

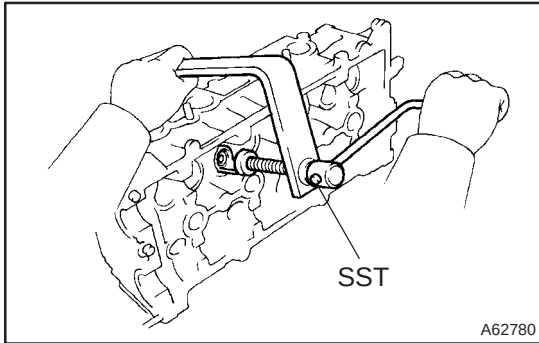
OVERHAUL

1. REMOVE W/HEAD TAPER SCREW PLUG NO.2

- (a) Using a socket hexagon wrench 10, remove the taper screw plug and gasket.

2. REMOVE VALVE LIFTER

- (a) Remove the 16 valve lifters from the cylinder head.



3. REMOVE INNER COMPRESSION SPRING

- (a) Using SST, compress the valve spring and remove the 2 keepers, the retainer, and the spring seat.
SST 09202-70020 (09202-00010)

4. REMOVE INTAKE VALVE

- (a) Remove the 8 intake valves from the cylinder head.

5. REMOVE EXHAUST VALVE

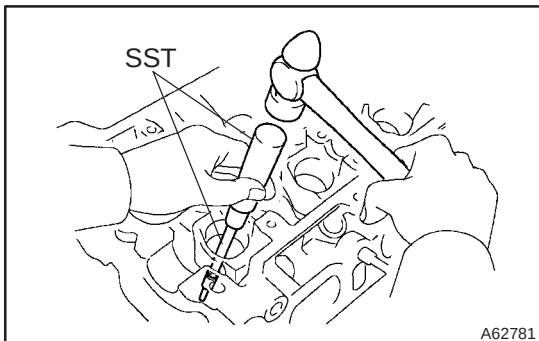
- (a) Remove the 8 exhaust valves from the cylinder head.

6. REMOVE VALVE STEM OIL O SEAL OR RING

- (a) Remove the 16 valve stem oil seals from the valve guide bush.

7. REMOVE VALVE SPRING SEAT

- (a) Remove the 16 valve spring seats from the cylinder head.

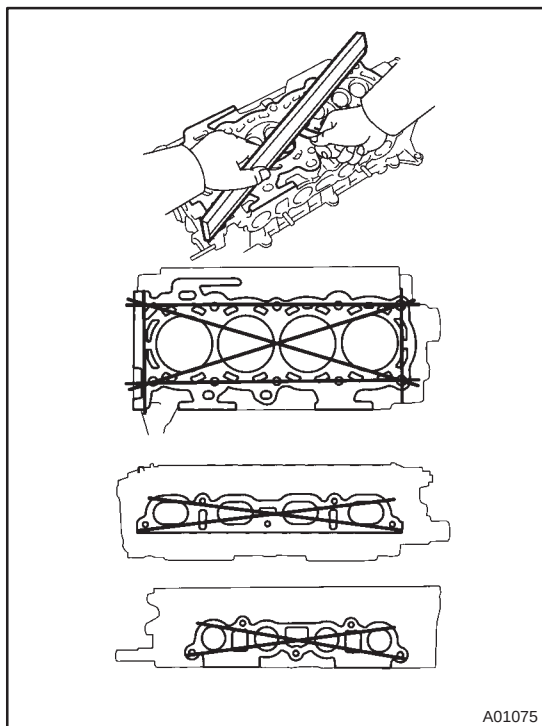


8. REMOVE VALVE GUIDE BUSH

- (a) Heat the cylinder head to 80 – 100°C (176 – 212°F).
(b) Using SST, tap out the valve guide bush.
SST 09201-10000, 09201-01055, 09950-70010
(09951-07100)

9. REMOVE STUD BOLT

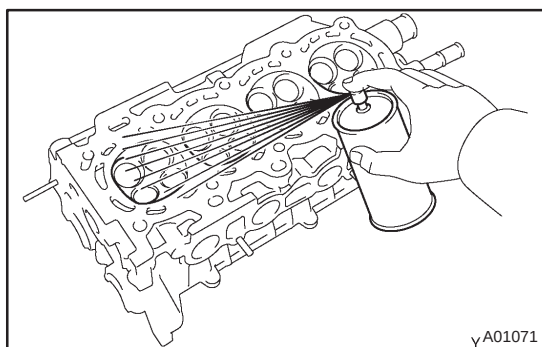
- (a) Remove the 11 stud bolts from the cylinder head.

