Report Forms
SEQUENCE VIBSJ

VERSION: ***20020410 BETA***

CONDUCTED FOR:

	V = VALID
	I = INVALID
	N = RESULTS CANNOT BE INTERPRETED (REFER TO COMMENT SECTION)

Lab:	Date Completed:	Time Completed:	
Test Number			
Test Stand:	Runs On The Stand:	Engine No.:	Runs on Engine:
Oil Code:			
Formulation/Stand Code:			
Alternate Codes			

In my opinion this test been conducted in a valid manner in accordance with the VIB Test Procedure (RR: D02-1469) 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

Fig. A7.1 Test Report Cover

Form 2

Sequence VIBSJ

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FIG. A7.2 Table of Contents

Sequence VIBSJ
Form 3

Summary of Test Method

The Sequence VIB is an engine dynamometer test that measures a lubricant's ability to improve the fuel economy of passenger cars and light-duty trucks. The method compares the performance of a test lubricant to the performance of a baseline lubricant over five different stages of operation.

A 1993 Ford 4.6L spark ignition, V-8 cylinder design, 4-cycle engine is used as the test apparatus. The engine incorporates overhead camshafts, a cross-flow, fast-burn cylinder head design, two valves per cylinder, and an electronic port fuel injection.

The Sequence VIBSJ test incorporates a flush and run type procedure. Each test consists of 5-stage fuel economy measurements on baseline oil (BC) and test oil. The test oil is aged during 16 hours of engine operation at 1500 r/min and 125˚C oil temperature. After the aging, a 5-stage fuel economy measurement is taken. The fuel economy measurement taken on the baseline oil (BC) and the test oil are used to calculate a final value for Fuel Economy Improvement.

Below is a summary of the operation conditions for the aging and 5-stage fuel economy portions of the test.

Fuel Economy Measurement and Aging Condition				
FE Stage	**Speed (r/min)**	**Torque (N-m)**	**Oil Temp. (˚C)**	**Coolant Temp. (˚C)**
1	1500	98	125	105
2	800	26	105	95
3	800	26	70	60
4	1500	98	70	60
5	1500	98	45	45

Aging Stage	**Speed (r/min)**	**Torque (N-m)**	**Oil Temp. (˚C)**	**Coolant Temp. (˚C)**
1	1500	98	125	105

FIG. A7.3 Summary of Test Method

SEQUENCE VIBSJ
FORM 4
TEST RESULT SUMMARY
NON-REFERENCE & REFERENCE OIL TESTS

Lab:	Date Completed:	Time Completed:	
Test Number			
Test Stand:	Runs On The Stand:	Engine No.:	Runs on Engine:
Oil Code:		Engine Serial Number:	
Formulation/Stand Code:			

TEST DOCUMENTATION		
	BC Before	Test Oil
Start Date		
Start Time		
End Date		
End Time		
Oil Test Length, hhh:mm		
Calibration Oil Batch		
Flush Oil Batch		
Laboratory Oil Code		
SAE Viscosity Grade		
TMC Oil Code (Reference Oil Tests Only)		
New Oil Viscosity @ 40 ˚C, cSt		
New Oil Viscosity @ 100˚C, cSt		
Total Test Length, hhh:mm		
Total Engine Hours @ EOT		
Most Recent Fuel Batch		

OVERALL RESULTS		
	BC Oil	Test Oil
	Before	Phase I
Fuel Consumed, kg		
Fuel Economy Improvement, %		
FEI Industry Correction Factor, %		
FEI Severity Adjustment, % (non-reference tests only)		
FEI Final Result, %		

Last Reference Oil Test on Stand/Engine History (Non-Reference Tests Only)			
Date Completed		Fuel Batch	
TMC Oil Code		SAE Viscosity Grade	
Oilcode		Calibration Oil Batch	
Runs on Stand		Runs on Engine	
		Phase I	Phase II
Final FEI Results			

Fig. A7.4 Test Result Summary - Non-reference and Reference Oil Tests

SEQUENCE VIBSJ
FORM 5
OPERATIONAL DATA ANALYSIS

Lab:	Date Completed:	Time Completed:	
Test Number			
Test Stand:	Runs On The Stand:	Engine No.:	Runs on Engine:
Oil Code:			
Formulation/Stand Code:			

Computed Averages						
Oil	Stage	BSFC kg/kW-h	BSFC C.V.%	Nominal Power kW	Weight Factor	Weighted Fuel Consumed kg
BC Oil	**1**			15.39	0.0802	
	2			2.18	0.0787	
	3			2.18	0.0848	
	4			15.39	0.0864	
	5			15.39	0.0699	
Total Fuel Consumed						

