Test Method D5967 Mack T-8

T 7	•	
v	ersion	
•	CI SIUII	

N	/		41			1	
1	/∎	Δ	T	n	n	$^{\circ}$	
17		L	u		"	u	

Conducted For

T-8A:	V = Valid	The Reference Oil/Non-Reference Oil was evaluated in accordance with the test procedure.
T-8:	I = Invalid	The Reference Oil/Non-Reference was not evaluated in accordance with the test procedure
T-8E:	N = Not Interpretable	The Non-Reference Oil results cannot be interpreted and shall not be used in determining an average test result using multiple test criteria.

Stand:	Stand Run No.:	Engine No.:	Engine Hours:			
End Of Tes	st Date:	End Of Test Time	:			
Oil Code/C	Oil Code/CMIR: A					
T-8 Formulation/Stand Code:						
T-8E Formulation/Stand Code:						
Alternate (Codes:					

^A CMIR or Non-Reference Oil Code

	von-reference on code
	Submitted By:
Testing Laboratory	
Signature	
Typed Name	
Title	

Test Method D5967 – Mack T-8 Form 1 **Test Result Summary**

T-8 Formula T -8E Formu								Test Length	n: ^A	
		Reference	Oil Test				N	on-Reference	Oil Test	
CMIR No.:						Oil Code:				
TMC Oil No.	Test Lab	Test Stand No.	Test Stand Run No.	Engine Block Serial No.	Rebuild Block Hours	Test Lab	Test Stand No.	Test Stand Run No.	Engine Block Serial NO.	Engine Block Hours
Date Test St	arted:	Date Test C	ompleted:	EOT Tim	ie:	Date Test S	tarted:	Date Test C	ompleted:	EOT Time:
Laboratory Code:	Oil					Laboratory Code:	Oil			ı
SAE Viscosi	ty:					SAE Viscos	ity:			

Viscosity Slope 100 - 150 h, cSt/h	Viscosity Slope 100 - 150 h, cSt/h
Viscosity Increase At 3.8% TGA, cSt	Viscosity Increase At 3.8% TGA, cSt
	Severity Adjustment For Viscosity Inc. At 3.8% TGA, cSt
	Adjusted Viscosity Increase At 3.8% TGA, cSt
Relative Viscosity At 4.8%, TGA (50% Loss) ^B	Relative Viscosity At 4.8%, TGA (50% Loss) B
	Severity Adjustment For Relative Viscosity
	Adjusted Relative Viscosity (50% Loss) B
Relative Viscosity At 4.8%, TGA (100% Loss) ^B	Relative Viscosity At 4.8%, TGA (100% Loss) ^B
	Severity Adjustment For Relative Viscosity
	Adjusted Relative Viscosity (100% Loss) B
TGA Soot % At 250 h	TGA Soot % At 250 h
TGA Soot % At 300 h	TGA Soot % At 300 h
Average Oil Consumption At 250 h (g/kW-h)	Average Oil Consumption At 250 h (g/kW-h)
Oil Filter Delta At 250 h, kPa	Oil Filter Delta At 250 h, kPA

^A Test length is discussed in sections 1.2, 4.1 A8.3.1 and A9.3.1 ^B Relative viscosities are calculated using shear loss determined by D6278

TEST METHOD D5967 FORM 2 OPERATIONAL SUMMARY A

Laboratory	Start Date
Test Number ^B	
Oil Code	
T-8 Formulation/Stand Code:	
T-8E Formulation/Stand Code:	