**10. INSPECT CYLINDER HEAD FOR FLATNESS**

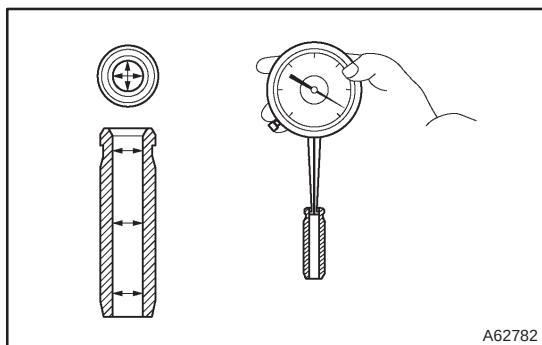
- (a) Using a precision straight edge and a feeler gauge, measure the surface contacting the cylinder block and the manifolds for warpage.

Maximum warpage:

Cylinder block side	0.05 mm (0.0020 in.)
Intake manifold side	0.10 mm (0.0040 in.)
Exhaust manifold side	0.10 mm (0.0040 in.)

**11. INSPECT CYLINDER HEAD FOR CRACKS**

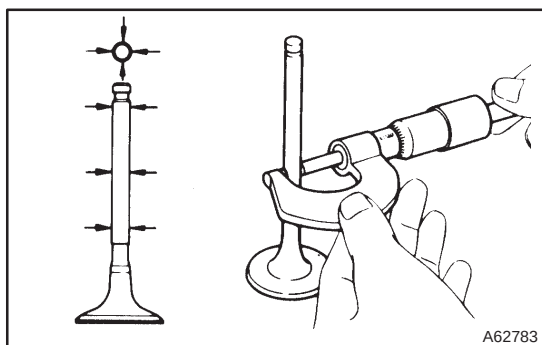
- (a) Using a dye penetrant, check the combustion chamber, intake ports, exhaust ports and cylinder block surface for cracks.

**12. INSPECT VALVE GUIDE BUSHING OIL CLEARANCE**

- (a) Using a caliper gauge, measure the inside diameter of the valve guide bush.

Busing inside diameter:

5.510 – 5.530 mm (0.2169 – 0.2177 in.)



- (b) Using a micrometer, measure the diameter of the valve stem.

Valve stem diameter:

Intake 5.470 – 5.485 mm (0.2154 – 0.2159 in.)

Exhaust 5.465 – 5.480 mm (0.2152 – 0.2158 in.)

- (c) Subtract the valve stem diameter measurement from the guide bushing inside diameter measurement.

Standard oil clearance:

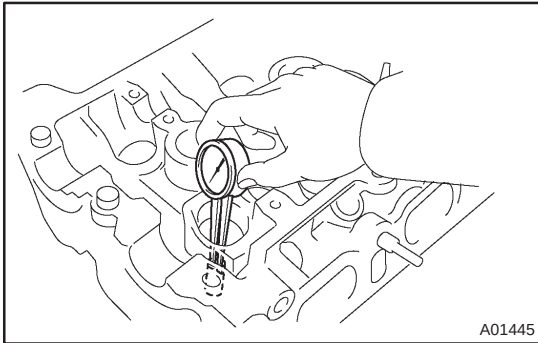
Intake 0.025 – 0.060 mm (0.0010 – 0.0024 in.)

Exhaust 0.030 – 0.065 mm (0.0012 – 0.0026 in.)

Maximum oil clearance:

Intake 0.08 mm (0.0031 in.)

Exhaust 0.01 mm (0.0039 in.)



13. INSPECT VALVE GUIDE BUSH

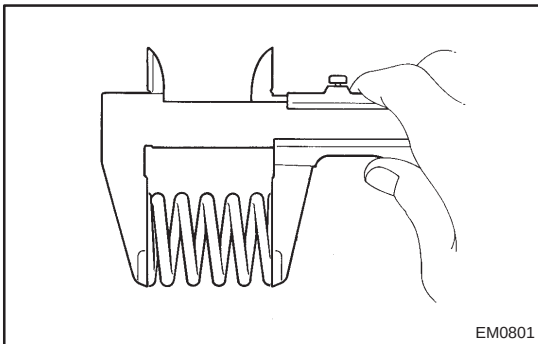
- (a) Using a caliper gauge, measure the bushing bore diameter of the cylinder head.

