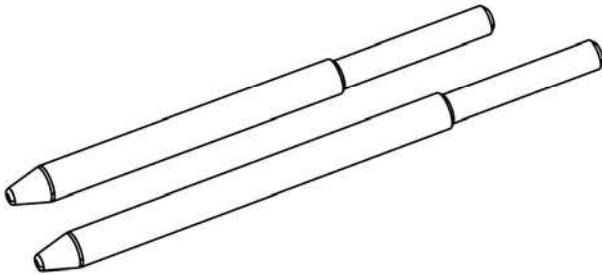


16.5 Installation of the DD13 Cylinder Head

Install as follows:

1. Inspect the head bolt holes in both block and head for the presence of oil, water, dirt, or damaged threads; clean or re-tap as necessary. Ensure piston domes, cylinder head, and cylinder block fire deck surfaces are clean and free of foreign matter.
2. Verify that the cylinder liner protrusion heights are within specification prior to installing the cylinder head. Refer to section "Installation of the Cylinder Liner" for cylinder liner protrusion specifications.
3. Install cylinder head guide studs (W471589016100).



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4. Position a new cylinder head gasket onto the cylinder block.



WARNING:

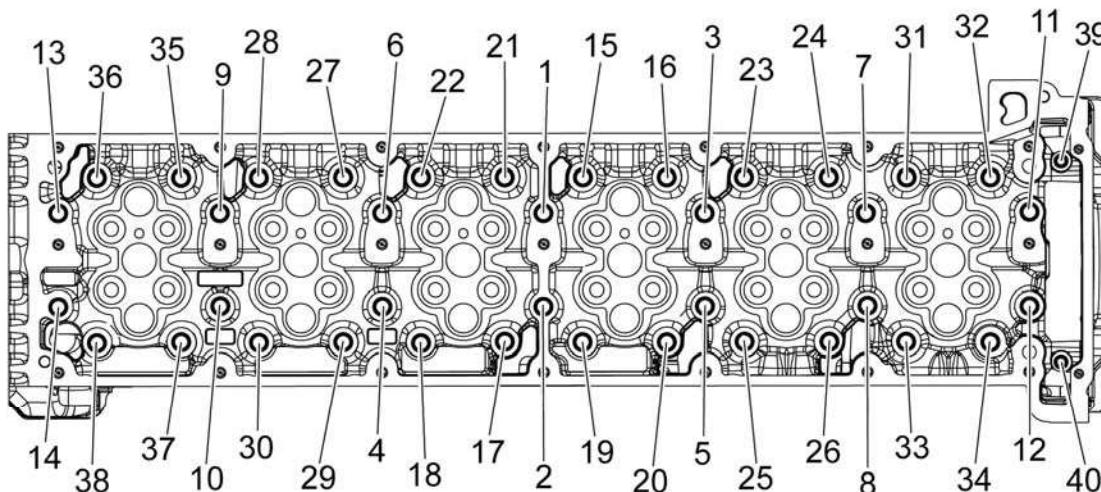
PERSONAL INJURY

To avoid injury when removing or installing a heavy engine component, ensure the component is properly supported and securely attached to an adequate lifting device to prevent the component from falling.

5. Install four lift hooks onto the cylinder head.
6. Lift the cylinder head into position using cylinder head/engine lifting bar tool (W470589006200). Lower cylinder head into place over the guide studs and dowel pins until it is seated on the engine block.
7. Remove the guide studs.
8. Remove the lifting hooks from the cylinder head.
9. Coat the threads and underside of bolt heads with clean engine oil before installation.
10. Install the 40 cylinder head bolts into the cylinder head. Torque bolts (1 through 38) in three steps as follows:
 - a. 200 N·m (147 lb·ft)

- b. 90° torque turn.
- c. 90° torque turn.

11. Using the torque sequence shown, torque the small bolts (39 and 40) to 60 N·m (44 lb·ft).



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12. Check and adjust the timing of the engine gear train, as needed. Refer to section "Installation and Timing of Engine Gear Train"
13. Install the turbocharger flange bolts.
14. Install the Exhaust Gas Recirculation (EGR) crossover tube. Refer to section "Installation of the Exhaust Gas Recirculation Crossover Tube"
15. Install the EGR actuator harness connector, linkage and the heat shield.
16. Install the coolant lines to EGR actuator.
17. Install the camshaft housing. Refer to section "Installation of the Camshaft Housing"
18. Install the camshaft and rocker shaft assemblies. Refer to section "Installation of the Camshaft and Rocker Shaft/Engine Brake Assembly"
19. Install the intake elbow.
20. Install the mixer pipe. Refer to section "Installation of the Mixer pipe"
21. Install the EGR venturi. Refer to section "Installation of the Exhaust Gas Recirculation Venturi"
22. Install the fuel injectors. Refer to section "Installation of the Fuel Injector"
23. Install the engine brake solenoids and injector harness.
24. Install the amplification needle and pressure limiting valve (PLV). Refer to section "Installation of the Needle, Amplifier, and Pressure Limiting Valve Return Lines"
25. Install the high pressure feed lines from high pressure pump to common fuel rail. Refer to section "Installation of the High Pressure Fuel Rail Feed Lines"
26. Install the injector feed lines from fuel rail. Refer to section "Installation of the High Pressure Fuel Injector Lines"
27. Connect the coolant temperature sensor harness.
28. Install the turbocharger inlet pipe.
29. Install any components that were removed and fill with required fluids as recommended. Refer to OEM guidelines.
30. Set the valve lash and engine brake. Refer to section "Valve Lash Adjustments"
31. Install the rocker cover. Refer to section "Installation of the Rocker Cover"
32. Fill the cooling system.
33. Prime engine lubrication system. Refer to section "Priming the Engine Lubrication System"

**WARNING:****ENGINE EXHAUST**

To avoid injury from inhaling engine exhaust, always operate the engine in a well-ventilated area. Engine exhaust is toxic.

34. Start the engine and check for fuel, coolant or oil leaks.
35. Shut down the engine.

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