

**Mack T-10  
EGR Engine Oil Test**

**Report Packet Version No.**

T10 VERSION 20011031

**Conducted For**

CC

CC

T-10: C	V = <b>Valid; The Reference Oil/Non-Reference Oil was evaluated in accordance with the test procedure.</b>
	I = <b>Invalid; The Reference Oil/Non-Reference Oil was not evaluated in accordance with the test procedure.</b>
T-10A: C	<b>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.</b>

CC	<b>NR = Non-Reference Oil Test</b>
	<b>RO = Reference Oil Test</b>

<b>Stand:</b> CCCCC	<b>Stand Run:</b> CCCC	<b>Engine:</b> CCCCCC	<b>Engine Hours:</b> CCCCC
<b>End Of Test Date:</b> YYYYMMDD		<b>End Of Test Time:</b> HH:MM	
<b>Oil Code:</b> CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC			
<b>Formulation/Stand Code:</b> CC-CCCCCCCCC-C-C-CCCCCC-CC-CC-CCCCC			
<b>Alternate Codes</b>	CCCCCCCCCCCCCCCC	CCCCCCCCCCCCCCCC	CCCCCCCCCCCCCCCC

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

**Submitted By:** CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC  
**Testing Laboratory**

Signature Image

**Signature**

CC  
**Typed Name**

CC  
**Title**

**Mack T-10  
EGR Engine Oil Test  
Form 2**

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**Mack T-10  
EGR Engine Oil Test  
Form 3**

The Mack T-10 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). The first phase is 75 h and is run with retarded fuel injection timing to produce elevated soot levels in the oil. The second phase is 225 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-10 Test Conditions**

<b>Parameter</b>	<b>Phase I</b>	<b>Phase II</b>
<b>Time, h</b>	<b>75</b>	<b>225</b>
<b>Injection Timing, °BTDC</b>	<b>Variable</b>	<b>18</b>
<b>Speed, r/min</b>	<b>1800</b>	<b>1200</b>
<b>Fuel Flow, kg/h</b>	<b>59.2</b>	<b>63.5</b>
<b>Exhaust O<sub>2</sub> Level, %</b>	<b>Record</b>	<b>Record</b>
<b>Intake CO<sub>2</sub>, %</b>	<b>1.5</b>	<b>0.2</b>
<b>Exhaust CO<sub>2</sub>, %</b>	<b>Record</b>	<b>Record</b>
<b>Inlet Manifold Temp., °C</b>	<b>70</b>	<b>66</b>
<b>Coolant Out Temp., °C</b>	<b>66</b>	<b>85</b>
<b>Fuel In Temp., °C</b>	<b>40</b>	<b>40</b>
<b>Oil Gallery Temp., °C</b>	<b>88</b>	<b>113</b>
<b>Intake Air Temp., °C</b>	<b>25</b>	<b>25</b>
<b>Intake Air Restriction, kPa</b>	<b>3.5 – 4.0</b>	<b>3.5 – 4.0</b>
<b>Inlet Manifold Pressure, kPa</b>	<b>tbd</b>	<b>tbd</b>
<b>Exhaust Back Pressure, kPa</b>	<b>2.7 – 3.5</b>	<b>2.7 – 3.5</b>
<b>Crankcase Pressure, kPa</b>	<b>0.25 – 0.75</b>	<b>0.25 – 0.75</b>
<b>Power, kW</b>	<b>~257</b>	<b>~324</b>
<b>Torque, Nm</b>	<b>Record</b>	<b>Record</b>
<b>Pre-Turbine Exhaust Temp., °C</b>	<b>Record</b>	<b>Record</b>
<b>Tailpipe Exhaust Temp., °C</b>	<b>Record</b>	<b>Record</b>
<b>Oil Sump Temp., °C</b>	<b>Record</b>	<b>Record</b>
<b>EGR Pre-Venturi Temp., °C</b>	<b>Record</b>	<b>Record</b>
<b>Inlet Air Dew Point, °C</b>	<b>Record</b>	<b>Record</b>
<b>Inlet Air Humidity, kg/kg</b>	<b>Record</b>	<b>Record</b>
<b>Main Gallery Oil Pressure, kPa</b>	<b>Record</b>	<b>Record</b>
<b>Oil Filter Delta P, kPa</b>	<b>Not to exceed 138</b>	<b>Not to exceed 138</b>

