

**Sequence III F  
Test Report**

Version III F VERSION 20030624

Conducted For

CC  
CC

C	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

CC	NR = Non-reference oil
	RO = Reference oil

<b>Test Number</b>					
Test Stand	CCCC	Stand Test Number	CCCC	Lab Run Number	CCCC
Oil Code:	CC				
Formulation/Stand Code	CC-CCCCCCCCCC-C-C-CCCCCC-CC-CC-CCCC				
Alternate Codes	CCCCCCCCCCCCCCCC	CCCCCCCCCCCCCCCC	CCCCCCCCCCCCCCCC	CCCCCCCCCCCCCCCC	CCCCCCCCCCCCCCCC
EOT Date	YYYYMMDD	EOT Time	HH:MM		

In my opinion this test CCCCCC been conducted in a valid manner in accordance with ASTM Test Method D 6984 and the appropriate amendments through the Information Letter System. The remarks included in this report describe anomalies associated with this test.
--

Submitted By:

\_\_\_\_\_  
CC

Testing Laboratory

Signature Image

\_\_\_\_\_  
Signature

\_\_\_\_\_  
CC

Typed Name

\_\_\_\_\_  
CC

Title

**Sequence IIIF  
Form 2**

Table of Contents

1.	Title / Validity Declaration Page	Form 1
2.	Table of Contents	Form 2
3.	Summary of Test Method	Form 3
4.	Test Result Summary	Form 4
5.	Operational Summary	Form 5
6.	Used Oil Analysis	Form 6
7.	Valve Lifter and Camshaft Wear Results	Form 7
8.	Summary of Oil Ring Land Deposit Rating	Form 8
9.	Summary of Piston Deposits	Form 9
10.	Blowby Values & Plot	Form 10
11.	Viscosity Increase Plot	Form 11
12.	Hardware Information	Form 12
13.	Downtime & Outlier Report Form	Form 13
14.	ACC Conformance Statement	Form 14

**Sequence IIIF  
Form 3**

Summary of Test Method

The Sequence IIIF Test is a fired-engine, dynamometer lubricant test for evaluating automotive engine oils for certain high-temperature performance characteristics, including oil thickening, varnish deposition, oil consumption, and engine wear. 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 IIIF Test utilizes a 1996 General Motors Powertrain 3800 Series II, water-cooled, 4 cycle, V-6 engine as the test apparatus. The Sequence IIIF 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 IIIF 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 IIIF Test is operated at the following test states during the 80-hour portion of the test:

<b>Parameter</b>	<b>Set Point</b>
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 III F  
Form 4**

**Test Result Summary**

Laboratory	CC	Oilcode	CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
Test Stand No.	CCCCC	Test No.	CCCCC – CCCC – CCCCC
Laboratory Oil Code	CCCCCCCCCCCCCCCCCCCC		
Formulation Stand Code	CC-CCCCCCCCC-C-C-CCCCC-CC-CC-CCCC		

Date Started	YYYYMMDD	Engine No.	CCCCCCCCCCCCCCCC
Time Started	HH:MM	Fuel Batch	CCCCCCCCCCCCCCCC
Date Completed	YYYYMMDD	SAE Viscosity	CCCCCC
Time Completed	HH:MM	TMC Oil Code <sup>A</sup>	CCCCCC
Test Length	S1234		

<b>Pass/Fail Results</b>						
	Viscosity Increase (%)	Screened Average Cam + Lifter Wear (µm)	Average Weighted Piston Deposits (merits)	Average Piston Skirt Varnish (merits)	Number of Hot Stuck Rings	Oil Consumption (L) <sup>B</sup>
Original Units	S1234.12	S1234.1	S12.12	S12.12	S12	S12.12
Transformed Results	S12.123456					
Industry Correction Factor	S12.123456	S1.1234	S1.1234	S1.1234		
Corrected Transformed Result	S12.123456					
Severity Adjustment	S12.123456		S1.1234	S1.1234		
Final Transformed Result	S12.123456					
Final Original Unit Result	S1234.1	S1234.1	S12.12	S12.12		

<b>Additional Results</b>			
Oil Consumption Hours, h	S12	Average Oil Ring Plugging, %	S1234
Maximum Cam + Lifter Wear, µm	S12345	Number of Cold-Stuck Rings	S12
Average Cam + Lifter Wear, µm	S1234.1		

<b>Most Recent Stand Reference Oil Test History<sup>C</sup></b>			
Test Number	CCCCC – CCCC – CCCCC		
Oilcode	CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC		
Date Completed	YYYYMMDD	TMC Oil Code	CCCCCC
Final Viscosity Increase, %	S1234.1	Fuel Batch	CCCCCCCCCCCCCCCC
Final Average Piston Skirt Varnish, merits	S12.12		
Final Screened Average Cam + Lifter Wear, µm	S123.1		
Final Maximum Cam + Lifter Wear, µm	S12345		
Final Average Weighted Piston Deposit, merits	S12.12		

