

D 6987
Mack T-10 EGR Engine Oil Test

Report Packet Version No.

T10 VERSION 20040505 BETA

Conducted For

TSTSPON1

TSTSPON2

T-10: LABVALID	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.
T-10A: LABVT10A	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.

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

Test Number			
Stand: STAND	Stand Run: STRUN	Engine: ENGINE	Engine Hours: ENHOURS
End Of Test Date: DTCOMP		End Of Test Time: EOTIME	
Oil Code: OILCODE		Formulation/Stand Code: FORM	
Alternate Codes	ALTCODE1	ALTCODE2	ALTCODE3

In my opinion this test OPVALID been conducted in a valid manner in accordance with the Test Method D 6987 and the appropriate amendments through the information letter system. The remarks included in this report describe the anomalies associated with this test.

Submitted By:

SUBLAB

Testing Laboratory

SUBSIGIM

Signature

SUBNAME

Typed Name

SUBTITLE

Title

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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

Parameter	Phase I	Phase II
Time, h	75	225
Injection Timing, °BTDC	Variable	18
Speed, r/min	1800	1200
Fuel Flow, kg/h	59.2	63.5
Exhaust O₂ Level, %	Record	Record
Intake CO₂, %	1.5	0.2
Exhaust CO₂, %	Record	Record
Inlet Manifold Temp., °C	70	66
Coolant Out Temp., °C	66	85
Fuel In Temp., °C	40	40
Oil Gallery Temp., °C	88	113
Intake Air Temp., °C	25	25
Intake Air Restriction, kPa	3.5 – 4.0	3.5 – 4.0
Inlet Manifold Pressure, kPa	160 minimum	210 minimum
Exhaust Back Pressure, kPa	2.7 – 3.5	2.7 – 3.5
Crankcase Pressure, kPa	0.25 – 0.75	0.25 – 0.75
Power, kW	~257	~324
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
Inlet Air Humidity, kg/kg	Record	Record
Main Gallery Oil Pressure, kPa	Record	Record
Oil Filter Delta P, kPa	Not to exceed 138	Not to exceed 138

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

Laboratory: LAB	EOT Date: DTCOMP	EOT Time: EOTTIME
Test Number TESTNUM		
Oil Code: OILCODE		
Formulation/Stand Code: FORM		

Test Results						
Date Test Started: DTSTRT	Start Time: STRTTIME	Test Length: TESTLEN				
TMC Oil Code: ^A IND	Laboratory Oil Code: LABOCODE				SAE Viscosity: SAEVISC	
Average TGA Soot % at 75 h				TGAAVG		
Centrifugal Oil Filter Mass Gain, g				MASSG		
Oil Filter Delta P, kPa (138 maximum)				XOILDP		
EOT TBN				TBNEOT		
MRV Yield Stress (Pa) ^C				MRVYS		
	Delta Pb@ EOT (ppm)	Avg Liner Wear (µm)	Avg Top Ring Weight Loss (mg)	Oil Consumption (g/h)	Delta Pb 250-300h (ppm)	MRV^C Viscosity @75h (cP)
Original Result	DPBEOT	ALW	ATRWL	OILCON	DPB2530	MRV75
Transformed Result ^B	TRNDPB	TRNALW	TRNATRWL	TRNOC	TRNDPB2	TRNMRV
Correction Factor ^B	DPBCF	ALWCF	ATRWLCF	OCCF	DPB2CF	MRVCF
Corrected Transformed Result ^B	DPBCOR	ALWCOR	ATRWLCOR	OCCOR	DPB2COR	MRVCOR
Severity Adjustment ^B	DPB_SA	CLW_SA	ATRWL_SA	OC_SA	DPB2_SA	MRV_SA
Final Transformed Result ^B	TDPBFNL	TCLWFNL	TTRWLFNL	TOCFNL	TDP2FNL	TMRVFNL
Final Original Unit Result ^B	DPBFNL	CLWFNL	ATRWLFNL	OCFNL	DPB2FNL	MRVFNL
Mack Merits ^D	DPBMER	CLWMER	TRWLMER	OCMER	DPB2MER	
Total Mack Merits ^D	MACKMER					

Last Stand Reference Results						
Test Number: RTESTNUM						
Oil Code: ROILCODE						
Test Length: RTESTLEN				TMC Oil Code: RIND		
EOT Date: RDTCOMP				EOT Time: REOTTIME		
Stand Calibration Expiration Date: DTCALEXP						
Average TGA Soot % at 75 h				RTGAAVG		
	Delta Pb@ EOT (ppm)	Avg Liner Wear (µm)	Avg Top Ring Weight Loss (mg)	Oil Consumption (g/h)	Delta Pb 250-300h (ppm)	MRV^C Viscosity @75h (cP)
Original Result	RDPBEOT	RALW	RATRWL	ROILCON	RDPB2530	RMRV75
Transformed Result ^B	RTRNDPB	RTRNALW	RTRNTRWL	RTRNOC	RTRNDPB2	RTRNMRV
Correction Factor ^B	RDPBCF	RALWCF	RATRWLCF	ROCCF	RDPB2CF	RMRVCF
Corrected Transformed Result ^B	RDPBCOR	RALWCOR	RTRWLCOR	ROCCOR	RDPB2COR	RMRVCOR
Final Transformed Result ^B	RTDPBFNL	RTCLWFNL	RTTRWLFNL	RTOCFNL	RTDP2FNL	RTMRVFNL
Final Original Unit Result ^B	RDPBFNL	RCLWFNL	RTRWLFNL	ROCFNL	RDPB2FNL	RMRVFNL

^A Reference Tests only.

^B Transformed Units for Delta Pb only.

^C For T-10A use only.

^D Non-reference Tests only.

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

Laboratory: LAB	EOT Date: DTCOMP	EOT Time: EOTTIME
Test Number: TESTNUM		Oil Code: OILCODE
Formulation/Stand Code: FORM		

Parameter	Units	Threshold	EOT QI ^A	Target		Average	Samples ^B	BQD ^C	Over/Under Range ^D
				1800	1800				
Speed	r/min	0.000	QRPM	1800	1800	ARPM1	NRPM	BRPM	ORPM
Fuel Flow	kg/h	0.000	QFFLO	59.2	59.2	AFFLO1	NFFLO	BFFLO	OFFLO
Inlet Manifold Temp.	°C	0.000	QINMANT	70	66	AINMANT1	NINMANT	BINMANT	OINMANT
Coolant Out Temp.	°C	0.000	QCOLOUT	66	85	ACOLOUT1	NCOLOUT	BCOLOUT	OCOLOUT
Fuel In Temp.	°C	0.000	QFUEL	40		AFUEL	NFUEL	BFUEL	OFUEL
Oil Gallery Temp.	°C	0.000	QOILGT	88	113	AOILGT1	NOILGT	BOILGT	OOILGT
Inlet Air Temp.	°C	0.000	QINAIRT	25		AINAIRT	NINAIRT	BINAIRT	OINAIRT
Inlet Air Restriction	kPa			3.5 – 4.0		AINAIRR	NINAIRR	BINAIRR	OINAIRR
Inlet Man. Pressure	kPa			160 min	210 min	AINMANP1	NINMANP	BINMANP	OINMANP
Exh. Back Pressure	kPa			2.7 – 3.5		AEXHSTP	NEXHSTP	BEXHSTP	OEXHSTP
Crankcase Pressure	kPa			0.25 – 0.75		ACCASEP	NCCASEP	BCCASEP	OCCASEP
Intake CO₂	%			1.5±.05	0.2±.05	AICO21	AICO22		