Computed Averages						
Oil	Stage	BSFC kg/kW-h	BSFC C.V.%	Nominal Power kW	Weight Factor	Weighted Fuel Consumed kg
Test Oil	**1**			15.39	0.0802	
	2			2.18	0.0787	
	3			2.18	0.0848	
	4			15.39	0.0864	
	5			15.39	0.0699	
Total Fuel Consumed						

Fig. A7.5 Operational Data Analysis

SEQUENCE VIBSJ
FORM 6

GENERAL PARAMETER LISTING

Lab:	Date Completed:		Time Completed:
Test Number			
Test Stand:	Runs On The Stand:	Engine No.:	Runs on Engine:
Oil Code:			
Formulation/Stand Code:			

16 Hour Aging

	SPEC	AVERAGE [A]	MAX [A]	MIN [A]
1. Speed, r/min	1500 ± 5			
2. Torque, N-m	98 ± 0.10			
3. Oil Gallery Temperature, ˚C	125 ± 2			
4. Coolant Inlet Temperature, ˚C	105 ± 2			
5. Oil Circulation Temperature, ˚C	Record			
6. Coolant Out Temperature, ˚C	Record			
7. Intake Air Temperature, ˚C	27 ± 2			
8. Fuel to Flowmeter Temperature, ˚C	20 - 32			
9. Fuel to Fuel Rail Temperature, ˚C	20 ± 2			
10. Load Cell Temperature, ˚C	Record			
11. Oil Heater Temperature, ˚C	205 max			
12. Intake Air Pressure, kPa	0.05 ± 0.02			
13. Fuel to Flowmeter Pressure, kPa	100 min			
14. Fuel to Fuel Rail Pressure, kPa	205 - 310			
15. Intake Manifold Pressure, kPa abs.	Record			
16. Exhaust Back Pressure, kPa abs.	104 ± 0.20			
17. Engine Oil Pressure, kPa	Record			
18. Coolant Flow, L/min	130 ± 4			
19. Fuel Flow, kg/h	Record			
20. Intake Air Humidity, grains/kg	11.4 ± 0.8			
21. Air/Fuel Ratio	Record			
22. Crankcase Pressure, kPa	0.00 ± 0.25			

[A] *Based on a minimum of one determination per hour*

Fig. A7.6 General Parameter Listing

SEQUENCE VIBSJ
FORM 7
GENERAL PARAMETER SUMMARY

Lab:	Date Completed:		Time Completed:
Test Number			
Test Stand:	Runs On The Stand:	Engine No.:	Runs on Engine:
Oil Code:			
Formulation/Stand Code:			

BC Oil

General Parameters

		Stage				
	Spec	**1**	**2**	**3**	**4**	**5**
1. Oil Circulation Temperature, ˚C	Record					
2. Coolant Out Temperature, ˚C	Record					
3. Fuel to Flowmeter Temperature, ˚C	20-32					
4. Delta Fuel to Flowmeter Temp., ˚C [A]	≤ 4					
5. Test Cell Temperature, ˚C	Record					
6. Load Cell Temperature, ˚C	Record					
7. Delta Load Cell Temperature, ˚C [A]	≤ 12					
8. Oil Heater Temperature, ˚C	205 max					
9. Intake Air Pressure, kPa	0.05 ± .02					
10. Fuel to Flowmeter Pressure, kPa	100 min					
11. Fuel to Fuel Rail Pressure, kPa	205 - 310					
12. Intake Manifold Pressure, kPa abs.	Record					
13. Engine Oil Pressure, kPa	Record					
14. Coolant Flow, L/min	130 ± 4					
15. Intake Air Humidity, grains/kg	11.4 ± 0.8					
16. Crankcase Pressure, kPa	0.00 ± 0.25					
17. Blowby, L/min [B]	Record					
18. Barometric Pressure, kPa	Record					

[A] Difference between the maximum stage average reading of the entire test and the individual stage average readings.

[B] Measurement not required by procedure.

Fig. A7.7 General Parameter Summary

SEQUENCE VIBSJ
FORM 8
GENERAL PARAMETER SUMMARY

Lab:	Date Completed:		Time Completed:
Test Number			
Test Stand:	Runs On The Stand:	Engine No.:	Runs on Engine:
Oil Code:			
Formulation/Stand Code:			

