

Mack T-12 EGR Engine Oil Test

Report Packet Version No.

Conducted For

	V = Valid; The Reference Oil/Non-Reference Oil was evaluated in accordance with the test procedure.
	I = Invalid; The Reference Oil/Non-Reference Oil was not evaluated in accordance with the test procedure.
	N = Results cannot be interpreted as representative of oil performance (Non-Reference Oil) and shall not be used in determining an average test result using multiple test criteria.

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

Test Number			
Stand:	Stand Run:	Engine:	Engine Hours:
End Of Test Date:		End Of Test Time:	
Oil Code:			
Formulation/Stand Code:			
Alternate Codes			

In my opinion this test _____ been conducted in a valid manner in accordance with the Test Method D 7422 and the appropriate amendments through the information letter system. The remarks included in this report describe the anomalies associated with this test.

Submitted By:

_____ **Testing Laboratory**

_____ **Signature**

_____ **Typed Name**

_____ **Title**

**Mack T-12 EGR Engine Oil Test
Form 2**

Table of Contents

1.	Final Report Cover Sheet	Form 1
2.	Table of Contents	Form 2
3.	Summary of Test Method	Form 3
4.	Test Results Summary	Form 4
5.	Operational Summary	Form 5
6.	Rod Bearing Weight Loss	Form 6
7.	Ring Weight Loss	Form 7
8.	Oil Analysis Summary	Form 8
9.	Liner Surface Roughness & Bore Diameter	Form 9
10.	Liner Wear Summary	Form 10
11.	Unscheduled Downtime & Maintenance Summary	Form 11
12.	Test Fuel Analysis (Last Batch)	Form 12
13.	Characteristics of the Data Acquisition System	Form 13
14.	Build-up and Hardware Information	Form 14
15.	Rating Summary: Piston 1	Form 15
16.	Rating Summary: Piston 2	Form 16
17.	Rating Summary: Piston 3	Form 17
18.	Rating Summary: Piston 4	Form 18
19.	Rating Summary: Piston 5	Form 19
20.	Rating Summary: Piston 6	Form 20
21.	Main Bearing Weight Loss	Form 21
22.	Ring Gap Measurements	Form 22
23.	T-10 Merits Calculated with T-12 Results	Form 23
24.	ACC Conformance Statement	Form 24

**Mack T-12 EGR Engine Oil Test
Form 3**

The Mack T-12 EGR Engine Oil Test is a fuel engine-dynamometer test which evaluates the ability of a lubricant to minimize piston ring wear, cylinder liner wear, lead corrosion, oil consumption, and oxidation. This test is a two-phase, steady state test (constant speed and load), run with heavy EGR. The first phase is 100 h and is run with retarded fuel injection timing to produce elevated soot levels in the oil. The second phase is 200 h and is run under heavy load conditions to induce piston ring and cylinder liner wear.

The test engine is a Mack E-TECH V-MAC III diesel engine with EGR. It is an in-line six-cylinder, four stroke, turbocharged engine. It has electronically controlled fuel injection with six individual electronic pumps. A one h break-in is conducted prior to each test since a new engine build is used for each test.

Mack T-12 Test Conditions

Parameter	Phase I	Phase II
Time, h	100	200
Injection Timing, °BTDC	Variable	21
Speed, r/min	1800	1200
Fuel Flow, kg/h	59.2	63.5
Intake CO₂, %	3.09	1.42
Exhaust CO₂, %	9.25	9.78-10.08 typical
Inlet Manifold Temp., °C	90	80
Coolant Out Temp., °C	66	108
Fuel In Temp., °C	40	40
Oil Gallery Temp., °C	88	116
Intake Air Temp., °C	25	25
Intake Air Restriction, kPa	3.5 – 4.0	3.5 – 4.0
Inlet Manifold Pressure, kPa	265 Nominal	302-312
Exhaust Back Pressure, kPa	2.7 – 3.5	2.7 – 3.5
Crankcase Pressure, kPa	0.25 – 0.75	0.25 – 0.75
Torque, Nm	Record	Record
Pre-Turbine Exhaust Temp., °C	Record	Record
Tailpipe Exhaust Temp., °C	Record	Record
Oil Sump Temp., °C	Record	Record
EGR Pre-Venturi Temp., °C	Record	Record
Inlet Air Dew Point, °C	Record	Record
EGR Pre-Venturi Press., kPa	Record	Record
Main Gallery Oil Pressure, kPa	Record	Record
Oil Filter Delta P, kPa	Not to exceed 138	Not to exceed 138