Parameter	Units	Typical Values ^E	
		Average	Average
Power	KW	230 – 255	308 – 326
Torque	Nm	1223 – 1351	2456 – 2593
Exhaust O₂	%	7.0 – 8.5	5.5 – 6.8
Exhaust CO₂	%	7.18 – 9.97	9.60 – 11.09
Pre-Turbine Temp. (L)	°C	518 – 655	547 – 730
Pre-Turbine Temp. (R)	°C	572 – 674	540 – 726
Tailpipe Temp.	°C	421 – 464	477 – 510
Oil Sump Temp.	°C	91 – 101	117 – 127
EGR Pre-Venturi Temp.	°C	210 – 253	91 – 111
Blowby	L/min	53 – 120	70 – 200
Inlet Air Dew Point	°C	6 – 25	8 – 28
Inlet Air Humidity	g/kg	4.5 – 20.3	3.5 – 24.1
Main Gallery Oil Pressure	kPa	398 – 489	174 – 263

^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

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Form 6
Rod Bearing Weight Loss

Laboratory: LAB	EOT Date: DTCOMP	EOT Time: EOTTIME
Test Number: TESTNUM		
Oil Code:		OILCODE
Formulation/Stand Code:		FORM

Cylinder #	Location	SOT Weight, g	EOT Weight, g	Weight Change, mg
1	Upper	BWSOTU1	BWEOTU1	BWLU1
2	Upper	BWSOTU2	BWEOTU2	BWLU2
3	Upper	BWSOTU3	BWEOTU3	BWLU3
4	Upper	BWSOTU4	BWEOTU4	BWLU4
5	Upper	BWSOTU5	BWEOTU5	BWLU5
6	Upper	BWSOTU6	BWEOTU6	BWLU6

Summary	As Measured	Outlier Screened
Upper Bearing Average Weight Loss, mg	ABWLU	OABWLU
Upper Bearing Weight Loss Std. Dev., mg	SBWLU	OSBWLU
Upper Bearing Minimum Weight Loss, mg	IBWLU	OIBWLU
Upper Bearing Maximum Weight Loss, mg	XBWLU	OXBWLU
Outlier Upper Rod Bearing ^A	BWLOUT	

^A Cylinder number

Cylinder #	Location	SOT Weight, g	EOT Weight, g	Weight Change, mg
1	Lower	BWSOTL1	BWEOTL1	BWLL1
2	Lower	BWSOTL2	BWEOTL2	BWLL2
3	Lower	BWSOTL3	BWEOTL3	BWLL3
4	Lower	BWSOTL4	BWEOTL4	BWLL4
5	Lower	BWSOTL5	BWEOTL5	BWLL5
6	Lower	BWSOTL6	BWEOTL6	BWLL6
Lower Bearing Average Weight Loss, mg				ABWLL
Lower Bearing Weight Loss Std. Dev., mg				SBWLL
Lower Bearing Minimum Weight Loss, mg				IBWLL
Lower Bearing Maximum Weight Loss, mg				XBWLL

Conrod Bearing Batch ID	CRBIDNUM
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Mack T-10 EGR Engine Oil Test
Form 7
Ring Weight Loss

Laboratory: LAB	EOT Date: DTCOMP	EOT Time:	EOTTIME
Test Number: TESTNUM			
Oil Code:		OILCODE	
Formulation/Stand Code:		FORM	

Cylinder #	Top Ring SOT Weight, g	Top Ring EOT Weight, g	Weight Loss, mg
1	TRWSOT1	TRWEOT1	TRWL1
2	TRWSOT2	TRWEOT2	TRWL2
3	TRWSOT3	TRWEOT3	TRWL3
4	TRWSOT4	TRWEOT4	TRWL4
5	TRWSOT5	TRWEOT5	TRWL5
6	TRWSOT6	TRWEOT6	TRWL6

Summary	As Measured	Outlier Screened
Top Ring Average Weight Loss, mg	AMATRWL	ATRWL
Top Ring Weight Loss Std. Dev., mg	AMSTRWL	STRWL
Top Ring Minimum Weight Loss, mg	AMITRWL	ITRWL
Top Ring Maximum Weight Loss, mg	AMXTRWL	XTRWL
Outlier Ring^B	OUTTR	

^A Results calculated without rings with plasma flanking.

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

Cylinder #	2nd Ring SOT Weight, g	2 nd Ring EOT Weight, g	Weight Loss, mg
1	R2WSOT1	R2WEOT1	R2WL1
2	R2WSOT2	R2WEOT2	R2WL2
3	R2WSOT3	R2WEOT3	R2WL3
4	R2WSOT4	R2WEOT4	R2WL4
5	R2WSOT5	R2WEOT5	R2WL5
6	R2WSOT6	R2WEOT6	R2WL6
2nd Ring Average Weight Loss, mg			AR2WL
2nd Ring Weight Loss Std. Dev., mg			SR2WL
2nd Ring Min. Weight Loss, mg			IR2WL
2nd Ring Max. Weight Loss, mg			XR2WL

Cylinder #	Oil Ring SOT Weight, g	Oil Ring EOT Weight, g	Weight Loss, mg
1	ORWSOT1	ORWEOT1	ORWL1
2	ORWSOT2	ORWEOT2	ORWL2
3	ORWSOT3	ORWEOT3	ORWL3
4	ORWSOT4	ORWEOT4	ORWL4
5	ORWSOT5	ORWEOT5	ORWL5
6	ORWSOT6	ORWEOT6	ORWL6
Oil Ring Average Weight Loss, mg			AORWL
Oil Ring Weight Loss Std. Dev., mg			SORWL
Oil Ring Minimum Weight Loss, mg			IORWL
Oil Ring Maximum Weight Loss, mg			XORWL

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

Laboratory: LAB	DTCOMP	EOT Date:	EOTTIME
Test Number: TESTNUM	OILCODE		
Formulation/Stand Code:	Oil Code: FORM		

