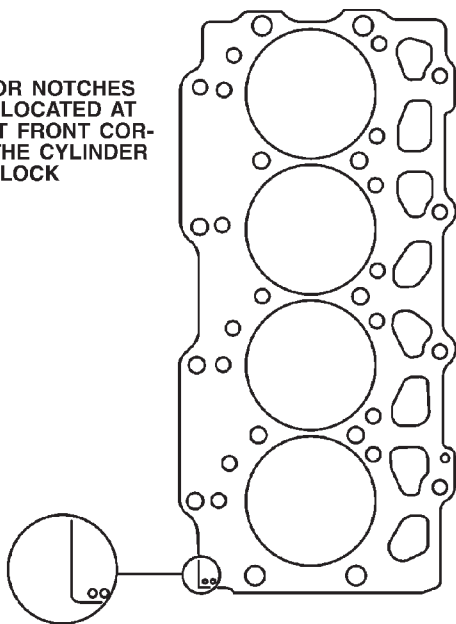


## REMOVAL AND INSTALLATION (Continued)

Measured dimension (mm)	0.53-0.62
Cyl. head gasket thickness (mm)	1.41
Piston clearance (mm)	0.80-0.89
Measured dimension (mm)	0.63-0.72
Cyl. head gasket thickness (mm)	1.51
Piston clearance (mm)	0.80-0.89
Measured dimension (mm)	0.73-0.82
Cyl. head gasket thickness (mm)	1.61
Piston clearance (mm)	0.80-0.89

HOLES OR NOTCHES CAN BE LOCATED AT THE RIGHT FRONT CORNER OF THE CYLINDER BLOCK



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Fig. 46 Head Gasket Identification

HOW TO IDENTIFY GASKET THICKNESS	
NO HOLES	1.41 mm
2 HOLES	1.51 mm
1 HOLE	1.61 mm

## INSTALLATION CYLINDER HEADS

(1) Remove the shop towels from the cylinder bores. Coat the bores with clean engine oil.

(2) Install the cylinder head alignment studs (VM-1009).

(3) After determining the correct head gasket thickness, clean the block and head mating surfaces, place the engine cylinder head gasket over the cylinder head alignment studs.

(4) Place the engine cylinder heads over the alignment studs.

**CAUTION: New cylinder head bolts must be used.**

(5) Tighten the engine cylinder head bolts in sequence according to the following procedure (Fig. 47) :

a. The threads and underside heads of the bolts should be lubricated. Use the cylinder head alignment studs tool number VM-1009. Position the heads on the block and secure with the ten large center bolts and spacers (clamps), finger tight only.

b. Ensure that the various clamps are installed correctly and the head gasket remains in its proper position, completely covered. Then, lubricate and install the eight small bolts, also finger tight.

(6) Install the intake and exhaust manifolds with new gaskets, partially tightening the nuts to a maximum of 5 N·m (44 in. lbs.). This will align the heads. Refer to Group 11, Exhaust System and Turbocharger for the proper procedures. Install lift eye and brake vacuum tube at this time.

(7) Then, tighten the 14mm bolts with special tool VM-1019 in the following manner:

(8) **1st Phase: Tightening Head Bolts** (Fig. 47). Starting with bolt H then G-F-E-D-C-B-A-L-I, to 30 N·m. Tighten all bolts an additional 70°, starting with bolt A and continuing in alphabetical order. Finally tighten all bolts an additional 70°.

(9) Then, tighten the 12mm bolts in the following manner:

(10) Side bolts (M1-M2): Tighten M1 bolts to 30 N·m, then rotate them 85° (±5). Tighten M2 bolts to 30 N·m, then rotate them 85° (±5).

