

## Sequence VG Report Forms

**Version** VG VERSION 20040210 BETA

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

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

Test Number			
Stand: STAND	Runs Between Calibration Tests: STRUN	Total Runs on Stand: TOTSRUN	
Date Completed: DTCOMP	End of Test Time: EOTTIME		
Oil Code: OILCODE			
Formulation/Stand Code: FORM			
Alternate Codes:	ALTCODE1	ALTCODE2	ALTCODE3

In my opinion this test OPVALID 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 \_\_\_\_\_ SUBLAB  
Testing Laboratory

\_\_\_\_\_ SUBSIGIM  
Signature

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

\_\_\_\_\_ SUBTITLE  
Title

## **Form 2**

### **Sequence VG**

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**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, °C	68	100	45
Engine Coolant Out, °C	57	85	45
Engine Coolant Flow, L/min	48	Record	Record
Engine Coolant Pressure, kPa (gauge)	70	70	70
RAC Coolant In, °C	29	85	29
Rocker Cover Flow, L/min	15	15	15
Intake Air, °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: LAB	Stand: STAND	Stand Runs: STRUN	Total Runs on Stand: TOTSRUN
Oilcode: OILCODE			
Formulation/Stand Code: FORM			

Date Started: DTSTRT	Time Started: STRTTIME	SAE Viscosity: SAEVISC
Date Complete: DTCOMP	Time Complete: EOTTIME	Lab Engine Number: ENGINE
Test Length: TESTLEN	Fuel Batch: FUELBTID	
Industry Oil Code: IND	Nominal Piston Oversize: NOMPISO	

<b>Critical Parameters</b>						
	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	AES	RACS	AEVB	APV	OSCRNSLG	NHSCMPRG
Transformed Result					TRANOSCR	
Industry Correction Factor	AESCF	RACSCF	AEVBCF	APVCF	TOSCRCF	NHSRCF
Corrected Transformed Result					TOSCRCOR	
Severity Adjustment	AESSA	RACSSA	AEVBSA	APVSA	TOSCRSA	NHSRSA
Final Transformed Result					TOSCRFNL	
<b>Final Original Unit Result</b>	<b>AESFNL</b>	<b>RACSFNL</b>	<b>AEVBFNL</b>	<b>APVFNL</b>	<b>OSCRFNL</b>	<b>NHSRFNL</b>

<b>Clogging Information</b>		<b>Additional Information</b>	
Oil Screen Debris, % Area	OSCRNDEB	Number of Cold Stuck Rings	NCSCMPRG
Oil Ring Clogging, % Area	OILRING	Average Blowby Stage II, L/min	ACBLWRT2
PCV Valve @ 25 kPa, %	PCV25	Oil Consumption, grams	TOILCONS
PCV Valve @ 60 kPa, %	PCV60	Avg Follower Pin Wear, Cyl 8, Micrometers	ACFPIN

<b>Last Reference Oil Test Calibrating Stand Information – Fill Out For Non-reference Oil Tests Only</b>						
Stand: RSTAND			Total Runs on Test Stand RTOTSRU			
Oilcode: ROILCODE						
Industry Oil Code: RIND	Engine Number: RENGINE		SAE Viscosity: RSAEVISC	Date Completed: RDTCOMP		
Test Length: RTESTLE	Fuel Batch: RFUELBITD		Calibration Expiration Date: RDTCALX			
<b>Clogging Information</b>			<b>Additional Information</b>			
Oil Screen Debris, % Area	ROSCRDEB		Number of Cold Stuck Rings	RCSCMPRG		
Oil Ring Clogging, % Area	ROILRING		Average Blowby Stage II, L/min	RACBLWR2		
PCV Valve @ 25 kPa, %	RPCV25		Oil Consumption, grams	RTOILCON		
PCV Valve @ 60 kPa, %	RPCV60					
	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	RAESFNL	RRACSFNL	RAEVBFNL	RAPVFNL	ROSCRSLG	UHSCMPRC

