Report On
Sequence IIIGA Evaluation

Version   IIIGA VERSION 20031114 BETA

Conducted For
TSTSPON1

TSTSPON2

LABVALID	**V** = Valid
	I = Invalid
	N = Results Cannot Be Interpreted As Representative Of Oil Perfromance (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 conducted in a valid manner in accordance with the latest draft of Sequence IIIGA procedure 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 IIIGA

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Form 3

Summary of Test Method

The Sequence IIIGA Test is a fired-engine, dynamometer lubricant test for generating a used oil sample to evaluate the low-temperature performance of automotive engine oils 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 IIIGA Test utilizes a 1996 General Motors Powertrain 3800 Series II, water-cooled, 4 cycle, V-6 engine as the test apparatus. The Sequence IIIGA 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 IIIGA 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 IIIGA 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 Completed	DTCOMP	SAE Viscosity	SAEVISC
Time Completed	EOTTIME	TMC Oil Code	IND
Test Length	TESTLEN		

Pass/Fail Results	
	Mini Rotary Viscometer Viscosity (cP)
Original Units	MRV
Transformed Results	TMRV
Industry Correction Factor	MRV_CF
Corrected Transformed	MRV_COR
Severity Adjustment	MRV_SA
Final Transformed Result	TMRVFNL
Final Original Unit Result	MRVFNL

Additional Results			
Oil Consumption Hours, h [B]	OCONHRS	Oil Consumption, L	OILCON

Most Recent Stand Reference Oil Test History[C]			
Test Number		RTESTNUM	
Oil Code	ROILCODE		
Date Completed		RDTCOMP	TMC Oil	RIND
Final Mini Rotary Viscometer Result, cP		RMRVFNL	Fuel Batch	RFUELBID

[A]Reference Oil Tests Only
[B]Test Hours at which Oil Consumption was calculated
[C]Non-Reference Oil Tests Only

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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 Threshol	EOT QI	Target	Average	Standard Deviation	Number of Samples	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	QCOLOUT	115.0	ACOLOUT	SCOLOUT	NCOLOUT	BCOLOUT
	Condenser Coolant Out	°C	0.000	QCCOLOU	40.0	ACCOLOU	SCCOLOU	NCCOLOU	BCCOLOU
	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	QCOLFLC	160.0	ACOLFLO	SCOLFLO	NCOLFLO	BCOLFLC

	Parameter	Units	Average	Standard Deviation	Number of Samples	BQD
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	OCONH020	OCONH040	OCONH060	OCONH080	OCONH100
Level (ml) low	OILLINI	OILLH020	OILLH040	OILLH060	OILLH080	OILLH100
Total Oil Consumed (L)		OILCH020	OILCH040	OILCH060	OILCH080	OILCH100

NO$_x$ Measurement			
Hours	NOXHH019	NOXHH049	NOXHH099
NO$_x$, ppm	NOX_H019	NOX_H049	NOX_H099

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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		

Cold Crank Simulator Results, D 5293	
Specified Temperature, ^{o}C	CCSTEMP
Cold-Crank Simulator Viscosity at Specified Temperature, cP	CCS

Mini-Rotary Viscometer Results, D 4684	
MRV Temperature, ^{o}C	MRVTEMP
MRV Result, cP	MRV
Yield Stress, Pa	YSTRESS

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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	BBYTH001	BBYTH006	BBYTH011	BBYTH016	BBYTH021	BBYTH026	BBYTH031	BBYTH036	BBYTH041	BBYTH046
Blowby, L/min.	BLWBH001	BLWBH006	BLWBH011	BLWBH016	BLWBH021	BLWBH026	BLWBH031	BLWBH036	BLWBH041	BLWBH046
Test Hours	BBYTH051	BBYTH056	BBYTH061	BBYTH066	BBYTH071	BBYTH076	BBYTH081	BBYTH086	BBYTH091	BBYTH096
Blowby, L/min.	BLWBH051	BLWBH056	BLWBH061	BLWBH066	BLWBH071	BLWBH076	BLWBH081	BLWBH086	BLWBH091	BLWBH096
Test Hours	BBYTH099	Average								
Blowby, L/min.	BLWBH099	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		

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		
Camshaft Batch Code	CAMBAT	Oil Cooler Batch Code	OILCLBAT		
Cylinder Head Serial Number, Left	LHEADSN	Valve Springs Batch Code	VALSPBAT		
Cylinder Head Serial Number, Right	RHEADSN		1	LFTR1SN	
Bearing Kit Serial Number	BRNGSN		2	LFTR2SN	
Top Ring Gap, mils	TRINGGAP		3	LFTR3SN	
Bottom Ring Gap, mils	BRINGGAP		4	LFTR4SN	
Intake Valve Seals Batch Code	INVSLBAT	Lifter Serial Number	5	LFTR5SN	
Exhaust Valve Seals Batch Code	EXVSLBAT		6	LFTR6SN	
Rocker Arm Batch Code	RARMBAT		7	LFTR7SN	
Connecting Rod Type (CAST or PM)	CRODTYPE		8	LFTR8SN	
			9	LFTR9SN	
			10	LFTR10SN	
			11	LFTR11SN	
			12	LFTR12SN	

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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	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 IIIGA

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		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	

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 <u>ESRQME</u>   No<u>ORQME</u> *

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 <u>YESFULL</u>   No <u>NOFULL</u> *

     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 <u>YESNODEC</u> *   No <u>NONODEC</u>

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 <u>YESDEV</u> *   No <u>NODEV</u> *(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
_____

Signature

SUBNAME
_____

Typed Name

SUBDATE
_____

Date

SUBTITLE
_____

Title