

Mack T-12 EGR Engine Oil Test

Report Packet Version No.

T12 VERSION 20050125

Conducted For

CC
 CC
 CC

C	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.

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

Test Number			
Stand:	CCCCC	Stand Run:	CCCC
End Of Test Date:	YYYYMMDD	End Of Test Time:	HH:MM
Oil Code:	CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC		
Formulation/Stand Code:	CC-CCCCCCCCCC-C-C-CCCCC-CC-CC-CCCC		
Alternate Codes	CCCCCCCCCCCCCCCC	CCCCCCCCCCCCCCCC	CCCCCCCCCCCCCCCC

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

Submitted By: _____ CC

Testing Laboratory

Signature Image

Signature

CC

Typed Name

CC

Title

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

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**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 CO ₂ , %	3.09	1.42
Exhaust CO ₂ , %	9.25	9.93
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	Tbd	Tbd
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:	CC	EOT Date:	YYYYMMDD	EOT Time:	HH:MM
Test Number	CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC				
Oil Code:	CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC				
Formulation/Stand Code:	CC-CCCCCCCCCC-C-C-CCCCCC-CC-CC-CCCC				

Test Results

Date Test Started:	YYYYMMDD	Start Time:	HH:MM	Test Length:	S1234
TMC Oil Code: ^A	CCCCCC	Lab Oil Code:	CCCCCCCCCCCCCCCCCCCCCCCC	SAE Viscosity:	CCCCCCC
Average TGA Soot % at 100 h	S123.1				
Centrifugal Oil Filter Mass Gain, g	S123.1				
Oil Filter Delta P, kPa (138 maximum)	S123				
EOT TBN	S123.1				

	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	S123	S12.1	S123	S123.1	S1234
Transformed Result ^B	S1.1234	S1.1234	S12.1234	S12.1234	S1234
Correction Factor ^B	S1.1234	S1.1234	S12.1234	S12.1234	S1234
Corrected Transformed Result ^B	S1.1234	S1.1234	S12.1234	S12.1234	S1234
Severity Adjustment ^B	S1.1234	S1.1234	S12.1234	S12.1234	S1234
Final Transformed Result ^B	S1.1234	S1.1234	S12.1234	S12.1234	S1234
Final Original Unit Result	S123	S12.1	S123	S123.1	S1234
Mack Merits ^C	S1234.1	S1234.1	S1234.1	S1234.1	S1234.1
Total Mack Merits ^C	S1234.1				

Last Stand Reference Results

Test Number:	CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC				
Oil Code:	CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC				
Test Length:	S1234	TMC Oil Code:	CCCCCC		
EOT Date:	YYYYMMDD	EOT Time:	HH:MM		
Stand Calibration Expiration Date:	YYYYMMDD				
Average TGA Soot % at 100 h	S123.1				
Final Original Unit Result	Delta Pb@ EOT (ppm)	Avg Liner Wear (µm)	Avg Top Ring Weight Loss (mg)	Oil Consumption (g/h)	Delta Pb 250-300h (ppm)
	S123	S12.1	S123	S123.1	S1234

^A Reference Tests only.

^B Transformed Units for Delta Pb only.

^C Non-reference Tests only.

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

Laboratory: CC	EOT Date: YYYYMMDD	EOT Time: HH:MM
Test Number: CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC		Oil Code: CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
Formulation/Stand Code: CC-CCCCCCCCC-C-C-CCCCC-CC-CC-CCCC		