<sup>A</sup> Reference Oil Tests Only

<sup>B</sup> Test Hours at which Oil Consumption was calculated

<sup>C</sup> Non-reference Oil Tests Only

**Sequence III F**

**Form 5**

**Operational Summary**

Laboratory	CC	Oilcode	CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
Test Stand No.	CCCCC	Test No.	CCCCC – CCCC – CCCCC
Laboratory Oil Code	CCCCCCCCCCCCCCCCCCCC		
Formulation Stand Code	CC-CCCCCCCCC-C-C-CCCCC-CC-CC-CCCC		

Controlled Parameters	Parameter	Units	QI Limit	EOT QI	Target	Average	Standard Deviation	Number of	
								Samples <sup>A</sup>	BQD <sup>B</sup>
	Speed	r/min	0.000	S12.123	3600	S12345	S12.123	S12345	S12345
	Load	N·m	0.000	S12.123	200	S12345	S12.123	S12345	S12345
	Oil Filter Block	°C	0.000	S12.123	155.0	S12345	S12.123	S12345	S12345
	Engine Coolant Out	°C	0.000	S12.123	122.0	S123.1	S12.123	S12345	S12345
	Condenser Coolant Out	°C	0.000	S12.123	40.0	S123.1	S12.123	S12345	S12345
	Left Air-to-Fuel Ratio	-	0.000	S12.123	15.0	S12.1	S12.123	S12345	S12345
	Right Air-to-Fuel Ratio	-	0.000	S12.123	15.0	S12.1	S12.123	S12345	S12345
	Left Exhaust Back Pressure	kPa	0.000	S12.123	6.0	S1.12	S12.123	S12345	S12345
	Right Exhaust Back Pressure	kPa	0.000	S12.123	6.0	S1.12	S12.123	S12345	S12345
	Intake Air	kPa	0.000	S12.123	0.05	S1.12	S12.123	S12345	S12345
	Engine Coolant Flow	L/min	0.000	S12.123	160.0	S123.1	S12.123	S12345	S12345

Non-controlled Parameters	Parameter	Units	Average	Standard Deviation	Number of	
					Samples <sup>A</sup>	BQD <sup>B</sup>
	Oil Sump	°C	S123.1	S12.123	S12345	S12345
	Pump Outlet Pressure	kPa	S123.1	S12.123	S12345	S12345
	Gallery Pressure	kPa	S1234	S12.123	S12345	S12345
	Engine Coolant In	°C	S1234	S12.123	S12345	S12345
	Fuel Inlet	°C	S12.123	S12345	S12345	S12345
	Intake Air	°C	S123.1	S12.123	S12345	S12345
	Intake Air Dew Point	°C	S12345	S12.123	S12345	S12345
	Intake Vacuum	kPa	S12345	S12.123	S12345	S12345
	Crankcase	kPa	S1.123	S12.123	S12345	S12345
	Fuel Pressure	kPa	S1234	S12.123	S12345	S12345

Oil Consumption Data									
HOURS	Initial Run-in	S12	S12	S12	S12	S12	S12	S12	S12
LEVEL (ml) low	S123	S123	S123	S123	S123	S123	S123	S123	S123

NO <sub>x</sub> Measurement			
Hours	S12	S12	S12
NO <sub>x</sub> , ppm	S12345	S12345	S12345

**Sequence III F  
Form 6**

**Used Oil Analysis Results**

Laboratory	CC	Oilcode	CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
Test Stand No.	CCCCC	Test No.	CCCCC – CCCC – CCCCC
Laboratory Oil Code	CCCCCCCCCCCCCCCCCCCC		
Formulation Stand Code	CC-CCCCCCCCC-C-C-CCCCC-CC-CC-CCCC		

<b>Viscosity Increase Data (cSt @ 40°C)</b>			
<b>Hours</b>	<b>Viscosity<sup>A</sup></b>	<b>Change</b>	<b>Percent</b>
New Oil	S1234.12		
Initial <sup>B</sup>	S1234.12		
S12	S1234.12	S1234.12	S1234.12
S12	S1234.12	S1234.12	S1234.12
S12	S1234.12	S1234.12	S1234.12
S12	S1234.12	S1234.12	S1234.12
S12	S1234.12	S1234.12	S1234.12
S12	S1234.12	S1234.12	S1234.12
S12	S1234.12	S1234.12	S1234.12
S12	S1234.12	S1234.12	S1234.12
S1234	S1234.12	S1234.12	S1234.12