**Mack T-10  
EGR Engine Oil Test  
Form 4  
Test Results Summary**

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

Test Results						
<b>Date Test Started:</b> YYYYMMDD	<b>Start Time:</b> HH:MM	<b>Test Length:</b> S1234				
<b>TMC Oil Code:</b> <sup>A</sup> CCCCC	<b>Laboratory Oil Code:</b> CCCCCCCCCCCCCCCCC	<b>SAE Viscosity:</b> CCCCCC				
<b>Average TGA Soot % at 75 h</b>				S123.1		
<b>Centrifugal Oil Filter Mass Gain, g</b>				S123.1		
<b>Oil Filter Delta P, kPa (138 maximum)</b>				S123		
<b>EOT TBN</b>				S123.1		
<b>MRV Yield Stress (Pa) <sup>C</sup></b>				S12345		
	<b>Delta Pb@ EOT (ppm)</b>	<b>Avg Liner Wear (µm)</b>	<b>Avg Top Ring Weight Loss (mg)</b>	<b>Oil Consumption (g/h)</b>	<b>Delta Pb 250-300h (ppm)</b>	<b>MRV<sup>C</sup> Viscosity @75h (cP)</b>
<b>Original Result</b>	S123	S12.1	S123	S123.1	S1234	S123456
<b>Transformed Result <sup>B</sup></b>	S1.1234	S1.1234	S12.1234	S12.1234	S1234	S123456
<b>Correction Factor <sup>B</sup></b>	S1.1234	S1.1234	S12.1234	S12.1234	S1234	S123456
<b>Corrected Transformed Result <sup>B</sup></b>	S1.1234	S1.1234	S12.1234	S12.1234	S1234	S123456
<b>Severity Adjustment <sup>B</sup></b>	S1.1234	S1.1234	S12.1234	S12.1234	S1234	S123456
<b>Final Transformed Result <sup>B</sup></b>	S1.1234	S1.1234	S12.1234	S12.1234	S1234	S123456
<b>Final Original Unit Result <sup>B</sup></b>	S123	S12.1	S123	S123.1	S1234	S123456
<b>Mack Merits <sup>D</sup></b>	S1234.1	S1234.1	S1234.1	S1234.1	S1234.1	
<b>Total Mack Merits <sup>D</sup></b>	S1234.1					

Last Stand Reference Results						
<b>Test Number:</b> CCCCC	<b>CCCC</b>	<b>CCCCC</b>	<b>CCCCC</b>			
<b>Oil Code:</b>	CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC					
<b>Test Length:</b> S1234	<b>TMC Oil Code:</b> CCCCCC					
<b>EOT Date:</b> YYYYMMDD	<b>EOT Time:</b> HH:MM					
<b>Stand Calibration Expiration Date:</b> YYYYMMDD						
<b>Average TGA Soot % at 75 h</b>				S123.1		
	<b>Delta Pb@ EOT (ppm)</b>	<b>Avg Liner Wear (µm)</b>	<b>Avg Top Ring Weight Loss (mg)</b>	<b>Oil Consumption (g/h)</b>	<b>Delta Pb 250-300h (ppm)</b>	<b>MRV<sup>C</sup> Viscosity @75h (cP)</b>
<b>Original Result</b>	S123	S12.1	S123	S123.1	S1234	S123456
<b>Transformed Result <sup>B</sup></b>	S1.1234	S1.1234	S12.1234	S12.1234	S1234	S123456
<b>Correction Factor <sup>B</sup></b>	S1.1234	S1.1234	S12.1234	S12.1234	S1234	S123456
<b>Corrected Transformed Result <sup>B</sup></b>	S1.1234	S1.1234	S12.1234	S12.1234	S1234	S123456
<b>Final Transformed Result <sup>B</sup></b>	S1.1234	S1.1234	S12.1234	S12.1234	S1234	S123456
<b>Final Original Unit Result <sup>B</sup></b>	S123	S12.1	S123	S123.1	S1234	S123456

<sup>A</sup> Reference Tests only.  
<sup>B</sup> Transformed Units for Delta Pb only.  
<sup>C</sup> For T-10A use only.  
<sup>D</sup> Non-reference Tests only.

**Mack T-10  
EGR Engine Oil Test  
Form 5  
Operational Summary**

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

	Parameter	Units	QI Threshold	EOT QI <sup>A</sup>	Target		Average		Samples <sup>B</sup>	BQD <sup>C</sup>	Over/Under Range <sup>D</sup>
<b>Controlled Parameters</b>	Speed	r/min	0.000	S12.123	1800	1800	S12345	S12345	S1234	S1234	S1234
	Fuel Flow	kg/h	0.000	S12.123	59.2	59.2	S12.12	S12.12	S1234	S1234	S1234
	Inlet Manifold Temp.	°C	0.000	S12.123	70	66	S1234	S1234	S1234	S1234	S1234
	Coolant Out Temp.	°C	0.000	S12.123	66	85	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	113	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 <sub>2</sub>	%			1.5±.05	0.2±.05	S12.12	S12.12			
<b>Non-controlled Parameters</b>	Parameter	Units	Typical Values <sup>E</sup>		Average						
	Power	KW	230 – 255	308 – 326	S12.1	S12.1					
	Torque	Nm	1223 – 1351	2456 – 2593	S1234	S1234					
	Exhaust O <sub>2</sub>	%	7.0 – 8.5	5.5 – 6.8	S12.1	S12.1					
	Exhaust CO <sub>2</sub>	%	7.18 – 9.97	9.60 – 11.09	S12.12	S12.12					
	Pre-Turbine Temp. (L)	°C	518 – 655	547 – 730	S1234	S1234					
	Pre-Turbine Temp. (R)	°C	572 – 674	540 - 726	S1234	S1234					
	Tailpipe Temp.	°C	421 – 464	477 – 510	S1234	S1234					
	Oil Sump Temp.	°C	91 – 101	117 – 127	S1234	S1234					
	EGR Pre-Venturi Temp.	°C	210 – 253	91 – 111	S1234	S1234					
	Blowby	L/min	53 – 120	70 – 200	S12.1	S12.1					
	Inlet Air Dew Point	°C	6 – 25	8 – 28	S1234	S1234					
Inlet Air Humidity	g/kg	4.5 – 20.3	3.5 – 24.1	S1.1	S1.1						
Main Gallery Oil Pressure	kPa	398 – 489	174 – 263	S1234	S1234						

<sup>A</sup> 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

<sup>B</sup> Total number of data points taken. Minimum acceptable value is 3000

<sup>C</sup> Number of Bad Quality Data points not used in the calculation of the statistical measures.