	Parameter	Units	QI Threshold	EOT QI ^A	Target		Average		Samples ^B	BQD ^C	Over/Under Range ^D
Controlled Parameters	Speed	r/min	0.000	S12.123	1800	1200	S12345	S12345	S1234	S1234	S1234
	Fuel Flow	kg/h	0.000	S12.123	59.2	63.5	S12.12	S12.12	S1234	S1234	S1234
	Inlet Manifold Temp.	°C	0.000	S12.123	90	80	S1234	S1234	S1234	S1234	S1234
	Coolant Out Temp.	°C	0.000	S12.123	66	108	S1234	S1234	S1234	S1234	S1234
	Fuel In Temp.	°C	0.000	S12.123	40		S1234		S1234	S1234	S1234
	Oil Gallery Temp.	°C	0.000	S12.123	88	116	S1234	S1234	S1234	S1234	S1234
	Inlet Air Temp.	°C	0.000	S12.123	25		S1234		S1234	S1234	S1234
	Inlet Air Restriction	kPa			3.5 – 4.0		S12.12		S1234	S1234	S1234
	Inlet Man. Pressure	kPa			tbd	Tbd	S123	S123	S1234	S1234	S1234
	Exh. Back Pressure	kPa			2.7 – 3.5		S1.1		S1234	S1234	S1234
	Crankcase Pressure	kPa			0.25 – 0.75		S1.12		S1234	S1234	S1234
	Intake CO ₂	%			3.09±0.05	1.42±0.05	S12.12	S12.12			
	Exhaust CO ₂	%			9.25±0.15	9.93±0.15	S12.12	S12.12			
Non-Controlled Parameters	Parameter	Units	Typical Values ^E		Average						
	Torque	Nm	tbd	tbd	S1234	S1234					
	Brake Specific Fuel Cons.	g/kW-h	tbd	tbd	S123.1	S123.1					
	Pre-Turbine Temp. (L)	°C	tbd	tbd	S1234	S1234					
	Pre-Turbine Temp. (R)	°C	tbd	tbd	S1234	S1234					
	Tailpipe Temp.	°C	tbd	tbd	S1234	S1234					
	Oil Sump Temp.	°C	tbd	tbd	S1234	S1234					
	EGR Pre-Venturi Temp.	°C	tbd	tbd	S1234	S1234					
	Blowby	L/min	tbd	tbd	S12.1	S12.1					
	Inlet Air Dew Point	°C	tbd	tbd	S1234	S1234					
	EGR Pre-Venturi Pressure	kPa	tbd	tbd	S1234	S1234					
Main Gallery Oil Pressure	kPa	tbd	tbd	S1234	S1234						

^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

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

Laboratory:	CC	EOT Date:	YYYYMMDD	EOT Time:	HH:MM
Test Number:	CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC				
Oil Code:	CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC				
Formulation/Stand Code:	CC-CCCCCCCCCG-C-C-CCCCC-CC-CC-CCCC				

Cylinder #	Location	SOT Weight, g	EOT Weight, g	Weight Change, mg
1	Upper	S12.1234	S12.1234	S123.1
2	Upper	S12.1234	S12.1234	S123.1
3	Upper	S12.1234	S12.1234	S123.1
4	Upper	S12.1234	S12.1234	S123.1
5	Upper	S12.1234	S12.1234	S123.1
6	Upper	S12.1234	S12.1234	S123.1

	Summary	As Measured	Outlier Screened
Upper Bearing Average Weight Loss, mg		S123.1	S123.1
Upper Bearing Weight Loss Std. Dev., mg		S123.1	S123.1
Upper Bearing Minimum Weight Loss, mg		S123.1	S123.1
Upper Bearing Maximum Weight Loss, mg		S123.1	S123.1
Outlier Upper Rod Bearing ^A		CCCC	

^ACylinder number

Cylinder #	Location	SOT Weight, g	EOT Weight, g	Weight Change, mg
1	Lower	S12.1234	S12.1234	S123.1
2	Lower	S12.1234	S12.1234	S123.1
3	Lower	S12.1234	S12.1234	S123.1
4	Lower	S12.1234	S12.1234	S123.1
5	Lower	S12.1234	S12.1234	S123.1
6	Lower	S12.1234	S12.1234	S123.1
Lower Bearing Average Weight Loss, mg				S123.1
Lower Bearing Weight Loss Std. Dev., mg				S123.1
Lower Bearing Minimum Weight Loss, mg				S123.1
Lower Bearing Maximum Weight Loss, mg				S123.1

Comrod Bearing Batch ID	CCCCCCCCCCCC
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Mack T-12 EGR Engine Oil Test
Form 7
Ring Weight Loss

Laboratory:	CC	EOT Date:	YYYYMMDD	EOT Time:	HH:MM
Test Number:	CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC				
Oil Code:	CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC				
Formulation/Stand Code:	CC-CCCCCCCCCG-C-C-CCCCCG-CC-CC-CCCC				

Cylinder No.	Top Ring SOT Weight, g	Top Ring EOT Weight, g	Weight Loss, mg
1	S12.1234	S12.1234	S123.1
2	S12.1234	S12.1234	S123.1
3	S12.1234	S12.1234	S123.1
4	S12.1234	S12.1234	S123.1
5	S12.1234	S12.1234	S123.1
6	S12.1234	S12.1234	S123.1

