Disassembly

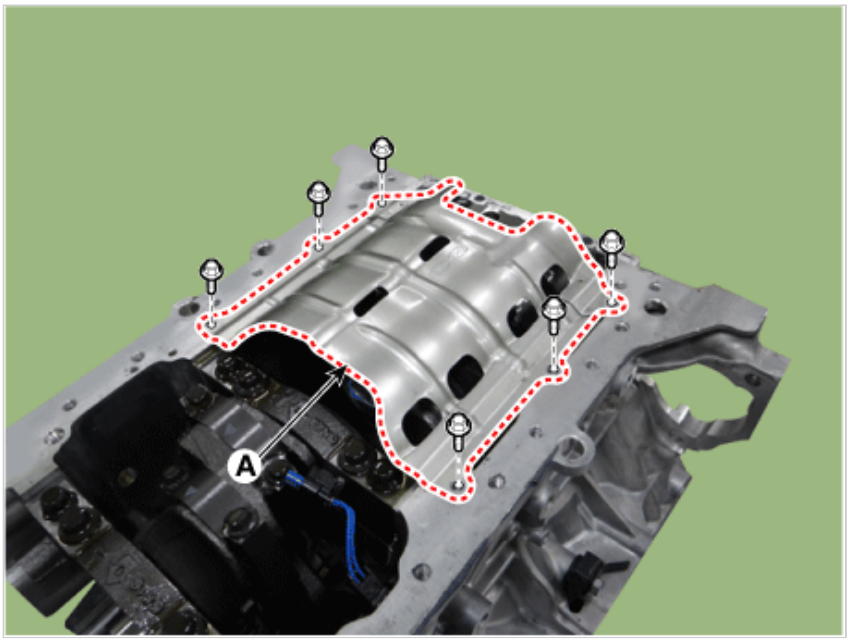
NOTICE

- Use fender covers to avoid damaging painted surfaces.
- To avoid damage, unplug the wiring connectors carefully while holding the connector portion.

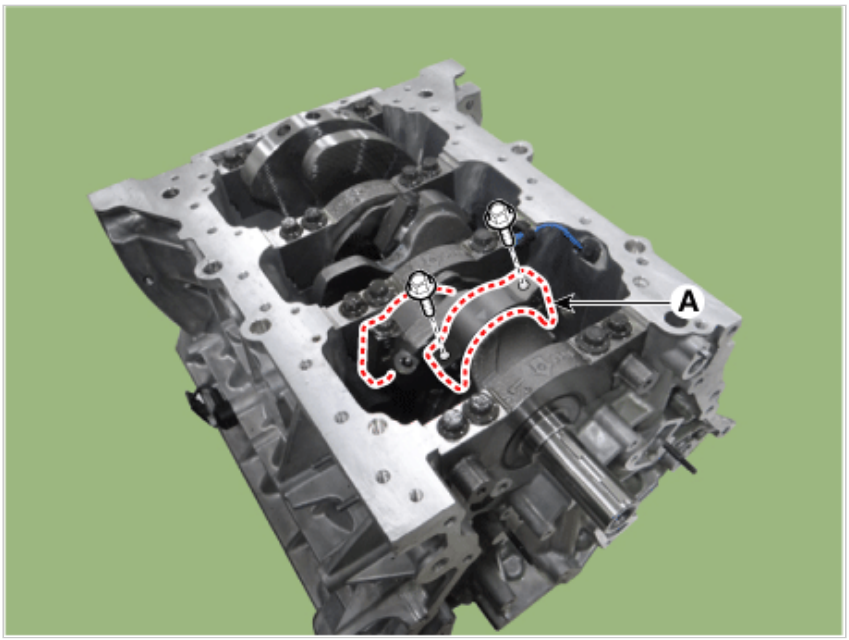
Information

- Mark all wiring and hoses to avoid misconnection.
- Inspect the timing chain before removing the cylinder head.
- Turn the crankshaft pulley so that the No.1 piston is at top dead center (TDC).

1. Remove the engine and transmission assembly.
   (Refer to Engine and Transmission Assembly - "Engine and Transmission Assembly")
2. Remove the automatic transmission.
   (Refer to Automatic Transmission System - "Automatic Transmission")
3. Remove the drive plate.
   (Refer to Cylinder Block - "Drive Plate")
4. Remove the front driveshaft. (If equipped with AWD system)
   (Refer to Driveshaft and Axle - "Front Driveshaft")
5. Remove the front differential assembly. (If equipped with AWD system)
   (Refer to Driveshaft and Axle - "Front Differential Carrier")
6. Install the engine assembly to engine stand for disassembly.
7. Remove the surge tank.
   (Refer to Intake and Exhaust System - "Surge Tank")
8. Remove the intake manifold.
   (Refer to Intake and Exhaust System - "Intake Manifold")
9. Remove the turbo manifold module.
   (Refer to Intake and Exhaust System - "Turbo Manifold Module")
10. Remove the water temperature control assembly and water center pipe.
    (Refer to Cooling System - "Water Temperature Control Assembly")
11. Remove the cylinder head cover.
    (Refer to Cylinder Head Assembly - "Cylinder Head Cover")
12. Remove the timing chain cover.
    (Refer to Timing System - Timing Chain Cover")
13. Remove the timing chain.
    (Refer to Timing System - "Timing Chain")
14. Remove the RH / LH CVVT & camshaft assembly.
    (Refer to Cylinder Head Assembly - "CVVT & Camshaft")
15. Remove the cylinder head.
    (Refer to Cylinder Head Assembly - "Cylinder Head")
16. Remove the lower and upper oil pan.
    (Refer to Lubrication System - "Oil Pan")
17. Remove the oil pump.
    (Refer to Lubrication System - "Oil Pump")
18. Remove the baffle plate (A).



19. Remove the piston and connecting rod assemblies from the cylinder block.
    (1) Using a ridge reamer, remove all the carbon from the top of the cylinder.
    (2) Remove the connecting rod bearing caps (A).



Information
Mark the connecting rod, and caps to be able to reassemble in the original position and direction.