<sup>D</sup> Number of points clipped by over/under range limits.

<sup>E</sup> Typical values determined from reference oil test database

**Mack T-10  
EGR Engine Oil Test  
Form 6  
Rod Bearing Weight Loss**

<b>Laboratory:</b> CC	<b>EOT Date:</b> YYYYMMDD	<b>EOT Time:</b> HH:MM	
<b>Test Number:</b> CCCCC	CCCC	CCCCCC	CCCCC
<b>Oil Code:</b> CCC			
<b>Formulation/Stand Code:</b> CC-CCCCCCCCC-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 <sup>A</sup>	CCCCC	

<sup>A</sup> Cylinder 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
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

**Mack T-10  
EGR Engine Oil Test  
Form 7  
Ring Weight Loss**

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

Cylinder #	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
<b>Top Ring Average Weight Loss, mg</b>	S123	S123
<b>Top Ring Weight Loss Std. Dev., mg</b>	S123.1	S123.1
<b>Top Ring Minimum Weight Loss, mg</b>	S123.1	S123.1
<b>Top Ring Maximum Weight Loss, mg</b>	S123.1	S123.1
<b>Outlier Ring<sup>B</sup></b>	CCCCC	

<sup>A</sup> Results calculated without rings with plasma flanking.

<sup>B</sup> Ring number wear results are not currently outlier screened.

Cylinder #	2nd Ring SOT Weight, g	2 <sup>nd</sup> 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
<b>2<sup>nd</sup> Ring Average Weight Loss, mg</b>			S123.1
<b>2<sup>nd</sup> Ring Weight Loss Std. Dev., mg</b>			S123.1
<b>2<sup>nd</sup> Ring Min. Weight Loss, mg</b>			S123.1
<b>2<sup>nd</sup> Ring Max. Weight Loss, mg</b>			S123.1

Cylinder #	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
<b>Oil Ring Average Weight Loss, mg</b>			S123.1
<b>Oil Ring Weight Loss Std. Dev., mg</b>			S123.1
<b>Oil Ring Minimum Weight Loss, mg</b>			S123.1
<b>Oil Ring Maximum Weight Loss, mg</b>			S123.1

**MACK T-10**  
**EGR Engine Oil Test**  
**Form 8**  
**Oil Analysis Summary**

<b>Laboratory:</b> CC	EOT Date: YYYYMMDD	EOT Time: HH:MM
<b>Test Number:</b> CCCC	CCCC	CCCC
<b>Formulation/Stand Code:</b> 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			
CCCCC	S123.1	S123.12		S123.1	S123.1	S1234.1	AAAAAA	AAAAAA	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	AAAAAA	AAAAAA
CCCCC	S123.1	S123.12	S12.12	S123.1	S123.1	S1234.1	AAAAAA	AAAAAA	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	AAAAAA	AAAAAA
75 (2nd)	S123.1																
75 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	AAAAAA	AAAAAA
CCCCC	S123.1	S123.12	S12.12	S123.1	S123.1	S1234.1	AAAAAA	AAAAAA	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	AAAAAA	AAAAAA
CCCCC	S123.1	S123.12	S12.12	S123.1	S123.1	S1234.1	AAAAAA	AAAAAA	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	AAAAAA	AAAAAA
CCCCC	S123.1	S123.12	S12.12	S123.1	S123.1	S1234.1	AAAAAA	AAAAAA	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	AAAAAA	AAAAAA
CCCCC	S123.1	S123.12	S12.12	S123.1	S123.1	S1234.1	AAAAAA	AAAAAA	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	
75-h MRV	S123456	