**Mack T-12 EGR Engine Oil Test
Form 4
Test Results Summary**

Laboratory:	EOT Date:	EOT Time:
Test Number		
Oil Code:		
Formulation/Stand Code:		

Test Results					
Date Test Started:		Start Time:		Test Length:	
TMC Oil Code: ^A		Lab Oil Code:		SAE Viscosity:	
Average TGA Soot % at 100 h					
Centrifugal Oil Filter Mass Gain, g					
Oil Filter Delta P, kPa (138 maximum)					
EOT TBN					
	Delta Pb@ EOT (ppm)	Avg Liner Wear (µm)	Avg Top Ring Weight Loss (mg)	Oil Consumption (g/h)	Delta Pb 250-300h (ppm)
Original Result					
Transformed Result ^B					
Correction Factor ^B					
Corrected Transformed Result ^B					
Severity Adjustment ^B					
Final Transformed Result ^B					
Final Original Unit Result					
Mack Merits ^C					
Total Mack Merits ^C					

Last Stand Reference Results					
Test Number:					
Oil Code:					
Test Length:			TMC Oil Code:		
EOT Date:			EOT Time:		
Number of Tests Since Stand Calibration^D					
Stand Calibration Expiration Date					
Average TGA Soot % at 100 h					
	Delta Pb@ EOT (ppm)	Avg Liner Wear (µm)	Avg Top Ring Weight Loss (mg)	Oil Consumption (g/h)	Delta Pb 250-300h (ppm)
Final Original Unit Result					

^A Reference Tests only.

^B Transformed Units apply to Delta Pb @ EOT, Oil Consumption, and Delta Pb 250-300h only.

^C Non-reference Tests only.

^D Operationally valid tests only, including current test.

**Mack T-12 EGR Engine Oil Test
Form 5
Operational Summary**

Laboratory:	EOT Date:	EOT Time:
Test Number:	Oil Code:	
Formulation/Stand Code:		

	Parameter	Units	QI		Target		Average		Samples ^B	BQD ^C	Over/Under Range ^D
			Threshold	EOT QI ^A							
Controlled Parameters	Speed	r/min	0.000		1800	1200					
	Fuel Flow	kg/h	0.000		59.2	63.5					
	Inlet Manifold Temp.	°C	0.000		90	80					
	Coolant Out Temp.	°C	0.000		66	108					
	Fuel In Temp.	°C	0.000		40						
	Oil Gallery Temp.	°C	0.000		88	116					
	Inlet Air Temp.	°C	0.000		25						
	Inlet Air Restriction	kPa			3.5 – 4.0						
	Inlet Man. Pressure	kPa			265 Nominal	307±5					
	Exh. Back Pressure	kPa			2.7 – 3.5						
	Crankcase Pressure	kPa			0.25 – 0.75						
	Intake CO ₂	%			3.09±0.05	1.42±0.05					
	Exhaust CO ₂	%			9.25±0.15	9.93±0.15					
Non-Controlled Parameters	Parameter	Units	Typical Values ^E		Average						
	Torque	Nm	1232-1397	2434-2543							
	Brake Specific Fuel Cons.	g/kW-h	212-263	179-228							
	Pre-Turbine Temp. (L)	°C	482-605	504-759							
	Pre-Turbine Temp. (R)	°C	503-567	491-758							
	Tailpipe Temp.	°C	303-354	280-433							
	Oil Sump Temp.	°C	92-105	73-190							
	EGR Pre-Venturi Temp.	°C	138-201	107-126							
	Blowby	L/min	41-176	71-264							
	Inlet Air Dew Point	°C	6-22	6-22							
	EGR Pre-Venturi Pressure	kPa	226-331	235-336							
	Main Gallery Oil Pressure	kPa	394-502	165-269							

^A QI values above the threshold are acceptable by the Mack Surveillance Panel. QI values below the threshold may not be considered acceptable based on an engineering review. Refer to Annex A5

^B Total number of data points taken. Minimum acceptable value is 3000

^C Number of Bad Quality Data points not used in the calculation of the statistical measures.

