Screened	Adjusted to x.x% Soot
Average Crosshead Mass Loss (mg)	AMACAWL	CAWL	ACWL
Minimum Crosshead Mass Loss (mg)	AMICAWL	ICHDEWL	
Maximum Crosshead Mass Loss (mg)	AMXCAWL	XCHDEWL	
Standard Deviation (mg)	AMSCAWL	SCHDEWL	

**ISB Lubricant Performance Test
Form 8
Valve Adjusting Screw Mass Loss Summary**

Laboratory:	LAB	EOT Date:	DTCOMP	EOT Time:	EOTTIME
Test Number:	TESTNUM				
Formulation / Stand Code:	FORM				
Oil Code:	OILCODE				

Location	Pretest Mass (g)	EOT Mass (g)	Mass Loss (mg)
1E	VASPTW1E	VASEW1E	VASEWL1E
1I	VASPTW1I	VASEW1I	VASEWL1I
2I	VASPTW2I	VASEW2I	VASEWL2I
2E	VASPTW2E	VASEW2E	VASEWL2E
3E	VASPTW3E	VASEW3E	VASEWL3E
3I	VASPTW3I	VASEW3I	VASEWL3I
4I	VASPTW4I	VASEW4I	VASEWL4I
4E	VASPTW4E	VASEW4E	VASEWL4E
5E	VASPTW5E	VASEW5E	VASEWL5E
5I	VASPTW5I	VASEW5I	VASEWL5I
6I	VASPTW6I	VASEW6I	VASEWL6I
6E	VASPTW6E	VASEW6E	VASEWL6E

Intake / Exhaust Summary	Intake		Exhaust	
	As Measured	Outlier Screened	As Measured	Outlier Screened
Average Mass Loss (mg)	AVASWLI	OAVASWLI	AVASWLE	OAVASWLE
Minimum Mass Loss (mg)	IVASWLI	OIVASWLI	IVASWLE	OIVASWLE
Maximum Mass Loss (mg)	XVASWLI	OXVASWLI	XVASWLE	OXVASWLE
Standard Deviation (mg)	SVASWLI	OSVASWLI	SVASWLE	OSVASWLE
Outlier Locations ^A	VASOUTI		VASOUTE	

^A Location Designation. Example: 3E

Overall Summary	As Measured	Outlier Screened	Adjusted to x.x% Soot
Average Mass Loss (mg)	AVSWL	OAVSWL	VASL
Minimum Mass Loss (mg)	IVSWL	OIVSWL	
Maximum Mass Loss (mg)	XVSWL	OXVSWL	
Standard Deviation (mg)	SVSWL	OSVSWL	

**ISB Lubricant Performance Test
Form 9
Rocker Lever Socket Mass Loss Summary**

Laboratory:	LAB	EOT Date:	DTCOMP	EOT Time:	EOTTIME
Test Number:	TESTNUM				
Formulation / Stand Code:	FORM				
Oil Code:	OILCODE				

Location	Pretest Mass (g)	EOT Mass (g)	Mass Loss (mg)
1E	RLSPTW1E	RLSEW1E	RLSEWL1E
1I	RLSPTW1I	RLSEW1I	RLSEWL1I
2I	RLSPTW2I	RLSEW2I	RLSEWL2I
2E	RLSPTW2E	RLSEW2E	RLSEWL2E
3E	RLSPTW3E	RLSEW3E	RLSEWL3E
3I	RLSPTW3I	RLSEW3I	RLSEWL3I
4I	RLSPTW4I	RLSEW4I	RLSEWL4I
4E	RLSPTW4E	RLSEW4E	RLSEWL4E
5E	RLSPTW5E	RLSEW5E	RLSEWL5E
5I	RLSPTW5I	RLSEW5I	RLSEWL5I
6I	RLSPTW6I	RLSEW6I	RLSEWL6I
6E	RLSPTW6E	RLSEW6E	RLSEWL6E

Intake / Exhaust Summary	Intake		Exhaust	
	As Measured	Outlier Screened	As Measured	Outlier Screened
Average Mass Loss (mg)	ARLSHLI	OARLSHLI	ARLSHLE	OARLSHLE
Minimum Mass Loss (mg)	IRLSHLI	OIRLSHLI	IRLSHLE	OIRLSHLE
Maximum Mass Loss (mg)	XRLSHLI	OXRLSHLI	XRLSHLE	OXRLSHLE
Standard Deviation (mg)	SRLSHLI	OSRLSHLI	SRLSHLE	OSRLSHLE
Outlier Locations ^A	RLSOUTI		RLSOUTE	

^A Location Designation. Example: 3E

Overall Summary	As Measured	Outlier Screened	Adjusted to x.x% Soot
Average Mass Loss (mg)	ARLSWL	OARLSWL	RLSWL
Minimum Mass Loss (mg)	IRLSWL	OIRLSWL	
Maximum Mass Loss (mg)	XRLSWL	OXRLSWL	
Standard Deviation (mg)	SRLSWL	OSRLSWL	

