Report On
Sequence IIIGB Evaluation

Version IIIGB VERSION 20140324

Conducted For

TSTSPON1

TSTSPON2

LABVALID	**V** = Valid
	I = Invalid
	N = Results Cannot Be Interpreted As Representative Of Oil Performance (Non-Reference Oil) And Shall Not Be Used For Multiple Test Acceptance

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

Test Number					
Test Stand	STAND	Stand Test	STRUN	Lab Test	LABRUN
Oil Code	OILCODE				
Formulation/Stand	FORM				
Alternate Codes	ALTCODE1		ALTCODE2		ALTCODE3
EOT Date	DTCOMP		EOT Time		EOTTIME

In my opinion this test OPVALID been conducted in a valid manner in accordance with ASTM Test Method D 7320 and the appropriate amendments through the information letter system. The remarks included in the report describe the anomalies associated with this test.

Submitted By:

SUBLAB

Testing Laboratory

SUBSIGIM

Signature

SUBNAME

Typed Name

SUBTITLE

Title

Form 2

Sequence IIIGB

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Sequence IIIGB

Form 3

Summary of Test Method

The Sequence IIIGB Test is a fired-engine, dynamometer lubricant test for generating a used oil sample to evaluate the ability of an oil to retain Phosphorus after operation in a high-temperature environment. Such oils include both single viscosity grade and multi-viscosity grade oils that are used in spark-ignition, gasoline-fueled engines, as well as diesel engines. The Sequence IIIGB Test utilizes a 1996 General Motors Powertrain 3800 Series II, water-cooled, 4 cycle, V-6 engine as the test apparatus. The Sequence IIIGB test engine is an overhead valve design (OHV) and uses a single camshaft operating both intake and exhaust valves via pushrods and hydraulic valve lifters in a sliding-follower arrangement. The engine uses one intake and one exhaust valve per cylinder. Induction is handled by a modified GM port fuel injection system setting the Air-to-Fuel ratio at 15:1. The test engine is overhauled prior to each test, during which critical engine dimensions are measured and rated or measured parts (pistons, camshaft, valve lifters, etc.) are replaced.

The Sequence IIIGB Test consists of a 10-minute operational check, followed by 100 hours of engine operation at moderately high speed, load, and temperature conditions. The 100-hour segment is broken down into five 20-hour test segments. Following each 20-hour segment, and the 10-minute operational check, oil samples are drawn from the engine.

The Sequence IIIGB Test is operated at the following test states during the 100-hour portion of the test:

Parameter	Set Point
Engine Speed	3600 r/min
Engine Load	250 N-m
Oil Filter Block Temperature	150 ^{o}C
Coolant Outlet Temperature	115 ^{o}C
Fuel Pressure	377.5 kPa
Intake Air Temperature	35 ^{o}C
Intake Air Pressure	0.05 kPa
Intake Air Dew Point	16.1 ^{o}C
Exhaust Back Pressure	6 kPa
Engine Coolant Flow	160 L/min
Breather Tube Coolant Flow	10 L/min
Air-to-Fuel Ratio	15.0:1
Condenser Coolant Outlet Temperature	40 ^{o}C

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Form 4

Test Result Summary

Lab	LAB	Oil Code	OILCODE
Stand	STAND	Test No.	TESTNUM
Laboratory Oil Code		LABOCODE	
Formulation Stand Code		FORM	

Date Started	DTSTRT	Engine No.	ENGINENO
Time Started	STRTTIME	Fuel Batch	FUELBTID
Date	DTCOMP	SAE Viscosity	SAEVISC
Time	EOTTIME	TMC Oil Code[A]	IND
Test Length	TESTLEN		

Pass/Fail Results	
	Phosphorus Retention
Original Units	PHOS
Industry Correction Factor	PHOSCF
Corrected Result	PHOSCOR
Severity Adjustment	PHOSSA
Final Original Unit Result	PHOSFNL