Diameter: 10.285 – 10.306 mm (0.4049 – 0.4057 in.)

- (b) If the bushing bore diameter of the cylinder head is greater than 10.306 mm (0.4057 in.), machine the bushing bore to the dimension of 10.335 – 10.356 mm (0.4068 – 0.4077 in.) to install a over size bushing.

HINT:

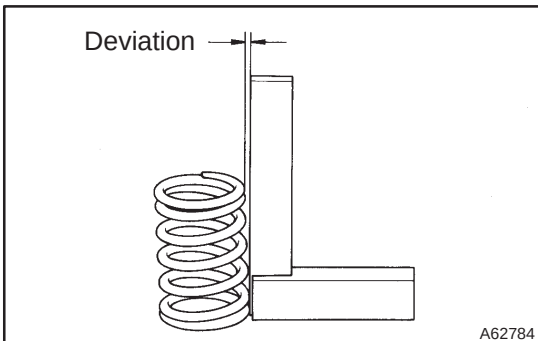
bushing bore diameter mm (in.)	Bushing size
10.285 – 10.306 (0.4049 – 0.4057)	Use STD
10.335 – 10.356 (0.4068 – 0.4077)	Use O/S 0.05



14. INSPECT INNER COMPRESSION SPRING

- (a) Using a vernier caliper, measure the free length of the valve spring.

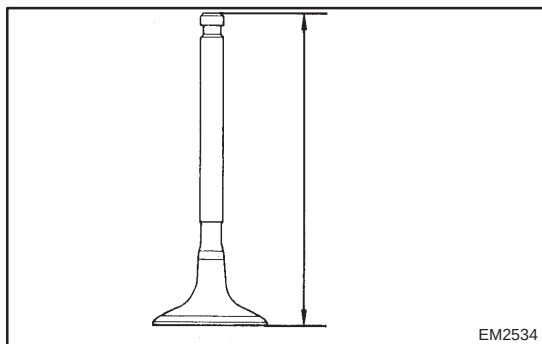
Free length: 43.40 mm (1.7087 in.)



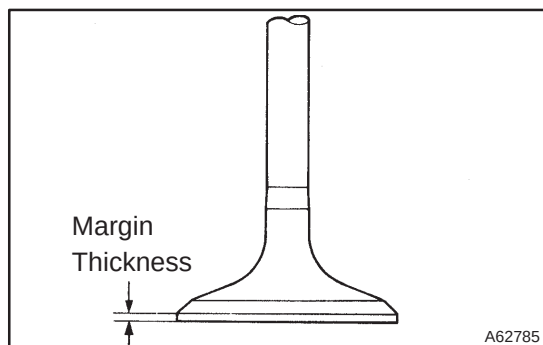
- (b) Using a steel square, measure the deviation of the valve spring.

Maximum deviation: 2.0 mm (0.078 in.)

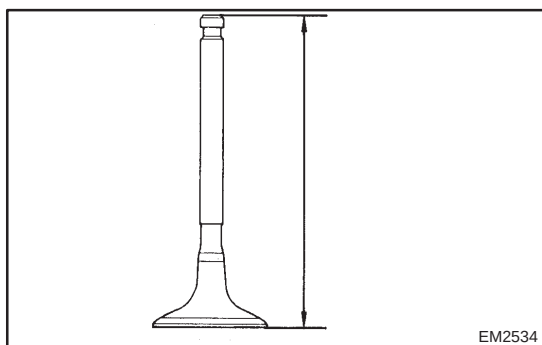
Maximum angle (reference): 2°

**15. INSPECT INTAKE VALVE**

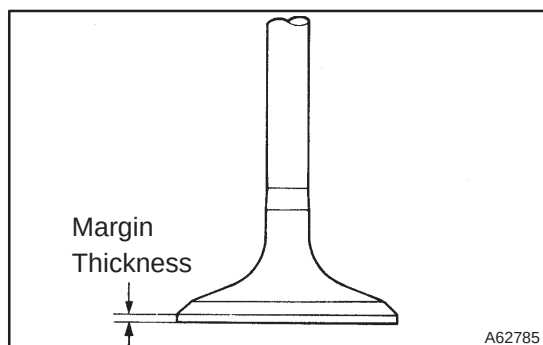
- (a) Using a vernier calipers, check the valve overall length.
Standard overall length: 88.65 mm (3.4902 in.)
Minimum overall length: 88.35 mm (3.4784 in.)



