

# DETROIT DIESEL



## MBE 4000 Service Information

**NUMBER:** 07 EPA04 MBE 4000-6 **S.M. REF.:** 1.2.2 **ENGINE:** MBE 4000 **DATE:** November 2007

**SUBJECT:** CYLINDER HEAD BOLTS TIGHTENING STAGES

**PUBLICATION:** 6SE412

The cylinder head bolts tightening stages have been updated as listed in Table 1.

Section	Change
1.2.2	Section title has been updated.
1.2.2	The Torque Value description has been changed from in. to lb-ft.
1.2.2	The Stage 2 torque value has been changed from (37 1) to (37).

**Table 1** Cylinder Head Bolts Tightening Stages

## 1.2.2 INSTALLATION OF CYLINDER HEAD

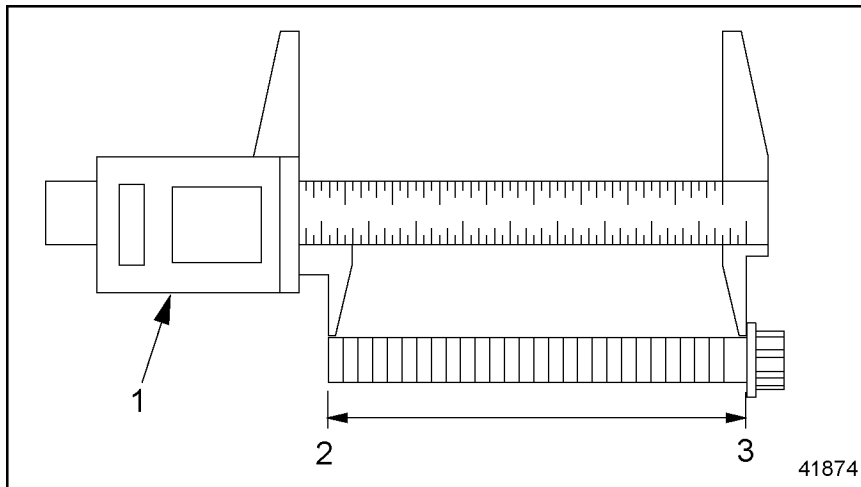
Installation steps are as follows:

1. Install a new head gasket. Match up the holes in gasket with those in the cylinder block and place the head gasket over the guide pins in the block.
2. Position the cylinder head on the head gasket. Make sure the head is seated onto the guide pins.

**NOTICE:**

**Head and gasket must be seated properly, or engine damage could result.**

3. Using a dial caliper, measure the length of the cylinder head bolts from the end of the bolt to the bottom of the flange. See Figure 1. Listed in Table 2 are the acceptable lengths. Replace any bolts which do not meet these specifications.



1. Dial Caliper

2. End of Cylinder Head Bolt

3. Bottom of Flange

**Figure 1 Measuring Head Bolts**

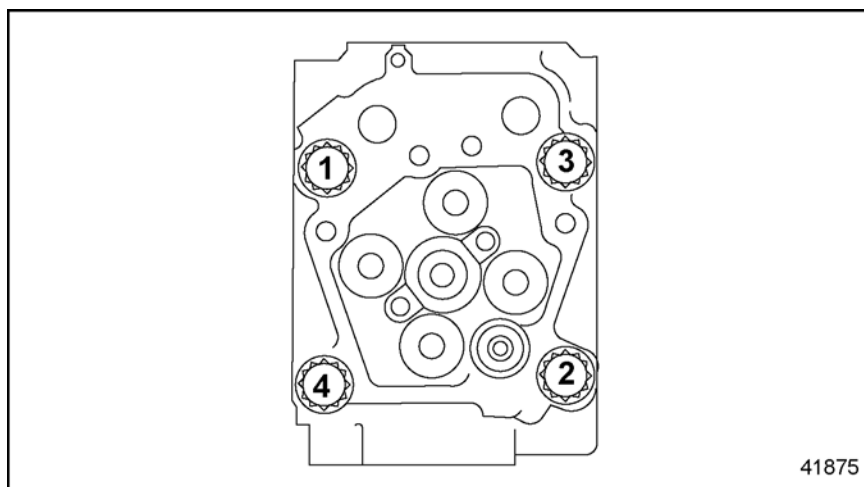
Description	Length: mm (in.)
Shaft length when new	210.0 (8.27)
Maximum shaft length	212.0 (8.35)

**Table 2 Cylinder Head Bolt Lengths**

4. Lubricate the cylinder head bolts with engine oil.
5. Using the head bolt impact socket (J-45389), install the cylinder head bolts.