**ISB Lubricant Performance Test
Form 10
Valve Rocker Shaft Mass Loss Summary**

Laboratory: LAB	EOT Date: DTCOMP	EOT Time: EOTTIME
Test Number:	TESTNUM	
Formulation / Stand Code:	FORM	
Oil Code:	OILCODE	

Location	Pretest Mass (g)	EOT Mass (g)	Mass Loss (mg)
1E	VRPTW1E	VRSEW1E	VRSEWL1E
1I	VRPTW1I	VRSEW1I	VRSEWL1I
2I	VRPTW2I	VRSEW2I	VRSEWL2I
2E	VRPTW2E	VRSEW2E	VRSEWL2E
3E	VRPTW3E	VRSEW3E	VRSEWL3E
3I	VRPTW3I	VRSEW3I	VRSEWL3I
4I	VRPTW4I	VRSEW4I	VRSEWL4I
4E	VRPTW4E	VRSEW4E	VRSEWL4E
5E	VRPTW5E	VRSEW5E	VRSEWL5E
5I	VRPTW5I	VRSEW5I	VRSEWL5I
6I	VRPTW6I	VRSEW6I	VRSEWL6I
6E	VRPTW6E	VRSEW6E	VRSEWL6E

Intake / Exhaust Summary	Intake		Exhaust	
	As Measured	Outlier Screened	As Measured	Outlier Screened
Average Mass Loss (mg)	AVRSHLI	OAVRSHLI	AVRSHLE	OAVRSHLE
Minimum Mass Loss (mg)	IVRSHLI	OIVRSHLI	IVRSHLE	OIVRSHLE
Maximum Mass Loss (mg)	XVRSHLI	OXVRSHLI	XVRSHLE	OXVRSHLE
Standard Deviation (mg)	SVRSHLI	OSVRSHLI	SVRSHLE	OSVRSHLE
Outlier Locations ^A	VRSOUTI		VRSOUTE	

^A Location Designation. Example: 3E

Overall Summary	As Measured	Outlier Screened	Adjusted to x.x% Soot
Average Mass Loss (mg)	AVRSWL	OAVRSWL	VRSWL
Minimum Mass Loss (mg)	IVRSWL	OIVRSWL	
Maximum Mass Loss (mg)	XVRSWL	OXVRSWL	
Standard Deviation (mg)	SVRSWL	OSVRSWL	

**ISB Lubricant Performance Test
Form 11
Valve Push Rods Mass Loss Summary**

Laboratory:	LAB	EOT Date:	DTCOMP	EOT Time:	EOTTIME
Test Number:	TESTNUM				
Formulation / Stand Code:	FORM				
Oil Code:	OILCODE				

Location	Pretest Mass (g)	EOT Mass (g)	Mass Loss (mg)
1E	VPRPTW1E	VPREW1E	VPREWL1E
1I	VPRPTW1I	VPREW1I	VPREWL1I
2I	VPRPTW2I	VPREW2I	VPREWL2I
2E	VPRPTW2E	VPREW2E	VPREWL2E
3E	VPRPTW3E	VPREW3E	VPREWL3E
3I	VPRPTW3I	VPREW3I	VPREWL3I
4I	VPRPTW4I	VPREW4I	VPREWL4I
4E	VPRPTW4E	VPREW4E	VPREWL4E
5E	VPRPTW5E	VPREW5E	VPREWL5E
5I	VPRPTW5I	VPREW5I	VPREWL5I
6I	VPRPTW6I	VPREW6I	VPREWL6I
6E	VPRPTW6E	VPREW6E	VPREWL6E

Intake / Exhaust Summary	Intake		Exhaust	
	As Measured	Outlier Screened	As Measured	Outlier Screened
Average Mass Loss (mg)	AVPRMLI	OAVPRMLI	AVPRMLE	OAVPRMLE
Minimum Mass Loss (mg)	IVPRMLI	OIVPRMLI	IVPRMLE	OIVPRMLE
Maximum Mass Loss (mg)	XVPRMLI	OXVPRMLI	XVPRMLE	OXVPRMLE
Standard Deviation (mg)	SVPRMLI	OSVPRMLI	SVPRMLE	OSVPRMLE
Outlier Locations ^A	VPROUTI		VPROUTE	

^A Location Designation. Example: 3E

Overall Summary	As Measured	Outlier Screened	Adjusted to x.x% Soot
Average Mass Loss (mg)	AVPRWL	OAVPRWL	VPRWL
Minimum Mass Loss (mg)	IVPRWL	OIVPRWL	
Maximum Mass Loss (mg)	XVPRWL	OXVPRWL	
Standard Deviation (mg)	SVPRWL	OSVPRWL	