    (3) Push the piston, connecting rod assembly and upper bearing through the top of the cylinder block.

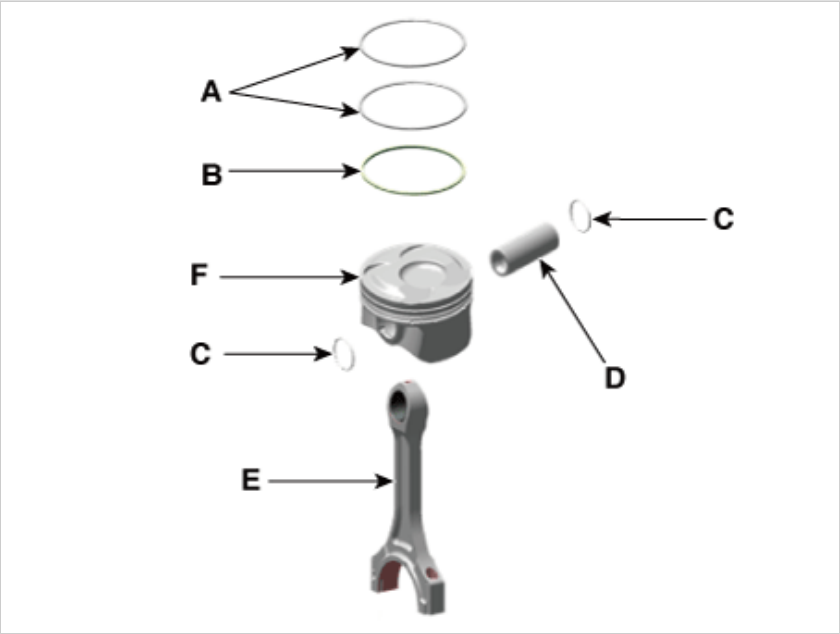
Information
- Keep the bearings, connecting rod and cap together.
- Arrange the piston and connecting rod assemblies in the correct order.
- Mark the piston and connecting rod assemblies to be able to reassemble in the original position.

20. Disassemble the piston rings.
    (1) Using a piston ring expander, remove the 2 compression rings (A).
    (2) Remove the oil ring and coil spring (B) by hand.

Information

Arrange the piston rings in the correct order only.

21. Disassemble the connecting rod from the piston.
    (1) Remove the snap ring (C) from the piston.
    (2) Using a press, remove the piston pin (D) from the piston.
    (3) Disassemble the piston (F) and connecting rod (E).

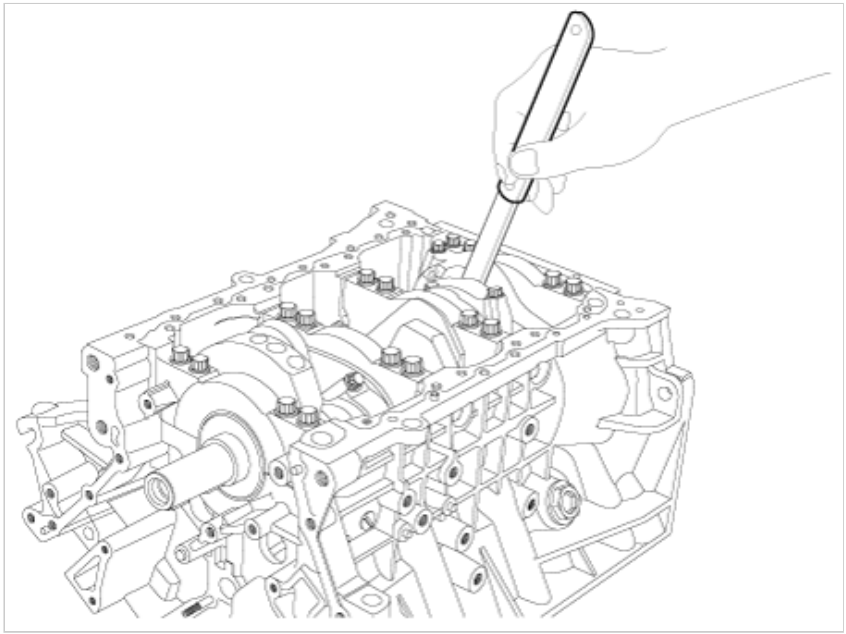


Inspection

Connecting Rod And Crankshaft

1. Check the connecting rod end play.
   Using a feeler gauge, measure the end play while moving the connecting rod back and forth.

Standard end play :
0.10 - 0.25 mm (0.004 - 0.010 in.)



- If out-of-tolerance, install a new connecting rod.
- If still out-of-tolerance, replace the crankshaft.

2. Check the connecting rod bearing oil clearance.
   (1) Check that the match marks on the connecting rod and cap are aligned to ensure correct reassembly.

(2) Remove 2 connecting rod cap bolts.

(3) Remove the connecting rod cap and bearing half.

(4) Clean the crank pin and bearing.

(5) Place plastigage across the crank pin.

(6) Reinstall the bearing half and cap, and torque the bolts.

Tightening torque:
[27.5 - 31.4 N·m (2.8 - 3.2 kgf·m, 20.3 - 23.1 lb·ft)] + [68 - 72°]