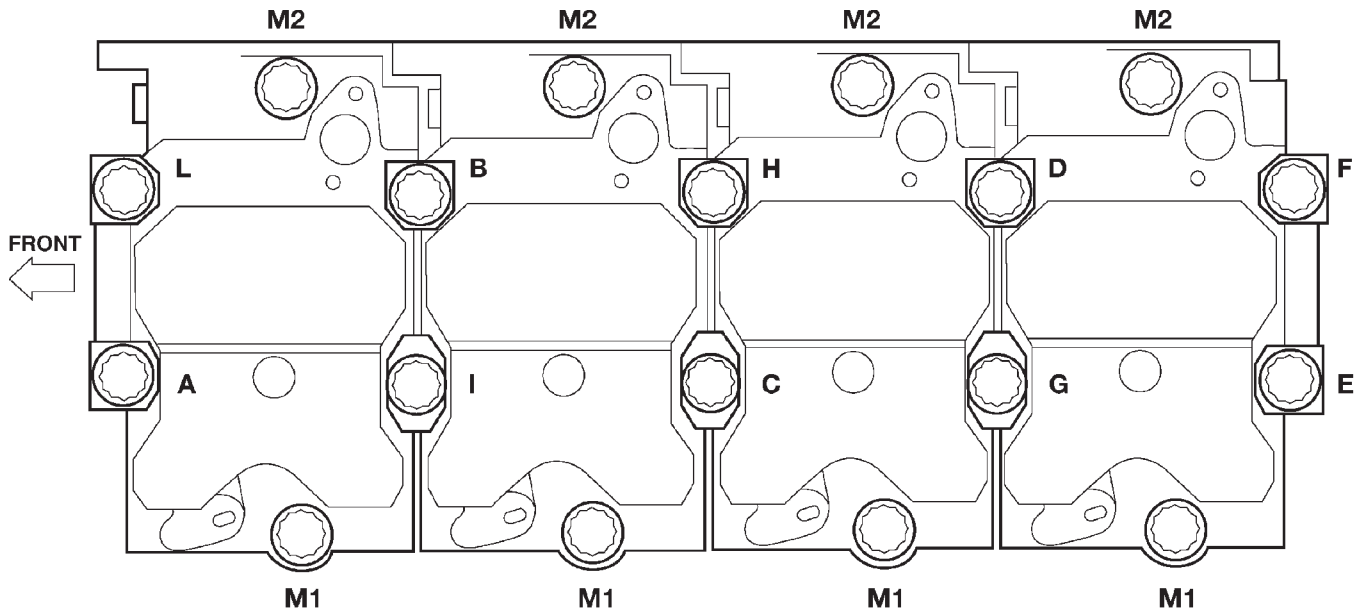
(11) **2nd Phase:** After 20 minutes of engine operation at operating temperature, allow engine to cool down completely. Then retorque the head bolts as follows:

(12) Central bolts A-L: Completely back off bolts one-by-one and then retighten to 30 N·m plus 130° (±5°). Then proceed in the same way, bolt by bolt, following alphabetical order, as indicated.

(13) Side bolts M1-M2: **Without slackening**, torque bolts M1 then bolts M2 to 90 N·m (66 ft. lbs.).

(14) Torque intake nuts to 32 N·m (24 ft. lbs.) and exhaust manifolds nuts to 32 N·m (24 ft. lbs.) after completing the cylinder head torquing procedure.

## REMOVAL AND INSTALLATION (Continued)



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**Fig. 47 Engine Cylinder Head Bolt Tightening Sequence**

(15) Install the oil feed lines for rocker arm assemblies and oil pressure switch. Torque oil feed lines to 13 N·m (115 in. lbs.).

(16) Install the rocker arm assemblies in the same order as removed. Position the crankshaft at T.D.C. on the number 1 cylinder. Rotate the engine 40° anti-clockwise and stop. Tighten all rocker arm assembly retaining nuts evenly until the assembly bottoms on the cylinder head. You must allow 30 minutes before starting the engine, once the rocker arms are torqued. This will allow the hydraulic tappets to stabilize and prevent the possibility of piston to valve contact. Torque the rocker arm nuts to 26.5 N·m (20 ft. lbs.).

(17) Install fuel injectors using special tool VM-1012. Refer to Group 14, Fuel System for procedures.

(18) Install cylinder head cover. Torque nuts to 15.7 N·m (139 in. lbs.).

(19) Connect the crankcase breather hose.

(20) Connect the injector sensor wire connector, and the glow plug connectors.

(21) Install the turbocharger oil supply line. Torque banjo bolts to 27 N·m (20 ft. lbs.).

(22) Install the turbocharger oil drain line. Torque bolts to 11 N·m (97 in. lbs.).

(23) Install water manifold. Torque bolts to 12 N·m (106 in. lbs.).

(24) Install exhaust pipe to turbocharger. Torque bolts to 28 N·m (20 ft. lbs.).

(25) Install the support strut from block to turbocharger exhaust elbow. Torque bolt to 47 N·m (35 ft. lbs.).

(26) Install EGR tube to EGR valve. Torque bolts to 27 N·m (20 ft. lbs.).

(27) Install intercooler hoses at intake manifold.

(28) Install coolant pressure bottle and hoses.

(29) Install wiper module. Refer to Group 8K, Windshield Wipers and Washers for procedure.

(30) Install intercooler hose at turbocharger tube.

(31) Install fuel injector lines from the pump to injectors. Torque nuts to 18 N·m (159 lbs.).

(32) Connect the upper radiator hose.

(33) Connect negative cable to battery.

(34) Fill the cooling system. Check for leaks.

**WARNING: USE EXTREME CAUTION WHEN THE ENGINE IS OPERATING. DO NOT STAND IN DIRECT LINE WITH THE FAN. DO NOT PUT HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE CLOTHING.**

(35) Operate the engine with the radiator cap off. Inspect for leaks and continue operating the engine until the thermostat opens. Add coolant, if required.

### VALVES AND VALVE SPRINGS—HEAD OFF

This procedure is done with the engine cylinder head removed from the block.