Report On
Sequence IIIFVS Evaluation

Version IIIFVS VERSION 20070508 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 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 6984 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

Sequence IIIFVS
Form 2

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Sequence IIIFVS
Form 3

Summary of Test Method

The Sequence IIIFVS test is a fired-engine, dynamometer lubricant test for evaluating automotive engine oils for certain high-temperature performance characteristics, including oil thickening and oil consumption. 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 IIIFVS test utilizes a 1996 General Motors Powertrain 3800 Series II, water-cooled, 4 cycle, V-6 engine as the test apparatus. The Sequence IIIFVS 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 measured parts (pistons, camshaft, valve lifters, etc.) are replaced.

The Sequence IIIFVS test consists of a 10-minute operational check, followed by 80 hours of engine operation at moderately high speed, load, and temperature conditions. The 80-hour segment is broken down into eight 10-hour test segments. Following each 10-hour segment, and the 10-minute operational check, oil samples are drawn from the engine. The kinematic viscosities of the 10-hour segment samples are compared to the viscosity of the 10-minute sample to determine the viscosity increase of the test oil.

The Sequence IIIFVS test is operated at the following test states during the 80-hour portion of the test:

Parameter	**Set Point**
Engine Speed	3600 r/min
Engine Load	200 N·m
Oil Filter Block Temperature	155 °C
Coolant Outlet Temperature	122 °C
Fuel Pressure	365 kPa
Intake Air Temperature	27 °C
Intake Air Pressure	0.05 kPa
Intake Air Dew Point	16.1 °C
Exhaust Back Pressure	6 kPa
Engine Coolant Flow	160 L/min
Condenser Coolant Flow	10 L/min
Air-to-Fuel Ratio	15.0:1
Condenser Coolant Outlet Temperature	40 °C

Sequence IIIFVS
Form 4
Test Result Summary

Laboratory	LAB	Oilcode	OILCODE
Test Stand No.	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 Completed	DTCOMP	SAE Viscosity	SAEVISC
Time Completed	EOTTIME	TMC Oil Code[A]	IND
Test Length	TESTLEN		

	Viscosity Increase (%)	Oil Consumption (L)[B]
Original Units	PVIS	OILCON
Transformed Results[C]	TPVIS	
Industry Correction Factor	PVIS_CF	
Corrected Transformed Result	PVIS_COR	
Severity Adjustment	PVIS_SA	
Final Transformed Result	TPVISFNL	
Final Original Unit Result	PVISFNL	

Most Recent Stand Reference Oil Test History[D]			
Test Number	RTESTNUM		
Oilcode	ROILCODE		
Date Completed	RDTCOMP	TMC Oil Code	RIND
Final Viscosity Increase, %	RPVISFNL	Fuel Batch	RFUELBID

[A] Reference Oil Tests Only

[B] Test Hours at which Oil Consumption was calculated

[C] Percent Viscosity Increase Transformation is 1/SQRT(Viscosity Increase)

[D] Non-reference Oil Tests Only

Sequence IIIFVS
Form 5
Operational Summary

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

	Parameter	Units	QI Limit	EOT QI	Target	Average	Standard Deviation	Number of	
								Samples[A]	BQD[B]
Controlled Parameters	Speed	r/min	0.000	QRPM	3600	ARPM	SRPM	NRPM	BRPM
	Load	N·m	0.000	QLOAD	200	ALOAD	SLOAD	NLOAD	BLOAD
	Oil Filter Block	°C	0.000	QOTEMP	155.0	AOTEMP	SOTEMP	NOTEMP	BOTEMP
	Engine Coolant Out	°C	0.000	QCOLOUT	122.0	ACOLOUT	SCOLOUT	NCOLOUT	BCOLOUT
	Condenser Coolant Out	°C	0.000	QCCOLOUT	40.0	ACCOLOUT	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	QCOLFLO	160.0	ACOLFLO	SCOLFLO	NCOLFLO	BCOLFLO

	Parameter	Units	Average	Standard Deviation	Number of	
					Samples[A]	BQD[B]
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

Oil Consumption Data									
HOURS	Initial Run-in	TST_H010	TST_H020	TST_H030	TST_H040	TST_H050	TST_H060	TST_H070	TST_H080
LEVEL (ml) low	OILLINI	OILLH010	OILLH020	OILLH030	OILLH040	OILLH050	OILLH060	OILLH070	OILLH080

NO_X Measurement			
Hours	NOXHH007	NOXHH039	NOXHH079
NO_X, ppm	NOX_H007	NOX_H039	NOX_H079

[A] Total number of data points taken as determined from test length and procedural specified sampling rate.
[B] Number of Bad Quality Data points not used in the calculation of the statistical measures.