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
TST_H000	TGA_H000	V100H000		TBN_H000	TAN_H000	IRINH000	FEWMH000	PBWMH000	CUWMH000	CRWMH000	ALWMH000	SIWMH000	SNWMH000	NAWMH000
TST_H025	TGA_H025	V100H025	IVISH025	TBN_H025	TAN_H025	IRINH025	FEWMH025	PBWMH025	CUWMH025	CRWMH025	ALWMH025	SIWMH025	SNWMH025	NAWMH025
TST_H050	TGA_H050	V100H050	IVISH050	TBN_H050	TAN_H050	IRINH050	FEWMH050	PBWMH050	CUWMH050	CRWMH050	ALWMH050	SIWMH050	SNWMH050	NAWMH050
TST_H075	TGA_H075	V100H075	IVISH075	TBN_H075	TAN_H075	IRINH075	FEWMH075	PBWMH075	CUWMH075	CRWMH075	ALWMH075	SIWMH075	SNWMH075	NAWMH075
75 (2nd)	TGA75_2													
75 AVG.	TGAAVG													
TST_H100	TGA_H100	V100H100	IVISH100	TBN_H100	TAN_H100	IRINH100	FEWMH100	PBWMH100	CUWMH100	CRWMH100	ALWMH100	SIWMH100	SNWMH100	NAWMH100
TST_H125	TGA_H125	V100H125	IVISH125	TBN_H125	TAN_H125	IRINH125	FEWMH125	PBWMH125	CUWMH125	CRWMH125	ALWMH125	SIWMH125	SNWMH125	NAWMH125
TST_H150	TGA_H150	V100H150	IVISH150	TBN_H150	TAN_H150	IRINH150	FEWMH150	PBWMH150	CUWMH150	CRWMH150	ALWMH150	SIWMH150	SNWMH150	NAWMH150
TST_H175	TGA_H175	V100H175	IVISH175	TBN_H175	TAN_H175	IRINH175	FEWMH175	PBWMH175	CUWMH175	CRWMH175	ALWMH175	SIWMH175	SNWMH175	NAWMH175
TST_H200	TGA_H200	V100H200	IVISH200	TBN_H200	TAN_H200	IRINH200	FEWMH200	PBWMH200	CUWMH200	CRWMH200	ALWMH200	SIWMH200	SNWMH200	NAWMH200
TST_H225	TGA_H225	V100H225	IVISH225	TBN_H225	TAN_H225	IRINH225	FEWMH225	PBWMH225	CUWMH225	CRWMH225	ALWMH225	SIWMH225	SNWMH225	NAWMH225
TST_H250	TGA_H250	V100H250	IVISH250	TBN_H250	TAN_H250	IRINH250	FEWMH250	PBWMH250	CUWMH250	CRWMH250	ALWMH250	SIWMH250	SNWMH250	NAWMH250
TST_H275	TGA_H275	V100H275	IVISH275	TBN_H275	TAN_H275	IRINH275	FEWMH275	PBWMH275	CUWMH275	CRWMH275	ALWMH275	SIWMH275	SNWMH275	NAWMH275
TST_H300	TGA_H300	V100H300	IVISH300	TBN_H300	TAN_H300	IRINH300	FEWMH300	PBWMH300	CUWMH300	CRWMH300	ALWMH300	SIWMH300	SNWMH300	NAWMH300

Summary		As Measured	Outlier Bearing Adjusted
Delta Pb @ EOT, ppm		AMDPBEOT	DPBEOT
Delta Pb @ 250-300h, ppm		DPB2530	
75-h MRV		MRV75	

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Mack T-10 EGR Engine Oil Test
Form 9
Liner Surface Roughness & Bore Diameter

Laboratory: LAB	EOT Date: DTCOMP	EOT Time:	EOTTIME
Test Number: TESTNUM			
Oil Code:		OILCODE	
Formulation/Stand Code:		FORM	

Liner No.	Location	Ra (µm)	Bore Diameter (mm)		Ra (µm)	Dia. (mm)
1	Top Ring Travel @ 0°C	LIN1RAA	LIN1IDA	Avg.	ALIN1RA	ALIN1ID
	Top Ring Travel @ 90°C	LIN1RAB	LIN1IDB	Std. Dev.	SLIN1RA	
	Top Ring Travel @ 180°C	LIN1RAC		Min.	ILIN1RA	
	Top Ring Travel @ 270°C	LIN1RAD		Max.	XLIN1RA	
2	Top Ring Travel @ 0°C	LIN2RAA	LIN2IDA	Avg.	ALIN2RA	ALIN2ID
	Top Ring Travel @ 90°C	LIN2RAB	LIN2IDB	Std.Dev.	SLIN2RA	
	Top Ring Travel @ 180°C	LIN2RAC		Min.	ILIN2RA	
	Top Ring Travel @ 270°C	LIN2RAD		Max.	XLIN2RA	
3	Top Ring Travel @ 0°C	LIN3RAA	LIN3IDA	Avg.	ALIN3RA	ALIN3ID
	Top Ring Travel @ 90°C	LIN3RAB	LIN3IDB	Std. Dev.	SLIN3RA	
	Top Ring Travel @ 180°C	LIN3RAC		Min.	ILIN3RA	
	Top Ring Travel @ 270°C	LIN3RAD		Max.	XLIN3RA	
4	Top Ring Travel @ 0°C	LIN4RAA	LIN4IDA	Avg.	ALIN4RA	ALIN4ID
	Top Ring Travel @ 90°C	LIN4RAB	LIN4IDB	Std.Dev.	SLIN4RA	
	Top Ring Travel @ 180°C	LIN4RAC		Min.	ILIN4RA	
	Top Ring Travel @ 270°C	LIN4RAD		Max.	XLIN4RA	
5	Top Ring Travel @ 0°C	LIN5RAA	LIN5IDA	Avg.	ALIN5RA	ALIN5ID
	Top Ring Travel @ 90°C	LIN5RAB	LIN5IDB	Std. Dev.	SLIN5RA	
	Top Ring Travel @ 180°C	LIN5RAC		Min.	ILIN5RA	
	Top Ring Travel @ 270°C	LIN5RAD		Max.	XLIN5RA	
6	Top Ring Travel @ 0°C	LIN6RAA	LIN6IDA	Avg.	ALIN6RA	ALIN6ID
	Top Ring Travel @ 90°C	LIN6RAB	LIN6IDB	Std. Dev.	SLIN6RA	
	Top Ring Travel @ 180°C	LIN6RAC		Min.	ILIN6RA	
	Top Ring Travel @ 270°C	LIN6RAD		Max.	XLIN6RA	

	Ra (µm)	Bore Diameter (mm)
Average Surface Roughness & Bore Diameter	ALINRA	ALINID
Standard Deviation Surface Roughness & Bore Diameter	SLINRA	SLINID
Minimum Surface Roughness & Bore Diameter	ILINRA	ILINID
Maximum Surface Roughness & Bore Diameter	XLINRA	XLINID

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

Laboratory: LAB	EOT Date: DTCOMP	EOT Time: EOTTIME
Test Number: TESTNUM		
Oil Code: OILCODE		
Formulation/Stand Code: FORM		

