Sequence IIIFHD
Test Report

Version IIIFHD VERSION 20030711

Conducted For

CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC

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

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

In my opinion this test CCCCCCC been conducted in a valid manner in accordance with the latest draft of the Sequence IIIFHD procedure and the appropriate amendments through the Information Letter System. The remarks included in this report describe anomalies associated with this test.

Submitted By:

CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
Testing Laboratory

Signature Image
Signature

CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
Typed Name

CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
Title

Sequence IIIFHD
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.	Blowby Values & Plot	Form 7
8.	Viscosity Increase Plot	Form 8
9.	Hardware Information	Form 9
10.	Downtime & Outlier Report Form	Form 10
11.	ACC Conformance Statement	Form 11

Sequence IIIFHD
Form 3

Summary of Test Method

The Sequence IIIFHD 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 IIIFHD Test utilizes a 1996 General Motors Powertrain 3800 Series II, water-cooled, 4 cycle, V-6 engine as the test apparatus. The Sequence IIIFHD 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 IIIFHD Test consists of a 10-minute operational check, followed by 60 hours of engine operation at moderately high speed, load, and temperature conditions. The 60-hour segment is broken down into six 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 IIIFHD Test is operated at the following test states during the 60-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 IIIFHD
Form 4

Test Result Summary

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

Date Started	YYYYMMDD	Engine No.	CCCCCCCCCCCCCCC
Time Started	HH:MM	Fuel Batch	CCCCCCCCCCCCCCC
Date Completed	YYYYMMDD	SAE Viscosity	CCCCCCC
Time Completed	HH:MM	TMC Oil Code[A]	CCCCCC
Test Length	S1234		

Pass/Fail Results	
	Viscosity Increase (%)
Original Units	S1234.12
Transformed Results	S12.123456
Industry Correction Factor	S12.123456
Corrected Transformed Result	S12.123456
Severity Adjustment	S12.123456
Final Transformed Result	S12.123456
Final Original Unit Result	S1234.1

Additional Results			
Oil Consumption Hours, h [B]	S12	Oil Consumption (L)	S12.12

Most Recent Stand Reference Oil Test History[C]			
Test Number	CCCCC – CCCC – CCCCC		
Oilcode	CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC		
Date Completed	YYYYMMDD	TMC Oil Code	CCCCCC
Final Viscosity Increase, %	S1234.1	Fuel Batch	CCCCCCCCCCCCCCC

[A] Reference Oil Tests Only

[B] Test Hours at which Oil Consumption was calculated

[C] Non-reference Oil Tests Only

Sequence IIIFHD
Form 5

Operational Summary

Laboratory	CC	Oilcode	CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
Test Stand No.	CCCCC	Test No.	CCCCC – CCCC – CCCCC
Laboratory Oil Code	CCCCCCCCCCCCCCCCCCCCC		
Formulation Stand Code	CC-CCCCCCCCCC-C-C-CCCCCC-CC-CC-CCCCC		

	Parameter	Units	QI Limit	EOT QI	Target	Average	Standard Deviation	Number of Samples[A]	Number of BQD[B]
Controlled Parameters	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

	Parameter	Units	Average	Standard Deviation	Number of Samples[A]	Number of BQD[B]
Non-controlled Parameters	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	S12345	S12.123	S12345	S12345
	Intake Air	°C	S12345	S12.123	S12345	S12345
	Intake Air Dew Point	°C	S123.1	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
LEVEL (ml) low	S123	S123	S123	S123	S123	S123	S123

NOx Measurement		
Hours	S12	S12
NO_X, ppm	S12345	S12345

Sequence IIIFHD
Form 6

Used Oil Analysis Results

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

Viscosity Increase Data (cSt @ 40°C)			
Hours	**Viscosity[A]**	**Change**	**Percent**
New Oil	S1234.12		
Initial[B]	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