^D Number of points clipped by over/under range limits.

^E Typical values determined from reference oil test database

Fig A1.5 – Operational Summary

**Mack T-12 EGR Engine Oil Test
Form 6
Rod Bearing Weight Loss**

Laboratory:	EOT Date:	EOT Time:
Test Number:		
Oil Code:		
Formulation/Stand Code:		

Cylinder #	Location	SOT Weight, g	EOT Weight, g	Weight Change, mg
1	Upper			
2	Upper			
3	Upper			
4	Upper			
5	Upper			
6	Upper			

Summary	As Measured	Outlier Screened
Upper Bearing Average Weight Loss, mg		
Upper Bearing Weight Loss Std. Dev., mg		
Upper Bearing Minimum Weight Loss, mg		
Upper Bearing Maximum Weight Loss, mg		
Outlier Upper Rod Bearing ^A		

^A Cylinder number

Cylinder #	Location	SOT Weight, g	EOT Weight, g	Weight Change, mg
1	Lower			
2	Lower			
3	Lower			
4	Lower			
5	Lower			
6	Lower			
Lower Bearing Average Weight Loss, mg				
Lower Bearing Weight Loss Std. Dev., mg				
Lower Bearing Minimum Weight Loss, mg				
Lower Bearing Maximum Weight Loss, mg				

**Mack T-12 EGR Engine Oil Test
Form 7
Ring Weight Loss**

Laboratory:	EOT Date:	EOT Time:
Test Number:		
Oil Code:		
Formulation/Stand Code:		

Cylinder No.	Top Ring SOT Weight, g	Top Ring EOT Weight, g	Weight Loss, mg
1			
2			
3			
4			
5			
6			

Summary	As Measured	Outlier Screened
Top Ring Average Weight Loss, mg		
Top Ring Weight Loss Std. Dev., mg		
Top Ring Minimum Weight Loss, mg		
Top Ring Maximum Weight Loss, mg		
Outlier Ring^B		

^A Results calculated without rings with plasma flanking.

^B Ring number wear results are not currently outlier screened.

Cylinder No.	2nd Ring SOT Weight, g	2 nd Ring EOT Weight, g	Weight Loss, mg
1			
2			
3			
4			
5			
6			
2nd Ring Average Weight Loss, mg			
2nd Ring Weight Loss Std. Dev., mg			
2nd Ring Min. Weight Loss, mg			
2nd Ring Max. Weight Loss, mg			

Cylinder No.	Oil Ring SOT Weight, g	Oil Ring EOT Weight, g	Weight Loss, mg
1			
2			
3			
4			
5			
6			
Oil Ring Average Weight Loss, mg			
Oil Ring Weight Loss Std. Dev., mg			
Oil Ring Minimum Weight Loss, mg			
Oil Ring Maximum Weight Loss, mg			

**MACK T-12 EGR Engine Oil Test
Form 8
Oil Analysis Summary**

Laboratory:	EOT Date:	EOT Time:
Test Number:		Oil Code:
Formulation/Stand Code:		

Hours	Soot Wt.% TGA	Viscosity At 100°C cSt	Viscosity Increase cSt	TBN	TAN	IR Oxidation		Metal Elements (ppm)									
						Inte- grated	Peak Height	Fe	Pb	Cu	Cr	Al	Si	Sn	Na	Ni	
100 (2nd)																	
100 Avg.																	