Position	Wear Step (µm)					
	Cylinder Number					
	1	2	3	4	5	6
1:00	C1LW1	C2LW1	C3LW1	C4LW1	C5LW1	C6LW1
2:00	C1LW2	C2LW2	C3LW2	C4LW2	C5LW2	C6LW2
3:00 (Thrust)	C1LW3	C2LW3	C3LW3	C4LW3	C5LW3	C6LW3
4:00	C1LW4	C2LW4	C3LW4	C4LW4	C5LW4	C6LW4
5:00	C1LW5	C2LW5	C3LW5	C4LW5	C5LW5	C6LW5
6:00 (Rear)	C1LW6	C2LW6	C3LW6	C4LW6	C5LW6	C6LW6
7:00	C1LW7	C2LW7	C3LW7	C4LW7	C5LW7	C6LW7
8:00	C1LW8	C2LW8	C3LW8	C4LW8	C5LW8	C6LW8
9:00 (Anti-Thrust)	C1LW9	C2LW9	C3LW9	C4LW9	C5LW9	C6LW9
10:00	C1LW10	C2LW10	C3LW10	C4LW10	C5LW10	C6LW10
11:00	C1LW11	C2LW11	C3LW11	C4LW11	C5LW11	C6LW11
12:00 (Front)	C1LW12	C2LW12	C3LW12	C4LW12	C5LW12	C6LW12
Average	C1ALW	C2ALW	C3ALW	C4ALW	C5ALW	C6ALW

Summary	As Measured	Outlier Screened
Average, µm	AMACLW	ALW
Std. Dev., µm	AMSCLW	SCLW
Minimum, µm	AMICLW	ICLW
Maximum, µm	AMXCLW	XCLW
Outlier Liners^A	OUTLIN	

^A Cylinder Number.

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Mack T-10 EGR Engine Oil Test
Form 11
Unscheduled Downtime and Maintenance Summary

Laboratory: LAB	EOT Date: DTCOMP	EOT Time:	EOTTIME
Test Number: TESTNUM			
Oil Code:		OILCODE	
Formulation/Stand Code:		FORM	

Number of Downtime Occurrences			DWNOCR
Test Hours	Date	Downtime	Reasons
DOWNR001	DDATR001	DTIMR001	DREAR001
DOWNR002	DDATR002	DTIMR002	DREAR002
DOWNR003	DDATR003	DTIMR003	DREAR003
DOWNR004	DDATR004	DTIMR004	DREAR004
DOWNR005	DDATR005	DTIMR005	DREAR005
DOWNR006	DDATR006	DTIMR006	DREAR006
DOWNR007	DDATR007	DTIMR007	DREAR007
DOWNR008	DDATR008	DTIMR008	DREAR008
DOWNR009	DDATR009	DTIMR009	DREAR009
DOWNR010	DDATR010	DTIMR010	DREAR010
DOWNR011	DDATR011	DTIMR011	DREAR011
DOWNR012	DDATR012	DTIMR012	DREAR012
DOWNR013	DDATR013	DTIMR013	DREAR013
DOWNR014	DDATR014	DTIMR014	DREAR014
DOWNR015	DDATR015	DTIMR015	DREAR015
TOTLDOWN			Total Downtime

Other Comments	
Number of Comment Lines	TOTCOM
	OCOMR001
	OCOMR002
	OCOMR003
	OCOMR004
	OCOMR005
	OCOMR006
	OCOMR007
	OCOMR008
	OCOMR009
	OCOMR010
	OCOMR011
	OCOMR012
	OCOMR013
	OCOMR014
	OCOMR015

D 6987
Mack T-10 EGR Engine Oil Test
Form 11A
Unscheduled Downtime and Maintenance Summary

Laboratory: LAB	EOT Date: DTCOMP	EOT Time:	EOTTIME
Test Number: TESTNUM			
Oil Code:		OILCODE	
Formulation/Stand Code:		FORM	

Number of Downtime Occurrences			DWNOCR
Test Hours	Date	Downtime	Reasons
DOWNR016	DDATR016	DTIMR016	DREAR016
DOWNR017	DDATR017	DTIMR017	DREAR017
DOWNR018	DDATR018	DTIMR018	DREAR018
DOWNR019	DDATR019	DTIMR019	DREAR019
DOWNR020	DDATR020	DTIMR020	DREAR020
DOWNR021	DDATR021	DTIMR021	DREAR021
DOWNR022	DDATR022	DTIMR022	DREAR022
DOWNR023	DDATR023	DTIMR023	DREAR023
DOWNR024	DDATR024	DTIMR024	DREAR024
DOWNR025	DDATR025	DTIMR025	DREAR025
DOWNR026	DDATR026	DTIMR026	DREAR026
DOWNR027	DDATR027	DTIMR027	DREAR027
DOWNR028	DDATR028	DTIMR028	DREAR028
DOWNR029	DDATR029	DTIMR029	DREAR029
DOWNR030	DDATR030	DTIMR030	DREAR030
TOTLDOWN			Total Downtime

Other Comments	TOTCOM
Number of Comment Lines	
	OCOMR016
	OCOMR017
	OCOMR018
	OCOMR019
	OCOMR020
	OCOMR021
	OCOMR022
	OCOMR023
	OCOMR024
	OCOMR025
	OCOMR026
	OCOMR027
	OCOMR028
	OCOMR029
	OCOMR030

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Mack T-10 EGR Engine Oil Test
Form 11B
Unscheduled Downtime and Maintenance Summary

Laboratory: LAB	EOT Date: DTCOMP	EOT Time: EOTTIME
Test Number: TESTNUM		
Oil Code:		OILCODE
Formulation/Stand Code:		FORM

Number of Downtime Occurrences			DWNOCR
Test Hours	Date	Downtime	Reasons
DOWNR031	DDATR031	DTIMR031	DREAR031
DOWNR032	DDATR032	DTIMR032	DREAR032
DOWNR033	DDATR033	DTIMR033	DREAR033
DOWNR034	DDATR034	DTIMR034	DREAR034
DOWNR035	DDATR035	DTIMR035	DREAR035
DOWNR036	DDATR036	DTIMR036	DREAR036
DOWNR037	DDATR037	DTIMR037	DREAR037
DOWNR038	DDATR038	DTIMR038	DREAR038
DOWNR039	DDATR039	DTIMR039	DREAR039
DOWNR030	DDATR040	DTIMR040	DREAR040
DOWNR041	DDATR041	DTIMR041	DREAR041
DOWNR042	DDATR042	DTIMR042	DREAR042
DOWNR043	DDATR043	DTIMR043	DREAR043
DOWNR044	DDATR044	DTIMR044	DREAR044
DOWNR045	DDATR045	DTIMR045	DREAR045
TOTLDOWN			Total Downtime

Other Comments	Number of Comment Lines	TOTCOM
		OCOMR031
		OCOMR032
		OCOMR033
		OCOMR034
		OCOMR035
		OCOMR036
		OCOMR037
		OCOMR038
		OCOMR039
		OCOMR040
		OCOMR041
		OCOMR042
		OCOMR043
		OCOMR044
		OCOMR045

D 6987
Mack T-10 EGR Engine Oil Test
Form 12
Test Fuel Analysis (Last Batch)

Laboratory: LAB	EOT Date: DTCOMP	EOT Time: EOTTIME
Test Number: TESTNUM		
Oil Code: OILCODE		
Formulation/Stand Code: FORM		
Supplier: FUELSUP	Batch Identifiers: FUELBTID	