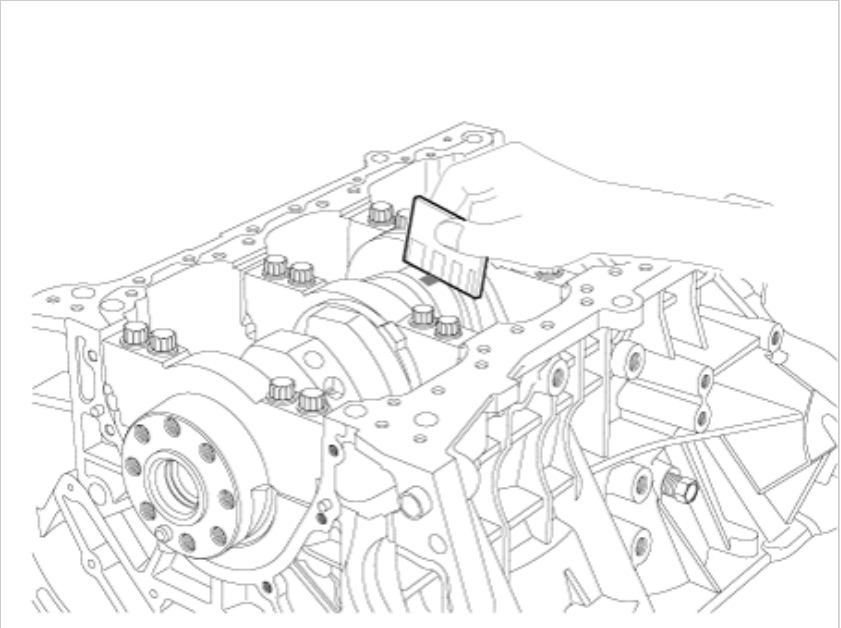
NOTICE

- Do not turn the crankshaft.
- Always use new connecting rod cap bolts. Connecting rod cap bolts are torque-to-yield bolts designed to be permanently elongated beyond the state of elasticity when torqued, so if the bolts are removed and reused, it may cause the bolts to break or fail to maintain clamping force.

(7) Remove 2 bolts, connecting rod cap and bearing half.

(8) Measure the plastigage at its widest point.

Standard oil clearance:
0.042 - 0.060 mm (0.0017 - 0.0024 in.)



(9) If the plastigage shows that the clearance is still incorrect, try the next larger or smaller bearing (the color listed above or below that one), and check clearance again.

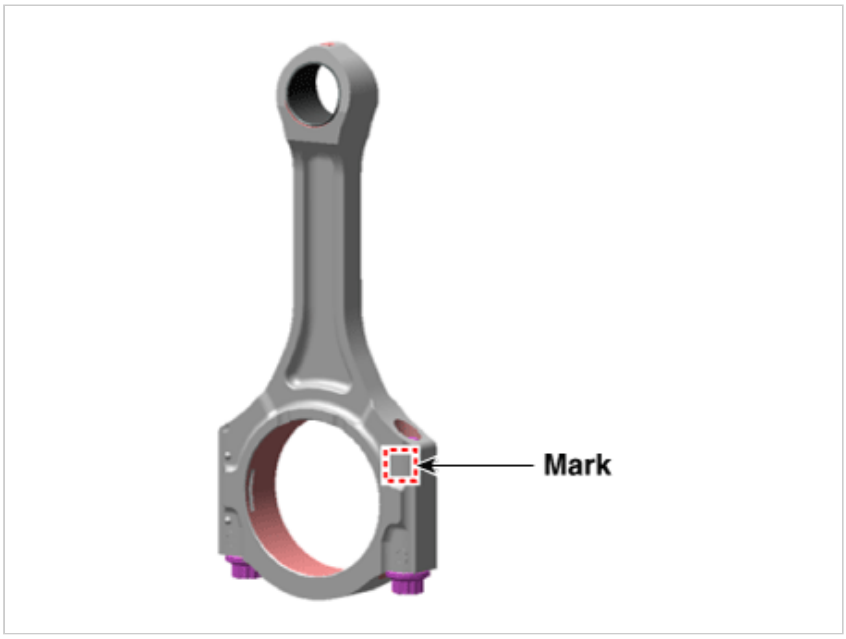
NOTICE
Do not file, shim, or scrape the bearings or the caps to adjust clearance.

(10) If the plastigage shows the clearance is still incorrect, try the next larger or smaller bearing(the color listed above or below that one), and check clearance again.

NOTICE
If the proper clearance cannot be obtained by using the appropriate larger or smaller bearings, replace the crankshaft and start over.

NOTICE
If the marks are indecipherable because of an accumulation of dirt and dust, clean with solvent or detergent instead of scrubbing with a wire brush or scraper.

Connecting Rod Mark Location

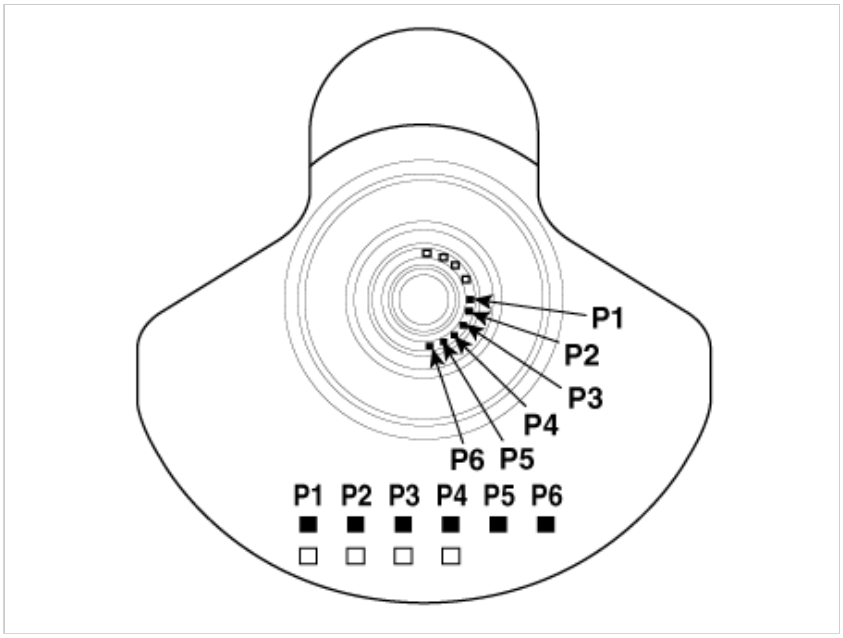


Identification Of Connecting Rod

Class	Mark	Inside Diameter
0	a	58.000 - 58.006 mm (2.2834 - 2.2837 in.)
1	b	58.006 - 58.012 mm (2.2837 - 2.2839 in.)
2	c	58.012 - 58.018 mm (2.2839 - 2.2842 in.)