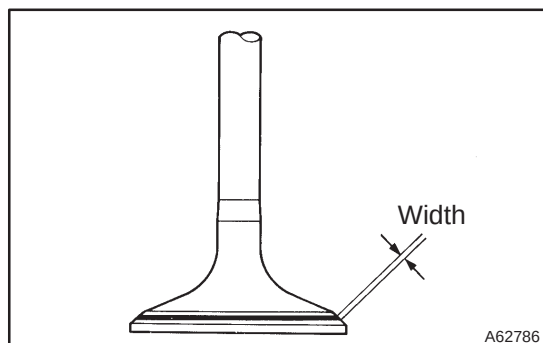
- (b) Using a vernier calipers, check the valve head margin thickness.
Standard margin thickness: 1.0 mm (0.039 in.)
Minimum margin thickness: 0.7 mm (0.028 in.)

**16. INSPECT EXHAUST VALVE**

- (a) Using a vernier calipers, check the valve overall length.
Standard overall length: 88.69 mm (3.4917 in.)
Minimum overall length: 88.39 mm (3.4799 in.)

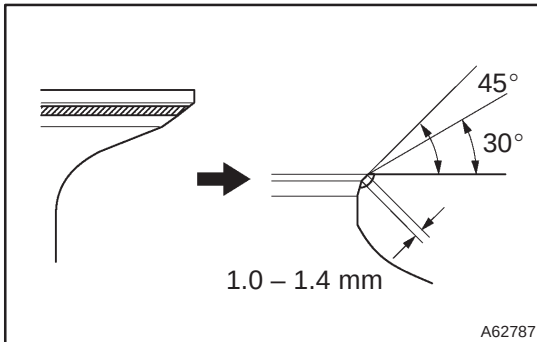


- (b) Using a vernier calipers, check the valve head margin thickness.
Standard margin thickness: 1.0 mm (0.039 in.)
Minimum margin thickness: 0.7 mm (0.028 in.)

**17. INSPECT VALVE SEATS**

- (a) Apply a light coat of prussian blue (or white lead) to the valve face.
 (b) Lightly press the valve against the seat.
 (c) Check the valve face and seat according to the following procedure.
 (1) If blue appears 360° around the face, the valve is concentric. If not, replace the valve.

- (2) If blue appears 360° around the valve seat, the guide and face are concentric. If not, resurface the seat.
- (3) Check that the seat contact is in the middle of the valve face with the width between 1.0 – 1.4 mm (0.039 – 0.055 in.).

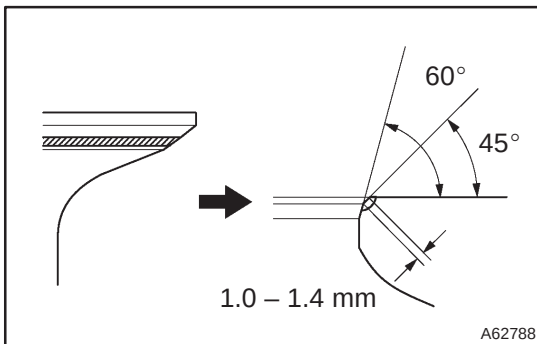


18. REPAIR VALVE SEATS

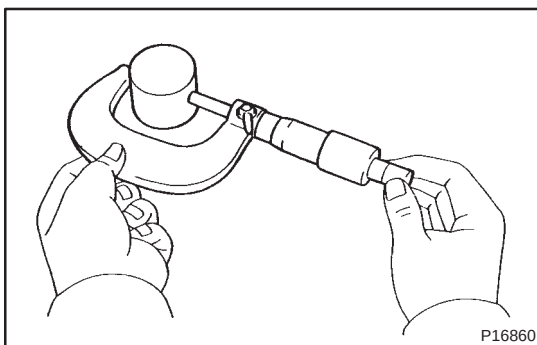
NOTICE:

Take off a cutter gradually to make smooth valve seats.

- (a) If the seating is too high on the valve face, use 30° and 45° cutters to correct the seat.



- (b) If the seating is too low on the valve face, use 75° and 45° cutters to correct the seat.
- (c) Hand-lap the valve and valve seat with an abrasive compound.
- (d) Check the valve seating position.