Measurement	Specs.	Analysis		Test Method
		New	EOT	
Total Sulfur, % Weight	0.04 – 0.05	FUELSNEW	FUELSEOT	D 2622
Gravity, °API	34.5 – 36.5	APIGRNEW	APIGREOT	D 287 or D 4052
Hydrocarbon Composition				
Aromatics % Vol.	28 – 33	FUELAROM		D 1319
Olefin	Report	FUELOLEF		D 1319
Cetane Index	Report	CETANEIN		D 976 & D 4737
Cetane No.	42 – 48	CETANENO		D 613
Copper Strip Corrosion	1 Maximum	FUELCU		D 130
Flash Point, °C	54 Minimum	FLASHPT		D 93
Pour Point, °C	-18 Maximum	FUELPOUR		D 97
Carbon Residue on 10% Residuum, %	0.35 Maximum	FUELGRES		D 524 (10% Bottoms)
Water & Sediment, % Vol.	0.05 Maximum	FUELH2O		D 2709
Viscosity, cSt @ 40°C	2.4 – 5.0	KINVIS		D 445
Total Acid Number	0.05 Maximum	FUEL TAN		D 664
Strong Acid Number	0.00 Maximum	FUELSAN		D 664
Accelerated Stability	Tbd	FUELACS		D 2274
Distillation, °C				
IBP	Report	FUELIBP		D 86
10%	Report	FUEL10		D 86
50%	Report	FUEL50		D 86
90%	282 – 338	FUEL90		D 86
EP	Report	FUELEP		D 86

D 6987
Mack T-10 EGR Engine Oil Test
Form 13
Characteristics of the Data Acquisition System

Laboratory: LAB	EOT Date: DTCOMP	EOT Time: EOTTIME
Test Number: TESTNUM		
Oil Code:		OILCODE
Formulation/Stand Code: FORM		

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.	OTEMSENS	OTEMCALF	OTEMRECD	OTEMOBSF	OTEMRECF	OTEMLOGF	OTEMSYSR
Fuel In.	FTEMSSENS	FTEMCALF	FTEMRECD	FTEMOBSF	FTEMRECF	FTEMLOGF	FTEMSYSR
Intake Air	AITSENS	AITCALF	AITRECD	AITOBSF	AITRECF	AITLOGF	AITSYSR
Intake Man.	IMANSENS	IMANCALF	IMANRECD	IMANOBSF	IMANRECF	IMANLOGF	IMANSYSR
Pre-Turb.	PTURSENS	PTURCALF	PTURRECD	PTUROBSF	PTURRECF	PTURLOGF	PTURSYSR
Cool. Out	COTSENS	COTCALF	COTRECD	COTOBSF	COTRECF	COTLOGF	COTSYSR
Other							
Fuel Flow	FFLOSENS	FFLOCALF	FFLORECD	FFLOOBSF	FFLORECF	FFLOLOGF	FFLOSYSR
Engine RPM	RPMSSENS	RPMCALF	RPMRECD	RPMOBSF	RPMRECF	RPMLOGF	RPMSYSR
Load	LOADSENS	LOADCALF	LOADRECD	LOADOBSF	LOADRECF	LOADLOGF	LOADSYSR
Inlet Restr.	INRESENS	INRECALF	INREREC	INREOBSF	INRERECF	INRELOGF	INRESYSR
Exh. Press.	EXPRSENS	EXPRCALF	EXPRRECD	EXPROBSF	EXPRRECF	EXPRLOGF	EXPRSYSR
Oil Gal. Press.	OILGSENS	OILGCALF	OILGRECD	OILGOBSF	OILGRECF	OILGLOGF	OILGSYSR

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**

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

Laboratory: LAB	EOT Date: DTCOMP	EOT Time:	EOTTIME
Test Number: TESTNUM			
Oil Code:		OILCODE	
Formulation/Stand Code:		FORM	

Injection Timing

Timing Hours	Timing (Deg)
SITHR001	SIT_R001
SITHR002	SIT_R002
SITHR003	SIT_R003
SITHR004	SIT_R004
SITHR005	SIT_R005
SITHR006	SIT_R006
SITHR007	SIT_R007
SITHR008	SIT_R008
TOTSIT	Total Timing Changes

Hardware

Part	Part Number	Serial Number
Primary Turbocharger	TRBCHPPN	
Secondary Charger	TRBCHSPN	
Cylinder Head (front)	CYLHFRPN	CYLHFRSN
Cylinder Head (rear)	CYLHRRPN	CYLHRRSN
Pistons	PISTONPN	
Injection Nozzles	INJNOZPN	
Rod Bearings	RODBRGPN	
Liners	LINERPN	
Ring Set	RINGSTPN	

Cylinder Kit Location	CPD ID Number
Cylinder 1	CPDIDC1
Cylinder 2	CPDIDC2
Cylinder 3	CPDIDC3
Cylinder 4	CPDIDC4
Cylinder 5	CPDIDC5
Cylinder 6	CPDIDC6

D 6987
Mack T-10 EGR Engine Oil Test
Form 15
Rating Summary: Piston #1

Laboratory: LAB	EOT Date: DTCOMP	EOT Time: EOTIME	
Test Number: TESTNUM			
Oil Code:	OILCODE		
Formulation/Stand Code:	FORM		
Date Rated: DTRATE	Rater Initials: RINIT	Verified By: VRINIT	

Dep. Factor		Grooves				Lands				Dep. Factor	Lands				Groove		Oil Cooling				Under Crown					
		No. 1		No. 2		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.	A, %	Dem.	A, %	Dem.	A, %	Dem.	A, %	Dem.	A, %	Dem.	A, %	Dem.	A, %	Dem.
C a r b o n	HC-1.0	G1HCA	G1HCD	G2HCA	G2HCD	L1HCA	L1HCD	L2HCA	L2HCD																	
	MC-0.5	G1MCA	G1MCD																							
	LC-25	G1LCA	G1LCD	G2LCA	G2LCD	L1LCA	L1LCD	L2LCA	L2LCD																	
	Total	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
	8 - 9	G1V9A	G1V9D	G2V9A	G2V9D	L1V9A	L1V9D	L2V9A	L2V9D																	
	7 - 7.9	G1V8A	G1V8D	G2V8A	G2V8D	L1V8A	L1V8D	L2V8A	L2V8D																	
	6 - 6.9	G1V7A	G1V7D	G2V7A	G2V7D	L1V7A	L1V7D	L2V7A	L2V7D																	
	5 - 5.9	G1V6A	G1V6D	G2V6A	G2V6D	L1V6A	L1V6D	L2V6A	L2V6D																	
	4 - 4.9	G1V5A	G1V5D	G2V5A	G2V5D	L1V5A	L1V5D	L2V5A	L2V5D																	
	3 - 3.9	G1V4A	G1V4D	G2V4A	G2V4D	L1V4A	L1V4D	L2V4A	L2V4D																	
2 - 2.9	G1V3A	G1V3D	G2V3A	G2V3D	L1V3A	L1V3D	L2V3A	L2V3D																		
1 - 1.9	G1V2A	G1V2D	G2V2A	G2V2D	L1V2A	L1V2D	L2V2A	L2V2D																		
>0 - 0.9	G1V1A	G1V1D	G2V1A	G2V1D	L1V1A	L1V1D	L2V1A	L2V1D																		
Clean	V	V	V	V	V	V	V	V	V	Clean																
Total	A	A	A	A	A	A	A	A	A																	
Rating	G1UWD1	G1UWD1	G2UWD1	G2UWD1	L1UWD1	L1UWD1	L2UWD1	L2UWD1																		
Location Factor	2	2	3	3	1	1	3	3																		
Ind Rating	G1WD1	G1WD1	G2WD1	G2WD1	L1WD1	L1WD1	L2WD1	L2WD1																		
WDP	TGC		TGC		TGC		TGC		TLC		TLC		TLC		TLC		TLC		TLC		TLC		TLC			
WD1	TGC1		TGC1		TGC1		TGC1		TLC1		TLC1		TLC1		TLC1		TLC1		TLC1		TLC1		TLC1			
	Unweighted Deposits				Unweighted Deposits				Unweighted Deposits				Unweighted Deposits				T. L. Flaked Carbon %									
	UWD1				UWD1				UWD1				UWD1				TLFC1									