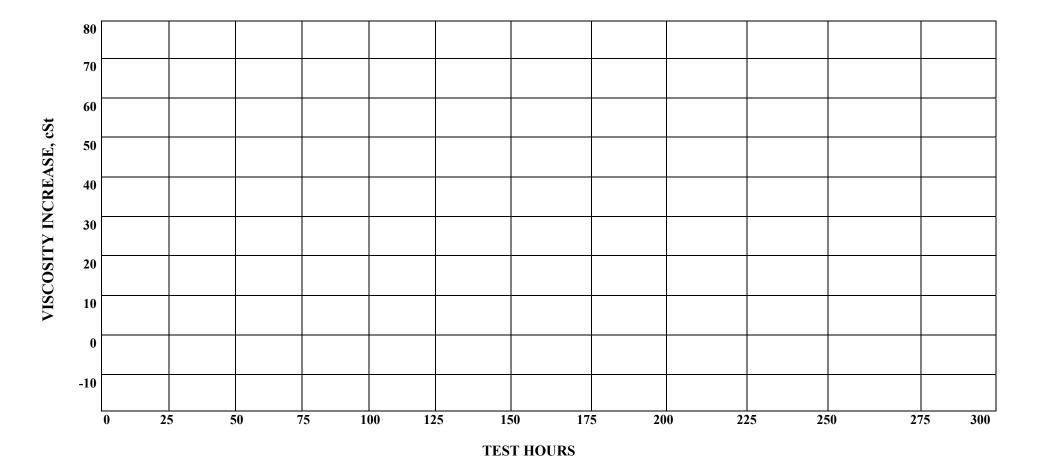
TEST PARAMETER	SPECIFICATION	AVERAGE	STD. DEV.	MINIMUM	MAXIMUM
		AVERAGE	SID. DEV.	IVIIIVIIVIUIVI	MAXIMUM
Engine Speed, r/min	1800 <u>+</u> 5				
Torque, N-m	1369 – 1398				
Fuel Flow, kg/h	63.28 <u>+</u> 0.63				
Humiditv, g/kg	Report				
Blowby, L/min	Report				
TEMPERATURES	SPECIFICATION	AVERAGE	STD. DEV	MINIMUM	MAXIMUM
Coolant Out, °C	85 <u>+</u> 3				
Coolant In. °C	Report Only				
Oil, °C	100 - 107				
Fuel In, °C	40 <u>+</u> 1				
Intake Air, °C	25 <u>+</u> 3				
Intake Manifold, °C	43 <u>+</u> 3				
Pre- Turb. (F), °C	602 - 632				
Pre-Turbo (R), °C	602 - 632				
TailPipe, °C	455 - 474				
PRESSURES	SPECIFICATION	AVERAGE	STD.DEV	MINIMUM	MAXIMUM
Oil Gallery, kPa	372 -441				
Crankcase, kPa	0.50 <u>+</u> 0.25				
Exhaust, kPa	3.1 <u>+</u> 0.4				
Oil Filter Delta, kPa	138 Max.				
Inlet Air Res., kPa	2.5 ± 0.25				
Intake Manifold, kPa	186 - 199				
Compressor Discharge, kPa	Report				
Intercooler Delta, kPa	13.6 Maximum				

A ALL DATA VALUES SHOWN ARE BASED ON TEST LENGTH REPORTED ON FORM1 B TEST NUMBER IS: STAND – STAND RUN NO. – ENGINE SERIAL NO. – ENGINE HOURS

TEST METHOD D5967 FORM 3

VISCOSITY INCREASE VERSUS TIME

Laboratory	Start Date
Test Number ^B	Oil Code
T-8 Formulation/Stand Code:	
T-8E Formulation/Stand Code	



TEST METHOD D5967 FORM 4 OIL ANALYSIS SUMMARY

Laboratory	Start Date
Test Number B	
Oil Code	
T-8 Formulation/Stand Code:	
T-8E Formulation/Stand Code:	

Hours	Soot TGA%	Viscosity (cSt)	Viscosity Increase From Minimum (cSt)
250 (2.1)			
250 (2nd)			
250 (Average)			

Viscosity Increase @ 3.8% TGA Soot Level	
D6278 Un sheared Viscosity (cSt), Vu	
D6278 Sheared Viscosity (cSt), Vs	
Relative Viscosity @, 4.8% TGA Soot Level (50% Loss) A	
Relative Viscosity @, 4.8% TGA Soot Level (100% Loss) A	

	Parts per million (ppm) at Test Hour		
ELEMENT			
Fe			
Pb			
Cu			
Cr			
Al			
Si			
Na			

Pre-Test	Post-Test	Mass Gain
Centrifugal Oil Filter mass: grams		

^ARelative viscosities are calculated using shear loss determined by D5278.

TEST METHOD D5967 FORM 5

TEST FUEL ANALYSIS (LAST BATCH	TEST FUEL	ANALYSIS	(LAST BATCH
--------------------------------	-----------	----------	-------------

Laboratory	Start Date
Test Number ^B	
Oil Code	
T-8 Formulation/Stand Code:	
T-8E Formulation/Stand Code:	
Supplier:	Batch Identifiers:

Measurement	Specs.	Analysis		Test Method	
	Î	NEW	EDT		
Total Sulfur, % wt	0.03 - 0.05			D 2622	
Gravity, °API	32-36			D 287 or D 4052	
Hydrocarbon Composition					
Aromatics % vol	28 - 35			D 1319	
Olefin	Report			D 1319	
Saturates	Report			D 1319	
Cetane Index	Report			D 4737	
Cetane No.	42 - 48			D 613	
Copper Strip Corrosion	3 max			D 130	
Flash Point, °C	54 min			D 93	
Cloud Point °C	-12 max			D 2500	
Pour Point °C	-18 max			D97	
				D 524	
Carbon Residue on 10% Residium, %	0.35 max			(10 % Bottoms)	
Water & Sediment, % Vol	0.05 max			D 2709	
Ash, % wt	0.01 max			D482	
Viscosity, cSt @ 40 °C	2.0 - 3.2			D445	
Distillation °C					
IBP	177 - 199			D 86	
10%	210 - 232			D 86	
50%	249 - 277			D 86	
90%	299 - 327			D 86	
EP	327 - 360			D 86	

