1.1.3.1 Testing the Cylinder Block (Immersion Pressure Method)

Use cylinder block pressure test kit (J–36223–D) for immersion method pressure testing as follows:

1. Install cylinder liners with new seal rings and crevice seals. Refer to section 1.23.3. Seat the liners firmly in the block counterbores with cylinder liner installation tool (J–35597–A).
2. Install two metric eye bolts (J–35595) in the head bolt holes at opposite ends of the block. See Figure 1-10.

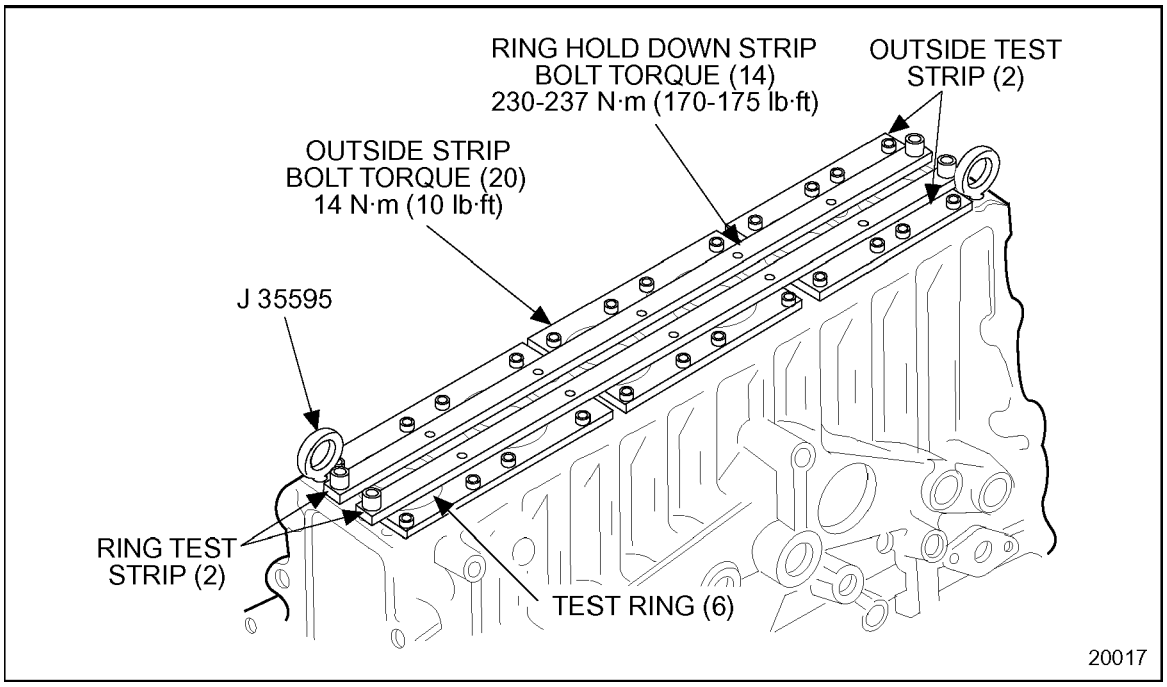

Figure 1-10 Cylinder Block Test Deck Plate Installation

3. Install the cylinder block test strips and rings. See Figure 1-10.
4. Install the bolts through the strips and into the cylinder block. Torque the bolts on the ring strips to 230-237 N·m (170-175 lb·ft). Torque the bolts on the outside strips to 14 N·m (10 lb·ft).

5. Install the water inlet cover plate (J–36223–7A, part of tool set J–36223–D). See Figure 1-11. Use the bolt supplied with the tool to secure it to the cylinder block.

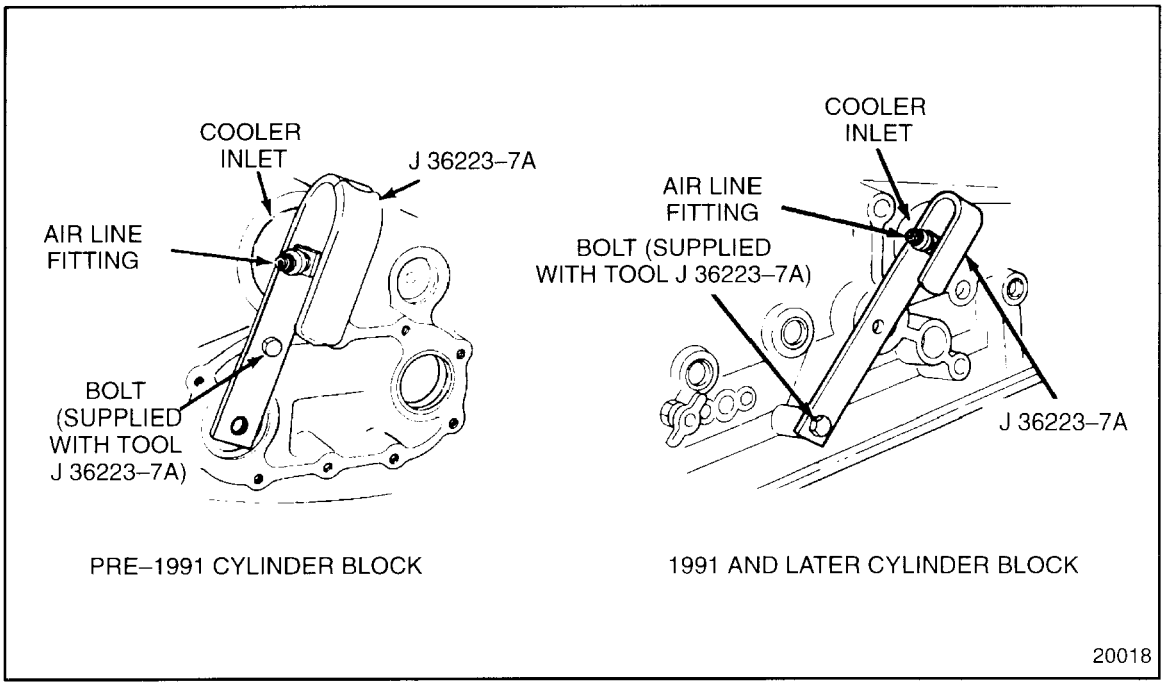

Figure 1-11 Water Inlet Cover Plate Installation

NOTE:
At the base of each liner, the space between upper and lower liner seals is vented to the block surface on the left side. Any coolant leakage past the upper seal is drained to the outside rather than into the crankcase, and is easily detected by a visual inspection.

