Report On
Sequence IIIGB Evaluation

Version

Conducted For

	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

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

Test Number					
Test Stand		Stand Test		Lab Test	
Oil Code					
Formulation/Stand					
Alternate Codes					
EOT Date		EOT Time			

In my opinion this test 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: _____
Testing Laboratory

_____
Signature

_____
Typed Name

_____
Title

Form 2

Sequence IIIGB

Table of Contents

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

Sequence IIIGB

Form 4

Test Result Summary

Lab		Oil Code	
Stand		Test No.	
Laboratory Oil Code			
Formulation Stand Code			

Date Started		Engine No.	
Time Started		Fuel Batch	
Date		SAE Viscosity	
Time		TMC Oil Code[A]	
Test Length			

Pass/Fail Results	
	Phosphorus Retention
Original Units	
Industry Correction Factor	
Corrected Result	
Severity Adjustment	
Final Original Unit Result	

Additional Results			
Oil Consumption Hours, h		Oil Consumption, L	

[A]Reference Oil Tests Only

Sequence IIIGB

Form 5

Operational Summary

Lab		Oil Code	
Stand		Test No.	
Laboratory Oil Code			
Formulation Stand Code			

	Parameter	Units	QI Threshold	EOT QI	Target	Average	Standard Deviation	Number of Samples	Number of BQD
Controlled Parameters	Speed	r/min	0.000		3600				
	Load	Nm	0.000		250				
	Oil Filter Block	°C	0.000		150.0				
	Engine Coolant Out	°C	0.000		115.0				
	Condenser Coolant Out	°C	0.000		40.0				
	Left Air-to-Fuel Ratio		0.000		15.0				
	Right Air-to-Fuel Ratio		0.000		15.0				
	Left Exhaust Back Pressure	kPa	0.000		6.0				
	Right Exhaust Back Pressure	kPa	0.000		6.0				
	Intake Air	kPa	0.000		0.05				
	Engine Coolant Flow	L/min	0.000		160.0				
Non-controlled Parameters	Oil Sump	°C							
	Pump Outlet Pressure	kPa							
	Gallery Pressure	kPa							
	Engine Coolant In	°C							
	Fuel Inlet	°C							
	Intake Air	°C							
	Intake Air Dew Point	°C							
	Intake Vacuum	kPa							
	Crankcase	kPa							
	Fuel Pressure	kPa							

Sequence IIIGB

Form 6

Used Oil Analysis Results

Lab		Oil Code	
Stand		Test No.	
Laboratory Oil Code			
Formulation Stand Code			

Calcium and Phosphorus Results by ICP (D 5185)			
Test Hour [A]	**Calcium (Ca)**	**Phosphorus (P)**	**Phosphorus Retention [B]**
	ppm	**ppm**	**%**
Initial[C]			

Oil Consumption Data						
Hours	Initial[C]					
Level low (mL)						
Total Oil Consumed (L)						

NO_x Measurement			
Hours			
NO_x (ppm)			

[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.

Sequence IIIGB

Form 7

Blowby Values & Plot

Lab		Oil Code	
Stand		Test No.	
Laboratory Oil Code			
Formulation Stand Code			

Blowby Plot

Test Hours										
Blowby, L/min.										
Test Hours										
Blowby, L/min.										
Test Hours		**Average**								
Blowby, L/min.										

Sequence IIIGB

Form 8

Hardware Information

Lab		Oil Code	
Stand		Test No.	
Laboratory Oil Code			
Formulation Stand Code			

Build Completion Date		Piston Batch (Code)	
Block Serial Number		Piston Size (Grade)	
Crankshaft Serial Number		Piston Ring Batch Code	
Camshaft Serial Number		Oil Filter Batch Code	
Camshaft Batch Code		Oil Cooler Batch Code	
Cylinder Head Serial Number, Left		Valve Springs Batch Code	
Cylinder Head Serial Number, Right			
Bearing Kit Serial Number			
Top Ring Gap, mils			
Bottom Ring Gap, mils			
Intake Valve Seals Batch Code			
Exhaust Valve Seals Batch Code			
Rocker Arm Batch Code			
Connecting Rod Type (CAST, PM OR PMNS)			

Sequence IIIGB

Form 9

Downtime & Outlier Report Form

Lab		Oil Code	
Stand		Test No.	
Laboratory Oil Code			
Formulation Stand Code			

Number of Downtime Occurrences			
Test Hours	**Date**	**Downtime**	**Reasons**
			Total Downtime (hours) – Maximum allowable downtime: 24 hours

Other Comments	
Number of Comment Lines	

Sequence IIIGB

Form 9A

Downtime & Outlier Report Form

Lab		Oil Code	
Stand		Test No.	
Laboratory Oil Code			
Formulation Stand Code			

Number of Downtime Occurrences			
Test Hours	**Date**	**Downtime**	**Reasons**
			Total Downtime (hours) – Maximum allowable downtime: 24 hours

Other Comments	
Number of Comment Lines	

Sequence IIIGB

Form 10

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)*

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

Comments

_____ _____
Signature Date

_____ _____
Typed Name Title