TEST METHOD D5967 FORM 6 DOWN TIME AND COMMENTS

ratory Number B Code Formulation/Stan Formulation/Sta	and Code:		Start Date
Code Formulation/Stan Formulation/Stan umber of Downtin Test	and Code:		
Formulation/Stan Formulation/Stan rumber of Downtin Test	and Code:		
Formulation/Sta	and Code:		
umber of Downtin			
Test			
Test			
Test	ne Occurrenc	ces	
		Downtime	Reasons
	Date	ownume	Reasons
			
			
			
<u> </u>		<u> </u>	
		<u>_</u>	
	———		
			
			
-	-		
			Total Downtime
Other Comn		1	
Vumber of Comme		1	
unioci oi commi	III Lines		
	_		
·			
		· 	
	_	- <u></u>	

TEST METHOD D5967 FORM 6A DOWN TIME AND COMMENTS

Laboratory	ory Start Date		
Test Number B	3		
Oil Code			
Γ-8 Formulation	1/Stand Code	•	
Γ-8E Formulation	on/Stand Cod	le:	
Number of Do	owntime Occu	rrences	
Test			D
Hours	Date	Downtime	Reasons
		 	
	+	+	
		+	
	+		
			Total Downtime
Other	Comments		
Number of C	Comment Lines		
		I .	

TEST METHOD D5967 FORM 6B DOWN TIME AND COMMENTS

Laboratory			Start Date	
Fest Number B	st Number ^B			
Oil Code				
Γ-8 Formulation	/Stand Code:	•		
Γ-8E Formulation	on/Stand Cod	e:		
	owntime Occur	rrences		
Test	Date	Downtime	Reasons	
Hours	_			
	-			
	-			
	+			
			Total Downtime	
•				
Other	Comments			
Number of C	omment Lines			

TEST METHOD D5967 FORM 7 CHARACTERISTICS OF THE DATA ACQUISTION SYSTEM

Laboratory	Start Date
Test Number ^B	
Oil Code	
T-8 Formulation/Stand Code:	
T-8E Formulation/Stand Code:	

PARAMETER	SENSING DEVICE	CALIBRATION FREQUENCY	RECORD DEVICE	OBSERVATION FREQUENCY	RECORD FREQUENCY	LOG FREQUENCY	SYSTEM RESPONSE
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Temperatures							
OIL@ FILT.							
FUEL IN.							
INTAKE AIR							
INTAKE MAN							
PRE- TURB.							
COOL. OUT							
Other							
FUEL FLOW							
ENGINE RPM							
LOAD							
INLET RESTR			•			_	
EXH. PRESS.	-		·				
OIL GAL PRES							

LEUEND:

- (I) OPERATING PARAMETER
- (2) THE TYPE OF DEVICE USED TO MEASURE TEMPERATURE, PRESSURE OR FLOW
- (3) FREQUENCY AT WHICH THE MEASUREMENT SYSTEM IS CALIBRATED
- (4) THE TYPE OF DEVICE WHERE DATA IS RECORDED

LG-HANDLOGSHEET

DL -AUTOMATIC DATA LOGGER

SC-STRIPCHARTRECORDER

C/M -COMPUTER, USING MANUAL DATA ENTRY

 $\mbox{C/D}$ -COMPUTER, USING DIRECT $\mbox{\it VO}$ ENTRY

- (5) DATA ARE OBSERVED BUT ONLY IF RECORDED OFF SPEC.
- (6) DATA ARE RECORDED BUT ARE NOT RETAINED AT EOT
- (7) DATA ARE LOGGED AS PERMANENT RECORD, NOTE SPECIFY IF:

SS -SNAPSHOT TAKEN AT SPECIFIED FREQUENCY

AG/X AVERAGE OF X DATA POINTS AT SPECIFIED FREQUENCY

(8) TIME FOR THE OUTPUT TO REACH 63.2% OF FINAL VALUE FOR STEP CHANGE AT INPUT

TEST METHOD D5967 FORM 8 BUILD-UP AND HARDWARE INFORMATION

Laboratory	Start Date
Test Number ^B	
Oil Code	
T-8 Formulation/Stand Code:	
T-8E Formulation/Stand Code:	

TIMING

Lite/HPC Offset (deg)	
Piston Travel to TDC (deg)	
Timing (deg)	

PARTS

Part	Part Number	Serial Number
Injection Pump		
Turbo Charger		
Cylinder Head (front)		
Cylinder Head (rear)		
Pistons		
Injection Nozzles		