Summary	As Measured	Outlier Bearing Adjusted
Delta Pb @ EOT, ppm		
Delta Pb @ 250-300h, ppm		
MRV @ 100h, cP		
MRV Yield Stress, Pa		

**Mack T-12 EGR Engine Oil Test
Form 9
Liner Surface Roughness & Bore Diameter**

Laboratory:	EOT Date:	EOT Time:
Test Number:		
Oil Code:		
Formulation/Stand Code:		

Liner No.	Location	Ra (µm)	Bore Diameter (mm)	Avg.	Ra (µm)	Dia. (mm)
1	Top Ring Travel @ 0°			Avg.		
	Top Ring Travel @ 90°			Std. Dev.		
	Top Ring Travel @ 180°			Min.		
	Top Ring Travel @ 270°			Max.		
2	Top Ring Travel @ 0°			Avg.		
	Top Ring Travel @ 90°			Std.Dev.		
	Top Ring Travel @ 180°			Min.		
	Top Ring Travel @ 270°			Max.		
3	Top Ring Travel @ 0°			Avg.		
	Top Ring Travel @ 90°			Std. Dev.		
	Top Ring Travel @ 180°			Min.		
	Top Ring Travel @ 270°			Max.		
4	Top Ring Travel @ 0°			Avg.		
	Top Ring Travel @ 90°			Std.Dev.		
	Top Ring Travel @ 180°			Min.		
	Top Ring Travel @ 270°			Max.		
5	Top Ring Travel @ 0°			Avg.		
	Top Ring Travel @ 90°			Std. Dev.		
	Top Ring Travel @ 180°			Min.		
	Top Ring Travel @ 270°			Max.		
6	Top Ring Travel @ 0°			Avg.		
	Top Ring Travel @ 90°			Std. Dev.		
	Top Ring Travel @ 180°			Min.		
	Top Ring Travel @ 270°			Max.		

	Ra (µm)	Bore Diameter (mm)
Average Surface Roughness & Bore Diameter		
Standard Deviation Surface Roughness & Bore Diameter		
Minimum Surface Roughness & Bore Diameter		
Maximum Surface Roughness & Bore Diameter		

**Mack T-12 EGR Engine Oil Test
Form 10
Liner Wear Summary**

Laboratory:	EOT Date:	EOT Time:
Test Number:		
Oil Code:		
Formulation/Stand Code:		

Position	Wear Step (μm)					
	Cylinder Number					
	1	2	3	4	5	6
1:00						
2:00						
3:00 (Thrust)						
4:00						
5:00						
6:00 (Rear)						
7:00						
8:00						
9:00 (Anti-Thrust)						
10:00						
11:00						
12:00 (Front)						
Average						

Summary	As Measured	Outlier Screened
Average, μm		
Std. Dev., μm		
Minimum, μm		
Maximum, μm		
Outlier Liners ^A		

^A Cylinder Number.

**Mack T-12 EGR Engine Oil Test
Form 12
Test Fuel Analysis (Last Batch)**

Laboratory:	EOT Date:	EOT Time:
Test Number:		
Oil Code:		
Formulation/Stand Code:		
Supplier:	Batch Identifiers:	

Measurement	Specs.	Analysis		Test Method
		New	EOT	
Total Sulfur, ppm	7 - 15			D 5453 or equivalent
Gravity, °API	34 - 37			D 4052
Hydrocarbon Composition				
Aromatics % Wt.	26 - 31.5			D 5186
Olefins % Vol.	Report			D 1319
Cetane Index	Report			D 976
Cetane No.	43 - 47			D 613
Copper Strip Corrosion	1 Maximum			D 130
Flash Point, °C	54 Minimum			D 93
Pour Point, °C	-18 Maximum			D 97
Carbon Residue on 10% Residuum, %	0.35 Maximum			D 524 (10% Bottoms)
Water & Sediment, % Vol.	0.05 Maximum			D 2709
Viscosity, cSt @ 40°C	2.0 - 2.6			D 445
Total Acid Number	0.05 Maximum			D 664
Strong Acid Number	0.00 Maximum			D 664
Accelerated Stability	1.5 max			D 2274
Ash, % Wt.	0.005 max			D 482
HFRR, µm	460 max^A			D 6079^A
90% Distillation, °C	293 - 332			D 86

^AMay be altered to be consistent with CARB or ASTM diesel fuel specifications.

**Mack T-12 EGR Engine Oil Test
Form 13
Characteristics of the Data Acquisition System**

Laboratory:	EOT Date:	EOT Time:
Test Number:		
Oil Code:		
Formulation/Stand Code:		

Parameter (1)	Sensing Device (2)	Calibration Frequency (3)	Record Device (4)	Observation Frequency (5)	Record Frequency (6)	Log Frequency (7)	System Response (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. Press.							