Crankshaft Pin Mark Location

Identification Of Crankshaft



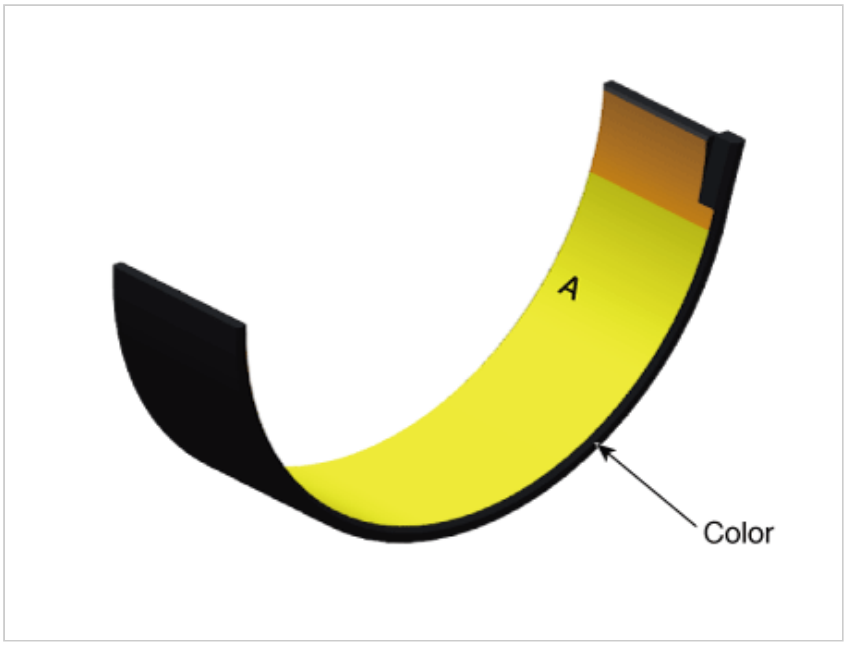
Identification Of Crankshaft

Class	Mark	Outside Diameter Of Pin
I	1 or A	54.966 - 54.972 mm (2.1640 - 2.1642 in.)

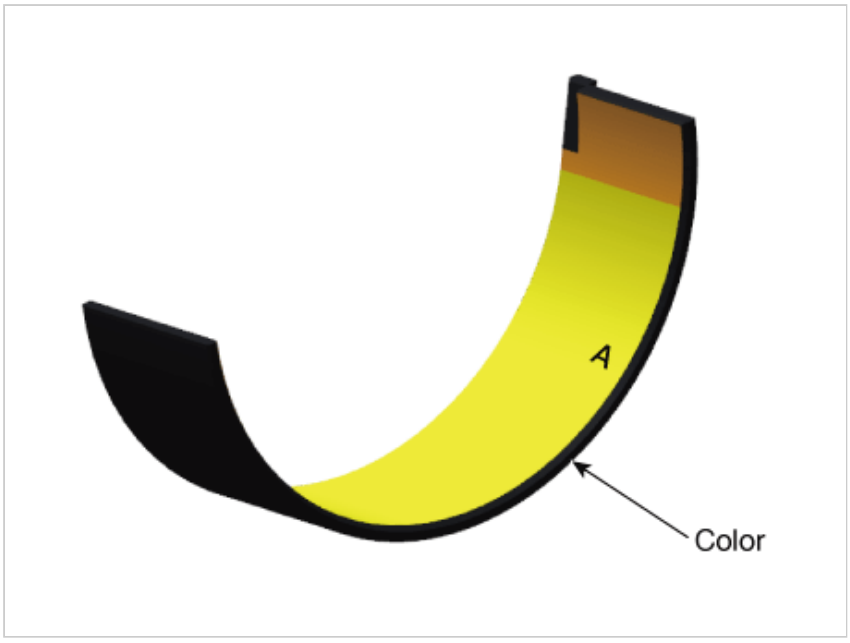
II	2 or B	54.960 - 54.966 mm (2.1638 - 2.1640 in.)
III	3 or C	54.954 - 54.960 mm (2.1635 - 2.1638 in.)

Place Of Identification Mark

[Connecting rod upper bearing]



[Connecting rod lower bearing]



Identification Of Connecting Rod Bearing

Class	Mark	Thickness Of Bearing
E	Blue	1.509 - 1.512 mm (0.0594 - 0.0595 in.)
D	Black	1.506 - 1.509 mm (0.0592 - 0.0594 in.)
C	Red	1.503 - 1.506 mm (0.0591 - 0.0592 in.)
B	Green	1.500 - 1.503 mm (0.0590 - 0.0591 in.)
A	Yellow	1.497 - 1.500 mm (0.0589 - 0.0590 in.)

(11) Selection

		Connecting Rod Identification Mark		
		0(a)	1(b)	2(c)
Crankshaft Identification Mark	1 or A	A (Yellow)	B (Green)	C (Red)
	2 or B	B (Green)	C (Red)	D (Black)
	3 or C	C (Red)	D (Black)	E (Blue)

3. Check the connecting rod.
   (1) When reinstalling, check the cylinder numbers on the connecting rods and the caps. When installing a new connecting rod, the bearing fixing notches on the connecting rods and caps should face the same direction.
   (2) If one or both edge of the connecting rod thrust surface is damaged, replace the rod. If the inner surface of the rod is damaged or rough, also replace it.
   (3) Using the connecting rod aligner, measure the bending and torsion of the rod. If the measurement is close to the specification, adjust the rod with a press. If the rod is bent or twisted excessively, replace it.

Allowable bending of connecting rod
0.05 mm/100 mm (0.0020 in./3.9370 in.)
Allowable twist of connecting rod
0.1 mm/100 mm (0.0039 in./3.9370 in.)

NOTICE
When assembling the rod without a bearing, there should be no difference.

Piston

1. Clean piston
   (1) Using a gasket scraper, remove the carbon from the piston top.
   (2) Using a groove cleaning tool, clean the piston ring grooves.
   (3) Using solvent and a brush, thoroughly clean the piston.