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

Laboratory: LAB	Stand: STAND	Stand Runs: STRUN	Total Runs on Stand: TOTSRUN
Oilcode: OILCODE			
Formulation/Stand Code: FORM			

Date Completed: DTCOMP	Time Completed : EOTTIME	
Camshaft Serial Numbers	Cam, Left: CAMSNL	Cam, Right: CAMSNR
Cylinder Head Serial Numbers	Head, Left: HEADSNL	Head, Right: HEADSNR
Number of Runs	Block: BLOCKRUN	Left Head: HEADRUNL Right Head: HEADRUNR

<b>Sludge Deposits</b>	
<b>Area</b>	<b>Merit</b>
Rocker Arm Cover, Left	RACLSRT
Rocker Arm Cover, Right	RACRSRT
Camshaft Baffle, Left	CAMBSLRT
Camshaft Baffle, Right	CAMBRVRT
Timing Chain Cover	TCCSRT
Oil Pan Baffle	OILPBSRT
Oil Pan	OILPNSRT
Valve Deck Area, Left	VLVDSLRT
Valve Deck Area, Right	VLVDRSRT
<b>Average Engine Sludge</b>	<b>AES</b>

<b>Varnish Deposits</b>	
<b>Area</b>	<b>Merit</b>
Piston Skirt, Thrust	APV
Rocker Arm Cover, Left	CAMBLVRT
Rocker Arm Cover, Right	CAMBRVRT
<b>Average Engine Varnish</b>	<b>AEVB</b>

<b>Wear Measurements</b>		
<b>Ring Wear</b>	<b>Units</b>	<b>Value</b>
Follower Pin Wear, Cyl #8, Intake	µm	CFPIN8I
Follower Pin Wear, Cyl #8, Exhaust.	µm	CFPIN8E
Ring Gap Increase, Cyl #1 & #8, Max	µm	MXRGINC
Ring Gap Increase, Cyl #1 & #8, Avg	µm	ARGINC

<b>Piston Varnish Deposits, Thrust Side</b>	
<b>Piston Number</b>	<b>Merit</b>
1	PSVTH1
2	PSVTH2
3	PSVTH3
4	PSVTH4
5	PSVTH5
6	PSVTH6
7	PSVTH7
8	PSVTH8
<b>Average</b>	<b>APV</b>

**Sequence VG  
Form 6  
Operational Summary**

Laboratory: LAB	Stand: STAND	Stand Runs: STRUN	Total Runs on Stand: TOTSRUN
Oilcode: OILCODE			
Formulation/Stand Code: FORM			