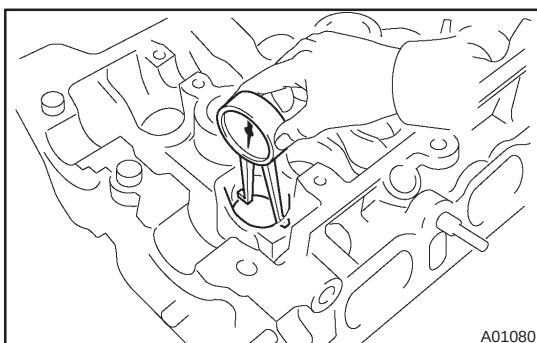


19. INSPECT VALVE LIFTER

- (a) Using a micrometer, measure the lifter diameter.

Lifter diameter:

30.966 – 30.976 mm (1.2191 – 1.2195 in.)



20. INSPECT VALVE LIFTER OIL CLEARANCE

- (a) Using a caliper gauge, measure the lifter bore diameter of the cylinder head.

Lifter bore diameter:

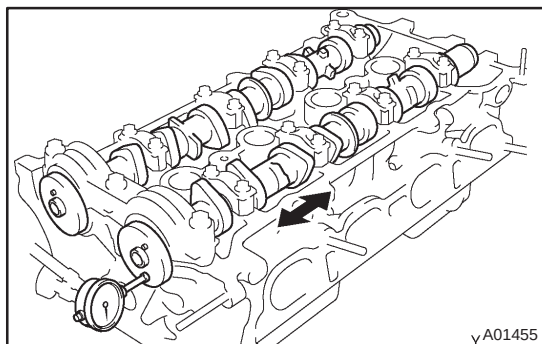
31.000 – 31.025 mm (1.2205 – 1.2215 in.)

- (b) Subtract the lifter diameter measurement from the lifter bore diameter measurement.

Standard oil clearance:

0.024 – 0.059 mm (0.0009 – 0.0023 in.)

Maximum oil clearance: 0.1 mm (0.0039 in.)

**21. INSPECT CAMSHAFT THRUST CLEARANCE**

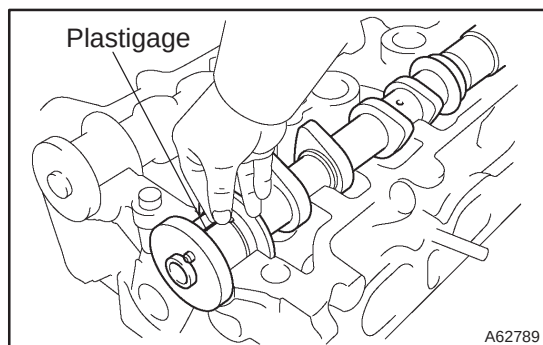
- (a) Install the 2 camshafts.
- (b) Using a dial indicator, measure the thrust clearance while moving the camshaft back and forth.

Standard thrust clearance:

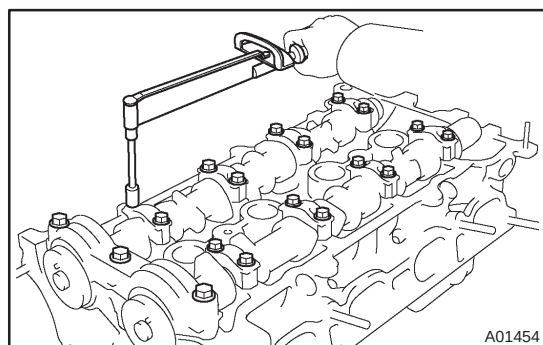
0.040 – 0.095 mm (0.0016 – 0.0037 in.)

Maximum thrust clearance: 0.110 mm (0.0043 in.)

- (c) If the thrust clearance is greater than maximum, replace the cylinder head. If damages are found on the camshaft thrust surfaces, the camshaft also has to be replaced.

**22. INSPECT CAMSHAFT OIL CLEARANCE**

- (a) Clean the bearing caps and camshaft journals.
- (b) Place the camshafts on the cylinder head.
- (c) Lay a strip of Plastigage across each of the camshaft journal.



- (d) Install the bearing caps ([See page 14-4](#)).