Legend:

- (1) 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 - Handlog Sheet
 DL - Automatic Data Logger
 SC - Strip Chart Recorder
 C/M - Computer, Using Manual Data Entry
 C/D - Computer, Using Direct I/O 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

**Mack T-12 EGR Engine Oil Test
Form 14
Build-up and Hardware Information**

Laboratory:	EOT Date:	EOT Time:
Test Number:		
Oil Code:		
Formulation/Stand Code:		

Injection Timing

Timing Hours	Timing (Deg)
Total Timing Changes	

Hardware

Part	Part Number	Serial Number
Primary Turbocharger		
Secondary Charger		
Cylinder Head (front)		
Cylinder Head (rear)		
Pistons		
Injection Nozzles		
Rod Bearings		
Liners		
Ring Set		

Cylinder Kit Location	CPD ID Number
Cylinder 1	
Cylinder 2	
Cylinder 3	
Cylinder 4	
Cylinder 5	
Cylinder 6	

Cylinder Liner Batch ID	
Ring Pack Batch ID	
Conrod Bearing Batch ID	
Main Bearing Batch ID	
Piston Crown Batch ID	
2nd Ring Batch ID	
Oil Ring Batch ID	
Piston Skirt Batch ID	

**Mack T-12 EGR Engine Oil Test
Form 15
Rating Summary: Piston #1**

Laboratory:	EOT Date:	EOT Time:
Test Number:		
Oil Code:		
Formulation/Stand Code:		
Date Rated:	Rater Initials:	Verified By:

NOTE: Reporting of this information is NOT mandatory for T-12 Tests.

Total Piston Ratings Summary																				
C a r b o n	Dep. Factor	Grooves				Lands				Dep. Factor	Groove		Lands				Oil Cooling		Under Crown	
		No. 1		No. 2		No. 1		No. 2			No. 3		No. 3		No. 4		A, %	Dem.	A, %	Dem.
		A, %	Dem.	A, %	Dem.	A, %	Dem.	A, %	Dem.		A, %	Dem.	A, %	Dem.	A, %	Dem.				
	HC-1.0																			
	MC-0.5																			
	LC-.25																			
	Total																			
V a r i s h	8 - 9										7.5									
	7 - 7.9																			
	6 - 6.9																			
	5 - 5.9										4.5									
	4 - 4.9																			
	3 - 3.9																			
	2 - 2.9										1.5									
	1 - 1.9																			
	>0 - 0.9																			
Clean	0	0	0	0	0	0	0	Clean	0	0	0	0	0	0	0	0	0	0		
Total																				
Rating																				
Location Factor	2	3	1	3						20	20	60	0.5	1						
Ind Rating																				
WDP		TGC				TLC				Unweighted Deposits				T. L. Flaked Carbon %						

**Mack T-12 EGR Engine Oil Test
Form 16
Rating Summary: Piston #2**

Laboratory:	EOT Date:	EOT Time:
Test Number:		
Oil Code:		
Formulation/Stand Code:		
Date Rated:	Rater Initials:	Verified By:

NOTE: Reporting of this information is NOT mandatory for T-12 Tests.

Total Piston Ratings Summary																				
C a r b o n	Dep. Factor	Grooves				Lands				Dep. Factor	Groove		Lands				Oil Cooling		Under Crown	
		No. 1		No. 2		No. 1		No. 2			No. 3		No. 3		No. 4		A, %	Dem.	A, %	Dem.
		A, %	Dem.	A, %	Dem.	A, %	Dem.	A, %	Dem.		A, %	Dem.	A, %	Dem.	A, %	Dem.				
	HC-1.0																			
	MC-0.5																			
	LC-.25																			
	Total																			
V a r i s h	8-9									7.5										
	7-7.9																			
	6-6.9																			
	5-5.9									4.5										
	4-4.9																			
	3-3.9																			
	2-2.9									1.5										
	1-1.9																			
	>0-0.9																			
	Clean		0		0		0		0	Clean		0		0		0		0		0
	Total																			
Rating																				
Location Factor		2		3		1		3		20		20		60		0.5		1		
Ind Rating																				
WDP				TGC				TLC				Unweighted Deposits				T. L. Flaked Carbon %				

**Mack T-12 EGR Engine Oil Test
Form 17
Rating Summary: Piston #3**

Laboratory:	EOT Date:	EOT Time:
Test Number:		
Oil Code:		
Formulation/Stand Code:		
Date Rated:	Rater Initials:	Verified By:

NOTE: Reporting of this information is NOT mandatory for T-12 Tests.