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

Laboratory:	LAB	EOT Date:	DTCOMP	EOT Time:	EOTTIME
Test Number:	TESTNUM				
Oil Code:	OILCODE				
Formulation/Stand Code:	FORM				
Date Rated:	DTRATE	Rater Initials:	RINIT	Verified By:	VRINIT

Total Piston Ratings Summary																						
Dep. Factor	Grooves				Lands				Dep. Factor	Groove				Lands				Oil Cooling		Under Crown		
	No.1	A, %	Dem.	No.2	No.1	A, %	Dem.	No.2		No.1	A, %	Dem.	No.2	No.3	A, %	Dem.	No.4	A, %	Dem.	A, %	Dem.	
HC-1.0	G1HCA2	G1HCD2	G2HCA2	G2HCD2	G1HCA2	G1HCD2	G2HCA2	G2HCD2					G3HCA2	G3HCD2	G3HCA2	G3HCD2	G4HCA2	G4HCD2				
MC-0.5	G1MCA2	G1MCD2											G3MCA2	G3MCD2								
LC-25	G1LCA2	G1LCD2	G2LCA2	G2LCD2	G1LCA2	G1LCD2	G2LCA2	G2LCD2					G3LCA2	G3LCD2	G3LCA2	G3LCD2	G4LCA2	G4LCD2	GJLCA2	GJLCD2		
Total	G1ACTO	G1DCTO	G2ACTO	G2DCTO	G1ACTO	G1DCTO	G2ACTO	G2DCTO					G3ACTO	G3DCTO	G3ACTO	G3DCTO	G4ACTO	G4DCTO	G5ACTO	G5DCTO		
8 - 9	G1V9A2	G1V9D2	G2V9A2	G2V9D2	G1V9A2	G1V9D2	G2V9A2	G2V9D2	7.5				G3V75A	G3V75D	G3V75A	G3V75D	G4V75A	G4V75D	G5V75A	G5V75D		
7 - 7.9	G1V8A2	G1V8D2	G2V8A2	G2V8D2	G1V8A2	G1V8D2	G2V8A2	G2V8D2					G3V45A	G3V45D	G3V45A	G3V45D	G4V45A	G4V45D	G5V45A	G5V45D		
6 - 6.9	G1V7A2	G1V7D2	G2V7A2	G2V7D2	G1V7A2	G1V7D2	G2V7A2	G2V7D2					G3V45A	G3V45D	G3V45A	G3V45D	G4V45A	G4V45D	G5V45A	G5V45D		
5 - 5.9	G1V6A2	G1V6D2	G2V6A2	G2V6D2	G1V6A2	G1V6D2	G2V6A2	G2V6D2	4.5				G3V45A	G3V45D	G3V45A	G3V45D	G4V45A	G4V45D	G5V45A	G5V45D		
4 - 4.9	G1V5A2	G1V5D2	G2V5A2	G2V5D2	G1V5A2	G1V5D2	G2V5A2	G2V5D2					G3V15A	G3V15D	G3V15A	G3V15D	G4V15A	G4V15D	G5V15A	G5V15D		
3 - 3.9	G1V4A2	G1V4D2	G2V4A2	G2V4D2	G1V4A2	G1V4D2	G2V4A2	G2V4D2					G3VCLN	G3VCLND	G3VCLN	G3VCLND	G4VCLN	G4VCLND	G5VCLN	G5VCLND		
2 - 2.9	G1V3A2	G1V3D2	G2V3A2	G2V3D2	G1V3A2	G1V3D2	G2V3A2	G2V3D2					G3VCLN	G3VCLND	G3VCLN	G3VCLND	G4VCLN	G4VCLND	G5VCLN	G5VCLND		
1 - 1.9	G1V2A2	G1V2D2	G2V2A2	G2V2D2	G1V2A2	G1V2D2	G2V2A2	G2V2D2	1.5				G3AVTO	G3DVTO	G3AVTO	G3DVTO	G4AVTO	G4DVTO	G5AVTO	G5DVTO		
>0 - 0.9	G1V1A2	G1V1D2	G2V1A2	G2V1D2	G1V1A2	G1V1D2	G2V1A2	G2V1D2					G3AVTO	G3DVTO	G3AVTO	G3DVTO	G4AVTO	G4DVTO	G5AVTO	G5DVTO		
Clean	G1VCLN	G1VCLND	G2VCLN	G2VCLND	G1VCLN	G1VCLND	G2VCLN	G2VCLND	Clean				G3VCLN	G3VCLND	G3VCLN	G3VCLND	G4VCLN	G4VCLND	G5VCLN	G5VCLND		
Total	G1AVTO	G1DVTO	G2AVTO	G2DVTO	G1AVTO	G1DVTO	G2AVTO	G2DVTO					G3AVTO	G3DVTO	G3AVTO	G3DVTO	G4AVTO	G4DVTO	G5AVTO	G5DVTO		
Rating Location Factor	G1UWD2	G1UWD2	G2UWD2	G2UWD2	G1UWD2	G1UWD2	G2UWD2	G2UWD2					G3UWD2	G3UWD2	G3UWD2	G3UWD2	G4UWD2	G4UWD2	G5UWD2	G5UWD2		
Ind Rating	G1WD2	G1WD2	G2WD2	G2WD2	G1WD2	G1WD2	G2WD2	G2WD2					G3WD2	G3WD2	G3WD2	G3WD2	G4WD2	G4WD2	G5WD2	G5WD2		
WDP	TGC				TGC				TLC				Unweighted Deposits				T. L. Flaked Carbon %					
WD2	TGC2				TGC2				TLC2				UWD2				TLFC2					

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

Laboratory: LAB	EOT Date: DTCOMP	EOT Time: EOTIME	
Test Number: TESTNUM			
Oil Code: OILCODE			
Formulation/Stand Code: FORM			
Date Rated: DTRATE	Rater Initials: RINIT	Verified By: VRINIT	