Torque:

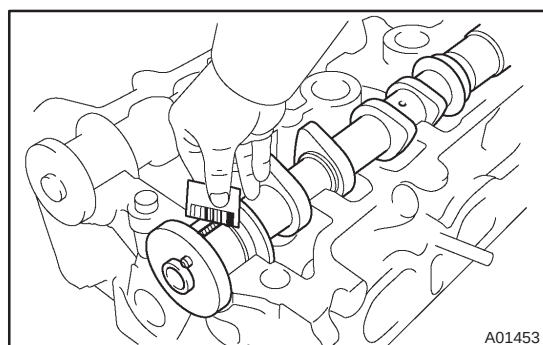
No. 1 23 N·m (235 kgf·cm, 17 ft·lbf)

No. 3 13 N·m (132 kgf·cm, 10 ft·lbf)

NOTICE:

Do not turn the camshaft.

- (e) Remove the bearing caps.



- (f) Measure the plastigage at its widest point.

Standard oil clearance:

0.035 – 0.072 mm (0.0014 – 0.0028 in.)

Maximum oil clearance: 0.10 mm (0.0039 in.)

NOTICE:

Completely remove the Plastigage after the measuring.

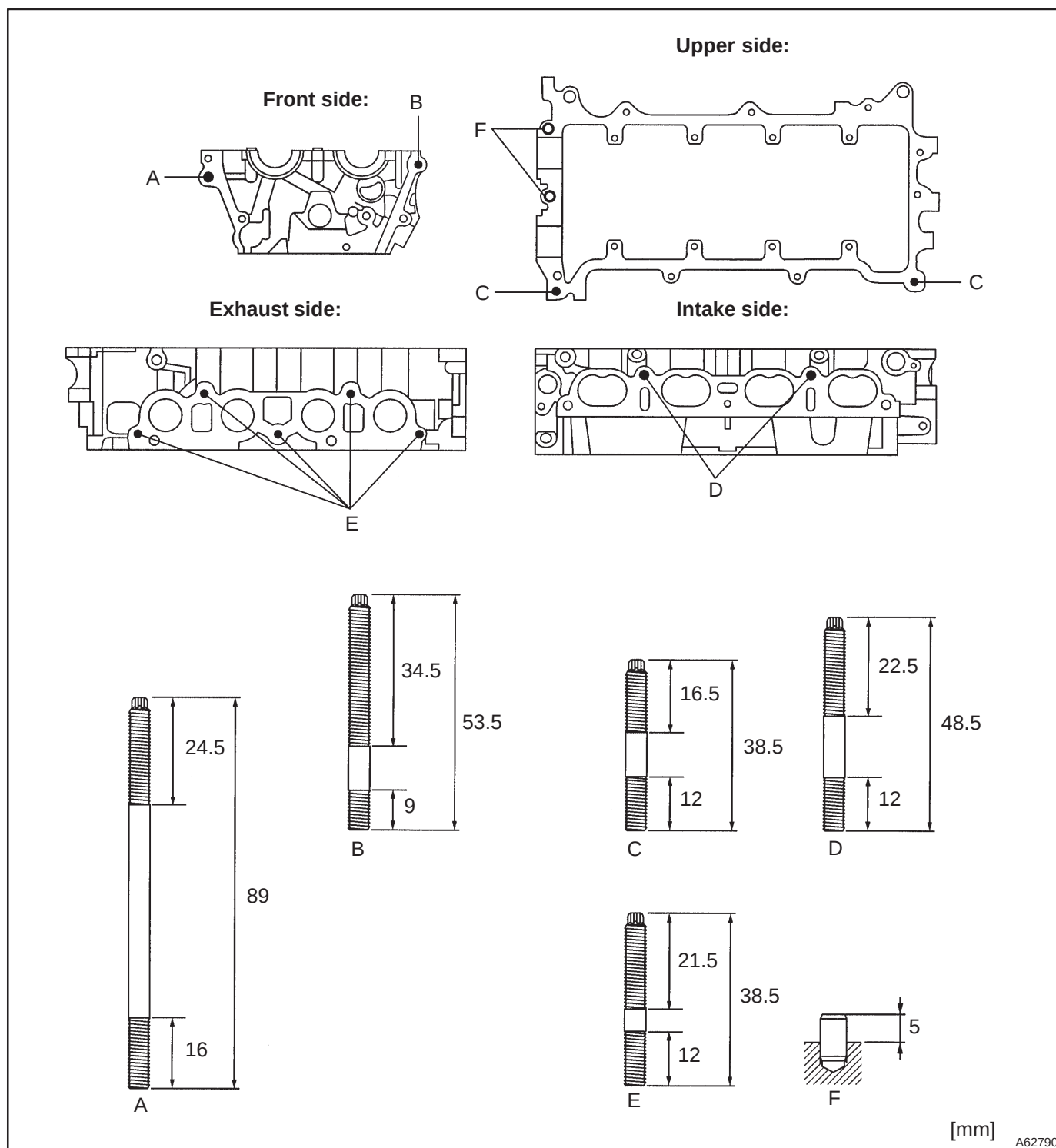
If the oil clearance is greater than maximum, replace the cylinder head.