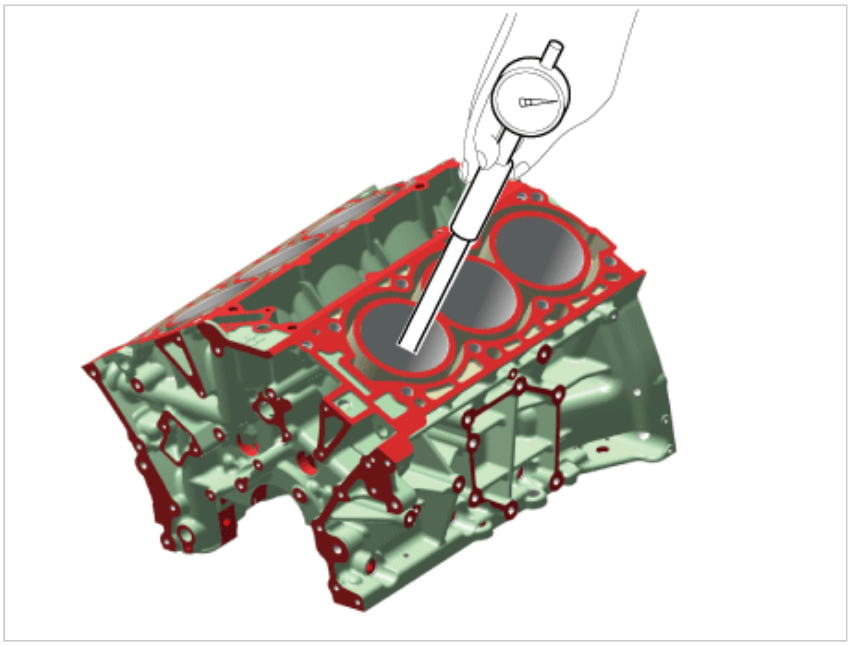
NOTICE
Do not use a wire brush.

2. Check the piston-to-cylinder clearance by calculating the difference between the cylinder bore inner diameter and the piston outer diameter.

Clearance :
0.04 - 0.06 mm (0.0016 - 0.0024 in.)

(1) Using a cylinder bore gauge, measure the cylinder bore diameter in the direction of the thrust and axial.

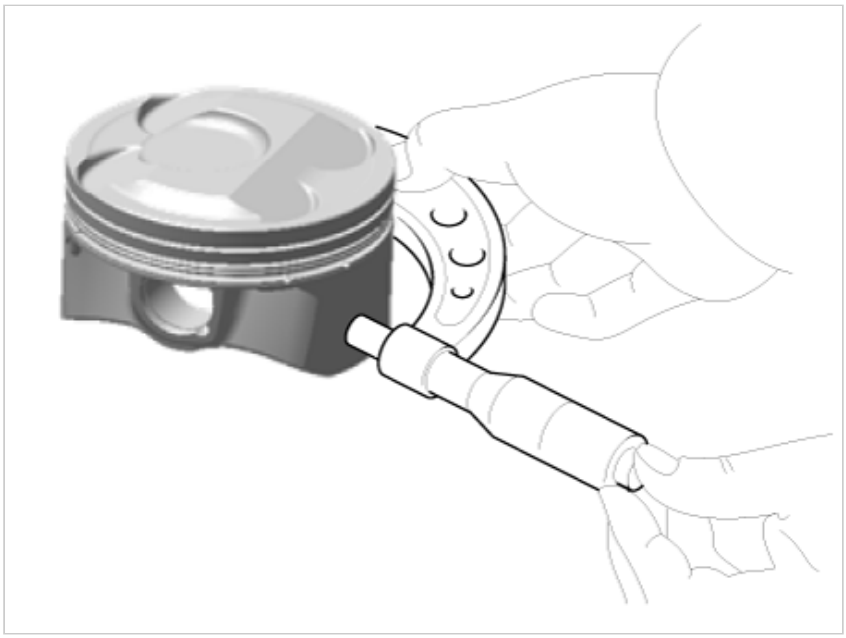
Standard diameter :
92.00 - 92.03 mm (3.6220 - 3.6232 in.)



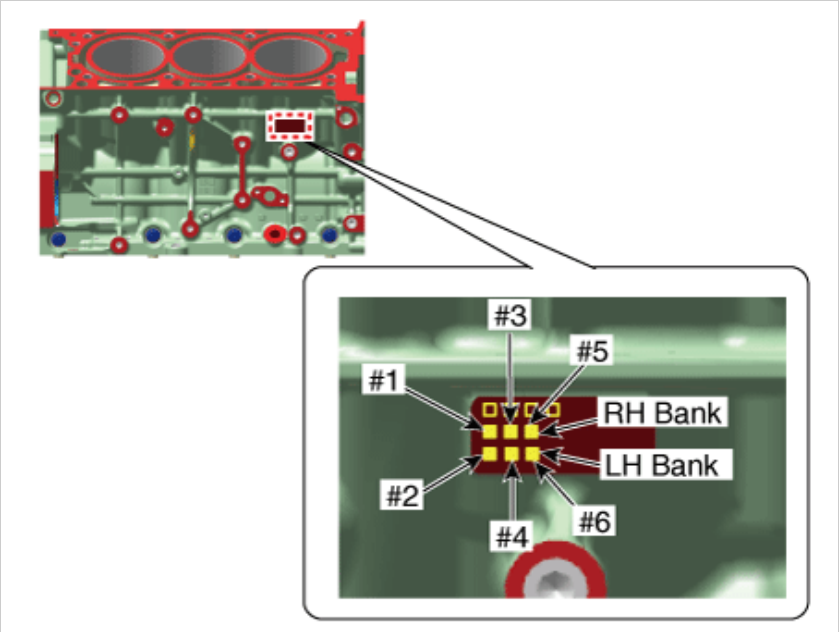
(2) Measure the piston outside diameter at 14 mm (0.55118 in.) from bottom land of the piston.

Standard diameter :

91.95 - 91.98 mm (3.6201 - 3.6213 in.)