Total Piston Ratings Summary																				
C a r b o n	Dep. Factor	Grooves				Lands				Dep. Factor	Groove		Lands				Oil Cooling		Under Crown	
		No. 1		No. 2		No. 1		No. 2			No. 3		No. 3		No. 4		A, %	Dem.	A, %	Dem.
		A, %	Dem.	A, %	Dem.	A, %	Dem.	A, %	Dem.		A, %	Dem.	A, %	Dem.	A, %	Dem.				
	HC-1.0																			
	MC-0.5																			
	LC-.25																			
	Total																			
V a r i s h	8-9									7.5										
	7-7.9																			
	6-6.9																			
	5-5.9									4.5										
	4-4.9																			
	3-3.9																			
	2-2.9									1.5										
	1-1.9																			
	>0-0.9																			
	Clean		0		0		0		0	Clean		0		0		0		0		0
	Total																			
Rating																				
Location Factor		2		3		1		3			20		20		60		0.5		1	
Ind Rating																				
WDP		TGC				TLC				Unweighted Deposits				T. L. Flaked Carbon %						

**Mack T-12 EGR Engine Oil Test
Form 18
Rating Summary: Piston #4**

Laboratory:	EOT Date:	EOT Time:
Test Number:		
Oil Code:		
Formulation/Stand Code:		
Date Rated:	Rater Initials:	Verified By:

NOTE: Reporting of this information is NOT mandatory for T-12 Tests.

Total Piston Ratings Summary																				
C a r b o n	Dep. Factor	Grooves				Lands				Dep. Factor	Groove		Lands				Oil Cooling		Under Crown	
		No. 1		No. 2		No. 1		No. 2			No. 3		No. 3		No. 4		A, %	Dem.	A, %	Dem.
		A, %	Dem.	A, %	Dem.	A, %	Dem.	A, %	Dem.		A, %	Dem.	A, %	Dem.	A, %	Dem.				
	HC-1.0																			
	MC-0.5																			
	LC-.25																			
	Total																			
V a r i s h	8-9									7.5										
	7-7.9																			
	6-6.9																			
	5-5.9									4.5										
	4-4.9																			
	3-3.9																			
	2-2.9									1.5										
	1-1.9																			
	>0-0.9																			
	Clean		0		0		0		0	Clean		0		0		0		0		0
	Total																			
Rating																				
Location Factor		2		3		1		3			20		20		60		0.5		1	
Ind Rating																				
WDP				TGC				TLC				Unweighted Deposits				T. L. Flaked Carbon %				

**Mack T-12 EGR Engine Oil Test
Form 19
Rating Summary: Piston #5**

Laboratory:	EOT Date:	EOT Time:
Test Number:		
Oil Code:		
Formulation/Stand Code:		
Date Rated:	Rater Initials:	Verified By:

NOTE: Reporting of this information is NOT mandatory for T-12 Tests.

Total Piston Ratings Summary																				
C a r b o n	Dep. Factor	Grooves				Lands				Dep. Factor	Groove		Lands				Oil Cooling		Under Crown	
		No. 1		No. 2		No. 1		No. 2			No. 3		No. 3		No. 4		A, %	Dem.	A, %	Dem.
		A, %	Dem.	A, %	Dem.	A, %	Dem.	A, %	Dem.		A, %	Dem.	A, %	Dem.	A, %	Dem.				
	HC-1.0																			
	MC-0.5																			
	LC-.25																			
	Total																			
V a r i s h	8-9									7.5										
	7-7.9																			
	6-6.9																			
	5-5.9																			
	4-4.9									4.5										
	3-3.9																			
	2-2.9																			
	1-1.9									1.5										
	>0-0.9																			
		Clean		0		0		0		0	Clean		0		0		0		0	
	Total																			
	Rating																			
	Location Factor	2		3		1		3			20		20		60		0.5		1	
	Ind Rating																			
	WDP					TGC				TLC		Unweighted Deposits				T. L. Flaked Carbon %				

**Mack T-12 EGR Engine Oil Test
Form 20
Rating Summary: Piston #6**

Laboratory:	EOT Date:	EOT Time:
Test Number:		
Oil Code:		
Formulation/Stand Code:		
Date Rated:	Rater Initials:	Verified By:

NOTE: Reporting of this information is NOT mandatory for T-12 Tests.