	Summary	As Measured	Outlier Screened
Top Ring Average Weight Loss, mg		S123	S123
Top Ring Weight Loss Std. Dev., mg		S123.1	S123.1
Top Ring Minimum Weight Loss, mg		S123.1	S123.1
Top Ring Maximum Weight Loss, mg		S123.1	S123.1
Outlier Ring ^B			CCCC

^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	S12.1234	S12.1234	S123.1
2	S12.1234	S12.1234	S123.1
3	S12.1234	S12.1234	S123.1
4	S12.1234	S12.1234	S123.1
5	S12.1234	S12.1234	S123.1
6	S12.1234	S12.1234	S123.1
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	S12.1234	S12.1234	S123.1
2	S12.1234	S12.1234	S123.1
3	S12.1234	S12.1234	S123.1
4	S12.1234	S12.1234	S123.1
5	S12.1234	S12.1234	S123.1
6	S12.1234	S12.1234	S123.1
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: CC	EOT Date: YYYYMMDD	EOT Time: HH:MM
Test Number: CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC	Oil Code: CCC	
Formulation/Stand Code: CC-CCCCCCCCC-C-C-CCCCC-CC-CC-CCCC		

Hours	Soot Wt.% TGA	Viscosity At 100°C cSt	Viscosity Increase cSt	TBN	TAN	Integrated IR Oxidation	Metal Elements (ppm)								
							Fe	Pb	Cu	Cr	Al	Si	Sn	Na	Ni
CCCCC	S123.1	S123.12		S123.1	S123.1	S1234.1	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA
CCCCC	S123.1	S123.12	S12.12	S123.1	S123.1	S1234.1	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA
CCCCC	S123.1	S123.12	S12.12	S123.1	S123.1	S1234.1	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA
CCCCC	S123.1	S123.12	S12.12	S123.1	S123.1	S1234.1	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA
CCCCC	S123.1	S123.12	S12.12	S123.1	S123.1	S1234.1	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA
100 (2nd)	S123.1														
100 Avg.	S123.1														
CCCCC	S123.1	S123.12	S12.12	S123.1	S123.1	S1234.1	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA
CCCCC	S123.1	S123.12	S12.12	S123.1	S123.1	S1234.1	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA
CCCCC	S123.1	S123.12	S12.12	S123.1	S123.1	S1234.1	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA
CCCCC	S123.1	S123.12	S12.12	S123.1	S123.1	S1234.1	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA
CCCCC	S123.1	S123.12	S12.12	S123.1	S123.1	S1234.1	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA
CCCCC	S123.1	S123.12	S12.12	S123.1	S123.1	S1234.1	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA
CCCCC	S123.1	S123.12	S12.12	S123.1	S123.1	S1234.1	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA
CCCCC	S123.1	S123.12	S12.12	S123.1	S123.1	S1234.1	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA
CCCCC	S123.1	S123.12	S12.12	S123.1	S123.1	S1234.1	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA	AAAAAA

Summary	As Measured	Outlier Bearing Adjusted
Delta Pb @ EOT, ppm	S123	S123
Delta Pb @ 250-300h, ppm	S1234	

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

Laboratory:	CC	EOT Date:	YYYYMMDD	EOT Time:	HH:MM
Test Number:	CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC				
Oil Code:	CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC				
Formulation/Stand Code:	CC-CCCCCCCCCCG-C-C-CCCCCC-CC-CC-CCCC				

Liner No.	Location	Ra (µm)	Bore Diameter (mm)		Ra (µm)	Dia. (mm)
1	Top Ring Travel @ 0°C	S1.12	S123.123	Avg.	S1.12	S123.123
	Top Ring Travel @ 90°C	S1.12	S123.123	Std. Dev.	S1.12	
	Top Ring Travel @ 180°C	S1.12		Min.	S1.12	
2	Top Ring Travel @ 270°C	S1.12		Max.	S1.12	
	Top Ring Travel @ 0°C	S1.12	S123.123	Avg.	S1.12	S123.123
	Top Ring Travel @ 90°C	S1.12	S123.123	Std.Dev.	S1.12	
3	Top Ring Travel @ 180°C	S1.12		Min.	S1.12	
	Top Ring Travel @ 270°C	S1.12		Max.	S1.12	
	Top Ring Travel @ 0°C	S1.12	S123.123	Avg.	S1.12	S123.123
4	Top Ring Travel @ 90°C	S1.12	S123.123	Std.Dev.	S1.12	
	Top Ring Travel @ 180°C	S1.12		Min.	S1.12	
	Top Ring Travel @ 270°C	S1.12		Max.	S1.12	
5	Top Ring Travel @ 0°C	S1.12	S123.123	Avg.	S1.12	S123.123
	Top Ring Travel @ 90°C	S1.12	S123.123	Std. Dev.	S1.12	
	Top Ring Travel @ 180°C	S1.12		Min.	S1.12	
6	Top Ring Travel @ 270°C	S1.12		Max.	S1.12	
	Top Ring Travel @ 0°C	S1.12	S123.123	Avg.	S1.12	S123.123
	Top Ring Travel @ 90°C	S1.12	S123.123	Std. Dev.	S1.12	
	Top Ring Travel @ 180°C	S1.12		Min.	S1.12	
	Top Ring Travel @ 270°C	S1.12		Max.	S1.12	

