



# Test Monitoring Center

6555 Penn Avenue  
Pittsburgh, PA 15206-4489  
(412) 365-1000

T-10 INFORMATION LETTER 04-1  
Sequence No. 6

May 19, 2004

*ASTM consensus has not been obtained on this information letter. An appropriate ASTM ballot will be issued in order to achieve such consensus.*

TO: Mack Mailing List

SUBJECT: Incorporation of Information Letters 03-1 through 03-3

The following sections of Test Method D 6987 have been revised or added to incorporate Information Letters 03-1, 03-2, and 03-3: 6.2.10, 8.5.1.5, 8.5.2.13, Table 1, Table 2, A2.2, Table A2.1, and Table A3.1.

Greg Shank  
Senior Staff Engineer  
Mack Division  
Volvo Powertrain

John L. Zalar  
Administrator  
ASTM Test Monitoring Center

Attachment

c: [ftp://ftp.astmtmc.cmu.edu/docs/diesel/mack/procedure\\_and\\_ils/T-10/il04-1.pdf](ftp://ftp.astmtmc.cmu.edu/docs/diesel/mack/procedure_and_ils/T-10/il04-1.pdf)

Distribution: Email

(Revises D 6987-03)

6.2.10 *Oil Pump*

Use a Mack P/N 315GC465BM oil pump. The oil pump is available from the supplier listed in A2.2, Annex A2.

8.5.1.5 *Thrust Washers*

Install new thrust washers for each test.

8.5.2.13 Thrust washers

**TABLE 1**  
**MAXIMUM ALLOWABLE SYSTEM TIME RESPONSES**

Measurement Type	Time Response (s)
Speed	2.0
Temperature	3.0
Pressure	3.0
Flow	45.0

**TABLE 2  
TEST CONDITIONS**

Parameters	Limits	
	Phase I	Phase II
Time, h	75	225 <sup>A</sup>
Injection Timing, °BTDC	Variable	18
<b>CONTROLLED PARAMETERS<sup>B</sup></b>		
Speed, r/min	1800	1200
Fuel Flow, kg/h (lb/h)	59.2 (130.5)	63.5 (140.0)
Intake CO <sub>2</sub> Level, %	1.5 +/- 0.05	0.2 +/- 0.05
Inlet Manifold Temp., °C (°F)	70 (158)	66 (150)
Coolant Out Temp., °C (°F)	66 (150)	85 (185)
Fuel In Temp., °C (°F)	40 (104)	40 (104)
Oil Gallery Temp., °C (°F)	88 (190)	113 (235)
Intake Air Temp., °C (°F)	25 (77)	25 (77)
<b>RANGED PARAMETERS<sup>C</sup></b>		
Inlet Air Restriction, kPa (in. H <sub>2</sub> O)	3.5 – 4.0 (14 - 16)	3.5 - 4.0 (14 – 16)
Inlet Manifold Pressure, kPa (in. Hg)	Minimum 160 (47.4)	Minimum 210 (62.2)
Exhaust Back Pressure, kPa (in. H <sub>2</sub> O)	2.7 – 3.5 (11 - 14)	2.7 – 3.5 (11 – 14)
Crankcase Pressure, kPa (in. H <sub>2</sub> O)	0.25 – 0.75 (1 – 3)	0.25 – 0.75 (1 – 3)
<b>UNCONTROLLED PARAMETERS</b>		
Power, kW (bhp)	~257 (~345)	~324 (~434)
Torque, N•m (lb•ft) <sup>C</sup>	Record <sup>D</sup>	Record <sup>D</sup>
Exhaust O <sub>2</sub> Level, %	Record	Record
Exhaust Temp., °C (°F)		
Pre-turbine	Record	Record
Tailpipe	Record	Record
Oil Sump Temp., °C (°F)	Record	Record
Coolant In Temp., °C (°F)	Record	Record
EGR Cooler Inlet Temp. Front, °C (°F)	Record	Record
EGR Cooler Outlet Temp. Rear, °C (°F)	Record	Record
EGR Pre-Venturi Temp., °C (°F)	Record	Record
Inlet Air Dew Point, °C (°F)	Record	Record
Inlet Air Humidity, g/kg (gr/lb)	Record	Record
Blowby, L/min (ft <sup>3</sup> /min)	Record	Record
Pre-turbine Exhaust Pressure, kPa (in. Hg)	Record	Record
Main Gallery Oil Pressure, kPa (psi)	Record	Record
Oil Filter ΔP, kPa (psi)	Not to exceed 138 (20) <sup>E</sup>	Not to exceed 138 (20) <sup>E</sup>

**A:** Check valve lash after break-in.

**B:** All control parameters shall be targeted at the mean indicated.

**C:** All ranged parameters shall fall within the specified ranges.

**D:** At 98.2 kPa (29 in. Hg) and 29.5 °C (85 °F) dry air.

**E:** If oil filter ΔP exceeds 138 kPa (20 psi), change the two full flow filters. If the filters are changed, attempt to recover as much oil as possible by draining the filters. No new oil is to be added. The test report shall indicate if the filters are changed.