**NOTE:**

For the correct tightening sequence, see Figure 2. Listed in Table 3 are the specific stages in the tightening sequence.



**Figure 2 Tightening Sequence, Cylinder Head Bolts**

Size	Max. Shaft Length	Tightening Stage	Torque Value: N·m (lb-ft)
M15 x 2	212.0 mm (8.35 in.)	Stage 1	10 (7)
		Stage 2	50 (37)
		Stage 3	100 (74)
		Stage 4	200 (148)
		Stage 5	additional 90°
		Stage 6	additional 90°

**Table 3 Tightening Stages, Cylinder Head Bolts**

**NOTE:**

If the stretch bolt tightening torque is exceeded remove it. Check its maximum permissible shaft length (replace if necessary), and tighten it from Stage 1. Unconditionally replace all bolts whose shaft length exceeds the maximum permissible value.

6. Replace the seal rings and connect the fuel return line to the cylinder head.
7. Replace the seal rings and install the constant-throttle line on the cylinder head.
8. Connect the coolant line to the cylinder head.

**NOTICE:**

**Correct torque on the high-pressure fuel lines is critical. Incorrect torques could result in leaks or lack of power due to restricted fuel flow.**

9. Without moving the transfer-tube thrust bolt, install the high-pressure fuel line as removed.
  - [a] When installing the transfer-tube fitting, use one wrench to hold the thrust bolt, and another to tighten the fitting.
  - [b] Tighten the fitting to 30 N·m (22 lb·ft).
  - [c] Remove the wrench used to hold the location of the thrust bolt.
10. Install new exhaust manifold gaskets on all exhaust ports. Make sure the gaskets are all positioned correctly.

**NOTE:**

Install new manifold gaskets on all exhaust ports, regardless of how many heads were removed.

11. Install the exhaust manifold and tighten the bolts to 50 N·m (37 lb·ft).
12. Install the charge-air intake manifold.
13. Lubricate the pushrods with a light coating of engine oil and install the pushrods, in order, as removed.

**NOTE:**

Make sure the pushrods are correctly seated in the valve tappets.

14. Install the valve bridges, in order, as removed.
15. Install the rocker arm assembly, in order, as removed. Tighten each rocker arm mounting bolt first to 60 N·m (44 lb·ft); then an additional 90 degrees. Refer to section 1.22.4.
16. Install the barring tool and adjust the valves. For valve lash adjustment procedures, refer to section 1.20.3.
17. Remove the barring tool. Refer to section 1.16.1.
18. Install the inspection hole end cover on the flywheel housing. Tighten the fasteners 25 N·m (18 lb·ft).
19. Check that the coolant drain plug is tight and not leaking.

20. Fill the radiator with coolant.
21. Install the cylinder head cover.
22. Install the engine trim cover.

**NOTE:**

Prime the fuel system.

 <b>WARNING:</b> <b>ENGINE EXHAUST</b>
<b>To avoid injury from inhaling engine exhaust, always operate the engine in a well-ventilated area. Engine exhaust is toxic.</b>

23. Turn on the ignition switch and test the engine. Observe the oil pressure gauge to verify the correct oil pressure. The maximum oil pressure readings at idle speed are listed in Table 4. Pay attention to the coolant temperature gauge, warning lights, fluid leaks, and any other signs of a problem.

Description	Minimum Oil Pressure Reading: kPa (psi)
Engine at Idle Speed	50 (7)
Engine at Maximum rpm	250 (36)

**Table 4 Oil Pressure Readings**

24. Stop the engine, check the coolant level, and top off if necessary.

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## **ADDITIONAL SERVICE INFORMATION**

Additional service information is available in the Detroit Diesel *EPA04 MBE 4000 Service Manual* (6SE412). The next revision to this manual will include the revised information.

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