Test Oil
General Parameters

		Stage				
	Spec	**1**	**2**	**3**	**4**	**5**
1. Oil Circulation Temperature, ˚C	Record					
2. Coolant Out Temperature, ˚C	Record					
3. Fuel to Flowmeter Temperature, ˚C	20-32					
4. Delta Fuel to Flowmeter Temp., ˚C [A]	≤ 4					
5. Test Cell Temperature, ˚C	Record					
6. Load Cell Temperature, ˚C	Record					
7. Delta Load Cell Temperature, ˚C [A]	≤ 12					
8. Oil Heater Temperature, ˚C	205 max					
9. Intake Air Pressure, kPa	0.05 ± .02					
10. Fuel to Flowmeter Pressure, kPa	100 min					
11. Fuel to Fuel Rail Pressure, kPa	205 - 310					
12. Intake Manifold Pressure, kPa abs.	Record					
13. Engine Oil Pressure, kPa	Record					
14. Coolant Flow, L/min	130 ± 4					
15. Intake Air Humidity, grains/kg	11.4 ± 0.8					
16. Crankcase Pressure, kPa	0.00 ± 0.25					
17. Barometric Pressure, kPa	Record					

[A] Difference between the maximum stage average reading of the entire test and the individual stage average readings

Fig. A7.8 General Parameter Summary

SEQUENCE VIBSJ
FORM 9
CRITICAL PARAMETER SUMMARY- STAGE 1

Lab:	Date Completed:		Time Completed:
Test Number			
Test Stand:	Runs On The Stand:	Engine No.:	Runs on Engine:
Oil Code:			
Formulation/Stand Code:			

BC Oil

Step SPEC	BSFC kg/kW-h	Speed r/min 1500 ± 2	Torque N-m 98 ± .07	Oil Gallery Temp. °C 125 ± 1	Coolant In Temp, °C 105 ± 1	Intake Air Temp, °C 27 ± 2	Fuel Rail Temp, °C 20 ± 2	EBP kPa 104 ± .17	Fuel Flow kg/h Record	AFR 14.25-15.25	Delta AFR ≤ .50 [A]
1											
2											
3											
4											
5											
6											
AVG.											
SD											
C.V.											

Test Oil

Step SPEC	BSFC kg/kW-h	Speed r/min 1500 ± 2	Torque N-m 98 ± .07	Oil Gallery Temp. °C 125 ± 1	Coolant In Temp, °C 105 ± 1	Intake Air Temp, °C 27 ± 2	Fuel Rail Temp, °C 20 ± 2	EBP kPa 104 ± .17	Fuel Flow kg/h Record	AFR 14.25-15.25	Delta AFR ≤ .50 [A]
1											
2											
3											
4											
5											
6											
AVG.											
SD											
C.V.											

[A] Difference between the maximum stage average reading of the entire test and the individual stage average readings.

Fig. A7.9 Critical Parameter Summary - Stage 1

SEQUENCE VIBSJ
FORM 10
CRITICAL PARAMETER SUMMARY- STAGE 2

Lab:	Date Completed:	Time Completed:	
Test Number			
Test Stand:	Runs On The Stand:	Engine No.:	Runs on Engine:
Oil Code:			
Formulation/Stand Code:			

BC Oil

Step SPEC	BSFC kg/kW-h	Speed r/min 800 ± 2	Torque N-m 26 ± .07	Oil Gallery Temp. ˚C 105 ± 1	Coolant In Temp, ˚C 95 ± 1	Intake Air Temp, ˚C 27 ± 2	Fuel Rail Temp, ˚C 20 ± 2	EBP kPa 104 ± .17	Fuel Flow kg/h Record	AFR 14.25-15.25	Delta AFR ≤ .50 [A]
1											
2											
3											
4											
5											
6											
AVG.											
SD											
C.V.											

Test Oil

Step SPEC	BSFC kg/kW-h	Speed r/min 800 ± 2	Torque N-m 26 ± .07	Oil Gallery Temp. ˚C 105 ± 1	Coolant In Temp, ˚C 95 ± 1	Intake Air Temp, ˚C 27 ± 2	Fuel Rail Temp, ˚C 20 ± 2	EBP kPa 104 ± .17	Fuel Flow kg/h Record	AFR 14.25-15.25	Delta AFR ≤ .50 [A]
1											
2											
3											
4											
5											
6											
AVG.											
SD											
C.V.											

[A] Difference between the maximum stage average reading of the entire test and the individual stage average readings

Fig. A7.10 Critical Parameter Summary - Stage 2

SEQUENCE VIBSJ
FORM 11
CRITICAL PARAMETER SUMMARY- STAGE 3

Lab:	Date Completed:		Time Completed:
Test Number			
Test Stand:	Runs On The Stand:	Engine No.:	Runs on Engine:
Oil Code:			
Formulation/Stand Code:			

BC Oil

Step SPEC	BSFC kg/kW-h	Speed r/min 800 ± 2	Torque N-m 26 ± .07	Oil Gallery Temp. °C 70 ± 1	Coolant In Temp, °C 60 ± 1	Intake Air Temp, °C 27 ± 2	Fuel Rail Temp, °C 20 ± 2	EBP kPa 104 ± .17	Fuel Flow kg/h Record	AFR 14.25-15.25	Delta AFR ≤ .50 [A]
1											
2											
3											
4											
5											
6											
AVG.											
SD											
C.V.											