<sup>A</sup> 8000 cSt is maximum allowable viscosity

<sup>B</sup> At end of leveling run

<b>Results of ICP Analysis of Used Oil</b>										
Test Hours	Initial	S12	S12	S12	S12	S12	S12	S12	S12	S1234
Iron	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA
Copper	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA
Lead	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA

<b>Cold Crank Simulator Results, D5293</b>	
Final Temperature, °C	AAA
Final Cold-Crank Simulator Viscosity, cP	AAAAAA

<b>Mini-Rotary Viscometer Results, D4684</b>	
MRV Temperature, °C	AAA
MRV Result, cP	AAAAAA
Yield Stress, cP	AAAA

**Sequence III F  
Form 7**

**Valve Lifter and Camshaft Wear Results**

Laboratory	CC	Oilcode	CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC		
Test Stand No..	CCCCC	Test No.	CCCCC	–	CCCC – CCCCC
Laboratory Oil Code	CCCCCCCCCCCCCCCCCCCC				
Formulation Stand Code	CC-CCCCCCCCC-C-C-CCCCC-CC-CC-CCCC				

Number	Camshaft Lobe, $\mu\text{m}$	Valve Lifter, $\mu\text{m}$	Cam & Lifter Wear, $\mu\text{m}$
1	S1234	S1234	S1234
2	S1234	S1234	S1234
3	S1234	S1234	S1234
4	S1234	S1234	S1234
5	S1234	S1234	S1234
6	S1234	S1234	S1234
7	S1234	S1234	S1234
8	S1234	S1234	S1234
9	S1234	S1234	S1234
10	S1234	S1234	S1234
11	S1234	S1234	S1234
12	S1234	S1234	S1234
<b>Maximum</b>	S1234	S1234	S12345
<b>Minimum</b>	S1234	S1234	S12345
<b>Average</b>	S1234	S1234	S1234.1
<b>Screened Average Cam + Lifter Wear<sup>A</sup></b>			S1234.1

<sup>A</sup> Average Cam + Lifter Wear based on ten positions, excluding the minimum and maximum positions.

**Sequence III F  
Form 8**

**Summary Of Oil Ring Land Deposit Ratings**

Laboratory	CC	Oilcode	CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
Test Stand No.	CCCCC	Test No.	CCCCC – CCCC – CCCCC
Laboratory Oil Code	CCCCCCCCCCCCCCCCCCCC		
Formulation Stand Code	CC-CCCCCCCCC-C-C-CCCCC-CC-CC-CCCC		
Rater	CCC	Rating Date	YYYYMMDD

<b>Piston</b>	<b>Oil Ring Land Deposit Rating, Merits</b>	<b>% Chipped</b>
1	S12.12	S1234
2	S12.12	S1234
3	S12.12	S1234
4	S12.12	S1234
5	S12.12	S1234
6	S12.12	S1234
<b>Average</b>	S12.12	S1.12

<b>Piston</b>	<b>% Oil Ring Plugging</b>	<b>Ring Sticking <sup>A</sup></b>	
		<b>Hot-Stuck Rings</b>	<b>Cold-Stuck Rings</b>
1	S1234	CCC	CCC
2	S1234	CCC	CCC
3	S1234	CCC	CCC
4	S1234	CCC	CCC
5	S1234	CCC	CCC
6	S1234	CCC	CCC
<b>Total</b>		S12	S12
<b>Average</b>	S1234		

<sup>A</sup> Possible values: T = top compression ring  
 B = bottom compression ring  
 O = oil ring  
 N = none



**Sequence III F  
Form 9**

**Summary Of Piston Deposits**

Laboratory	CC	Oilcode	CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
Test Stand No.	CCCCC	Test No.	CCCCC – CCCC – CCCCC
Laboratory Oil Code	CCCCCCCCCCCCCCCCCCCC		
Formulation Stand Code	CC-CCCCCCCCC-C-C-CCCCC-CC-CC-CCCC		
Rater	CCC	Rating Date	YYYYMMDD

**Note: CRC Manual 20 used for all ratings.**

Note: These are all unweighted ratings.

	Grooves, merits			Lands, merits		Undercrown, merits
	1	2	3	2	3	
Piston 1	S12.12	S12.12	S12.12	S12.12	S12.12	S12.12
Piston 2	S12.12	S12.12	S12.12	S12.12	S12.12	S12.12
Piston 3	S12.12	S12.12	S12.12	S12.12	S12.12	S12.12
Piston 4	S12.12	S12.12	S12.12	S12.12	S12.12	S12.12
Piston 5	S12.12	S12.12	S12.12	S12.12	S12.12	S12.12
Piston 6	S12.12	S12.12	S12.12	S12.12	S12.12	S12.12
WF	0.05	0.10	0.20	0.15	0.30	0.10

Note: These are all unweighted ratings.