Additional Results			
Oil Consumption Hours, h	OCONHRS	Oil Consumption, L	OILCON

[A]Reference Oil Tests Only

Sequence IIIGB

Form 5

Operational Summary

Lab	LAB	Oil Code	OILCODE
Stand	STAND	Test No.	TESTNUM
Laboratory Oil Code			LABOCODE
Formulation Stand Code			FORM

	Parameter	Units	QI Threshold	EOT QI	Target	Average	Standard Deviation	Number of Samples	Number of BQD
Controlled Parameters	Speed	r/min	0.000	QRPM	3600	ARPM	SRPM	NRPM	BRPM
	Load	Nm	0.000	QLOAD	250	ALOAD	SLOAD	NLOAD	BLOAD
	Oil Filter Block	°C	0.000	QOTEMP	150.0	AOTEMP	SOTEMP	NOTEMP	BOTEMP
	Engine Coolant Out	°C	0.000	QCOLOU	115.0	ACOLOUT	SCOLOUT	NCOLOUT	BCOLOUT
	Condenser Coolant Out	°C	0.000	QCCOLO	40.0	ACCOLOU	SCCOLOUT	NCCOLOUT	BCCOLOUT
	Left Air-to-Fuel Ratio		0.000	QLAFR	15.0	ALAFR	SLAFR	NLAFR	BLAFR
	Right Air-to-Fuel Ratio		0.000	QRAFR	15.0	ARAFR	SRAFR	NRAFR	BRAFR
	Left Exhaust Back Pressure	kPa	0.000	QLEXBP	6.0	ALEXBP	SLEXBP	NLEXBP	BLEXBP
	Right Exhaust Back Pressure	kPa	0.000	QREXBP	6.0	AREXBP	SREXBP	NREXBP	BREXBP
	Intake Air	kPa	0.000	QINAIR	0.05	AINAIR	SINAIR	NINAIR	BINAIR
	Engine Coolant Flow	L/min	0.000	QCOLFL(	160.0	ACOLFLO	SCOLFLO	NCOLFLO	BCOLFLO
Non-controlled Parameters	Oil Sump	°C				AOSUMP	SOSUMP	NOSUMP	BOSUMP
	Pump Outlet Pressure	kPa				APOUTP	SPOUTP	NPOUTP	BPOUTP
	Gallery Pressure	kPa				AOILPRS	SOILPRS	NOILPRS	BOILPRS
	Engine Coolant In	°C				AECOLIN	SECOLIN	NECOLIN	BECOLIN
	Fuel Inlet	°C				AFUELIN	SFUELIN	NFUELIN	BFUELIN
	Intake Air	°C				AINAT	SINAT	NINAT	BINAT
	Intake Air Dew Point	°C				AINDEW	SINDEW	NINDEW	BINDEW
	Intake Vacuum	kPa				AINVAC	SINVAC	NINVAC	BINVAC
	Crankcase	kPa				ACCASEP	SCCASEP	NCCASEP	BCCASEP
	Fuel Pressure	kPa				APFUEL	SPFUEL	NPFUEL	BPFUEL

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Form 6

Used Oil Analysis Results

Lab	LAB	Oil Code	OILCODE
Stand	STAND	Test No.	TESTNUM
Laboratory Oil Code			LABOCODE
Formulation Stand Code			FORM

Calcium and Phosphorus Results by ICP (D 5185)			
Test Hour [A]	**Calcium (Ca)**	**Phosphorus (P)**	**Phosphorus Retention [B]**
	ppm	**ppm**	**%**
Initial[C]	CAWMINI	PWMINI	
TST_H020	CAWMH020	PWM_H020	PRETH020
TST_H040	CAWMH040	PWM_H040	PRETH040
TST_H060	CAWMH060	PWM_H060	PRETH060
TST_H080	CAWMH080	PWM_H080	PRETH080
TST_EOT	CAWMEOT	PWMEOT	PHOS