6. With a suitable lifting device and spreadable bars, immerse the cylinder block for twenty minutes in a tank of water heated to 82-93°C (180-200°F).
7. Attach an air line to the water inlet cover plate and apply 138 kPa (20 psi) air pressure to the water jacket. Observe the water in the tank for bubbles that will indicate cracks or leaks. A cracked cylinder block must be replaced by a new block.

⚠ WARNING:

EYE INJURY

To avoid injury from flying debris when using compressed air, wear adequate eye protection (face shield or safety goggles) and do not exceed 276 kPa (40 psi) air pressure.

8. Remove the block from the water tank. Remove the plates and gaskets and blow out all of the passages in the block with compressed air.
9. Install the cylinder block to the engine overhaul stand (J–29109). See Figure 1-6.

1.1.3.2 Testing the Cylinder Block (Leak-Marker Pressure)

When a large water tank is not available, or when it is desired to check the block for cracks without removing the engine from the vehicle cylinder block, leak-marker pressure testing may be used. However, it is necessary to remove the cylinder head, oil cooler, and oil pan.

1. Install cylinder liners with new seal rings and crevice seals. Refer to section 1.23.3. Seat the liners firmly in the block counterbores with cylinder liner installation tool (J–35597–A).
2. Install two metric eye bolts (J–35595) in the head bolt holes at opposite ends of the block. See Figure 1-10.
3. Fill the water jacket with a mixture of water and 3.8 liters (1 U.S. gallon) of permanent-type antifreeze. The antifreeze will penetrate small cracks and its color will aid in detecting their presence.
4. Install the cylinder block test strips and rings. See Figure 1-10.
5. Install the bolts through the strips and into the cylinder block. Torque the bolts on the ring strips to 230-237 N·m (170-175 lb·ft). Torque the bolts on the outside strips to 14 N·m (10 lb·ft).
6. Install the water inlet cover plate (J–36223–7A, part of tool set J–36223–D). See Figure 1-11. Use the bolt supplied with the tool to secure it to the cylinder block.

NOTE:
At the base of each liner, the space between upper and lower liner seals is vented to the block surface, on the left side. Any coolant leakage past the upper seal is drained to the outside rather than into the crankcase, and is easily detected by a visual inspection.

7. Apply 138 kPa (20 psi) air pressure to the water jacket and maintain this pressure for at least two hours to give the water and antifreeze mixture ample time to work its way through any cracks which may exist.
8. At the end of this test period, examine the outside diameter area of the liner flanges, oil passages, crankcase and exterior of the block for presence of the water and antifreeze mixture, which will indicate the presence of cracks. A cracked cylinder block must be replaced with a new block.

WARNING:

EYE INJURY

To avoid injury from flying debris when using compressed air, wear adequate eye protection (face shield or safety goggles) and do not exceed 276 kPa (40 psi) air pressure.

9. After the pressure test is completed, remove the test deck plate and gasket and the water inlet cover plate. Drain the water jacket. Then blow out all of the passages in the cylinder block with compressed air.
10. Install the cylinder block to the engine overhaul stand (J–29109). See Figure 1-6.

1.1.3.3 Inspection of the Cylinder Block

Perform the following for cylinder block inspection:

1. Remove the cylinder liners and check to determine whether liner replacement is necessary. Refer to section 1.23.2.2.
2. Measure the bore of each cylinder with cylinder bore gage (J–5347–B) which has a dial indicator calibrated in 0.0001 in. increments. See Figure 1-12.

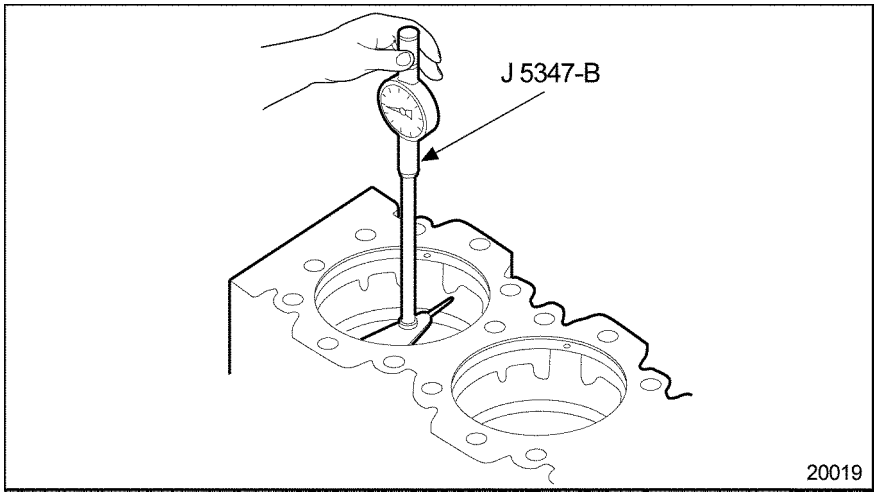

Figure 1-12 Gaging Cylinder Bores