Test Oil

Step SPEC	BSFC kg/kW-h	Speed r/min 800 ± 2	Torque N-m 26 ± .07	Oil Gallery Temp. °C 70 ± 1	Coolant In Temp, °C 60 ± 1	Intake Air Temp, °C 27 ± 2	Fuel Rail Temp, °C 20 ± 2	EBP kPa 104 ± .17	Fuel Flow kg/h Record	AFR 14.25-15.25	Delta AFR ≤ .50 [A]
1											
2											
3											
4											
5											
6											
AVG.											
SD											
C.V.											

[A] Difference between the maximum stage average reading of the entire test and the individual stage average readings

Fig. A7.11 Critical Parameter Summary - Stage 3

SEQUENCE VIBSJ
FORM 12
CRITICAL PARAMETER SUMMARY- STAGE 4

Lab:	Date Completed:	Time Completed:	
Test Number			
Test Stand:	Runs On The Stand:	Engine No.:	Runs on Engine:
Oil Code:			
Formulation/Stand Code:			

BC Oil

Step SPEC	BSFC kg/kW-h	Speed r/min 1500 ± 2	Torque N-m 98 ± .07	Oil Gallery Temp. °C 70 ± 1	Coolant In Temp, °C 60 ± 1	Intake Air Temp, °C 27 ± 2	Fuel Rail Temp, °C 20 ± 2	EBP kPa 104 ± .17	Fuel Flow kg/h Record	AFR 14.25-15.25	Delta AFR ≤ .50 [A]
1											
2											
3											
4											
5											
6											
AVG.											
SD											
C.V.											

Test Oil

Step SPEC	BSFC kg/kW-h	Speed r/min 1500 ± 2	Torque N-m 98 ± .07	Oil Gallery Temp. °C 70 ± 1	Coolant In Temp, °C 60 ± 1	Intake Air Temp, °C 27 ± 2	Fuel Rail Temp, °C 20 ± 2	EBP kPa 104 ± .17	Fuel Flow kg/h Record	AFR 14.25-15.25	Delta AFR ≤ .50 [A]
1											
2											
3											
4											
5											
6											
AVG.											
SD											
C.V.											

[A] Difference between the maximum stage average reading of the entire test and the individual stage average readings

Fig. A7.12 Critical Parameter Summary - Stage 4

SEQUENCE VIBSJ
FORM 13
CRITICAL PARAMETER SUMMARY- STAGE 5

Lab:	Date Completed:		Time Completed:
Test Number			
Test Stand:	Runs On The Stand:	Engine No.:	Runs on Engine:
Oil Code:			
Formulation/Stand Code:			

BC Oil

Step SPEC	BSFC kg/kW-h	Speed r/min 1500 ± 2	Torque N-m 98 ± .07	Oil Gallery Temp. °C 45 ± 1	Coolant In Temp, °C 45 ± 1	Intake Air Temp, °C 27 ± 2	Fuel Rail Temp, °C 20 ± 2	EBP kPa 104 ± .17	Fuel Flow kg/h Record	AFR 14.25-15.25	Delta AFR ≤ .50 [A]
1											
2											
3											
4											
5											
6											
AVG.											
SD											
C.V.											

Test Oil

Step SPEC	BSFC kg/kW-h	Speed r/min 1500 ± 2	Torque N-m 98 ± .07	Oil Gallery Temp. °C 45 ± 1	Coolant In Temp, °C 45 ± 1	Intake Air Temp, °C 27 ± 2	Fuel Rail Temp, °C 20 ± 2	EBP kPa 104 ± .17	Fuel Flow kg/h Record	AFR 14.25-15.25	Delta AFR ≤ .50 [A]
1											
2											
3											
4											
5											
6											
AVG.											
SD											
C.V.											

[A] Difference between the maximum stage average reading of the entire test and the individual stage average readings

Fig. A7.13 Critical Parameter Summary - Stage 5

SEQUENCE VIBSJ
FORM 14
DOWNTIME AND OTHER COMMENTS

Lab:	Date Completed:	Time Completed:	
Test Number			
Test Stand:	Runs On The Stand:	Engine No.:	Runs on Engine:
Oil Code:			
Formulation/Stand Code:			

Downtime Occurrences			
Test Hours	**Date**	**Downtime**	**Reasons**
Total Downtime			

Total Number of Comments & Outlier Lines	

Fig. A7.14 Downtime and Other Comments