**Mack T-10  
EGR Engine Oil Test  
Form 9**

**Liner Surface Roughness & Bore Diameter**

<b>Laboratory:</b> CC	<b>EOT Date:</b> YYYYMMDD	<b>EOT Time:</b> HH:MM	
<b>Test Number:</b> CCCCC	CCCC	CCCCCC	CCCCC
<b>Oil Code:</b> CCC			
<b>Formulation/Stand Code:</b> CC-CCCCCCCCC-C-C-CCCCC-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	<b>Avg.</b>	S1.12	S123.123
	Top Ring Travel @ 90°C	S1.12	S123.123	<b>Std. Dev.</b>	S1.12	
	Top Ring Travel @ 180°C	S1.12		<b>Min.</b>	S1.12	
	Top Ring Travel @ 270°C	S1.12		<b>Max.</b>	S1.12	
2	Top Ring Travel @ 0°C	S1.12	S123.123	<b>Avg.</b>	S1.12	S123.123
	Top Ring Travel @ 90°C	S1.12	S123.123	<b>Std.Dev.</b>	S1.12	
	Top Ring Travel @ 180°C	S1.12		<b>Min.</b>	S1.12	
	Top Ring Travel @ 270°C	S1.12		<b>Max.</b>	S1.12	
3	Top Ring Travel @ 0°C	S1.12	S123.123	<b>Avg.</b>	S1.12	S123.123
	Top Ring Travel @ 90°C	S1.12	S123.123	<b>Std. Dev.</b>	S1.12	
	Top Ring Travel @ 180°C	S1.12		<b>Min.</b>	S1.12	
	Top Ring Travel @ 270°C	S1.12		<b>Max.</b>	S1.12	
4	Top Ring Travel @ 0°C	S1.12	S123.123	<b>Avg.</b>	S1.12	S123.123
	Top Ring Travel @ 90°C	S1.12	S123.123	<b>Std.Dev.</b>	S1.12	
	Top Ring Travel @ 180°C	S1.12		<b>Min.</b>	S1.12	
	Top Ring Travel @ 270°C	S1.12		<b>Max.</b>	S1.12	
5	Top Ring Travel @ 0°C	S1.12	S123.123	<b>Avg.</b>	S1.12	S123.123
	Top Ring Travel @ 90°C	S1.12	S123.123	<b>Std. Dev.</b>	S1.12	
	Top Ring Travel @ 180°C	S1.12		<b>Min.</b>	S1.12	
	Top Ring Travel @ 270°C	S1.12		<b>Max.</b>	S1.12	
6	Top Ring Travel @ 0°C	S1.12	S123.123	<b>Avg.</b>	S1.12	S123.123
	Top Ring Travel @ 90°C	S1.12	S123.123	<b>Std. Dev.</b>	S1.12	
	Top Ring Travel @ 180°C	S1.12		<b>Min.</b>	S1.12	
	Top Ring Travel @ 270°C	S1.12		<b>Max.</b>	S1.12	

	Ra (µm)	Bore Diameter (mm)
<b>Average Surface Roughness &amp; Bore Diameter</b>	S1.12	S123.123
<b>Standard Deviation Surface Roughness &amp; Bore Diameter</b>	S1.12	S123.123
<b>Minimum Surface Roughness &amp; Bore Diameter</b>	S1.12	S123.123
<b>Maximum Surface Roughness &amp; Bore Diameter</b>	S1.12	S123.123

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

<b>Laboratory:</b> CC	<b>EOT Date:</b> YYYYMMDD	<b>EOT Time:</b> HH:MM	
<b>Test Number:</b> CCCCC	CCCC	CCCCCC	CCCC
<b>Oil Code:</b> CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC			
<b>Formulation/Stand Code:</b> CC-CCCCCCCCC-C-C-CCCCC-CC-CC-CCCC			

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

Summary	As Measured	Outlier Screened
<b>Average, µm</b>	S123.1	S12.1
<b>Std. Dev., µm</b>	S123.1	S123.1
<b>Minimum, µm</b>	S123.1	S123.1
<b>Maximum, µm</b>	S123.1	S123.1
<b>Outlier Liners<sup>A</sup></b>	CCCCC	

<sup>A</sup> Cylinder Number.







**Mack T-10  
EGR Engine Oil Test  
Form 12  
Test Fuel Analysis (Last Batch)**

<b>Laboratory:</b>	CC	<b>EOT Date:</b>	YYYYMMDD	<b>EOT Time:</b>	HH:MM
<b>Test Number:</b>	CCCCC	CCCC	CCCCCC	CCCCC	
<b>Oil Code:</b>	CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC				
<b>Formulation/Stand Code:</b>	CC-CCCCCCCCC-C-C-CCCCC-CC-CC-CCCC				
<b>Supplier:</b>	CCCCCCCCCCCCCCCCCCCC			<b>Batch Identifiers:</b>	CCCCCCCCCCCCCCCC

Measurement	Specs.	Analysis		Test Method
		New	EOT	
<b>Total Sulfur, % Weight</b>	<b>0.04 – 0.05</b>	S1.12	S1.12	<b>D 2622</b>
<b>Gravity, °API</b>	<b>34.5 – 36.5</b>	S1.1	S1.1	<b>D 287 or D 4052</b>
<b>Hydrocarbon Composition</b>				
<b>Aromatics % Vol.</b>	<b>28 – 33</b>	S1.1		<b>D 1319</b>
<b>Olefin</b>	<b>Report</b>	S12.1		<b>D 1319</b>
<b>Cetane Index</b>	<b>Report</b>	S1.1		<b>D 976 &amp; D 4737</b>
<b>Cetane No.</b>	<b>42 – 48</b>	S1.1		<b>D 613</b>
<b>Copper Strip Corrosion</b>	<b>1 Maximum</b>	AAAA		<b>D 130</b>
<b>Flash Point, °C</b>	<b>54 Minimum</b>	S123		<b>D 93</b>
<b>Pour Point, °C</b>	<b>-18 Maximum</b>	S123		<b>D 97</b>
<b>Carbon Residue on 10% Residuum, %</b>	<b>0.35 Maximum</b>	S1.12		<b>D 524 (10% Bottoms)</b>
<b>Water &amp; Sediment, % Vol.</b>	<b>0.05 Maximum</b>	AAAAAA		<b>D 2709</b>
<b>Viscosity, cSt @ 40°C</b>	<b>2.4 – 5.0</b>	S1.1		<b>D 445</b>
<b>Total Acid Number</b>	<b>0.05 Maximum</b>	S1.1		<b>D 664</b>
<b>Strong Acid Number</b>	<b>0.00 Maximum</b>	S1.1		<b>D 664</b>
<b>Accelerated Stability</b>	<b>Tbd</b>	S1.1		<b>D 2274</b>
<b>Distillation, °C</b>				
<b>IBP</b>	<b>Report</b>	S1234		<b>D 86</b>
<b>10%</b>	<b>Report</b>	S1234		<b>D 86</b>
<b>50%</b>	<b>Report</b>	S1234		<b>D 86</b>
<b>90%</b>	<b>282 – 338</b>	S1234		<b>D 86</b>
<b>EP</b>	<b>Report</b>	S1234		<b>D 86</b>

