REPORT ON
SEQUENCE IIIFHD EVALUATION

VERSION *20020725*

CONDUCTED FOR

	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

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

Test Number					
Test Stand		Stand Test Number		Lab Test Number	
Oil Code					
Formulation/Stand Code					
Alternate Codes					
EOT Date		EOT Time			

In my opinion this test been conducted in a valid manner in accordance with the latest draft of Sequence IIIF-HD 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: _____

Testing Laboratory

_____

Signature

_____

Typed Name

_____

Title

Form 2

Sequence IIIFHD

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

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 multiviscosity grade oils that are used in spark-ignition, gasoline-fueled engines, as well as diesel engines.

The Sequence IIIFHD Test utilizes a 1996 model Buick 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 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
Breather Tube Coolant Flow	10 L/min
Air-to-Fuel Ratio	15.0:1
Breather Tube Coolant Outlet Temperature	40 ˚C

SEQUENCE IIIFHD
FORM 4
TEST RESULT SUMMARY

LAB		OIL CODE	
TEST STAND NO.		TEST NO.	- -
LABORATORY OIL CODE			
FORMULATION STAND CODE			

DATE STARTED		ENGINE NO.	
TIME STARTED		FUEL BATCH	
DATE COMPLETED		SAE VISCOSITY	
TIME COMPLETED		TMC OIL CODE [A]	
TEST LENGTH			

Pass/Fail Results	
	Viscosity Increase (%)
Original Units	
Transformed Results	
Industry Correction Factor	
Corrected Transformed Result	
Severity Adjustment	
Final Transformed Result	
Final Original Unit Result	

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

Most Recent Stand Reference Oil Test History [C]			
Test Number	-		
Oilcode			
Date Completed		TMC Oil Code	
Final Viscosity Increase, %		Fuel Batch	

[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

LAB		OIL CODE	
TEST STAND NO.		TEST NO.	- -
LABORATORY OIL CODE			
FORMULATION STAND CODE			

	Parameter	Units	QI Threshold	EOT QI	Target	Average	Standard Deviation	Number Of	
								Samples	BQD
Controlled Parameters	Speed	r/min	0.000		3600				
	Load	Nm	0.000		200				
	Oil Filter Block	˚C	0.000		155.0				
	Engine Coolant Out	˚C	0.000		122.0				
	Condenser Coolant Out	˚C	0.000		40.0				
	Left Air-to-Fuel Ratio		0.000		15.0				
	Right Air-to-Fuel Ratio		0.000		15.0				
	Left Exhaust Back Pressure	kPa	0.000		6.0				
	Right Exhaust Back Pressure	kPa	0.000		6.0				
	Intake Air	kPa	0.000		0.05				
	Engine Coolant Flow	L/min	0.000		160.0				

	Parameter	Units	Average	Standard Deviation	Number Of	
					Samples	BQD
Non-controlled Parameters	Oil Sump	˚C				
	Pump Outlet Pressure	kPa				
	Gallery Pressure	kPa				
	Engine Coolant In	˚C				
	Fuel Inlet	˚C				
	Intake Air	˚C				
	Intake Air Dew Point	˚C				
	Intake Vacuum	kPa				
	Crankcase	kPa				
	Fuel Pressure	kPa				

OIL CONSUMPTION DATA							
HOURS	Initial Run-in						
LEVEL (ml) low							

NO_x Measurement		
Hours		
NO_x, ppm		

SEQUENCE IIIFHD
FORM 6
USED OIL ANALYSIS RESULTS

LAB		OIL CODE	
TEST STAND NO.		TEST NO.	- -
LABORATORY OIL CODE			
FORMULATION STAND CODE			

VISCOSITY INCREASE DATA (cSt AT 40˚C)			
HOURS	VISCOSITY [A]	CHANGE	PERCENT
NEW OIL			
INITIAL [B]			

[A] 8000 cSt is maximum allowable viscosity

[B] At end of leveling run

Results of ICP Analysis of Used Oil								
Test Hours	Initial							
Iron								
Copper								
Lead								

SEQUENCE IIIFHD
FORM 7
BLOWBY VALUES & PLOT

LAB		OIL CODE	
TEST STAND NO.		TEST NO.	- -
LABORATORY OIL CODE			
FORMULATION STAND CODE			

Blowby Plot

Test Hours										
Blowby, L/min.										
Test Hours										Average
Blowby, L/min.										

SEQUENCE IIIFHD
FORM 8
VISCOSITY INCREASE PLOT

LAB		OIL CODE	
TEST STAND NO.		TEST NO.	- -
LABORATORY OIL CODE			
FORMULATION STAND CODE			

SEQUENCE IIIFHD
FORM 9
HARDWARE INFORMATION

LAB		OIL CODE	
TEST STAND NO.		TEST NO.	- -
LABORATORY OIL CODE			
FORMULATION STAND CODE			

Build Completion Date		Piston Batch (Code)	
Block Serial Number		Piston Size (Grade)	
Crankshaft Serial Number		Piston Ring Batch Code	
Camshaft Serial Number		Oil Filter Batch Code	
Cylinder Head Serial Number, Left		Intake Valve Seals Batch Code	
Cylinder Head Serial Number, Right		Valve Springs Batch Code	
Bearing Kit Serial Number			
Top Ring Gap, mils			
Bottom Ring Gap, mils			

SEQUENCE IIIFHD
FORM 10
DOWNTIME & OUTLIER REPORT FORM

LAB		OIL CODE	
TEST STAND NO.		TEST NO.	- -
LABORATORY OIL CODE			
FORMULATION STAND CODE			

Downtime Occurrences			
Test Hours	Date	Total Downtime	Reasons
Total Downtime			Maximum allowable downtime: 24 hours

Other Comments & Outliers	