**ISB Lubricant Performance Test
Form 12
Oil Analysis Summary**

Laboratory:	LAB	EOT Date:	DTCOMP	EOT Time:	EOTTIME
Test Number:	TESTNUM				
Formulation / Stand Code:	FORM				
Oil Code:	OILCODE				

Test Hours	Viscosity @ 100°C, cSt	TGA % Soot	TBN D4739	TAN D664	Copper (ppm)	Iron (ppm)	Lead (ppm)	Aluminum (ppm)	Chromium (ppm)
NEW	V100NEW	TGANEW	TBNNEW	TANNEW	CUWNEW	FEWNEW	PBWNEW	ALWNEW	CRWNEW
TST_H025	V100H025	TGA_H025	TBN_H025	TAN_H025	CUWMH025	FEWMH025	PBWMH025	ALWMH025	CRWMH025
TST_H050	V100H050	TGA_H050	TBN_H050	TAN_H050	CUWMH050	FEWMH050	PBWMH050	ALWMH050	CRWMH050
TST_H075	V100H075	TGA_H075	TBN_H075	TAN_H075	CUWMH075	FEWMH075	PBWMH075	ALWMH075	CRWMH075
TST_H100	V100H100	TGA100	TBN_H100	TAN_H100	CUWMH100	FEWMH100	PBWMH100	ALWMH100	CRWMH100
TST_H150	V100H150	TGA_H150	TBN_H150	TAN_H150	CUWMH150	FEWMH150	PBWMH150	ALWMH150	CRWMH150
TST_H200	V100H200	TGA_H200	TBN_H200	TAN_H200	CUWMH200	FEWMH200	PBWMH200	ALWMH200	CRWMH200
TST_H250	V100H250	TGA_H250	TBN_H250	TAN_H250	CUWMH250	FEWMH250	PBWMH250	ALWMH250	CRWMH250
TST_H300	V100H300	TGA_H300	TBN_H300	TAN_H300	CUWMH300	FEWMH300	PBWMH300	ALWMH300	CRWMH300
TST_H350	V100H350	TGA_H350	TBN_H350	TAN_H350	CUWMH350	FEWMH350	PBWMH350	ALWMH350	CRWMH350

**ISB Lubricant Performance Test
Form 13
Unscheduled Downtime & Maintenance Summary**

Laboratory: LAB	EOT Date: DTCOMP	EOT Time: EOTTIME
Test Number:	TESTNUM	
Formulation / Stand Code:	FORM	
Oil Code:	OILCODE	

Number of Downtime Occurrences			DWNOCR
Test Hours	Date	Downtime	Reasons
DOWNR001	DDATR001	DTIMR001	DREAR001
DOWNR002	DDATR002	DTIMR002	DREAR002
DOWNR003	DDATR003	DTIMR003	DREAR003
DOWNR004	DDATR004	DTIMR004	DREAR004
DOWNR005	DDATR005	DTIMR005	DREAR005
DOWNR006	DDATR006	DTIMR006	DREAR006
DOWNR007	DDATR007	DTIMR007	DREAR007
DOWNR008	DDATR008	DTIMR008	DREAR008
DOWNR009	DDATR009	DTIMR009	DREAR009
DOWNR010	DDATR010	DTIMR010	DREAR010
DOWNR011	DDATR011	DTIMR011	DREAR011
DOWNR012	DDATR012	DTIMR012	DREAR012
DOWNR013	DDATR013	DTIMR013	DREAR013
DOWNR014	DDATR014	DTIMR014	DREAR014
DOWNR015	DDATR015	DTIMR015	DREAR015
TOTLDOWN			Total Downtime (hours)

Other Comments	
Number of Comment Lines	TOTCOM
	OCOMR001
	OCOMR002
	OCOMR003
	OCOMR004
	OCOMR005
	OCOMR006
	OCOMR007
	OCOMR008
	OCOMR009
	OCOMR010
	OCOMR011
	OCOMR012
	OCOMR013
	OCOMR014
	OCOMR015

**ISB Lubricant Performance Test
Form 13a
Unscheduled Downtime & Maintenance Summary**

Laboratory: LAB	EOT Date: DTCOMP	EOT Time: EOTTIME
Test Number: TESTNUM		
Formulation / Stand Code: FORM		
Oil Code: OILCODE		