Total Piston Ratings Summary																
Dep. Factor	Grooves			Lands			Dep. Factor	Groove			Lands			Oil Cooling		Under Crown
	No. 1	A, %	Dem.	No. 2	A, %	Dem.		No. 1	A, %	Dem.	No. 3	A, %	Dem.	No. 4	A, %	
HC-1.0	1HCA	1HCD	2HCA	2HCD	1HCA	1HCD	2HCA	2HCD	3HCA	3HCD	3HCA	3HCD	4HCA	4HCD		
MC-0.5	1MCA	1MCD							3MCA	3MCD						
LC-25	1LCA	1LCD	2LCA	2LCD	1LCA	1LCD	2LCA	2LCD	3LCA	3LCD	3LCA	3LCD	4LCA	4LCD		
Total	1ACTO	1DCTO	2ACTO	2DCTO	1ACTO	1DCTO	2ACTO	2DCTO	3ACTO	3DCTO	3ACTO	3DCTO	4ACTO	4DCTO	3ACTO	3DCTO
8 - 9	G1V9A3	G1V9D3	G2V9A3	G2V9D3	L1V9A3	L1V9D3	L2V9A3	L2V9D3								
7 - 7.9	G1V8A3	G1V8D3	G2V8A3	G2V8D3	L1V8A3	L1V8D3	L2V8A3	L2V8D3	3V75A	3V75D	4V75A	4V75D			GV75A	GV75D
6 - 6.9	G1V7A3	G1V7D3	G2V7A3	G2V7D3	L1V7A3	L1V7D3	L2V7A3	L2V7D3								
5 - 5.9	G1V6A3	G1V6D3	G2V6A3	G2V6D3	L1V6A3	L1V6D3	L2V6A3	L2V6D3	3V45A	3V45D	4V45A	4V45D			GV45A	GV45D
4 - 4.9	G1V5A3	G1V5D3	G2V5A3	G2V5D3	L1V5A3	L1V5D3	L2V5A3	L2V5D3								
3 - 3.9	G1V4A3	G1V4D3	G2V4A3	G2V4D3	L1V4A3	L1V4D3	L2V4A3	L2V4D3								
2 - 2.9	G1V3A3	G1V3D3	G2V3A3	G2V3D3	L1V3A3	L1V3D3	L2V3A3	L2V3D3								
1 - 1.9	G1V2A3	G1V2D3	G2V2A3	G2V2D3	L1V2A3	L1V2D3	L2V2A3	L2V2D3	3V15A	3V15D	4V15A	4V15D			GV15A	GV15D
>0 - 0.9	G1V1A3	G1V1D3	G2V1A3	G2V1D3	L1V1A3	L1V1D3	L2V1A3	L2V1D3								
Clean	1VCLN	0	2VCLN	0	1VCLN	0	2VCLN	0	3VCLN	0	4VCLN	0	3VCLN	0	3VCLN	0
Total	1AVTO	1DVTO	2AVTO	2DVTO	1AVTO	1DVTO	2AVTO	2DVTO	3AVTO	3DVTO	4AVTO	4DVTO	3AVTO	3DVTO	3AVTO	3DVTO
Rating	G1UWD3		G2UWD3		L1UWD3		L2UWD3		G3UWD3		L3UWD3		L4UWD3		OGUWD3	UCUWD3
Location Factor	2		3		1		3		20		20		60		0.5	1
Ind Rating	G1WD3		G2WD3		L1WD3		L2WD3		G3WD3		L3WD3		L4WD3		OGWD3	UCWD3
WDP	TGC			TGC			TGC			Unweighted Deposits			T. L. Flaked Carbon %			
WD3	TGC3			TGC3			TLC3			UWD3			TLFC3			

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

Laboratory: LAB	DTCOMP	EOT Date:	EOT Time: EOTTIME
Test Number: TESTNUM	FORM		
Oil Code:	OILCODE		
Formulation/Stand Code:	FORM		
Date Rated: DTRATE	RINIT	Rated By:	VRINIT
Verified By:			

Dep. Factor		Grooves				Lands				Dep. Factor	Lands				Groove		Oil Cooling				Under Crown							
		No.1		No.2		No.1		No.2			No.3		No.4		No.3		No.4		A, %		A, %		A, %					
		A, %	Dem.	A, %	Dem.	A, %	Dem.	A, %	Dem.		A, %	Dem.	A, %	Dem.	A, %	Dem.	A, %	Dem.	A, %	Dem.	A, %	Dem.	A, %	Dem.				
C a r b o n	HC-1.0	G1HCA	G1HCD	G2HCA	G2HCD	L1HCA	L1HCD	L2HCA	L2HCD																			
	MC-0.5	G1MCA	G1MCD																									
	LC-25	G1LCA	G1LCD	G2LCA	G2LCD	L1LCA	L1LCD	L2LCA	L2LCD																			
	Total	LACTO	LDCTO	LACTO	LDCTO	LACTO	LDCTO	LACTO	LDCTO																			
	8 - 9	G1V9A	G1V9D	G2V9A	G2V9D	L1V9A	L1V9D	L2V9A	L2V9D																			
	7 - 7.9	G1V8A	G1V8D	G2V8A	G2V8D	L1V8A	L1V8D	L2V8A	L2V8D																			
	6 - 6.9	G1V7A	G1V7D	G2V7A	G2V7D	L1V7A	L1V7D	L2V7A	L2V7D																			
	5 - 5.9	G1V6A	G1V6D	G2V6A	G2V6D	L1V6A	L1V6D	L2V6A	L2V6D																			
	4 - 4.9	G1V5A	G1V5D	G2V5A	G2V5D	L1V5A	L1V5D	L2V5A	L2V5D																			
	3 - 3.9	G1V4A	G1V4D	G2V4A	G2V4D	L1V4A	L1V4D	L2V4A	L2V4D																			
2 - 2.9	G1V3A	G1V3D	G2V3A	G2V3D	L1V3A	L1V3D	L2V3A	L2V3D																				
1 - 1.9	G1V2A	G1V2D	G2V2A	G2V2D	L1V2A	L1V2D	L2V2A	L2V2D																				
>0 - 0.9	G1V1A	G1V1D	G2V1A	G2V1D	L1V1A	L1V1D	L2V1A	L2V1D																				
Clean	1VCLN	0	2VCLN	0	1VCLN	0	2VCLN	0	Clean																			
Total	LAVTO	LDVTO	LAVTO	LDVTO	LAVTO	LDVTO	LAVTO	LDVTO																				
Rating	GIUWD4	GIUWD4	G2UWD4	G2UWD4	L1UWD4	L1UWD4	L2UWD4	L2UWD4																				
Location Factor	2				3				1				3															
Ind Rating	G1WD4				G2WD4				L1WD4				L2WD4															
WDP	TGC				TGC				TLC				TLC															
WD4	TGC4				TGC4				TLC4				TLC4															
Unweighted Deposits	G3UWD4				L3UWD4				L3WD4				L4WD4															
T. L. Flaked Carbon %					20				20				60				0.5				1							
TLFC4					UGWD4				UGWD4				UGWD4				TLFC4											

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

Laboratory: LAB	EOT Date: DTCOMP	EOT Time: EOTIME	
Test Number: TESTNUM			
Oil Code:	OILCODE		
Formulation/Stand Code:	FORM		
Date Rated: DTRATE	Rater Initials: RINIT	Verified By: VRINIT	