**Mack T-10  
EGR Engine Oil Test  
Form 13  
Characteristics of the Data Acquisition System**

<b>Laboratory:</b>	CC	<b>EOT Date:</b>	YYYYMMDD	<b>EOT Time:</b>	HH:MM
<b>Test Number:</b>	CCCCC	CCCC	CCCCCC	CCCCC	
<b>Oil Code:</b>	CC				
<b>Formulation/Stand Code:</b>	CC-CCCCCCCCCC-C-C-CCCCCC-CC-CC-CCCCC				

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

**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-10  
EGR Engine Oil Test  
Form 14  
Build-up and Hardware Information**

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

**Injection Timing**

Timing Hours	Timing (Deg)
CC	CCCCC
CC	CCCCC
CC	CCCCC
CC	CCCCC
CC	CCCCC
CC	CCCCC
CC	CCCCC
CC	CCCCC
CC	CCCCC
S1	<b>Total Timing Changes</b>

**Hardware**

Part	Part Number	Serial Number
<b>Primary Turbocharger</b>	CCCCCCCCCCCCCCCCCCCC	
<b>Secondary Charger</b>	CCCCCCCCCCCCCCCCCCCC	
<b>Cylinder Head (front)</b>	CCCCCCCCCCCCCCCCCCCC	cccccccccccccccccccc
<b>Cylinder Head (rear)</b>	CCCCCCCCCCCCCCCCCCCC	cccccccccccccccccccc
<b>Pistons</b>	CCCCCCCCCCCCCCCCCCCC	
<b>Injection Nozzles</b>	CCCCCCCCCCCCCCCCCCCC	
<b>Rod Bearings</b>	CCCCCCCCCCCCCCCCCCCC	
<b>Liners</b>	CCCCCCCCCCCCCCCCCCCC	
<b>Ring Set</b>	CCCCCCCCCCCCCCCCCCCC	

Cylinder Kit Location	CPD ID Number
<b>Cylinder 1</b>	CCCCCCCCCCCCCCCCCCCC
<b>Cylinder 2</b>	CCCCCCCCCCCCCCCCCCCC
<b>Cylinder 3</b>	CCCCCCCCCCCCCCCCCCCC
<b>Cylinder 4</b>	CCCCCCCCCCCCCCCCCCCC
<b>Cylinder 5</b>	CCCCCCCCCCCCCCCCCCCC
<b>Cylinder 6</b>	CCCCCCCCCCCCCCCCCCCC



**Mack T-10  
EGR Engine Oil Test  
Form 15  
Rating Summary: Piston #1**

<b>Laboratory:</b> CC	<b>EOT Date:</b> YYYYMMDD	<b>EOT Time:</b> HH:MM	
<b>Test Number:</b> CCCCC	CCCC	CCCCC	CCCCC
<b>Oil Code:</b>	CC		
<b>Formulation/Stand Code:</b>	CC-CCCCCCCCC-C-C-CCCCC-CC-CC-CCCC		
<b>Date Rated:</b> YYYYMMDD	<b>Rater Initials:</b> CCC	<b>Verified By:</b> CCC	

Total Piston Ratings Summary																	
Dep. Factor	Grooves						Dep. Factor	Lands						Oil Cooling	Under Crown		
	No. 1		No. 2		No. 3			No. 4		No. 3		No. 4					
	A,%	Dem.	A,%	Dem.	A,%	Dem.		A,%	Dem.	A,%	Dem.	A,%	Dem.			A,%	Dem.
<b>HC -1.0</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12				
<b>MC -0.5</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12				
<b>LC - .25</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12				
<b>Total</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12				
<b>8 - 9</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12				
<b>7 - 7.9</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12				
<b>6 - 6.9</b>	S123	S123.12	S123	S123.12	S123	S123.12	7.5	S123	S123.12	S123	S123.12	S123	S123.12				
<b>5 - 5.9</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12				
<b>4 - 4.9</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12				
<b>3 - 3.9</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12				
<b>2 - 2.9</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12				
<b>1 - 1.9</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12				
<b>&gt;0 - 0.9</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12				
<b>Clean</b>	S123	0	S123	0	S123	0	Clean	S123	0	S123	0	S123	0				
<b>Total</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12				
<b>Rating</b>	S123.12	S123.12	S123.12	S123.12	S123.12	S123.12		S123.12	S123.12	S123.12	S123.12	S123.12	S123.12				
<b>Location Factor</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>1</b>	<b>3</b>	<b>0</b>		<b>20</b>	<b>20</b>	<b>20</b>	<b>60</b>	<b>60</b>	<b>0.5</b>				
<b>Ind Rating</b>	S123.12	S123.12	S123.12	S123.12	S123.12	S123.12	<b>TLC</b>	S123.12	S123.12	S123.12	S123.12	S123.12	S123.12				
<b>WDP</b>	<b>TGC</b>	<b>TGC</b>	<b>TGC</b>	<b>TGC</b>	<b>TGC</b>	<b>TGC</b>	<b>TLC</b>	<b>Unweighted Deposits</b>	<b>Unweighted Deposits</b>	<b>Unweighted Deposits</b>	<b>Unweighted Deposits</b>	<b>Unweighted Deposits</b>	<b>T.L. Flaked Carbon %</b>				
S1234.1	S12.12	S12.12	S12.12	S12.12	S12.12	S12.12	S12.12	S1234.1	S1234.1	S1234.1	S1234.1	S1234.1	S123456				