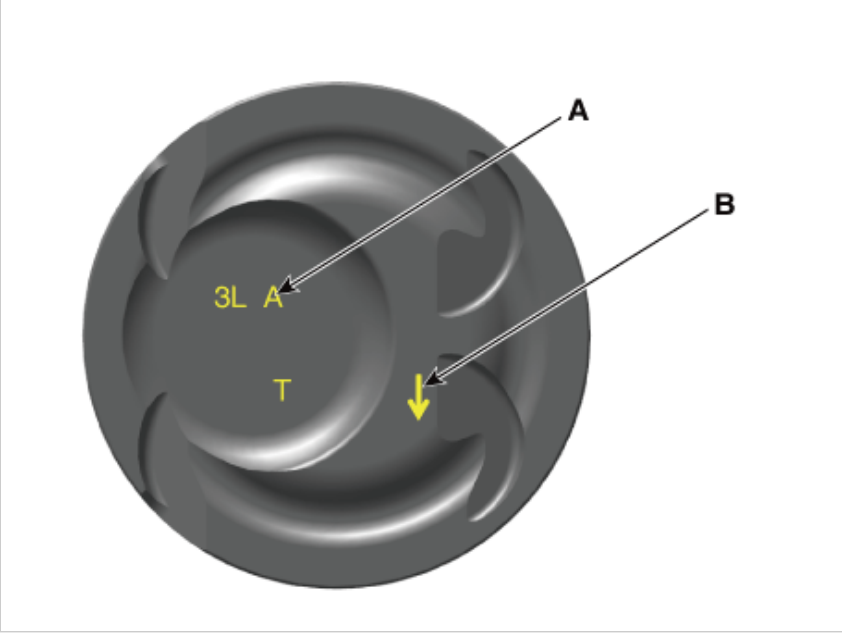
3. Select piston by the cylinder bore class.
   (1) Check the cylinder bore size code on the cylinder block.



Identification Of Cylinder Bore

Class	Size code	Cylinder bore inner diameter
A	A	92.00 - 92.01 mm (3.6220 - 3.6224 in.)
B	B	92.01 - 92.02 mm (3.6224 - 3.6228 in.)
C	C	92.02 - 92.03 mm (3.6228 - 3.6232 in.)

(2) Check the piston size code (A) and the front mark (B) on the piston top face.



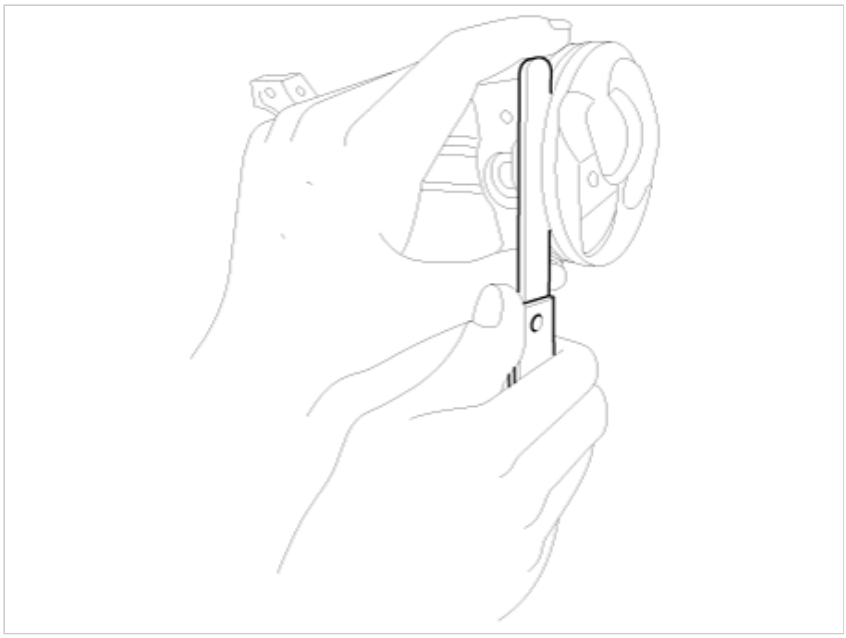
Identification of Piston Outer Diameter

Class	Size code	Piston outer diameter
A	A	91.95 - 91.96 mm (3.6201 - 3.6205 in.)
B	B	91.96 - 91.97 mm (3.6205 - 3.6209 in.)
C	C	91.97 - 91.98 mm (3.6209 - 3.6213 in.)

Piston Rings

1. Inspect the piston ring side clearance.
   Using a feeler gauge, measure the clearance between new piston ring and the wall of the ring groove.

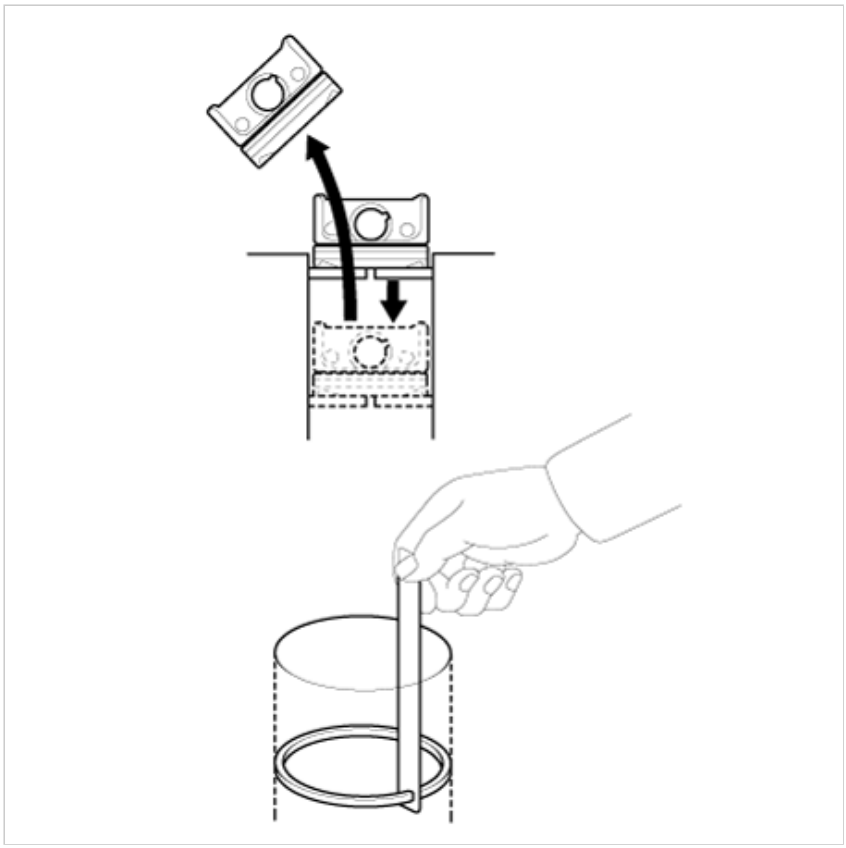
Piston ring side clearance
Standard
No.1 : 0.04 - 0.08 mm (0.0015 - 0.0031 in.)
No.2 : 0.04 - 0.08 mm (0.0015 - 0.0031 in.)
Oil ring : 0.02 - 0.06 mm (0.0008 - 0.0024 in.)
Limit
No.1 : 0.1 mm (0.004 in.)
No.2 : 0.1 mm (0.004 in.)
Oil ring : 0.2 mm (0.008 in.)