Average Surface Roughness & Bore Diameter		Ra (µm)	Bore Diameter (mm)
Standard Deviation Surface Roughness & Bore Diameter		S1.12	S123.123
Minimum Surface Roughness & Bore Diameter		S1.12	S123.123
Maximum Surface Roughness & Bore Diameter		S1.12	S123.123

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

Laboratory:	CC	FOT Date:	YYYYMMDD	FOT Time:	HH:MM
Test Number:	CCCCCCCCCCCCCCCCCCCCCCCCCCCCCC				
Oil Code:	CCCCCCCCCCCCCCCCCCCCCCCCCCCCCC				
Formulation/Stand Code:	CC-CCCCCCCCCC-C-C-CCCCCC-CC-CC-CCCC				

Position	Wear Step (µm)					
	Cylinder Number					
	1	2	3	4	5	6
1:00	S123.1	S123.1	S123.1	S123.1	S123.1	S123.1
2:00	S123.1	S123.1	S123.1	S123.1	S123.1	S123.1
3:00 (Thrust)	S123.1	S123.1	S123.1	S123.1	S123.1	S123.1
4:00	S123.1	S123.1	S123.1	S123.1	S123.1	S123.1
5:00	S123.1	S123.1	S123.1	S123.1	S123.1	S123.1
6:00 (Rear)	S123.1	S123.1	S123.1	S123.1	S123.1	S123.1
7:00	S123.1	S123.1	S123.1	S123.1	S123.1	S123.1
8:00	S123.1	S123.1	S123.1	S123.1	S123.1	S123.1
9:00 (Anti-Thrust)	S123.1	S123.1	S123.1	S123.1	S123.1	S123.1
10:00	S123.1	S123.1	S123.1	S123.1	S123.1	S123.1
11:00	S123.1	S123.1	S123.1	S123.1	S123.1	S123.1
12:00 (Front)	S123.1	S123.1	S123.1	S123.1	S123.1	S123.1
Average	S123.1	S123.1	S123.1	S123.1	S123.1	S123.1

Summary	As Measured	Outlier Screened
Average, µm	S123.1	S12.1
Std. Dev., µm	S123.1	S123.1
Minimum, µm	S123.1	S123.1
Maximum, µm	S123.1	S123.1
Outlier Liners ^A	CCCCC	

^A Cylinder Number.

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

Laboratory:	CC	EOT Date:	YYYYMMDD	EOT Time:	HH:MM
Test Number:	CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC				
Oil Code:	CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC				
Formulation/Stand Code:	CC-C-CCCCCCCCC-C-C-CCCCCC-CC-CC-CCCC				
Supplier:	CCCCCCCCCCCCCCCC		Batch Identifiers: CCCCCCCCCCCCCCCC		

Measurement	Specs.	Analysis		Test Method
		New	EOT	
Total Sulfur, ppm	7 - 15	S12.12	S12.12	D 5453
Gravity, °API	34 – 37	S12.1	S12.1	D 4052
Hydrocarbon Composition				
Aromatics % Wt.	26 – 31.5	S12.1		D 5186
Olefins % Vol.	Report	S12.1		D 1319
Cetane Index	Report	S12.1		D 976
Cetane No.	43 – 47	S12.1		D 613
Copper Strip Corrosion	1 Maximum	CCCC		D 130
Flash Point, °C	54 Minimum	S123		D 93
Pour Point, °C	-18 Maximum	S123		D 97
Carbon Residue on 10% Residuam, %	0.35 Maximum	S12.12		D 524 (10% Bottoms)
Water & Sediment, % Vol.	0.05 Maximum	AAAAAAA		D 2709
Viscosity, cSt @ 40°C	2.0 – 2.6	S12.1		D 445
Total Acid Number	0.05 Maximum	S1.12		D 664
Strong Acid Number	0.00 Maximum	S1.12		D 664
Accelerated Stability	1.5 max	S12.1		D 2274
Ash, % Wt.	0.005 max	S123.123		D 482
SLBOCLE, g	3100 min⁴	S1234567		D 6078⁴
90% Distillation, °C	293 - 332	S1234		D 86