	Piston Skirt Varnish, merits		
	Thrust	Anti-Thrust	Average
Piston 1	S12.12	S12.12	S1.12
Piston 2	S12.12	S12.12	S1.12
Piston 3	S12.12	S12.12	S1.12
Piston 4	S12.12	S12.12	S1.12
Piston 5	S12.12	S12.12	S1.12
Piston 6	S12.12	S12.12	S1.12
Average	S12.12	S12.12	S12.12
WF			0.10

	Total Weighted Deposits, merits
Piston 1	S12.12
Piston 2	S12.12
Piston 3	S12.12
Piston 4	S12.12
Piston 5	S12.12
Piston 6	S12.12

<b>Average Weighted Piston Deposits, merits</b>	S12.12
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**Sequence III  
Form 10**

**Blowby Values & Plot**

Laboratory	CC	Oilcode	CC							
Test Stand No.	CCCC	Test No.	CCCC	–	CCCC	–	CCCC	–	CCCC	
Laboratory Oil Code	CCCCCCCCCCCCCCCCCCCC									
Formulation Stand Code	CC-CCCCCCCCC-C-C-CCCCC-CC-CC-CCCC									

Blowby Plot



<b>Test Hours</b>	S12	S12	S12	S12	S12	S12	S12	S12	S12	S12
<b>Blowby, L/min</b>	S12.1	S12.1	S12.1	S12.1	S12.1	S12.1	S12.1	S12.1	S12.1	S12.1
<b>Test Hours</b>	S12	S12	S12	S12	S12	S12	S12			<b>Average</b>
<b>Blowby, L/min</b>	S12.1	S12.1	S12.1	S12.1	S12.1	S12.1	S12.1			S12.1



**Sequence III F  
Form 12**

**Hardware Information**

Laboratory	CC	Oilcode	CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
Test Stand No.	CCCCC	Test No.	CCCCC – CCCC – CCCCC
Laboratory Oil Code	CCCCCCCCCCCCCCCCCCCC		
Formulation Stand Code	CC-CCCCCCCCC-C-C-CCCCC-CC-CC-CCCC		

Build Completion Date	YYYYMMDD	Piston Batch (Code)	CCCCC	
Block Serial Number	CCCCCC	Piston Size (Grade)	CC	
Crankshaft Serial Number	CCCCC	Piston Ring Batch Code	CCCCC	
Camshaft Serial Number	CCCCCC	Oil Filter Batch Code	CCCCC	
Cylinder Head Serial Number, Left	CCCCCCCCC	Intake Valve Seals Batch Code	CCCCC	
Cylinder Head Serial Number, Right	CCCCCCCCC	Valve Springs Batch Code	CCCCC	
Bearing Kit Serial Number	CCCCCC	Lifter Serial Number	Lifter Position 1	CCCCCCCC
Top Ring Gap, mils	S12		Lifter Position 2	CCCCCCCC
Bottom Ring Gap, mils	S12		Lifter Position 3	CCCCCCCC
Connecting Rod Type (CAST or PM)	CCCC		Lifter Position 4	CCCCCCCC
			Lifter Position 5	CCCCCCCC
			Lifter Position 6	CCCCCCCC
			Lifter Position 7	CCCCCCCC
			Lifter Position 8	CCCCCCCC
			Lifter Position 9	CCCCCCCC
			Lifter Position 10	CCCCCCCC
			Lifter Position 11	CCCCCCCC
			Lifter Position 12	CCCCCCCC







**Sequence IIF  
Form 14  
American Chemistry Council Code Of Practice  
Test Laboratory Conformance Statement**

Test Laboratory	CC				
Test Sponsor	CC				
Formulation / Stand Code	CC-CCCCCCCCC-C-C-CCCCC-CC-CC-CCCC				
Test Number	CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC				
Start Date	YYYYMMDD	Start Time	HH:MM	Time Zone	CCC

***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  C  No  C  \*

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  C  No  C  \*

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  C  \* No  C

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  C  \* No  C  (*This currently applies only to specific deviations identified in the ASTM Information Letter System*)

***Check The Appropriate Conclusion***

C	Operational review of this test indicates that the results should be included in the Multiple Test Acceptance Criteria calculations.
C	*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.*

<i>Comments</i>
CC
CC
CC
CC

Signature Image \_\_\_\_\_

YYYYMMDD \_\_\_\_\_

Signature \_\_\_\_\_

Date \_\_\_\_\_

CC

CC

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

Title \_\_\_\_\_