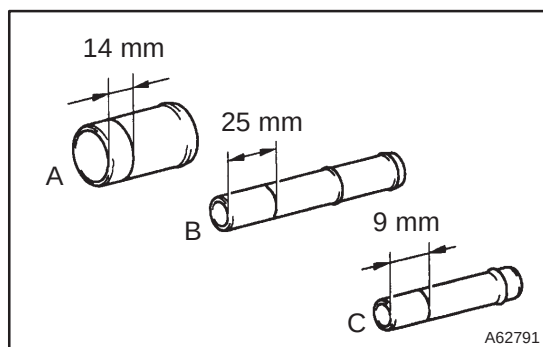
23. INSTALL STUD BOLT AND RING PIN

- (a) Install the 11 stud bolts to cylinder head,

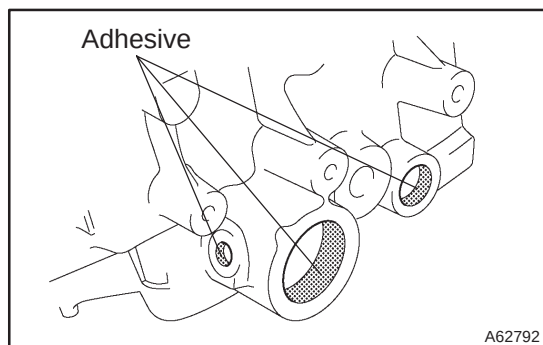
Torque:**Stud bolt A, D and E 9.5 N·m (97, 84 in.·lbf)****Stud bolt B and C 5.0 N·m (51, 44 in.·lbf)**

- (b) Using a plastic hammer, install the new 2 ring pins to the cylinder head.

Standard protrusion: 5 mm (0.020 in.)

**24. INSTALL UNION**

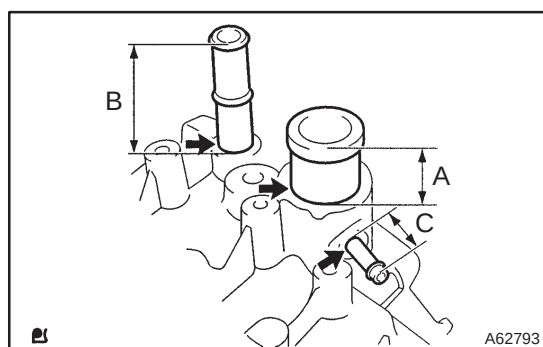
- (a) Mark the standard position away from the edge, onto the water hose union as shown in the illustration.



- (b) Apply adhesive to the water hose union hole of the cylinder head.

Adhesive:

Part No. 08833-00070, THREE BOND 1324 or equivalent.



- (c) Using a press, press in a new water hose union until the standard marks come to the level of the cylinder head surface.

Standard protrusion:

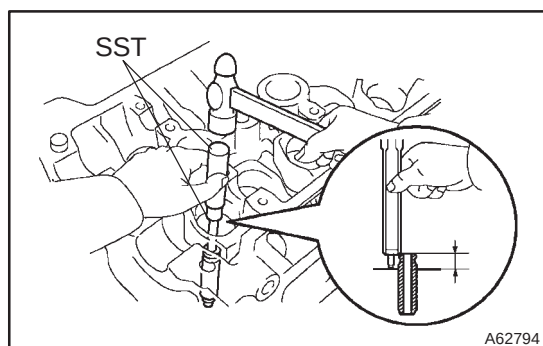
A 29 mm (1.14 in.)

B 66.5 mm (2.62 in.)

C 24 mm (0.95 in.)

NOTICE:

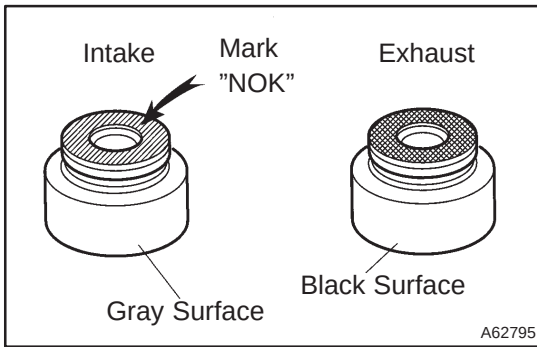
- Install the water hose union within 3 minutes after applying adhesive.
- Do not put into coolant within an hour after installing.