   If the clearance is greater than maximum, replace the piston.

2. Inspect piston ring end gap.
   To measure the piston ring end gap, insert a piston ring into the cylinder bore. Position the ring at right angles to the cylinder wall by gently pressing it down with a piston. Measure the gap with a feeler gauge. If the gap exceeds the service limit, replace the piston ring. If the gap is too large, recheck the cylinder bore diameter against the wear limits. If the bore is over the service limit, the cylinder block must be replaced.

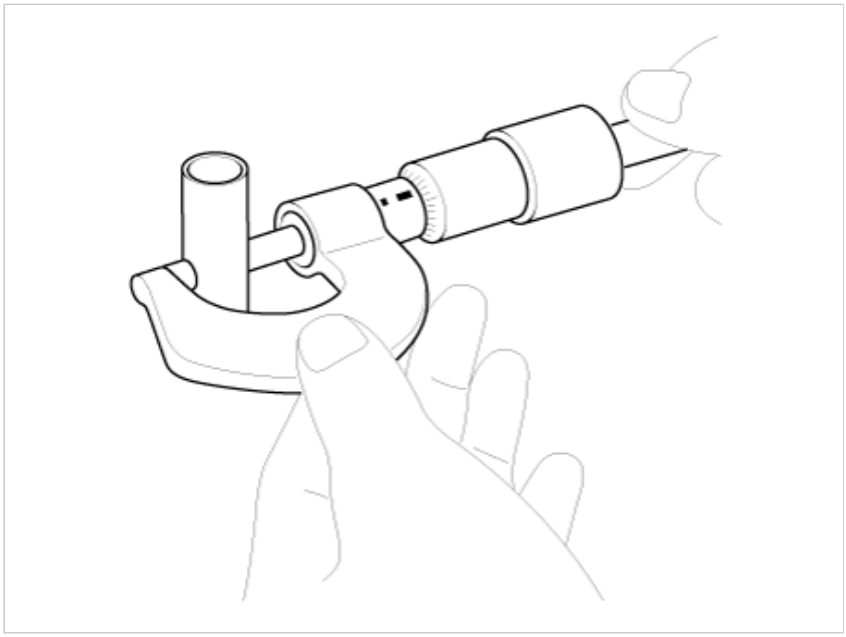
Piston ring end gap
Standard
No.1 : 0.17 - 0.27 mm (0.0067 - 0.0106 in.)
No.2 : 0.30 - 0.40 mm (0.0118 - 0.0157 in.)
Oil ring :
0.20 - 0.40 mm (0.0078 - 0.0157 in.)
Limit
No.1 : 0.6 mm (0.0236 in.)
No.2 : 0.7 mm (0.0275 in.)
Oil ring : 0.8 mm (0.0315 in.)



Piston Pin

1. Measure the diameter of the piston pin.

Piston pin diameter :
22.997 - 23.000 mm (0.9054 - 0.9055 in.)



2. Measure the piston pin-to-piston clearance.

Piston pin-to-piston clearance :
0.004 - 0.015 mm (0.00016 - 0.00059 in.)

3. Check the difference between the piston pin diameter and the connecting rod small end diameter.

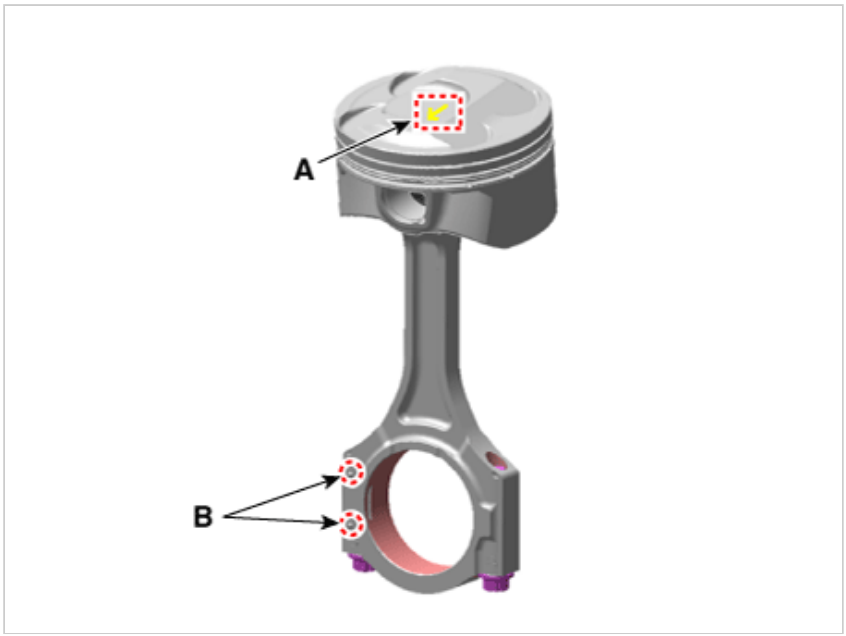
Piston pin-to-connecting rod interference :
0.007 - 0.023 mm (0.00028 - 0.00091 in.)