⁴May 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:	CC	EOT Date:	YYYYMMDD	EOT Time:	HH:MM
Test Number:	CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC				
Oil Code:	CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC				
Formulation/Stand Code:	CC-CCCCCCCCCCC-C-C-CCCCCC-CC-CC-CCCC				

Parameter (1)	Sensing Device (2)	Calibration Frequency (3)	Record Device (4)	Observation Frequency (5)	Record Frequency (6)	Log Frequency (7)	System Response (8)
Temperatures	CCCCCCCCCCC	CCCCCCCCCCC	CCC	CCCCCCCCCCC	CCCCCCCCCCC	CCCCCCCCCCC	CCCCCCCCC
Oil @ Filt.	CCCCCCCCCCC	CCCCCCCCCCC	CCC	CCCCCCCCCCC	CCCCCCCCCCC	CCCCCCCCCCC	CCCCCCCCC
Fuel In.	CCCCCCCCCCC	CCCCCCCCCCC	CCC	CCCCCCCCCCC	CCCCCCCCCCC	CCCCCCCCCCC	CCCCCCCCC
Intake Air	CCCCCCCCCCC	CCCCCCCCCCC	CCC	CCCCCCCCCCC	CCCCCCCCCCC	CCCCCCCCCCC	CCCCCCCCC
Intake Man.	CCCCCCCCCCC	CCCCCCCCCCC	CCC	CCCCCCCCCCC	CCCCCCCCCCC	CCCCCCCCCCC	CCCCCCCCC
Pre-Turb.	CCCCCCCCCCC	CCCCCCCCCCC	CCC	CCCCCCCCCCC	CCCCCCCCCCC	CCCCCCCCCCC	CCCCCCCCC
Cool. Out	CCCCCCCCCCC	CCCCCCCCCCC	CCC	CCCCCCCCCCC	CCCCCCCCCCC	CCCCCCCCCCC	CCCCCCCCC
Other							
Fuel Flow	CCCCCCCCCCC	CCCCCCCCCCC	CCC	CCCCCCCCCCC	CCCCCCCCCCC	CCCCCCCCCCC	CCCCCCCCC
Engine RPM	CCCCCCCCCCC	CCCCCCCCCCC	CCC	CCCCCCCCCCC	CCCCCCCCCCC	CCCCCCCCCCC	CCCCCCCCC
Load	CCCCCCCCCCC	CCCCCCCCCCC	CCC	CCCCCCCCCCC	CCCCCCCCCCC	CCCCCCCCCCC	CCCCCCCCC
Inlet Restr.	CCCCCCCCCCC	CCCCCCCCCCC	CCC	CCCCCCCCCCC	CCCCCCCCCCC	CCCCCCCCCCC	CCCCCCCCC
Exh. Press.	CCCCCCCCCCC	CCCCCCCCCCC	CCC	CCCCCCCCCCC	CCCCCCCCCCC	CCCCCCCCCCC	CCCCCCCCC
Oil Gal. Press.	CCCCCCCCCCC	CCCCCCCCCCC	CCC	CCCCCCCCCCC	CCCCCCCCCCC	CCCCCCCCCCC	CCCCCCCCC

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: CC	EOT Date: YYYYMMDD	EOT Time: HH:MM
Test Number: CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC		
Oil Code: CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC		
Formulation/Stand Code: CC-CCCCCCCCC-C-C-CCCCCC-CC-CC-CCCCC		

Injection Timing

Timing Hours	Timing (Deg)
CCC	CCCCCC
CCC	CCCCCC
CCC	CCCCCC
CCC	CCCCCC
CCC	CCCCCC
CCC	CCCCCC
CCC	CCCCCC
CCC	CCCCCC
CCC	CCCCCC
CCC	CCCCCC
S1	Total Timing Changes