Number of Downtime Occurrences			DWNOCR
Test Hours	Date	Downtime	Reasons
DOWNR016	DDATR016	DTIMR016	DREAR016
DOWNR017	DDATR017	DTIMR017	DREAR017
DOWNR018	DDATR018	DTIMR018	DREAR018
DOWNR019	DDATR019	DTIMR019	DREAR019
DOWNR020	DDATR020	DTIMR020	DREAR020
DOWNR021	DDATR021	DTIMR021	DREAR021
DOWNR022	DDATR022	DTIMR022	DREAR022
DOWNR023	DDATR023	DTIMR023	DREAR023
DOWNR024	DDATR024	DTIMR024	DREAR024
DOWNR025	DDATR025	DTIMR025	DREAR025
DOWNR026	DDATR026	DTIMR026	DREAR026
DOWNR027	DDATR027	DTIMR027	DREAR027
DOWNR028	DDATR028	DTIMR028	DREAR028
DOWNR029	DDATR029	DTIMR029	DREAR029
DOWNR030	DDATR030	DTIMR030	DREAR030
TOTLDOWN			Total Downtime (hours)

Other Comments	TOTCOM
Number of Comment Lines	
OCOMR016	
OCOMR017	
OCOMR018	
OCOMR019	
OCOMR020	
OCOMR021	
OCOMR022	
OCOMR023	
OCOMR024	
OCOMR025	
OCOMR026	
OCOMR027	
OCOMR028	
OCOMR029	
OCOMR030	

**ISB Lubricant Performance Test
Form 13b
Unscheduled Downtime & Maintenance Summary**

Laboratory: LAB	EOT Date: DTCOMP	EOT Time: EOTTIME
Test Number:	TESTNUM	
Formulation / Stand Code:	FORM	
Oil Code:	OILCODE	

Number of Downtime Occurrences			DWNOCR
Test Hours	Date	Downtime	Reasons
DOWNR031	DDATR031	DTIMR031	DREAR031
DOWNR032	DDATR032	DTIMR032	DREAR032
DOWNR033	DDATR033	DTIMR033	DREAR033
DOWNR034	DDATR034	DTIMR034	DREAR034
DOWNR035	DDATR035	DTIMR035	DREAR035
DOWNR036	DDATR036	DTIMR036	DREAR036
DOWNR037	DDATR037	DTIMR037	DREAR037
DOWNR038	DDATR038	DTIMR038	DREAR038
DOWNR039	DDATR039	DTIMR039	DREAR039
DOWNR040	DDATR040	DTIMR040	DREAR040
DOWNR041	DDATR041	DTIMR041	DREAR041
DOWNR042	DDATR042	DTIMR042	DREAR042
DOWNR043	DDATR043	DTIMR043	DREAR043
DOWNR044	DDATR044	DTIMR044	DREAR044
DOWNR045	DDATR045	DTIMR045	DREAR045
TOTLDOWN			Total Downtime (hours)

Other Comments	
Number of Comment Lines	TOTCOM
	OCOMR031
	OCOMR032
	OCOMR033
	OCOMR034
	OCOMR035
	OCOMR036
	OCOMR037
	OCOMR038
	OCOMR039
	OCOMR040
	OCOMR041
	OCOMR042
	OCOMR043
	OCOMR044
	OCOMR045

**ISB Lubricant Performance Test
Form 14
Test Fuel Analysis (Last Batch)**

Laboratory:	LAB	EOT Date:	DTCOMP	EOT Time:	EOTTIME
Test Number:	TESTNUM				
Formulation / Stand Code:	FORM				
Oil Code:	OILCODE				

Fuel Supplier		Fuel Batch Identifier		
Measurement	Specs.	Analysis		Test Method
		New	EOT	
Total Sulfur, ppm	7 - 15	FUELSNEW	FUELSEOT	D 5453
Gravity, °API	34 - 37	APIGRNEW	APIGREOT	D 4052
Hydrocarbon Composition				
Aromatics % Wt.	26 - 31.5	FUELAROM		D 5186
Olefins % Vol.	Report	FUELOLEF		D 1319
Cetane Index	Report	CETANEIN		D 976
Cetane No.	43 - 47	CETANENO		D 613
Copper Strip Corrosion	1 Maximum	FUEL CU		D 130
Flash Point, °C	54 Minimum	FLASHPT		D 93
Pour Point, °C	-18 Maximum	FUELPOUR		D 97
Carbon Residue on 10% Residuum, %	0.35 Maximum	FUEL CRES		D 524 (10% Bottoms)
Water & Sediment, % Vol.	0.05 Maximum	FUEL H2O		D 2709
Viscosity, cSt @ 40°C	2.0 - 2.6	KINVIS		D 445
Total Acid Number	0.05 Maximum	FUEL TAN		D 664
Strong Acid Number	0.00 Maximum	FUEL SAN		D 664
Accelerated Stability	1.5 max	FUEL ACS		D 2274
Ash, % Wt.	0.005 max	FUEL ASH		D 482
SLBOCLE, g	3100 min ⁴	SLBOCLE		D 6078 ⁴
90% Distillation, °C	293 - 332	FUEL 90		D 86

⁴May be altered to be consistent with CARB or ASTM diesel fuel specifications.