A2.2 The test engine (P/N 11GBA81025) is available from:  
Mack Trucks, Inc.  
13302 Pennsylvania Avenue  
Hagerstown, MD 21742

The oil pump and the parts shown in Table A2.1 are available from:  
Test Engineering, Inc.  
12718 Cimarron Path  
San Antonio, TX 78249-3423

**TABLE A2.1  
NEW PARTS FOR EACH REBUILD**

<b>PART NAME</b>	<b>MACK PART NUMBER</b>	<b>QUANTITY</b>
<b>1. Cylinder liners</b>	<b>509GC471</b>	<b>6</b>
<b>2. Piston Assembly</b>	<b>240GC2256M</b>	
<b>Piston Crown</b>	<b>240GC5114M</b>	<b>6</b>
<b>Piston Skirt</b>	<b>240GC5119M</b>	<b>6</b>
<b>3. Piston Ring Set</b>	<b>353GC2141</b>	
<b>#1 Compression ring</b>	<b>349GC3107</b>	<b>6</b>
<b>#2 Compression ring</b>	<b>349GC3108</b>	<b>6</b>
<b>Oil ring</b>	<b>350GC343</b>	<b>6</b>
<b>4. Overhaul gasket sets</b>	<b>57GC2176</b>	<b>2</b>
	<b>57GC2178A</b>	<b>1</b>
	<b>57GC2179</b>	<b>1</b>
<b>5. Spin-on filters</b>	<b>485GB3191C</b>	<b>2</b>
<b>Centrifugal filter cartridge</b>	<b>239GB244B</b>	<b>1</b>
<b>6. Engine coolant conditioner</b>	<b>25MF435B</b>	<b>1</b>
<b>7. Primary fuel filter</b>	<b>483GB470AM</b>	<b>1</b>
<b>8. Secondary fuel filter</b>	<b>483GB471M</b>	<b>1</b>
<b>9. Valve guides</b>	<b>714GB3103</b>	<b>24</b>
<b>10. Valve stem seals</b>	<b>446GC328</b>	<b>6</b>
<b>11. Connecting rod bearings</b>	<b>62GB2396A</b>	<b>6</b>
<b>12. Main Bearings</b>	<b>57GC387</b>	<b>7</b>
<b>13. Thrust Washers</b>	<b>714GC45</b>	<b>2</b>
	<b>714GC46</b>	<b>2</b>

A P/N 57GC3116 Cylinder Rebuild Kit contains items 1, 2, and 3. Six kits are required per engine rebuild. A P/N 57GC2177B Filter Kit contains items 5, 6, 7, and 8. A P/N 62GB2396A Service Bearing Pair contains one each of the upper and lower connecting rod bearings (item 11).

**TABLE A3.1  
QUALITY INDEX AND AVERAGE CALCULATION VALUES**

Control Parameter	Units	Quality Index Threshold		Quality Index U & L Values				Over & Under Range Values	
				U		L		Low	High
Speed <sup>A</sup>	r/min	0.000		1802.5	1202.5	1797.5	1197.5	1063	1937
Fuel Flow <sup>A</sup>	kg/h	0.000		60.20	64.50	58.20	62.50	4.4	118.3
Inlet Manifold Temp.	°C	0.000		70.8	66.8	69.2	65.2	22.2	113.8
Coolant Out Temp.	°C	0.000		66.9	85.9	65.1	84.1	16.7	134.3
Fuel In Temp.	°C	0.000		40.5		39.5		12.6	67.4
Oil Gallery Temp.	°C	0.000		88.6	113.6	87.4	112.4	55.1	145.9
Intake Air Temp.	°C	0.000		26.0		24.0		-29.8	79.8
Ranged Parameter	Units	Range						Over & Under Range Values	
Inlet Air Restriction	kPa	3.5 – 4.0						0	14
Inlet Manifold Pressure	kPa	min 160	min 210					0	400
Exhaust Back Pressure	kPa	2.7 – 3.5						0	16
Crankcase Pressure	kPa	0.25 – 0.75						0	3
Intake CO <sub>2</sub>	%	1.5 ± 0.05	0.2 ± 0.05					0	5

<sup>A</sup>U and L values for speed, fuel flow, coolant out temperature, and oil gallery temperature are split by test phase.