Oil Consumption Data						
Hours	Initial[C]	OCONH020	OCONH040	OCONH060	OCONH080	OCONH100
Level low (mL)	OILLINI	OILLH020	OILLH040	OILLH060	OILLH080	OILLH100
Total Oil Consumed (L)		OILCH020	OILCH040	OILCH060	OILCH080	OILCH100

NO_x Measurement (Not required by procedure)			
Hours	NOXHH019	NOXHH049	NOXHH099
NO_x (ppm)	NOX_H019	NOX_H049	NOX_H099

[A] Optional samples at test hours 20, 40, 60 and 80 are not required by procedure.

[B] Phosphorus Retention = $(Ca_{tI} / Ca_{t100})x(P_{t100} / P_{tI})x100$

where Ca_{tI} and P_{tI} are the analytical results from initial oil sample, removed from the engine following the initial run and Ca_{t100} and P_{t100} are the analytical results from the End of Test (100h). For oils where Calcium is not the highest concentration detergent metal, the highest concentration detergent metal should be substituted for Calcium into the equation.

[C] Initial = taken after the initial ten minute run.

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Form 7

Blowby Values & Plot

Lab	LAB	Oil Code	OILCODE
Stand	STAND	Test No.	TESTNUM
Laboratory Oil Code		LABOCODE	
Formulation Stand Code		FORM	

Blowby Plot

BLOWBYIM

Test Hours	BBYTH0	BBYTH	BBYTH	BBYTH	BBYTH	BBYTH	BBYTH	BBYTH	BBYTH	BBYTH
Blowby, L/min.	BLWBH0	BLWBH	BLWBH	BLWBH	BLWBH	BLWBH	BLWBH	BLWBH	BLWBH	BLWBH
Test Hours	BBYTH0	BBYTH	BBYTH	BBYTH	BBYTH	BBYTH	BBYTH	BBYTH	BBYTH	BBYTH
Blowby, L/min.	BLWBH0	BLWBH	BLWBH	BLWBH	BLWBH	BLWBH	BLWBH	BLWBH	BLWBH	BLWBH
Test Hours	BBYTH0	**Average**								
Blowby, L/min.	BLWBH0	ABLOBY								

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Form 8

Hardware Information

Lab	LAB	Oil Code	OILCODE
Stand	STAND	Test No.	TESTNUM
Laboratory Oil Code			LABOCODE
Formulation Stand Code			FORM

FIFO	Piston Ring Batch Code	RINGCODE	Build Completion Date	BUILDDT
FIFO	Oil Control (OC) Batch Code	ORINGBAT	Piston Size (Grade)	PISTSIZE
FIFO	Expander Ring (EXP) Batch Code	ERINGBAT	Block Serial Number	BLOCKSN
FIFO	Oil Filter Batch Code	OILFIBAT	Crankshaft Serial Number	CRANKSN
FIFO	Camshaft Pour Code	CAMPOURC	Crankshaft Part Number	CRANKPN
FIFO	Oil Cooler Batch Code	OILCLBAT	Camshaft Serial Number	CAMSN
FIFO	Valve Springs Batch Code	VALSPBAT	Camshaft Phosphate Batch Code	CAMBAT
FIFO	Intake Valve Seals Batch Code	INVSLBAT	Cylinder Head Serial Number, Left	LHEADSN
FIFO	Exhaust Valve Seals Batch Code	EXVSLBAT	Cylinder Head Serial Number, Right	RHEADSN
FIFO	Main Bearings (M) Batch Code	MBRNGBAT	Top Ring Gap, mils	TRINGGAP
FIFO	Connecting Rod Bearings (CR) Batch Code	CBRNGBAT	Bottom Ring Gap, mils	BRINGGAP
FIFO	Camshaft Bushing (CB) Batch Code	CBUSHBAT	Bearing Kit Serial Number	BRNGSN
FIFO	Rocker Arm Batch Code	RARMBAT	Cylinder Head Part Number, Left	CYLHPNLT
FIFO	Piston Batch (Code)	PISTBAT	Cylinder Head Part Number, Right	CYLHPNRT