**Mack T-10  
EGR Engine Oil Test  
Form 16  
Rating Summary: Piston #2**

<b>Laboratory:</b>	CC	<b>EOT Date:</b>	YYYYMMDD	<b>EOT Time:</b>	HH:MM
<b>Test Number:</b>	CCCCC		CCCC	CCCCC	CCCCC
<b>Oil Code:</b>	CC				
<b>Formulation/Stand Code:</b>	CC-CCCCCCCCC-C-C-CCCCC-CC-CC-CCCC				
<b>Date Rated:</b>	YYYYMMDD	<b>Rater Initials:</b>	CCC	<b>Verified By:</b>	CCC

Total Piston Ratings Summary													
Dep. Factor	Grooves						Dep. Factor	Lands					
	No. 1		No. 2		No. 3			No. 4		No. 3		No. 4	
	A,%	Dem.	A,%	Dem.	A,%	Dem.		A,%	Dem.	A,%	Dem.	A,%	Dem.
<b>HC -1.0</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12
<b>MC -0.5</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12
<b>LC - .25</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12
<b>Total</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12
<b>8 - 9</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12
<b>7 - 7.9</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12
<b>6 - 6.9</b>	S123	S123.12	S123	S123.12	S123	S123.12	7.5	S123	S123.12	S123	S123.12	S123	S123.12
<b>5 - 5.9</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12
<b>4 - 4.9</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12
<b>3 - 3.9</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12
<b>2 - 2.9</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12
<b>1 - 1.9</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12
<b>&gt;0 - 0.9</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12
<b>Clean</b>	S123	0	S123	0	S123	0	Clean	S123	0	S123	0	S123	0
<b>Total</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12
<b>Rating</b>	S123.12	S123.12	S123.12	S123.12	S123.12	S123.12		S123.12	S123.12	S123.12	S123.12	S123.12	S123.12
<b>Location Factor</b>	<b>2</b>	<b>3</b>	<b>1</b>	<b>3</b>	<b>0</b>	<b>3</b>		<b>20</b>	<b>20</b>	<b>60</b>	<b>60</b>	<b>0.5</b>	<b>1</b>
<b>Ind Rating</b>	S123.12	S123.12	S123.12	S123.12	S123.12	S123.12	<b>TLC</b>	S123.12	S123.12	S123.12	S123.12	S123.12	S123.12
<b>WDP</b>	<b>TGC</b>	<b>TGC</b>	<b>TGC</b>	<b>TGC</b>	<b>TGC</b>	<b>TGC</b>	<b>TLC</b>	<b>Unweighted Deposits</b>	<b>Unweighted Deposits</b>	<b>Unweighted Deposits</b>	<b>Unweighted Deposits</b>	<b>T.L. Flaked Carbon %</b>	<b>T.L. Flaked Carbon %</b>
S1234.1	S12.12	S12.12	S12.12	S12.12	S12.12	S12.12	S12.12	S1234.1	S1234.1	S1234.1	S1234.1	S123456	S123456

**Mack T-10  
EGR Engine Oil Test  
Form 17  
Rating Summary: Piston #3**

<b>Laboratory:</b> CC	<b>EOT Date:</b> YYYYMMDD	<b>EOT Time:</b> HH:MM	
<b>Test Number:</b> CCCCC	CCCC	CCCCC	CCCCC
<b>Oil Code:</b>	CC		
<b>Formulation/Stand Code:</b>	CC-CCCCCCCCC-C-C-CCCCC-CC-CC-CCCC		
<b>Date Rated:</b> YYYYMMDD	<b>Rater Initials:</b> CCC	<b>Verified By:</b> CCC	CCC