Total Piston Ratings Summary																		
Dep. Factor	Grooves			Lands			Dep. Factor	Groove			Lands			Oil Cooling		Under Crown		
	No. 1	A, %	Dem.	No. 2	A, %	Dem.		No. 1	A, %	Dem.	No. 2	A, %	Dem.	No. 3	A, %	Dem.	No. 4	A, %
HC-1.0	G1HCA	G1HCD	G2HCA	G2HCD	L1HCA	L1HCD	L2HCA	L2HCD	G3HCA	G3HCD	L3HCA	L3HCD	L4HCA	L4HCD				
MC-0.5	G1MCA	G1MCD							G3MCA	G3MCD								
LC-25	G1LCA	G1LCD	G2LCA	G2LCD	L1LCA	L1LCD	L2LCA	L2LCD	G3LCA	G3LCD	L3LCA	L3LCD	L4LCA	L4LCD				
Total	ACTO	DCCTO	ACTO	DCCTO	ACTO	DCCTO	ACTO	DCCTO	ACTO	DCCTO	ACTO	DCCTO	ACTO	DCCTO	ACTO	DCCTO	ACTO	DCCTO
8 - 9	G1V9A5	G1V9D5	G2V9A5	G2V9D5	L1V9A5	L1V9D5	L2V9A5	L2V9D5										
7 - 7.9	G1V8A5	G1V8D5	G2V8A5	G2V8D5	L1V8A5	L1V8D5	L2V8A5	L2V8D5										
6 - 6.9	G1V7A5	G1V7D5	G2V7A5	G2V7D5	L1V7A5	L1V7D5	L2V7A5	L2V7D5										
5 - 5.9	G1V6A5	G1V6D5	G2V6A5	G2V6D5	L1V6A5	L1V6D5	L2V6A5	L2V6D5										
4 - 4.9	G1V5A5	G1V5D5	G2V5A5	G2V5D5	L1V5A5	L1V5D5	L2V5A5	L2V5D5										
3 - 3.9	G1V4A5	G1V4D5	G2V4A5	G2V4D5	L1V4A5	L1V4D5	L2V4A5	L2V4D5										
2 - 2.9	G1V3A5	G1V3D5	G2V3A5	G2V3D5	L1V3A5	L1V3D5	L2V3A5	L2V3D5										
1 - 1.9	G1V2A5	G1V2D5	G2V2A5	G2V2D5	L1V2A5	L1V2D5	L2V2A5	L2V2D5										
>0 - 0.9	G1V1A5	G1V1D5	G2V1A5	G2V1D5	L1V1A5	L1V1D5	L2V1A5	L2V1D5										
Clean	VCLN	0	2VCLN	0	VCLN	0	2VCLN	0	VCLN	0	3VCLN	0	4VCLN	0	5VCLN	0	6VCLN	0
Total	AVTO	LDVTO	AVTO	LDVTO	AVTO	LDVTO	AVTO	LDVTO	AVTO	LDVTO	AVTO	LDVTO	AVTO	LDVTO	AVTO	LDVTO	AVTO	LDVTO
Rating Location Factor	GIUWD5	GIUWD5	G2UWD5	G2UWD5	LIUWD5	LIUWD5	L2UWD5	L2UWD5	G3UWD5	G3UWD5	L3UWD5	L3UWD5	L4UWD5	L4UWD5	OGUWD5	OGUWD5	UCUWD5	UCUWD5
Ind Rating	G1WD5	G1WD5	G2WD5	G2WD5	L1WD5	L1WD5	L2WD5	L2WD5	G3WD5	G3WD5	L3WD5	L3WD5	L4WD5	L4WD5	OGWD5	OGWD5	UCWD5	UCWD5
WDP	TGC			TGC			TLC			TLC			Unweighted Deposits			T. L. Flaked Carbon %		
WD5	TGC5			TGC5			TLC5			TLC5			UWD5			TLFC5		

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Mack T-10 EGR Engine Oil Test
Form 21
Main Bearing Weight Loss

Laboratory: LAB	EOT Date: DTCOMP	EOT Time: EOTTIME
Test Number: TESTNUM		
Oil Code:		OILCODE
Formulation/Stand Code:		FORM

Position #	Location	SOT Weight, g	EOT Weight, g	Weight Change, mg
1	Upper	MBWSOTU1	MBWEOTU1	MBWLU1
2	Upper	MBWSOTU2	MBWEOTU2	MBWLU2
3	Upper	MBWSOTU3	MBWEOTU3	MBWLU3
4	Upper	MBWSOTU4	MBWEOTU4	MBWLU4
5	Upper	MBWSOTU5	MBWEOTU5	MBWLU5
6	Upper	MBWSOTU6	MBWEOTU6	MBWLU6
7	Upper	MBWSOTU7	MBWEOTU7	MBWLU7
Upper Bearing Average Weight Loss, mg				AMBWLU
Upper Bearing Weight Loss Std. Dev., mg				SMBWLU
Upper Bearing Minimum Weight Loss, mg				IMBWLU
Upper Bearing Maximum Weight Loss, mg				XMBWLU

Position #	Location	SOT Weight, g	EOT Weight, g	Weight Change, mg
1	Lower	MBWSOTL1	MBWEOTL1	MBWLL1
2	Lower	MBWSOTL2	MBWEOTL2	MBWLL2
3	Lower	MBWSOTL3	MBWEOTL3	MBWLL3
4	Lower	MBWSOTL4	MBWEOTL4	MBWLL4
5	Lower	MBWSOTL5	MBWEOTL5	MBWLL5
6	Lower	MBWSOTL6	MBWEOTL6	MBWLL6
7	Lower	MBWSOTL7	MBWEOTL7	MBWLL7
Lower Bearing Average Weight Loss, mg				AMBWLL
Lower Bearing Weight Loss Std. Dev., mg				SMBWLL
Lower Bearing Minimum Weight Loss, mg				IMBWLL
Lower Bearing Maximum Weight Loss, mg				XMBWLL

Main Bearing Batch ID	MBBIDNUM
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D 6987
Mack T-10 EGR Engine Oil Test
Form 22
American Chemistry Council Code of Practice
Test Laboratory Conformance Statement

Test Laboratory		SUBLAB			
Test Sponsor		TSTSPON1			
Formulation / Stand Code		FORM			
Test Number		TESTNUM			
Start Date	DTSTRT	Start Time	STRTTIME	Time Zone	TZONE

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 YESRQMET No NORQMET*
- 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 YESFULL No NOFULL*
- 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 YESNODEC* No NONODEC
- 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 YESDEV* No NODEV (*This currently applies only to specific deviations identified in the ASTM Information Letter System*)

Check The Appropriate Conclusion

INCLUDE	Operational review of this test indicates that the results should be included in the Multiple Test Acceptance Criteria calculations.
DONOTINC	*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	
ACCCOMM1	
ACCCOMM2	
ACCCOMM3	
ACCCOMM4	

SUBSIGIM
Signature

SUBDATE
Date

SUBNAME
Typed Name

SUBTITLE
Title