TEST METHOD D5967 FORM 9 OPERATIONAL DATA

Laboratory	Start Date
Test Number ^B	
Oil Code	
7-8 Formulation/Stand Code: 7-8E Formulation/Stand Code:	
ob i omination/stand code.	
<u> </u>	
	ENGINE SPEED (R/MIN) PLOT
	TORQUE (N-M) PLOT
	FUEL FLOW (KG/H) PLOT
	AVED A CE DDE TUDDINE TEMBED ATUDE (QC) DI OT
	AVERAGE PRE-TURBINE TEMPERATURE (°C) PLOT
[-	
	TAILPIPE TEMPERATURE (°C) PLOT

TEST METHOD D5967 FORM 10 OPERATIONAL DATA

aboratory	Start Date	
est Number ^B Oil Code		
7-8 Formulation/Stand Code:		
-8E Formulation/Stand Code:		
	COOLANT IN TEMPERATURE (°C) PLOT	
	COOLANT OUT TEMPERATURE (°C) PLOT	
	OIL TEMPERATURE (°C) PLOT	
	FUEL IN TEMPERATURE (°C) PLOT	

TEST METHOD D5967 FORM 11 OPERATIONAL DATA

boratory	Start Date
est Number ^B 1 Code	
8 Formulation/Stand Code:	
8E Formulation/Stand Code:	
<u> </u>	
	INTAKE AIR TEMPERATURE (°C) PLOT
	INTAKE MANIFOLD TEMPERATURE (°C) PLOT
	OIL GALLERY PRESSURE (KPA) PLOT
	OIL FILTER PRESSURE (KPA) PLOT

TEST METHOD D5967 FORM 12 OPERATIONAL DATA

aboratory	Start Date
est Number B	
il Code	
-8 Formulation/Stand Code:	
-8E Formulation/Stand Code:	
	CRANKCASE PRESSURE (KPA) PLOT
	EXHAUST PRESSURE (KPA) PLOT
	INLET AIR RESTRICTION (KPA) PLOT
	DIEANE MANUEL D DEGGLIDE (VDA) N. O.T.
	INTAKE MANIFOLD PRESSURE (KPA) PLOT

TEST METHOD D5967 FORM 13 ROTATIONAL VISCOSITY ANALYSIS SUMMARY

Laboratory	Start Date
Test Number ^B	
Oil Code	
T-8 Formulation/Stand Code:	
T-8E Formulation/Stand Code:	

Hours	Viscosity at 100 deg C (mPa-s)		Rate Index	
	Increasing	Decreasing	Increasing	Decreasing

TEST METHOD D5967

Form 14

American Chemistry Council Code of Practice Test Laboratory Conformance Statement

Test Labo	oratory			
Test Spor	isor			
T8E Forn	nulation / Stand Cod	le		
Test Num	ber			
Start Date		Start Time	Time Zone	
	•			
		Declara	tions	
No. 1	All requirements	of the ACC Code of Pract	tice for which the test labor	ratory is responsible were
110. 1	_	et of this test. Yes		atory is responsible were
No. 2	operational validion other) including a	ty requirements of the late	tion following all procedurest version of the applicable rganization responsible for	e test procedure (ASTM or
	operational validi		does the test engineer cons rred to be beyond the contr	
No. 3	the test as being a	special case. Yes	M Information Letter System	This currently applies only
		. 1	· 1: 4 4 4 1 1 1 1	111 : 1 1 1: 4
		ational review of this test iple Test Acceptance Crite	indicates that the results sh	iould be included in the
			et indicates that the results s	hould not be included in
		fultiple Test Acceptance (mould not be included in
	uic iv	Tuttiple Test Acceptance (enteria carculations.	
Note: Sunno	rting comments are	required for all responses	s identified with an asterisk	
Note: Suppo	rung comments are	Comm	· ·	•
		Commi	ents	
Signature				Date
			•	
Typed Name	<u> </u>			Γitle

TEST METHOD D5967

Form 14A

American Chemistry Council Code of Practice Test Laboratory Conformance Statement

Test Labor	ratory			
Test Spons	sor			
T8 Formul	lation / Stand Code	e		
Test Numb	per			
Start Date		Start Time	Time Zone	
		Decl	arations	
No. 1			Practice for which the test labo No*	ratory is responsible were
No. 2	operational valid other) including	lity requirements of the	duration following all procedu e latest version of the applicable he organization responsible for	le test procedure (ASTM or
	operational valid		No", does the test engineer concecurred to be beyond the cont	
No. 3	the test as being	a special case. Yestions identified in the A	ISTM Information Letter Syste	(This currently applies only
		Check The App	ropriate Conclusion	
		rational review of this tiple Test Acceptance	test indicates that the results si Criteria calculations.	hould be included in the
	_		s test indicates that the results ace Criteria calculations.	should not be included in
Note: Suppor	ting comments are		nses identified with an asterisi	΄τ.
		Coi	mments	
Signature				Date
Typed Name				Title