Total Piston Ratings Summary													
Dep. Factor	Grooves						Dep. Factor	Lands					
	No. 1		No. 2		No. 3			No. 4		No. 3		No. 4	
	A,%	Dem.	A,%	Dem.	A,%	Dem.		A,%	Dem.	A,%	Dem.	A,%	Dem.
<b>HC -1.0</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12
<b>MC -0.5</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12
<b>LC - .25</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12
<b>Total</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12
<b>8 - 9</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12
<b>7 - 7.9</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12
<b>6 - 6.9</b>	S123	S123.12	S123	S123.12	S123	S123.12	7.5	S123	S123.12	S123	S123.12	S123	S123.12
<b>5 - 5.9</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12
<b>4 - 4.9</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12
<b>3 - 3.9</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12
<b>2 - 2.9</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12
<b>1 - 1.9</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12
<b>&gt;0 - 0.9</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12
<b>Clean</b>	S123	0	S123	0	S123	0	Clean	S123	0	S123	0	S123	0
<b>Total</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12
<b>Rating</b>	S123.12	S123.12	S123.12	S123.12	S123.12	S123.12		S123.12	S123.12	S123.12	S123.12	S123.12	S123.12
<b>Location Factor</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>1</b>	<b>3</b>	<b>0</b>		<b>20</b>	<b>20</b>	<b>20</b>	<b>60</b>	<b>60</b>	<b>1</b>
<b>Ind Rating</b>	S123.12	S123.12	S123.12	S123.12	S123.12	S123.12	<b>TLC</b>	S123.12	S123.12	S123.12	S123.12	S123.12	S123.12
<b>WDP</b>	<b>TGC</b>			<b>TGC</b>			<b>TLC</b>	<b>Unweighted Deposits</b>			<b>T.L. Flaked Carbon %</b>		
S1234.1	S12.12			S12.12			S12.12	S1234.1			S123456		

**Mack T-10  
EGR Engine Oil Test  
Form 18  
Rating Summary: Piston #4**

<b>Laboratory:</b> CC	<b>EOT Date:</b> YYYYMMDD	<b>EOT Time:</b> HH:MM	
<b>Test Number:</b> CCCCC	CCCC	CCCCC	CCCCC
<b>Oil Code:</b>	CC		
<b>Formulation/Stand Code:</b>	CC-CCCCCCCCC-C-C-CCCCC-CC-CC-CCCC		
<b>Date Rated:</b> YYYYMMDD	<b>Rater Initials:</b> CCC	<b>Verified By:</b> CCC	CCC

Total Piston Ratings Summary														
Dep. Factor	Grooves						Dep. Factor	Lands						
	No. 1		No. 2		No. 3			No. 4		No. 3		No. 4		
	A,%	Dem.	A,%	Dem.	A,%	Dem.		A,%	Dem.	A,%	Dem.	A,%	Dem.	
<b>HC -1.0</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12	
<b>MC -0.5</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12	
<b>LC - .25</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12	
<b>Total</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12	
<b>8 - 9</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12	
<b>7 - 7.9</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12	
<b>6 - 6.9</b>	S123	S123.12	S123	S123.12	S123	S123.12	7.5	S123	S123.12	S123	S123.12	S123	S123.12	
<b>5 - 5.9</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12	
<b>4 - 4.9</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12	
<b>3 - 3.9</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12	
<b>2 - 2.9</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12	
<b>1 - 1.9</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12	
<b>&gt;0 - 0.9</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12	
<b>Clean</b>	S123	0	S123	0	S123	0	Clean	S123	0	S123	0	S123	0	0
<b>Total</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12	
<b>Rating</b>	S123.12	S123.12	S123.12	S123.12	S123.12	S123.12		S123.12	S123.12	S123.12	S123.12	S123.12	S123.12	
<b>Location Factor</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>1</b>	<b>3</b>	<b>0</b>		<b>20</b>	<b>20</b>	<b>20</b>	<b>60</b>	<b>60</b>	<b>0.5</b>	<b>1</b>
<b>Ind Rating</b>	S123.12	S123.12	S123.12	S123.12	S123.12	S123.12	<b>TLC</b>	S123.12	S123.12	S123.12	S123.12	S123.12	S123.12	S123.12
<b>WDP</b>	<b>TGC</b>		<b>TGC</b>		<b>TGC</b>		<b>TLC</b>	<b>Unweighted Deposits</b>		<b>T.L. Flaked Carbon %</b>				
S1234.1	S12.12		S12.12		S12.12		S12.12	S1234.1		S1234.1		S123456		

**Mack T-10  
EGR Engine Oil Test  
Form 19  
Rating Summary: Piston #5**

<b>Laboratory:</b>	CC	<b>EOT Date:</b>	YYYYMMDD	<b>EOT Time:</b>	HH:MM
<b>Test Number:</b>	CCCCC		CCCC		CCCCC
<b>Oil Code:</b>	CC				
<b>Formulation/Stand Code:</b>	CC-CCCCCCCCC-C-C-CCCCC-CC-CC-CCCC				
<b>Date Rated:</b>	YYYYMMDD	<b>Rater Initials:</b>	CCC	<b>Verified By:</b>	CCC

