REPORT ON
SEQUENCE IIIFHD EVALUATION

VERSION *20020725*

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 Number	*STRUN*	Lab Test Number	*LABRUN*
Oil Code	*OILCODE*				
Formulation/Stand Code	*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 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: *SUBLAB*

Testing Laboratory

SUBSIGIM

Signature

SUBNAME

Typed Name

SUBTITLE

Title

Form 2

Sequence IIIFHD

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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	*LAB*	OIL CODE	*OILCODE*
TEST STAND NO.	*STAND*	TEST NO.	*STAND - STRUN - LABRUN*
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*		

Pass/Fail Results	
	Viscosity Increase (%)
Original Units	*PVIS*
Transformed Results	*TPVIS*
Industry Correction Factor	*PVIS_CF*
Corrected Transformed Result	*PVIS_COR*
Severity Adjustment	*PVIS_SA*
Final Transformed Result	*TPVISFNL*
Final Original Unit Result	*PVISFNL*

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

Most Recent Stand Reference Oil Test History [C]			
Test Number	*RSTAND RSTRUN - RLABRUN*		
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] Non-Reference Oil Tests Only

SEQUENCE IIIFHD
FORM 5
OPERATIONAL SUMMARY

LAB	*LAB*	OIL CODE	*OILCODE*
TEST STAND NO.	*STAND*	TEST NO.	*STAND - STRUN - LABRUN*
LABORATORY OIL CODE	*LABOCODE*		
FORMULATION STAND CODE	*FORM*		

	Parameter	Units	QI Threshold	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*	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	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	*OCONH010*	*OCONH020*	*OCONH030*	*OCONH040*	*OCONH050*	*OCONH060*
LEVEL (ml) low	*OILLINI*	*OILLH010*	*OILLH020*	*OILLH030*	*OILLH040*	*OILLH050*	*OILLH060*

NO_x Measurement		
Hours	*NOXHH007*	*NOXHH039*
NO_x, ppm	*NOX_H007*	*NOX_H039*

SEQUENCE IIIFHD
FORM 6
USED OIL ANALYSIS RESULTS

LAB	*LAB*	OIL CODE	*OILCODE*
TEST STAND NO.	*STAND*	TEST NO.	*STAND - STRUN - LABRUN*
LABORATORY OIL CODE	*LABOCODE*		
FORMULATION STAND CODE	*FORM*		

VISCOSITY INCREASE DATA (cSt AT 40˚C)			
HOURS	VISCOSITY [A]	CHANGE	PERCENT
NEW OIL	*VNEW*		
INITIAL [B]	*VINI*		
VISTH010	*VIS_H010*	*DVISH010*	*PVISH010*
VISTH020	*VIS_H020*	*DVISH020*	*PVISH020*
VISTH030	*VIS_H030*	*DVISH030*	*PVISH030*
VISTH040	*VIS_H040*	*DVISH040*	*PVISH040*
VISTH050	*VIS_H050*	*DVISH050*	*PVISH050*
VISTH060	*VIS_H060*	*DVISH060*	*PVISH060*
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*	*TESTLEN*
Iron	*FEWMINI*	*FEWMH010*	*FEWMH020*	*FEWMH030*	*FEWMH040*	*FEWMH050*	*FEWMH060*	*FEWMEOT*
Copper	*CUWMINI*	*CUWMH010*	*CUWMH020*	*CUWMH030*	*CUWMH040*	*CUWMH050*	*CUWMH060*	*CUWMEOT*
Lead	*PBWMINI*	*PBWMH010*	*PBWMH020*	*PBWMH030*	*PBWMH040*	*PBWMH050*	*PBWMH060*	*PBWMEOT*

SEQUENCE IIIFHD
FORM 7
BLOWBY VALUES & PLOT

LAB	*LAB*	OIL CODE	*OILCODE*
TEST STAND NO.	*STAND*	TEST NO.	*STAND - STRUN - LABRUN*
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*								Average
Blowby, L/min.	*BLWBH051*	*BLWBH056*								*ABLOBY*

SEQUENCE IIIFHD
FORM 8
VISCOSITY INCREASE PLOT

LAB	*LAB*	OIL CODE	*OILCODE*
TEST STAND NO.	*STAND*	TEST NO.	*STAND - STRUN - LABRUN*
LABORATORY OIL CODE	*LABOCODE*		
FORMULATION STAND CODE	*FORM*		

VISINIM

SEQUENCE IIIFHD
FORM 9
HARDWARE INFORMATION

LAB	*LAB*	OIL CODE	*OILCODE*
TEST STAND NO.	*STAND*	TEST NO.	*STAND - STRUN - LABRUN*
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*		
Bottom Ring Gap, mils	*BRINGGAP*		

SEQUENCE IIIFHD
FORM 10
DOWNTIME & OUTLIER REPORT FORM

LAB	*LAB*	OIL CODE	*OILCODE*
TEST STAND NO.	*STAND*	TEST NO.	*STAND - STRUN - LABRUN*
LABORATORY OIL CODE	*LABOCODE*		
FORMULATION STAND CODE	*FORM*		

Downtime Occurrences		*DWNOCR*	
Test Hours	Date	Total Downtime	Reasons
DOWNR001	*DDATR001*	*DTIMR001*	*DREAR001*
Total Downtime		*TOTLDOWN*	Maximum allowable downtime: 24 hours

Other Comments & Outliers	*TOTCOM*
OCOMR001	