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			
Speed	r/min	0.000	QRPM	1200	2900	700	ARPM1	ARPM2	ARPM3	NRPM	BRPM	ORPM
Manifold Abs Press	kPa	0.000	MANAF	69	66	Record	AMANABF	AMANABP	AMANABP	NMAP	BMAP	OMAP
Engine Oil, In	°C	0.000	ENGOI	68	100	45	AENGOIN1	AENGOIN2	AENGOIN3	NEOIN	BEOIN	OEOIN
Engine Coolant, Out	°C	0.000	COLOU	57	85	45	ACOLOUT	ACOLOUT	ACOLOUT	NCOUT	BCOUT	OCOUT
Engine Coolant Flow	L/min	0.000	COLFR	48	Record	Record	ACOLFRT1	ACOLFRT2	ACOLFRT3	NCFRT	BCFRT	OCFRT
Engine Coolant Pressure	kPa	0.000	COLPR	70	70	70	ACOLPRE1	ACOLPRE2	ACOLPRE3	NCPRE	BCPRE	OCPRE
RAC Coolant, In	°C	0.000	RACCT	29	85	29	ARACCTP1	ARACCTP2	ARACCTP3	NRACC	BRACC	ORACC
RAC Flow	L/min	0.000	RACCF	15	15	15	ARACCFR1	ARACCFR2	ARACCFR3	NRACF	BRACF	ORACF
Intake Air	°C	0.000	AINAIR	30	30	30	AINAIRT1	AINAIRT2	AINAIRT3	NINAT	BINAT	OINAT
Intake Air Pressure	kPa	0.000	AINAIRI	0.05	0.05	0.05	AINAIRP1	AINAIRP2	AINAIRP3	NINAP	BINAP	OINAP
Intake Air Humidity	g/kg	0.000	AIRHUI	11.4	11.4	11.4	AAIRHUM1	AAIRHUM2	AAIRHUM3	NAHUM	BAHUM	OAHUM
Exhaust Backpressure	kPa	0.000	EXBKP	104	107	Record	AEXBKPR1	AEXBKPR2	AEXBKPR3	NEXBP	BEXBP	OEXBP
<b>Parameter</b>	<b>Units</b>	<b>Threshold</b>	<b>EOT</b>	<b>Specifications</b>								
Fuel Flow	kg/h			Record	Record	Record	AFUELRT1	AFUELRT2	AFUELRT3			
Blowby	L/min			Record	60-70			ACBLWRT				
Power	kW			Record	Record	1.3 ± 0.2	APOWER1	APOWER2	APOWER3			
<b>Exhaust Gas</b>												
Lambda, Left Bank	AFR			1.0	1.0	0.75	LLAMBDA	LLAMBDA	LLAMBDA	LLAMBDA	LLAMBDA	LLAMBDA
Lambda, Right Bank	AFR			1.0	1.0	0.75	RLAMBDA	RLAMBDA	RLAMBDA	RLAMBDA	RLAMBDA	RLAMBDA

**Controlled Parameters**

**Non-**

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

Laboratory: LAB	Stand: STAND	Stand Runs: STRUN	Total Runs on Stand: TOTSRUN
Oilcode: OILCODE			
Formulation/Stand Code: FORM			

Cycle	Test Hour	Oil Added, g	Oil Consumed, g
CYC_R006	TSC_R006	OILAR006	OILCR006
CYC_R012	TSC_R012	OILAR012	OILCR012
CYC_R018	TSC_R018	OILAR018	OILCR018
CYC_R024	TSC_R024	OILAR024	OILCR024
CYC_R030	TSC_R030	OILAR030	OILCR030
CYC_R036	TSC_R036	OILAR036	OILCR036
CYC_R042	TSC_R042	OILAR042	OILCR042
CYC_R048	TSC_R048	OILAR048	OILCR048
CYC_R054	TSC_R054		OILCR054
<b>Total, g</b>		TOILADD	TOILCONS

<b>Stage II</b>	
<b>Test Hours</b>	<b>Blowby, L/min</b>
TSBBRK	BLBYBRK
TSB_H023	BLBYH023
TSB_H047	BLBYH047
TSB_H071	BLBYH071
TSB_H095	BLBYH095
TSB_H119	BLBYH119
TSB_H143	BLBYH143
TSB_H167	BLBYH167
TSB_H191	BLBYH191
TSB_H215	BLBYH215
<b>Maximum</b>	XCBLWRT2
<b>Minimum</b>	MCBLWRT2
<b>Average Blowby, Hours 23 - 119</b>	ABLW2120
<b>Average</b>	ACBLWRT2

**Sequence VG  
Form 8  
Analysis of Oil**

Laboratory: LAB	Stand: STAND	Stand Runs: STRUN	Total Runs on Stand: TOTSRUN
Oilcode: OILCODE			
Formulation/Stand Code: FORM			

