

**Sequence VIBSJ
Report Cover Sheet**

Version:

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					

<p>In my opinion this test _____ been conducted in a valid manner in accordance with the Test Method D 6837 and the appropriate amendments through the Information Letter System. The remarks included in the report describe the anomalies associated with this test.</p>
--

Submitted By: _____

Testing Laboratory

Signature

Typed Name

Title

Table of Contents

1.	Report Cover Sheet (Includes Validity Statement)	Form 1
2.	Summary of Test Method	Form 3
3.	Test Result Summary	Form 4
4.	Operational Data Analysis	Form 5
5.	General Parameter Listing	Form 6
6.	General Parameter Summary	Form 7
7.	General Parameter Summary	Form 8
8.	Critical Parameter Summary - Stage 1	Form 9
9.	Critical Parameter Summary - Stage 2	Form 10
10.	Critical Parameter Summary - Stage 3	Form 11
11.	Critical Parameter Summary - Stage 4	Form 12
12.	Critical Parameter Summary - Stage 5	Form 13
13.	Downtime Occurrences & Outliers	Form 14
14.	ACC Conformance Statement	Form 15

**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 two 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. The fuel economy measurements taken on the baseline oil (BC) and 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

**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.
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
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			

**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						

**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

**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

	Spec	Stage				
		1	2	3	4	5
1. Oil Circulation Temperature,	Record					
2. Coolant Out Temperature, °C	Record					
3. Fuel to Flowmeter	20-32					
4. Delta Fuel to Flowmeter	≤4					
5. Test Cell Temperature, °C	Record					
6. Load Cell Temperature, °C	Record					
7. Delta Load Cell Temperature,	≤12					
8. Oil Heater Temperature, °C	205 max					
9. Intake Air Pressure, kPa	0.05 ±					
10. Fuel to Flowmeter Pressure,	100 min					
11. Fuel to Fuel Rail Pressure,	205-310					
12. Intake Manifold Pressure, kPa	Record					
13. Engine Oil Pressure, kPa	Record					
14. Coolant Flow, L/min	130 ±4					
15. Intake Air Humidity,	11.4 ±0.8					
16. Crankcase Pressure, kPa	0.00 ±					
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 Not required by test procedure

**Sequence VIB
Form 8
General Parameter Summary**

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

Test Oil

General Parameters

	Spec	Stage				
		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

**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	BSFC	Speed	Torque	Oil Gallery	Coolant In	Intake Air	Fuel Rail	EBP	Fuel Flow	AFR	Delta ^A
SPEC	kg/kW-h	r/min	N-m	Temp. °C	Temp, °C	Temp, °C	Temp, °C	kPa	kg/h	14.00-15.00	AFR < .50
1		1500 ± 2	98 ± .07	125 ± 1	105 ± 1	27 ± 2	20 ± 2	104 ± .17	Record		
2											
3											
4											
5											
6											
AVG.											
SD											
C.V.											

Test Oil

Step	BSFC	Speed	Torque	Oil Gallery	Coolant In	Intake Air	Fuel Rail	EBP	Fuel Flow	AFR	Delta ^A
SPEC	kg/Kw-h	r/min	N-m	Temp. °C	Temp, °C	Temp, °C	Temp, °C	kPa	kg/h	14.00-15.00	AFR < .50
1		1500 ± 2	98 ± .07	125 ± 1	105 ± 1	27 ± 2	20 ± 2	104 ± .17	Record		
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.

**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 14.00- 15.00	Delta ^A AFR < .50
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 14.00- 15.00	Delta ^A AFR < .50
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.

**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	BSFC	Speed	Torque	Oil	Coolant	Intake	Fuel Rail	EBP	Fuel	AFR	Delta ^A
SPEC	kg/kW-h	r/min	N-m	Gallery	In	Air	Temp, °C	kPa	Flow	14.00-	AFR
		800 ± 2	26 ± .07	Temp. °C	Temp, °C	Temp, °C	Temp, °C	104 ±	kg/h	15.00	< .50
1				70 ± 1	60 ± 1	27 ± 2	20 ± 2	.17	Record		
2											
3											
4											
5											
6											
AVG.											
SD											
C.V.											

Test Oil

Step	BSFC	Speed	Torque	Oil	Coolant	Intake	Fuel Rail	EBP	Fuel	AFR	Delta ^A
SPEC	kg/Kw-h	r/min	N-m	Gallery	In	Air	Temp, °C	kPa	Flow	14.00-	AFR
		800 ± 2	26 ± .07	Temp. °C	Temp, °C	Temp, °C	Temp, °C	104 ±	kg/h	15.00	< .50
1				70 ± 1	60 ± 1	27 ± 2	20 ± 2	.17	Record		
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.

Sequence VIBSJ
Form 12
Critical Parameter Summary - Stage 4

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

BC Oil

Step	BSFC	Speed	Torque	Oil	Coolant	Intake	Fuel Rail	EBP	Fuel	AFR	Delta ^A
SPEC	kg/kW-h	r/min	N-m	Temp. °C	Temp, °C	Temp, °C	Temp, °C	kPa	Flow	14.00-	AFR
		1500 ± 2	98 ± .07	70 ± 1	60 ± 1	27 ± 2	20 ± 2	104 ± .17	kg/h	15.00	< .50
1											
2											
3											
4											
5											
6											
AVG.											
SD											
C.V.											

Test Oil

Step	BSFC	Speed	Torque	Oil	Coolant	Intake	Fuel Rail	EBP	Fuel	AFR	Delta ^A
SPEC	kg/Kw-h	r/min	N-m	Temp. °C	Temp, °C	Temp, °C	Temp, °C	kPa	Flow	14.00-	AFR
		1500 ± 2	98 ± .07	70 ± 1	60 ± 1	27 ± 2	20 ± 2	104 ± .17	kg/h	15.00	< .50
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.

**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 14.00- 15.00	Delta ^A AFR < .50
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 14.00- 15.00	Delta ^A AFR < .50
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.

**Sequence VIBSJ
Form 15
American Chemistry Council Code of Practice
Test Laboratory Conformance Statement**

Test Laboratory					
Test Sponsor					
Formulation / Stand Code					
Test Number					
Start Date		Start Time		Time Zone	

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 _____ No _____ *

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 _____ No _____ *

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 _____ * No _____

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

Check The Appropriate Conclusion

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

Signature

Date

Typed Name

Title