Hardware

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

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

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

Laboratory: CC	EOT Date: YYYYMMDD	EOT Time: HH:MM	
Test Number: CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC			
Oil Code: CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC			
Formulation/Stand Code: CC-CCCCCCCC-C-C-CCCC-CC-CC-CCCC			
Date Rated: YYYYMMDD	Rater Initials: CCC	Verified By: CCC	

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	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12					
	MC-0.5	S123	S123.12								S123	S123.12									
	LC-.25	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	
	Total	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	
V a r i a n t	8 – 9	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	7.5	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	
	7 – 7.9	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12												
	6 – 6.9	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12												
	5 – 5.9	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	4.5	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	
	4 – 4.9	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12												
	3 – 3.9	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12												
	2 – 2.9	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	1.5	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	
	1 – 1.9	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12												
	>0 – 0.9	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12												
	Clean	S123	0	S123	0	S123	0	S123	0	Clean	S123	0	S123	0	S123	0	S123	0	S123	0	
	Total	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	
	Rating	S123.12		S123.12		S123.12		S123.12			S123.12		S123.12		S123.12		S123.12		S123.12		
	Location Factor	2		3		1		3			20		20		60		0.5		1		
	Ind Rating	S123.12		S123.12		S123.12		S123.12			S123.12		S123.12		S123.12		S123.12		S123.12		
	WDP	TGC				TLC				Unweighted Deposits				T. L. Flaked Carbon %							
	S1234.1	S12.12				S12.12				S1234.1				S123456							

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

Laboratory: CC	EOT Date: YYYYMMDD	EOT Time: HH:MM	
Test Number: CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC			
Oil Code: CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC			
Formulation/Stand Code: CC-CCCCCCCC-C-C-CCCCC-CC-CC-CCCC			
Date Rated: YYYYMMDD	Rater Initials: CCC	Verified By: CCC	

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	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12					
	MC-0.5	S123	S123.12								S123	S123.12									
	LC-.25	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	
	Total	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	
V a r i s h	8 – 9	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	7.5	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	
	7 – 7.9	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12												
	6 – 6.9	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12												
	5 – 5.9	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	4.5	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	
	4 – 4.9	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12												
	3 – 3.9	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12												
	2 – 2.9	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	1.5	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	
	1 – 1.9	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12												
	>0 – 0.9	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12												
	Clean	S123	0	S123	0	S123	0	S123	0	Clean	S123	0	S123	0	S123	0	S123	0	S123	0	
	Total	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	
	Rating	S123.12		S123.12		S123.12		S123.12			S123.12		S123.12		S123.12		S123.12		S123.12		
	Location Factor	2		3		1		3			20		20		60		0.5		1		
	Ind Rating	S123.12		S123.12		S123.12		S123.12			S123.12		S123.12		S123.12		S123.12		S123.12		
	WDP	TGC				TLC				Unweighted Deposits				T. L. Flaked Carbon %							
	S1234.1	S12.12				S12.12				S1234.1				S123456							

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

Laboratory: CC	EOT Date: YYYYMMDD	EOT Time: HH:MM	
Test Number: CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC			
Oil Code: CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC			
Formulation/Stand Code: CC-CCCCCCCC-C-C-CCCC-CC-CC-CCCC			
Date Rated: YYYYMMDD	Rater Initials: CCC	Verified By: CCC	

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	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12						
	MC-0.5	S123	S123.12								S123	S123.12										
	LC-.25	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12		
	Total	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12		
V a r n i s h	8 – 9	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	7.5	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12		
	7 – 7.9	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12													
	6 – 6.9	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12													
	5 – 5.9	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	4.5	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12		
	4 – 4.9	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12													
	3 – 3.9	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12													
	2 – 2.9	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	1.5	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12		
	1 – 1.9	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12													
	>0 – 0.9	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12													
		Clean	S123	0	S123	0	S123	0	S123	0	Clean	S123	0	S123	0	S123	0	S123	0	S123	0	
	Total	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12		
	Rating	S123.12		S123.12		S123.12		S123.12			S123.12		S123.12		S123.12		S123.12		S123.12			
	Location Factor	2		3		1		3			20		20		60		0.5		1			
	Ind Rating	S123.12		S123.12		S123.12		S123.12			S123.12		S123.12		S123.12		S123.12		S123.12			
	WDP	TGC				TLC				Unweighted Deposits				T. L. Flaked Carbon %								
	S1234.1	S12.12				S12.12				S1234.1				S123456								