Total Piston Ratings Summary																				
C a r b o n	Dep. Factor	Grooves				Lands				Dep. Factor	Groove		Lands				Oil Cooling		Under Crown	
		No. 1		No. 2		No. 1		No. 2			No. 3		No. 3		No. 4		A, %	Dem.	A, %	Dem.
		A, %	Dem.	A, %	Dem.	A, %	Dem.	A, %	Dem.		A, %	Dem.	A, %	Dem.	A, %	Dem.				
	HC-1.0																			
	MC-0.5																			
	LC-.25																			
	Total																			
V a r i s h	8-9									7.5										
	7-7.9																			
	6-6.9																			
	5-5.9																			
	4-4.9									4.5										
	3-3.9																			
	2-2.9																			
	1-1.9									1.5										
	>0-0.9																			
		Clean		0		0		0		0	Clean		0		0		0		0	
	Total																			
	Rating																			
	Location Factor	2		3		1		3			20		20		60		0.5		1	
	Ind Rating																			
	WDP					TGC				TLC		Unweighted Deposits				T. L. Flaked Carbon %				

**Mack T-12 EGR Engine Oil Test
Form 21
Main Bearing Weight Loss**

Laboratory:	EOT Date:	EOT Time:
Test Number:		
Oil Code:		
Formulation/Stand Code:		

Position No.	Location	SOT Weight, g	EOT Weight, g	Weight Change, mg
1	Upper			
2	Upper			
3	Upper			
4	Upper			
5	Upper			
6	Upper			
7	Upper			
Upper Bearing Average Weight Loss, mg				
Upper Bearing Weight Loss Std. Dev., mg				
Upper Bearing Minimum Weight Loss, mg				
Upper Bearing Maximum Weight Loss, mg				

Position No.	Location	SOT Weight, g	EOT Weight, g	Weight Change, mg
1	Lower			
2	Lower			
3	Lower			
4	Lower			
5	Lower			
6	Lower			
7	Lower			
Lower Bearing Average Weight Loss, mg				
Lower Bearing Weight Loss Std. Dev., mg				
Lower Bearing Minimum Weight Loss, mg				
Lower Bearing Maximum Weight Loss, mg				

**Mack T-12 EGR Engine Oil Test
Form 22
Ring Gap Measurements**

Laboratory:	EOT Date:	EOT Time:
Test Number:		
Oil Code:		
Formulation/Stand Code:		

Cylinder No.	Top Ring Gap, mm		
	SOT	EOT	Delta (EOT-SOT)
1			
2			
3			
4			
5			
6			
Average			

Cylinder No.	2 nd Ring Gap, mm		
	SOT	EOT	Delta (EOT-SOT)
1			
2			
3			
4			
5			
6			
Average			

Cylinder No.	Oil Ring Gap, mm		
	SOT	EOT	Delta (EOT-SOT)
1			
2			
3			
4			
5			
6			
Average			

**Mack T-12 EGR Engine Oil Test
Form 23
T-10 Merits Calculated with T-12 Results**

Laboratory:	EOT Date:	EOT Time:
Test Number		
Oil Code:		
Formulation/Stand Code:		

	Delta Pb@ EOT (ppm)	Avg Liner Wear (µm)	Avg Top Ring Weight Loss (mg)	Oil Consumption (g/h)	Delta Pb 250-300h (ppm)
T-12 Final Original Unit Result					
T-10 Mack Merits ^A					
Total T-10 Mack Merits ^A					

^A Non-reference Tests only.

**Mack T-12 EGR Engine Oil Test
Form 24
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