**25. INSTALL VALVE GUIDE BUSH**

- (a) Gradually heat the cylinder head to 80 – 100°C (176 – 212°F).
- (b) Using SST and a hammer, tap in a new guide bushing to the specified protrusion height.

SST 09201-10000, 09201-01055, 09950-70010
(09951-07100)

Protrusion height: 8.7 – 9.1 mm (0.342 – 0.358 in.)



26. INSTALL VALVE STEM OIL O SEAL OR RING

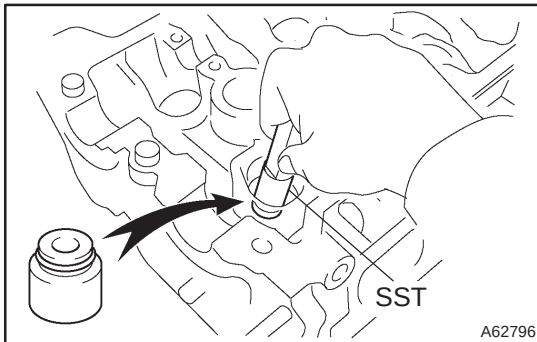
- (a) Apply a light coat of engine oil on the valve stem oil seals.

NOTICE:

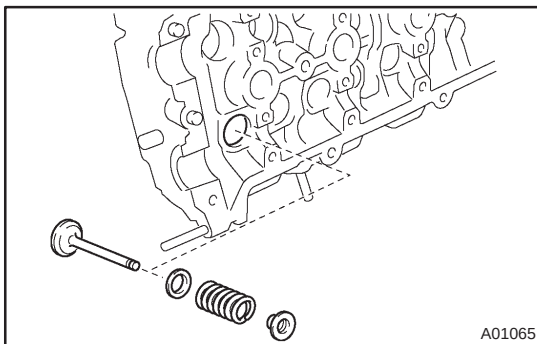
Be very careful to assemble the oil seal for intake and exhaust. Assembling the wrong one may cause a failure.

HINT:

The intake valve stem oil seal is gray and the exhaust valve stem oil seal is black.

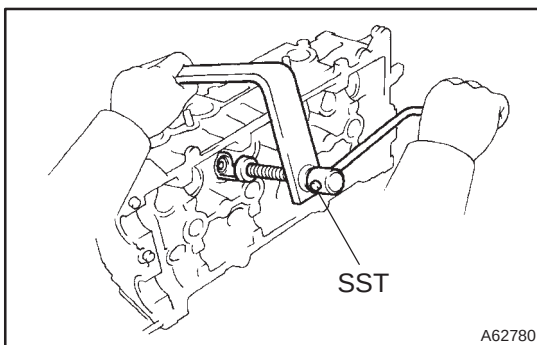


- (b) Using SST, push in a new valve stem oil seal.
SST 09201-41020

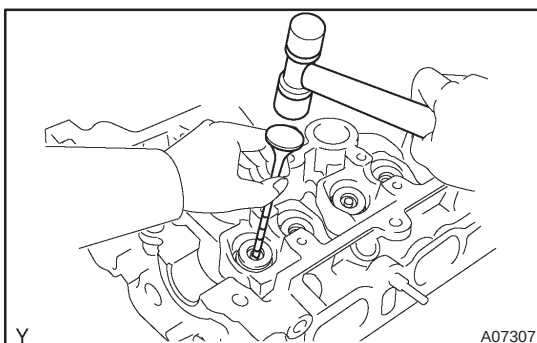


27. INSTALL INNER COMPRESSION SPRING

- (a) Install the valve, spring seat, valve spring, and spring retainer.



- (b) Using SST, compress the valve spring and place the 2 keepers around the valve stem.
SST 09202-70020 (09202-00010)



- (c) Using a plastic hammer and the valve stem (not in use) tip wound with vinyl tape, lightly tap the valve stem tip to ensure a proper fit.

NOTICE:

Be careful not to damage the valve stem tip.

28. INSTALL W/HEAD TAPER SCREW PLUG NO.2

- (a) Using a socket hexagon wrench 10, install the taper screw plug with a new gasket.
Torque: 44 N·m (449 kgf·cm, 33 ft·lbf)