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

Laboratory: CC	EOT Date: YYYYMMDD	EOT Time: HH:MM	
Test Number: CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC			
Oil Code: CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC			
Formulation/Stand Code: CC-CCCCCCCC-C-C-CCCC-CC-CC-CCCC			
Date Rated: YYYYMMDD	Rater Initials: CCC	Verified By: CCC	

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	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12					
	MC-0.5	S123	S123.12								S123	S123.12									
	LC-.25	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	
	Total	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	
V a r n i s h	8 – 9	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	7.5	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	
	7 – 7.9	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12												
	6 – 6.9	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12												
	5 – 5.9	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	4.5	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	
	4 – 4.9	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12												
	3 – 3.9	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12												
	2 – 2.9	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	1.5	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	
	1 – 1.9	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12												
	>0 – 0.9	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12												
		Clean	S123	0	S123	0	S123	0	S123	0	Clean	S123	0	S123	0	S123	0	S123	0	S123	0
	Total	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	
	Rating	S123.12		S123.12		S123.12		S123.12			S123.12		S123.12		S123.12		S123.12		S123.12		
	Location Factor	2		3		1		3			20		20		60		0.5		1		
	Ind Rating	S123.12		S123.12		S123.12		S123.12			S123.12		S123.12		S123.12		S123.12		S123.12		
	WDP	TGC				TLC				Unweighted Deposits				T. L. Flaked Carbon %							
	S1234.1	S12.12				S12.12				S1234.1				S123456							

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

Laboratory: CC	EOT Date: YYYYMMDD	EOT Time: HH:MM	
Test Number: CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC			
Oil Code: CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC			
Formulation/Stand Code: CC-CCCCCCCC-C-C-CCCC-CC-CC-CCCC			
Date Rated: YYYYMMDD	Rater Initials: CCC	Verified By: CCC	

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.	A, %	Dem.	A, %	Dem.
	HC-1.0	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12				
	MC-0.5	S123	S123.12								S123	S123.12								
	LC-.25	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12
	Total	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12
V a r n i s h	8 – 9	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	7.5	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12
	7 – 7.9	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12
	6 – 6.9	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12
	5 – 5.9	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	4.5	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12
	4 – 4.9	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12
	3 – 3.9	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12
	2 – 2.9	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12
	1 – 1.9	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	1.5	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12
	>0 – 0.9	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12
		Clean	S123	0	S123	0	S123	0	S123	0	Clean	S123	0	S123	0	S123	0	S123	0	S123
	Total	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12
	Rating	S123.12		S123.12		S123.12		S123.12			S123.12		S123.12		S123.12		S123.12		S123.12	
	Location Factor	2		3		1		3			20		20		60		0.5		1	
	Ind Rating	S123.12		S123.12		S123.12		S123.12			S123.12		S123.12		S123.12		S123.12		S123.12	
	WDP	TGC				TLC				Unweighted Deposits				T. L. Flaked Carbon %						
	S1234.1	S12.12				S12.12				S1234.1				S123456						

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

Laboratory: CC	EOT Date: YYYYMMDD	EOT Time: HH:MM
Test Number: CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC		
Oil Code: CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC		
Formulation/Stand Code: CC-CCCCCCCC-C-C-CCCC-CC-CC-CCCC		
Date Rated: YYYYMMDD	Rater Initials: CCC	Verified By: CCC

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	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12					
	MC-0.5	S123	S123.12								S123	S123.12									
	LC-.25	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	
	Total	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	
V a r n i s h	8-9	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	7.5	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	
	7-7.9	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12												
	6-6.9	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12												
	5-5.9	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	4.5	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	
	4-4.9	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12												
	3-3.9	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12												
	2-2.9	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	1.5	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	
	1-1.9	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12												
	>0-0.9	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12												
	Clean	S123	0	S123	0	S123	0	S123	0	Clean	S123	0	S123	0	S123	0	S123	0	S123	0	
	Total	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	
	Rating	S123.12		S123.12		S123.12		S123.12			S123.12		S123.12		S123.12		S123.12		S123.12		
	Location Factor	2		3		1		3			20		20		60		0.5		1		
	Ind Rating	S123.12		S123.12		S123.12		S123.12			S123.12		S123.12		S123.12		S123.12		S123.12		
	WDP	TGC				TLC				Unweighted Deposits				T. L. Flaked Carbon %							
	S1234.1	S12.12				S12.12				S1234.1				S123456							