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 <sup>A</sup>	TBN D4739 <sup>A</sup>	Vis. @ 40°C, cSt D445	Vis. @ 100°C, cSt D445 <sup>A</sup>
TSTNEW	AGWM	ALWM	CRWM	CUWM	FEWM	PBWM	SIWMI	SNWM			TBNNE	V40NE	V100NEW
TST_H024	AGWM	ALWM	CRWM	CUWM	FEWM	PBWM	SIWMI	SNWM	FUELHC		TBN_H	V40_H	V100H024
TST_H048	AGWM	ALWM	CRWM	CUWM	FEWM	PBWM	SIWMI	SNWM	FUELHC	PEN_H048	TBN_H	V40_H	V100H048
TST_H072	AGWM	ALWM	CRWM	CUWM	FEWM	PBWM	SIWMI	SNWM	FUELHC		TBN_H	V40_H	V100H072
TST_H096	AGWM	ALWM	CRWM	CUWM	FEWM	PBWM	SIWMI	SNWM	FUELHC	PEN_H096	TBN_H	V40_H	V100H096
TST_H120	AGWM	ALWM	CRWM	CUWM	FEWM	PBWM	SIWMI	SNWM	FUELH1		TBN_H	V40_H	V100H120
TST_H144	AGWM	ALWM	CRWM	CUWM	FEWM	PBWM	SIWMI	SNWM	FUELH1	PEN_H144	TBN_H	V40_H	V100H144
TST_H168	AGWM	ALWM	CRWM	CUWM	FEWM	PBWM	SIWMI	SNWM	FUELH1		TBN_H	V40_H	V100H168
TST_H192	AGWM	ALWM	CRWM	CUWM	FEWM	PBWM	SIWMI	SNWM	FUELH1	PEN_H192	TBN_H	V40_H	V100H192
TST_H216	AGWM	ALWM	CRWM	CUWM	FEWM	PBWM	SIWMI	SNWM	FUELH2	PEN_H216	TBN_H	V40_H	V100H216

<sup>A</sup> Analyses not required by Test Method

**Sequence VG  
Form 9  
Downtime Occurrences and Other Comments**

Laboratory: LAB	Stand: STAND	Stand Runs: STRUN	Total Runs on Stand: TOTSRUN
Oilcode: OILCODE			
Formulation/Stand Code: FORM			

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

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

## Sequence VG

### Form 9A

#### Downtime Occurrences and Other Comments

Laboratory: LAB	Stand: STAND	Stand Runs: STRUN	Total Runs on Stand: TOTSRUN
Oilcode: OILCODE			
Formulation/Stand Code: FORM			

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	

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

**Sequence VG  
Form 9B  
Downtime Occurrences and Other Comments**

Laboratory: LAB	Stand: STAND	Stand Runs: STRUN	Total Runs on Stand: TOTSRUN
Oilcode: OILCODE			
Formulation/Stand Code: FORM			

Number of Downtime Occurrences			DWNOCR	
Test Hours	Date	Downtime	Reasons	
DOWNR03	DDATR031	DTIMR031	DREAR031	
DOWNR03	DDATR032	DTIMR032	DREAR032	
DOWNR03	DDATR033	DTIMR033	DREAR033	
DOWNR03	DDATR034	DTIMR034	DREAR034	
DOWNR03	DDATR035	DTIMR035	DREAR035	
DOWNR03	DDATR036	DTIMR036	DREAR036	
DOWNR03	DDATR037	DTIMR037	DREAR037	
DOWNR03	DDATR038	DTIMR038	DREAR038	
DOWNR03	DDATR039	DTIMR039	DREAR039	
DOWNR04	DDATR040	DTIMR040	DREAR040	
DOWNR04	DDATR041	DTIMR041	DREAR041	
DOWNR04	DDATR042	DTIMR042	DREAR042	
DOWNR04	DDATR043	DTIMR043	DREAR043	
DOWNR04	DDATR044	DTIMR044	DREAR044	
DOWNR04	DDATR045	DTIMR045	DREAR045	
TOTLDOWN			Total Downtime	

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

**Sequence VG  
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

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 ESRQME No NORQME\*

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 YESNODEC\* 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*)

***Check the Appropriate Conclusion***

INCLUDE	Operational review of this test indicates that the results should be included in the Multiple Test Acceptance Criteria calculations.
DONOTINC	*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	
ACCCOMM1	
ACCCOMM2	
ACCCOMM3	
ACCCOMM4	

SUBSIGIM \_\_\_\_\_  
Signature

SUBDATE \_\_\_\_\_  
Date

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

SUBTITLE \_\_\_\_\_  
Title