LOOKUP UPDATE

Sequence VG Report Forms

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 in determining an average test result using multiple test acceptance criteria.

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

Test Number			
Stand:	Runs Between Calibration Tests:		Total Runs on Stand:
Date Completed:		End of Test Time:	
Oil Code:			
Formulation/Stand Code:			
Alternate Codes:			

In my opinion this test has been conducted in a valid manner in accordance with the VG Test Method D 6593 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 VG

Table of Contents

Sequence VG Sludge and Varnish Deposit Test
Form 3

Summary of Test Method

The Sequence VG engine sludge and varnish deposit test is a fired engine-dynamometer test which evaluates the ability of a lubricant to minimize the formation of sludge and varnish deposits. This test method is a cyclic test, with a total running duration of 216 hours.

The test engine is a Ford 4.6L, spark ignition, four stroke, eight cylinder "V" configuration engine. Features of this engine include dual overhead camshafts, a cross-flow fast burn cylinder head design, two valves per cylinder and electronic port fuel injection. A 90 minute break-in schedule is conducted prior to each test, since a new engine build is used for each test.

The Sequence VG test requires a new engine for each test. Each test is run for 216 hours, consisting of 54 cycles of 4 hours each. Each cycle consists of 3 stages. The stages of the test cycle are set at the following conditions:

Condition	Stage I	Stage II	Stage III
Duration, minutes	120	75	45
Engine Speed, r/min	1200	2900	700
Engine Power, kW	Record	Record	1.10 - 1.50
Manifold Abs Press, kPa (abs)	69	66	Record
Engine Oil In, ^{o}C	68	100	45
Engine Coolant Out, ^{o}C	57	85	45
Engine Coolant Flow, L/min	48	Record	Record
Engine Coolant Pressure, kPa (gauge)	70	70	70
RAC Coolant In, ^{o}C	29	85	29
Rocker Cover Flow, L/min	15	15	15
Intake Air, ^{o}C	30	30	30
Intake Air, Press, kPa (gauge)	0.05	0.05	0.05
Exhaust Gas Analysis, Lambda	1.0	1.0	0.75
Blowby Flow Rate Avg, L/min	Record	60 - 70	-----
Air/Fuel Ratio	Stoichmetric	Stoichmetric	11.5:1
Intake Air Humidity, g/kg	11.4	11.4	11.4
Exhaust Back Pressure, kPa abs	104	107	Record
Fuel Flow, kg/h	Record	Record	Record

Upon test completion, the engine is disassembled and rated for sludge and varnish. Average Engine Sludge and Average Engine Varnish are calculated.

Sequence VG
Form 4
Test Result Summary
Non-Reference & Reference Oil Tests

Laboratory:	Stand:	Stand Runs:	Total Runs on Stand:
Oilcode:			
Formulation/Stand Code:			

Date Started:	Time Started:	SAE Viscosity:
Date Complete:	Time Complete:	Lab Engine Number:
Test Length:		Fuel Batch:
Industry Oil Code:		Nominal Piston Oversize:

Critical Parameters						
	Average Engine Sludge, merits	Rocker Cover Sludge, merits	Average Engine Varnish, merits	Average Piston Skirt Varnish, merits	Oil Screen Sludge, % Area	Number of Hot Stuck Rings
Original Result						
Transformed Result						
Industry Correction Factor						
Corrected Transformed Result						
Severity Adjustment						
Final Transformed Result						
Final Original Unit Result						

Clogging Information		**Additional Information**	
Oil Screen Debris, % Area		Number of Cold Stuck Rings	
Oil Ring Clogging, % Area		Average Blowby Stage II, L/min	
PCV Valve @ 25 kPa, %		Oil Consumption, grams	
PCV Valve @ 60 kPa, %			

Last Reference Oil Test Calibrating Stand Information – Fill Out For Non-reference Oil Tests Only						
Stand:			Total Runs on Test Stand			
Oilcode:						
Industry Oil Code:	Engine Number:		SAE Viscosity:		Date Completed:	
Test Length:	Fuel Batch:		Calibration Expiration Date:			
Clogging Information			**Additional Information**			
Oil Screen Debris, % Area			Number of Cold Stuck Rings			
Oil Ring Clogging, % Area			Average Blowby Stage II, L/min			
PCV Valve @ 25 kPa, %			Oil Consumption, grams			
PCV Valve @ 60 kPa, %						
	Average Engine Sludge, merits	Average Rocker Cover Sludge, merits	Average Engine Varnish, merits	Average Piston Skirt Varnish, merits	Oil Screen Sludge, % Area	Number of Hot Stuck Rings
Final Original Unit Result						

Sequence VG
Form 5
Test Result Summary
Non-Reference & Reference Oil Tests

Laboratory:	Stand:	Stand Runs:	Total Runs on Stand:
Oilcode:			
Formulation/Stand Code:			

Date Completed:		Time Completed :	
Camshaft Serial Numbers		Cam, Left:	Cam, Right:
Cylinder Head Serial Numbers		Head, Left:	Head, Right:
Number of Runs	Block:	Left Head:	Right Head:

Sludge Deposits	
Area	**Merit**
Rocker Arm Cover, Left	
Rocker Arm Cover, Right	
Camshaft Baffle, Left	
Camshaft Baffle, Right	
Timing Chain Cover	
Oil Pan Baffle	
Oil Pan	
Valve Deck Area, Left	
Valve Deck Area, Right	
Average Engine Sludge	

Varnish Deposits	
Area	**Merit**
Piston Skirt, Thrust	
Rocker Arm Cover, Left	
Rocker Arm Cover, Right	
Average Engine Varnish	

Wear Measurements		
Ring Wear	**Units**	**Value**
Follower Pin Wear, cyl #8, Intake	µm	
Follower Pin Wear, cyl #8, Exhaust.	µm	
Ring Gap Increase, cyl #1 & #8, Max	µm	
Ring Gap Increase, cyl #1 & #8, Avg	µm	

Piston Varnish Deposits, Thrust Side	
Piston Number	**Merit**
1	
2	
3	
4	
5	
6	
7	
8	
Average	

Sequence VG
Form 6
Operational Summary

Laboratory:	Stand:	Stand Runs:	Total Runs on Stand:
Oilcode:			
Formulation/Stand Code:			

	Parameter	Units	QI Threshold	EOT QI	Target			Average			Samples	BQD	Over/Under Range
					Stage 1	Stage 2	Stage 3	Stage 1	Stage 2	Stage 3			
Controlled Parameters	Speed	r/min	**0.000**		**1200**	**2900**	**700**						
	Manifold Abs Press	kPa	**0.000**		**69**	**66**	**Record**						
	Engine Oil, In	°C	**0.000**		**68**	**100**	**45**						
	Engine Coolant, Out	°C	**0.000**		**57**	**85**	**45**						
	Engine Coolant Flow	L/min	**0.000**		**48**	**Record**	**Record**						
	Engine Coolant Pressure	kPa	**0.000**		**70**	**70**	**70**						
	RAC Coolant, In	°C	**0.000**		**29**	**85**	**29**						
	RAC Flow	L/min	**0.000**		**15**	**15**	**15**						
	Intake Air	°C	**0.000**		**30**	**30**	**30**						
	Intake Air Pressure	kPa	**0.000**		**0.05**	**0.05**	**0.05**						
	Intake Air Humidity	g/kg	**0.000**		**11.4**	**11.4**	**11.4**						
	Exhaust Backpressure	kPa	**0.000**		**104**	**107**	**Record**						
Non-controlled	**Parameter**		**Units**		**Specifications**								
	Fuel Flow		kg/h		Record	Record	Record						
	Blowby		L/min		Record	60-70							
	Power		kW		Record	Record	1.3 ± 0.2						
	Exhaust Gas												
	Lambda, Left Bank		AFR		1.0	1.0	0.75						
	Lambda, Right Bank		AFR		1.0	1.0	0.75						

Sequence VG
Form 7
Oil Addition Record & Blowby Rates
Non-Reference & Reference Oil Tests

Laboratory:	Stand:	Stand Runs:	Total Runs on Stand:
Oilcode:			
Formulation/Stand Code:			

Cycle	Test Hour	Oil Added, g	Oil Consumed, g
Total, g			

Stage II	
Test Hours	**Blowby, L/min**
Maximum	
Minimum	
Average Blowby, Hours 23 - 119	
Average	

Sequence VG
Form 8
Analysis of Oil

Laboratory:	Stand:	Stand Runs:	Total Runs on Stand:
Oilcode:			
Formulation/Stand Code:			

Test Hours	Ag, ppm	Al, ppm	Cr, ppm	Cu, ppm	Fe, ppm	Pb, ppm	Si, ppm	Sn, ppm	Fuel Dilution by GC, Wt.% D3525	Pentane Insolubles, Wt.% D893B[A]	TBN D4739[A]	Vis. @ 40°C, cSt D445	Vis. @ 100°C, cSt D445[A]

[A] Analyses not required by Test Method

Sequence VG
Form 9
Downtime Occurrences and Other Comments

Laboratory:	Stand:	Stand Runs:	Total Runs on Stand:
Oilcode:			
Formulation/Stand Code:			

Number of Downtime Occurrences			
Test Hours	Date	Downtime	Reasons
			Total Downtime

Other Comments		
Number of Comment Lines		

Sequence VG

Form 9A
Downtime Occurrences and Other Comments

Laboratory:	Stand:	Stand Runs:	Total Runs on Stand:
Oilcode:			
Formulation/Stand Code:			

Number of Downtime Occurrences		

Test Hours	Date	Downtime	Reasons
			Total Downtime

Other Comments		
Number of Comment Lines		

Sequence VG
Form 9B
Downtime Occurrences and Other Comments

Laboratory:	Stand:	Stand Runs:	Total Runs on Stand:
Oilcode:			
Formulation/Stand Code:			

Number of Downtime Occurrences			
Test Hours	Date	Downtime	Reasons
			Total Downtime

Other Comments		
Number of Comment Lines		

Sequence VG
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	

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)*

	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