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

Laboratory:	CC	EOT Date:	YYYYMMDD	EOT Time:	HH:MM
Test Number:	CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC				
Oil Code:	CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC				
Formulation/Stand Code:	CC-CCCCCCCCCG-C-C-CCCCC-CC-CC-CCCC				

Position No.	Location	SOT Weight, g	EOT Weight, g	Weight Change, mg
1	Upper	S12.1234	S12.1234	S123.1
2	Upper	S12.1234	S12.1234	S123.1
3	Upper	S12.1234	S12.1234	S123.1
4	Upper	S12.1234	S12.1234	S123.1
5	Upper	S12.1234	S12.1234	S123.1
6	Upper	S12.1234	S12.1234	S123.1
7	Upper	S12.1234	S12.1234	S123.1
Upper Bearing Average Weight Loss, mg				S123.1
Upper Bearing Weight Loss Std. Dev., mg				S123.1
Upper Bearing Minimum Weight Loss, mg				S123.1
Upper Bearing Maximum Weight Loss, mg				S123.1

Position No.	Location	SOT Weight, g	EOT Weight, g	Weight Change, mg
1	Lower	S12.1234	S12.1234	S123.1
2	Lower	S12.1234	S12.1234	S123.1
3	Lower	S12.1234	S12.1234	S123.1
4	Lower	S12.1234	S12.1234	S123.1
5	Lower	S12.1234	S12.1234	S123.1
6	Lower	S12.1234	S12.1234	S123.1
7	Lower	S12.1234	S12.1234	S123.1
Lower Bearing Average Weight Loss, mg				S123.1
Lower Bearing Weight Loss Std. Dev., mg				S123.1
Lower Bearing Minimum Weight Loss, mg				S123.1
Lower Bearing Maximum Weight Loss, mg				S123.1

Main Bearing Batch ID	CCCCCCCCCCCC
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**Mack T-12 EGR Engine Oil Test
Form 22
Ring Gap Measurements**

Laboratory:	CC	EOT Date:	YYYYMMDD	EOT Time:	HH:MM
Test Number:	CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC				
Oil Code:	CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC				
Formulation/Stand Code:	CC-CCCCCCCCCC-C-G-CCCCCC-C-CC-CC-CCCC				

Cylinder No.	Top Ring Gap, mm			
	SOT	EOT	Delta (EOT-SOT)	
1	S12.123	S12.123	S12.123	
2	S12.123	S12.123	S12.123	
3	S12.123	S12.123	S12.123	
4	S12.123	S12.123	S12.123	
5	S12.123	S12.123	S12.123	
6	S12.123	S12.123	S12.123	
Average				S12.123

Cylinder No.	2 nd Ring Gap, mm			
	SOT	EOT	Delta (EOT-SOT)	
1	S12.123	S12.123	S12.123	
2	S12.123	S12.123	S12.123	
3	S12.123	S12.123	S12.123	
4	S12.123	S12.123	S12.123	
5	S12.123	S12.123	S12.123	
6	S12.123	S12.123	S12.123	
Average				S12.123

Cylinder No.	Oil Ring Gap, mm			
	SOT	EOT	Delta (EOT-SOT)	
1	S12.123	S12.123	S12.123	
2	S12.123	S12.123	S12.123	
3	S12.123	S12.123	S12.123	
4	S12.123	S12.123	S12.123	
5	S12.123	S12.123	S12.123	
6	S12.123	S12.123	S12.123	
Average				S12.123

**Mack T-12 EGR Engine Oil Test
Form 23
American Chemistry Council Code of Practice
Test Laboratory Conformance Statement**

Test Laboratory	CC				
Test Sponsor	CC				
Formulation / Stand Code	CC-CCCCCCCCCC-G-G-CCCCCC-CC-CC-CCCC				
Test Number	CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC				
Start Date	YYYYMMDD	Start Time	HH:MM	Time Zone	CCC

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 C No C *

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 C No C *

No. 3 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 C * No C *

A deviation occurred for one of the test parameters identified by the organization responsible for the test as being a special case. Yes C * No C * *(This currently applies only to specific deviations identified in the ASTM Information Letter System)*

Check The Appropriate Conclusion

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

Signature Image YYYMMDD

Signature Date

CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC

Typed Name Title