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Form 9

Downtime & Outlier Report Form

Lab	LAB	Oil Code	OILCODE
Stand	STAND	Test No.	TESTNUM
Laboratory Oil Code		LABOCODE	
Formulation Stand Code		FORM	

Number of Downtime Occurrences		DWNO	
Test Hours	**Date**	**Downtime**	**Reasons**
DOWNR(	DDATR001	DTIMR001	DREAR001
DOWNR(	DDATR002	DTIMR002	DREAR002
DOWNR(	DDATR003	DTIMR003	DREAR003
DOWNR(	DDATR004	DTIMR004	DREAR004
DOWNR(	DDATR005	DTIMR005	DREAR005
DOWNR(	DDATR006	DTIMR006	DREAR006
DOWNR(	DDATR007	DTIMR007	DREAR007
DOWNR(	DDATR008	DTIMR008	DREAR008
DOWNR(	DDATR009	DTIMR009	DREAR009
DOWNR(	DDATR01(	DTIMR010	DREAR010
DOWNR(	DDATR011	DTIMR011	DREAR011
DOWNR(	DDATR012	DTIMR012	DREAR012
DOWNR(	DDATR013	DTIMR013	DREAR013
DOWNR(	DDATR014	DTIMR014	DREAR014
DOWNR(	DDATR015	DTIMR015	DREAR015
		TOTLDOWN	**Total Downtime (hours) – Maximum allowable downtime: 24 hours**

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

Sequence IIIGB

Form 9A

Downtime & Outlier Report Form

Lab	LAB	Oil Code	OILCODE
Stand	STAND	Test No.	TESTNUM
Laboratory Oil Code			LABOCODE
Formulation Stand Code			FORM

Number of Downtime Occurrences			DWNO
Test Hours	**Date**	**Downtime**	**Reasons**
DOWNR(	DDATR016	DTIMR016	DREAR016
DOWNR(	DDATR017	DTIMR017	DREAR017
DOWNR(	DDATR018	DTIMR018	DREAR018
DOWNR(	DDATR019	DTIMR019	DREAR019
DOWNR(	DDATR020	DTIMR020	DREAR020
DOWNR(	DDATR021	DTIMR021	DREAR021
DOWNR(	DDATR022	DTIMR022	DREAR022
DOWNR(	DDATR023	DTIMR023	DREAR023
DOWNR(	DDATR024	DTIMR024	DREAR024
DOWNR(	DDATR025	DTIMR025	DREAR025
DOWNR(	DDATR026	DTIMR026	DREAR026
DOWNR(	DDATR027	DTIMR027	DREAR027
DOWNR(	DDATR028	DTIMR028	DREAR028
DOWNR(	DDATR029	DTIMR029	DREAR029
DOWNR(	DDATR030	DTIMR030	DREAR030
		TOTLDOWN	**Total Downtime (hours) – Maximum allowable downtime: 24 hours**

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

Sequence IIIGB

Form 10

American Chemistry Council Code of Practice
Test Laboratory Conformance Statement

Test Laboratory	SUBLAB				
Test Sponsor	TSTSPON1				
Formulation / Stand Code	FORM				
Test Number	TESTNUM				
Start Date	DTSTRT	Start Time	STRTTIME	Time Zone	TZONE

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 YESRQM No NORQMI*

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 YESFULL No NOFULL *

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 YESNODE* No NONODEC

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 YESDEV* No NODEV *(This currently applies only to specific deviations identified in the ASTM Information Letter System)*

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

Comments
ACCCOMM1
ACCCOMM2
ACCCOMM3
ACCCOMM4

SUBSIGIM
Signature

SUBDATE
Date

SUBNAME
Typed Name

SUBTITLE
Title