Total Piston Ratings Summary														
Dep. Factor	Grooves						Dep. Factor	Lands						
	No. 1		No. 2		No. 3			No. 4		No. 3		No. 4		
	A,%	Dem.	A,%	Dem.	A,%	Dem.		A,%	Dem.	A,%	Dem.	A,%	Dem.	
<b>HC -1.0</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12	
<b>MC -0.5</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12	
<b>LC - .25</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12	
<b>Total</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12	
<b>8 - 9</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12	
<b>7 - 7.9</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12	
<b>6 - 6.9</b>	S123	S123.12	S123	S123.12	S123	S123.12	7.5	S123	S123.12	S123	S123.12	S123	S123.12	
<b>5 - 5.9</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12	
<b>4 - 4.9</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12	
<b>3 - 3.9</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12	
<b>2 - 2.9</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12	
<b>1 - 1.9</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12	
<b>&gt;0 - 0.9</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12	
<b>Clean</b>	S123	0	S123	0	S123	0	Clean	S123	0	S123	0	S123	0	0
<b>Total</b>	S123	S123.12	S123	S123.12	S123	S123.12		S123	S123.12	S123	S123.12	S123	S123.12	
<b>Rating</b>	S123.12	S123.12	S123.12	S123.12	S123.12	S123.12		S123.12	S123.12	S123.12	S123.12	S123.12	S123.12	
<b>Location Factor</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>1</b>	<b>3</b>	<b>0</b>		<b>20</b>	<b>20</b>	<b>20</b>	<b>60</b>	<b>60</b>	<b>0.5</b>	<b>1</b>
<b>Ind Rating</b>	S123.12	S123.12	S123.12	S123.12	S123.12	S123.12	<b>TLC</b>	S123.12	S123.12	S123.12	S123.12	S123.12	S123.12	S123.12
<b>WDP</b>	<b>TGC</b>		<b>TGC</b>		<b>TGC</b>		<b>TLC</b>	<b>Unweighted Deposits</b>		<b>Unweighted Deposits</b>		<b>T.L. Flaked Carbon %</b>		
S1234.1	S12.12		S12.12		S12.12		S12.12	S1234.1		S1234.1		S123456		

**Mack T-10  
EGR Engine Oil Test  
Form 20  
Rating Summary: Piston #6**

<b>Laboratory:</b>	CC	<b>EOT Date:</b>	YYYYMMDD	<b>EOT Time:</b>	HH:MM
<b>Test Number:</b>	CCCCC		CCCC	CCCCC	CCCCC
<b>Oil Code:</b>	CC				
<b>Formulation/Stand Code:</b>	CC-CCCCCCCCC-C-C-CCCCC-CC-CC-CCCC				
<b>Date Rated:</b>	YYYYMMDD	<b>Rater Initials:</b>	CCC	<b>Verified By:</b>	CCC

Total Piston Ratings Summary														
Dep. Factor	Grooves						Dep. Factor	Lands						
	No. 1		No. 2		No. 3			No. 4		No. 3		No. 4		
	A,%	Dem.	A,%	Dem.	A,%	Dem.		A,%	Dem.	A,%	Dem.	A,%	Dem.	
<b>HC -1.0</b>	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12
<b>MC -0.5</b>	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12
<b>LC - .25</b>	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12
<b>Total</b>	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12
<b>8 - 9</b>	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12
<b>7 - 7.9</b>	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12
<b>6 - 6.9</b>	S123	S123.12	S123	S123.12	S123	S123.12	7.5	S123	S123.12	S123	S123.12	S123	S123.12	S123
<b>5 - 5.9</b>	S123	S123.12	S123	S123.12	S123	S123.12	4.5	S123	S123.12	S123	S123.12	S123	S123.12	S123
<b>4 - 4.9</b>	S123	S123.12	S123	S123.12	S123	S123.12	1.5	S123	S123.12	S123	S123.12	S123	S123.12	S123
<b>3 - 3.9</b>	S123	S123.12	S123	S123.12	S123	S123.12	Clean	S123	S123.12	S123	S123.12	S123	S123.12	S123
<b>2 - 2.9</b>	S123	S123.12	S123	S123.12	S123	S123.12	0	S123	S123.12	S123	S123.12	S123	S123.12	S123
<b>1 - 1.9</b>	S123	S123.12	S123	S123.12	S123	S123.12	0	S123	S123.12	S123	S123.12	S123	S123.12	S123
<b>&gt;0 - 0.9</b>	S123	S123.12	S123	S123.12	S123	S123.12	0	S123	S123.12	S123	S123.12	S123	S123.12	S123
<b>Clean</b>	S123	0	S123	0	S123	0	Clean	S123	0	S123	0	S123	0	S123
<b>Total</b>	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12	S123	S123.12
<b>Rating</b>	S123.12	S123.12	S123.12	S123.12	S123.12	S123.12	S123.12	S123.12	S123.12	S123.12	S123.12	S123.12	S123.12	S123.12
<b>Location Factor</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>1</b>	<b>3</b>	<b>0</b>		<b>20</b>	<b>20</b>	<b>20</b>	<b>60</b>	<b>60</b>	<b>0.5</b>	<b>1</b>
<b>Ind Rating</b>	S123.12	S123.12	S123.12	S123.12	S123.12	S123.12	<b>TLC</b>	S123.12	S123.12	S123.12	S123.12	S123.12	S123.12	S123.12
<b>WDP</b>	<b>TGC</b>		<b>TGC</b>		<b>TGC</b>		<b>TLC</b>	<b>Unweighted Deposits</b>		<b>Unweighted Deposits</b>		<b>T.L. Flaked Carbon %</b>		
S1234.1	S12.12		S12.12		S12.12		S12.12	S1234.1		S1234.1		S123456		