Sequence IIIFVS
Form 6
Used Oil Analysis Results

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

Viscosity Increase Data (cSt @ 40°C)			
Hours	**Viscosity[A]**	**Change**	**Percent**
New Oil	VNEW		
Initial[B]	VINI		
TST_H010	VIS_H010	DVISH010	PVISH010
TST_H020	VIS_H020	DVISH020	PVISH020
TST_H030	VIS_H030	DVISH030	PVISH030
TST_H040	VIS_H040	DVISH040	PVISH040
TST_H050	VIS_H050	DVISH050	PVISH050
TST_H060	VIS_H060	DVISH060	PVISH060
TST_H070	VIS_H070	DVISH070	PVISH070
TST_H080	VIS_H080	DVISH080	PVISH080
TESTLEN	VISEOT	DVISEOT	PVIS

[A] 8000 cSt is maximum allowable viscosity
[B] At end of leveling run

Results of ICP Analysis of Used Oil										
Test Hours	Initial	TST_H010	TST_H020	TST_H030	TST_H040	TST_H050	TST_H060	TST_H070	TST_H080	TESTLEN
Iron	FEWMINI	FEWMH01	FEWMH02	FEWMH03	FEWMH04	FEWMH05	FEWMH06	FEWMH07	FEWMH08	FEWMEO
Copper	CUWMIN	CUWMH0	CUWMH02	CUWMH0	CUWMH0	CUWMH0	CUWMH0	CUWMH0	CUWMH08	CUWMEO
Lead	PBWMINI	PBWMH01	PBWMH02	PBWMH03	PBWMH04	PBWMH05	PBWMH06	PBWMH07	PBWMH08	PBWMEO

Cold Crank Simulator Results, D5293	
Final Temperature, °C	CCSTEMP
Final Cold-Crank Simulator Viscosity, cP	CCS

Mini-Rotary Viscometer Results, D4684	
MRV Temperature, °C	MRVTEMP
MRV Result, cP	MRV
Yield Stress, Pa	YSTRESS

Sequence IIIFVS
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	BBYTH00	BBYTH00(	BBYTH01	BBYTH01(	BBYTH02	BBYTH02(	BBYTH03	BBYTH03	BBYTH04	BBYTH04
Blowby, L/min	BLWBH00	BLWBH00	BLWBH01	BLWBH01	BLWBH02	BLWBH02	BLWBH03	BLWBH03	BLWBH04	BLWBH04
Test Hours	BBYTH05	BBYTH05(	BBYTH06	BBYTH06(	BBYTH07	BBYTH07(	BBYTH07	**Average**		
Blowby, L/min	BLWBH05	BLWBH05	BLWBH06	BLWBH06	BLWBH07	BLWBH07	BLWBH07	ABLOBY		

Sequence IIIFVS
Form 8
Viscosity Increase Plot

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

VISINIM

Sequence IIIFVS
Form 9
Hardware Information

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

Build Completion Date	BUILDDT	Piston Batch (Code)	PISTBAT
Block Serial Number	BLOCKSN	Piston Size (Grade)	PISTSIZE
Crankshaft Serial Number	CRANKSN	Piston Ring Batch Code	RINGCODE
Camshaft Serial Number	CAMSN	Oil Filter Batch Code	OILFIBAT
Cylinder Head Serial Number, Left	LHEADSN	Intake Valve Seals Batch Code	INVSLBAT
Cylinder Head Serial Number, Right	RHEADSN	Valve Springs Batch Code	VALSPBAT
Bearing Kit Serial Number	BRNGSN	Top Ring Gap, mils	TRINGGAP
Connecting Rod Type (PMNS)	CRODTYPE	Bottom Ring Gap, mils	BRINGGAP

Sequence IIIFVS
Form 10
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		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) – Maximum allowable downtime: 24 hours

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

Sequence IIIFVS
Form 10A
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		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) – Maximum allowable downtime: 24 hours

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

Sequence IIIFVS
Form 11
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)

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 _____ SUBDATE _____

Signature Date

SUBNAME _____ SUBTITLE _____

Typed Name Title