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

Results of ICP Analysis of Used Oil								
Test Hours	Initial	S12	S12	S12	S12	S12	S12	S1234
Iron	AAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA
Copper	AAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA
Lead	AAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA

Sequence IIIFHD
Form 7

Blowby Values & Plot

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

Blowby Plot

CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC

Test Hours	S12	S12	S12	S12	S12	S12	S12	S12	S12	S12
Blowby, L/min	S12.1	S12.1	S12.1	S12.1	S12.1	S12.1	S12.1	S12.1	S12.1	S12.1
Test Hours	S12	S12								**Average**
Blowby, L/min	S12.1	S12.1								S12.1

Sequence IIIFHD
Form 8

Viscosity Increase Plot

Laboratory	CC	Oilcode	CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
Test Stand No.	CCCCC	Test No.	CCCCC – CCCC – CCCCC
Laboratory Oil Code	CCCCCCCCCCCCCCCCCCCCC		
Formulation Stand Code	CC-CCCCCCCCCC-C-C-CCCCCC-CC-CC-CCCCC		

CCCCCCCCCCCCCCCCCCCC

Sequence IIIFHD
Form 9

Hardware Information

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

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	CCCCCCC	Oil Filter Batch Code	CCCCC
Cylinder Head Serial Number, Left	CCCCCCCCCCC	Intake Valve Seals Batch Code	CCCCC
Cylinder Head Serial Number, Right	CCCCCCCCCCC	Valve Springs Batch Code	CCCCC
Bearing Kit Serial Number	CCCCCC		
Top Ring Gap, mils	S12		
Bottom Ring Gap, mils	S12		

Sequence IIIFHD
Form 10

Downtime & Outlier Report Form

Lab	CC	Oil Code	CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
Stand	CCCCC	Test No.	CCCCC -- CCCC -- CCCCC
Laboratory Oil Code		CCCCCCCCCCCCCCCCCCCC	
Formulation Stand Code		CC-CCCCCCCCCC-C-C-CCCCCC-CC-CC-CCCCC	

Number of Downtime Occurrences		S1	
Test Hours	**Date**	**Downtime**	**Reasons**
CCCCCC	CCCCCCCC	CCCCCC	CCCCCCCCCCCCCCCCCCCC

Sequence IIIFHD
Form 10A

Downtime & Outlier Report Form

Lab	CC	Oil Code	CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
Stand	CCCCC	Test No.	CCCCC -- CCCC -- CCCCC
Laboratory Oil Code		CCCCCCCCCCCCCCCCCCCC	
Formulation Stand Code		CC-CCCCCCCCCC-C-C-CCCCCC-CC-CC-CCCCC	

Number of Downtime Occurrences			S1
Test Hours	**Date**	**Downtime**	**Reasons**
CCCCCC	CCCCCCCC	CCCCCC	CCCCCCCCCCCCCCCCCCCC

Sequence IIIFHD
Form 10B

Downtime & Outlier Report Form

Lab	CC	Oil Code	CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
Stand	CCCCC	Test No.	CCCCC -- CCCC -- CCCCC
Laboratory Oil Code		CCCCCCCCCCCCCCCCCCCCC	
Formulation Stand Code		CC-CCCCCCCCCC-C-C-CCCCCC-CC-CC-CCCCC	

Number of Downtime Occurrences		S1	
Test Hours	**Date**	**Downtime**	**Reasons**
CCCCCC	CCCCCCCC	CCCCCC	CCCCCCCCCCCCCCCCCCCC

Sequence IIIFHD
Form 11
American Chemistry Council Code Of Practice
Test Laboratory Conformance Statement

Test Laboratory	CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC				
Test Sponsor	CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC				
Formulation / Stand Code	CC-CCCCCCCCCC-C-C-CCCCCC-CC-CC-CCCCC				
Test Number	CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC				
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.*

Comments
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC

Signature Image
Signature

YYYYMMDD
Date

CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
Typed Name

CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
Title