Reassembly

NOTICE

- Thoroughly clean all parts to be assembled.
- Before installing the parts, apply fresh engine oil to all sliding and rotating surfaces.
- Replace all gaskets, O-rings and oil seals with new parts.

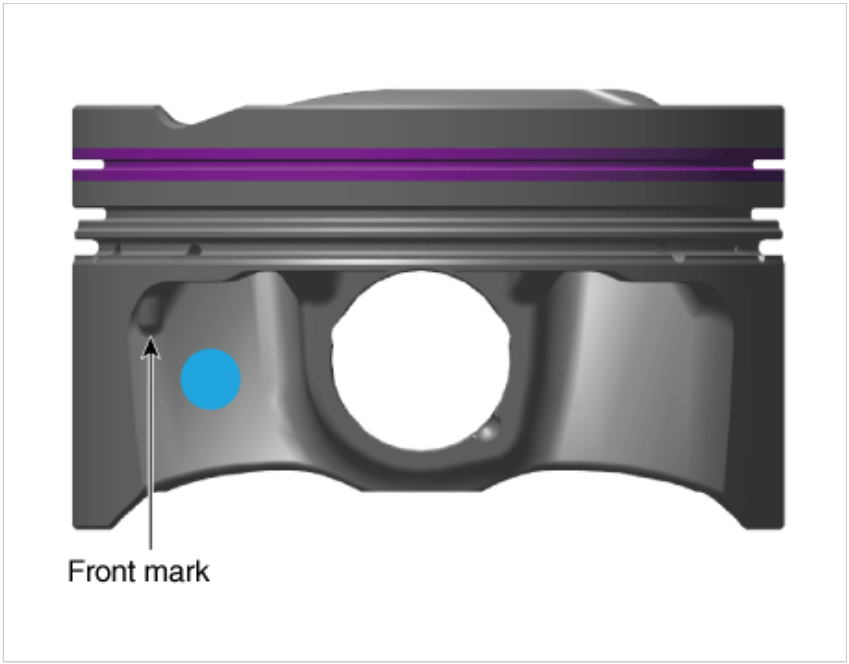
1. Assemble the piston and the connecting rod.
   (1) Install the piston pin with two snap rings and check the snap ring assembly thoroughly.
   (2) The piston front mark (A) and the connecting rod front mark (B) must face the timing chain side of the engine.



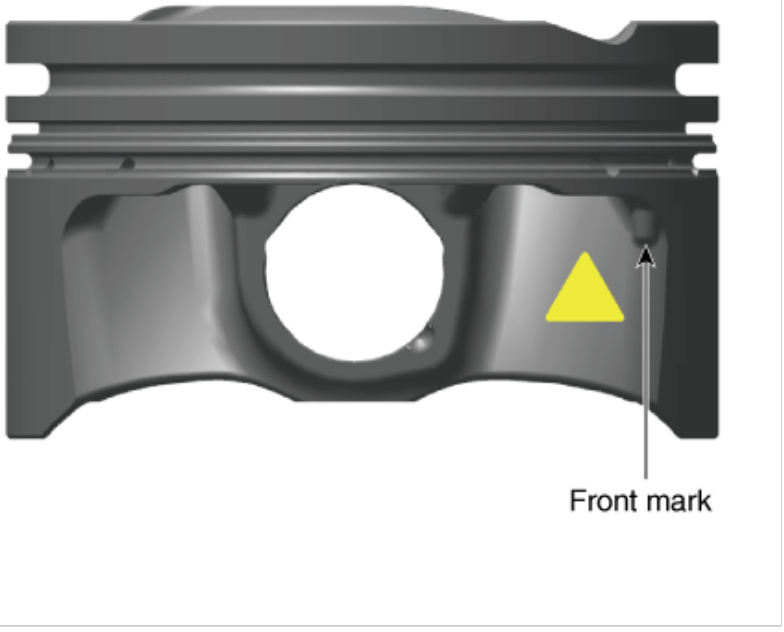
NOTICE

When reassembling the piston and connecting rod, check the RH and LH mark and front mark of piston.

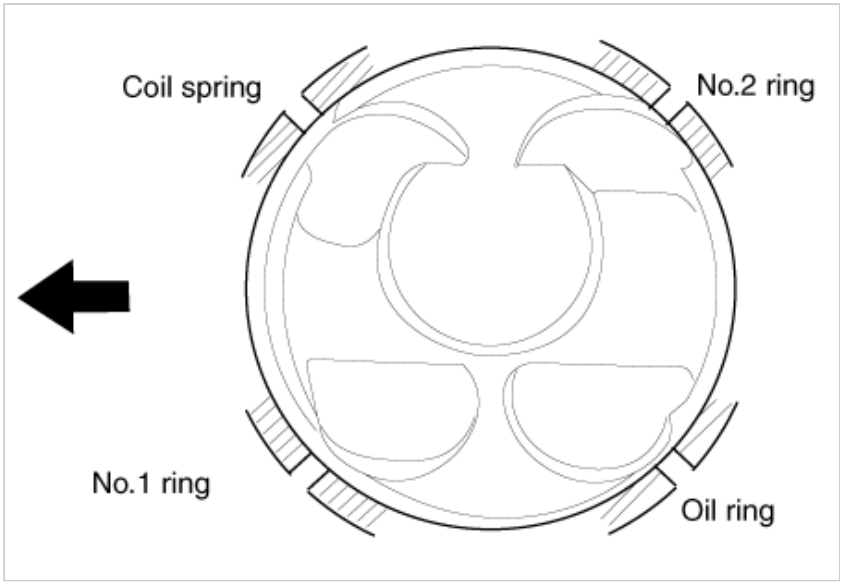
[LH Piston]



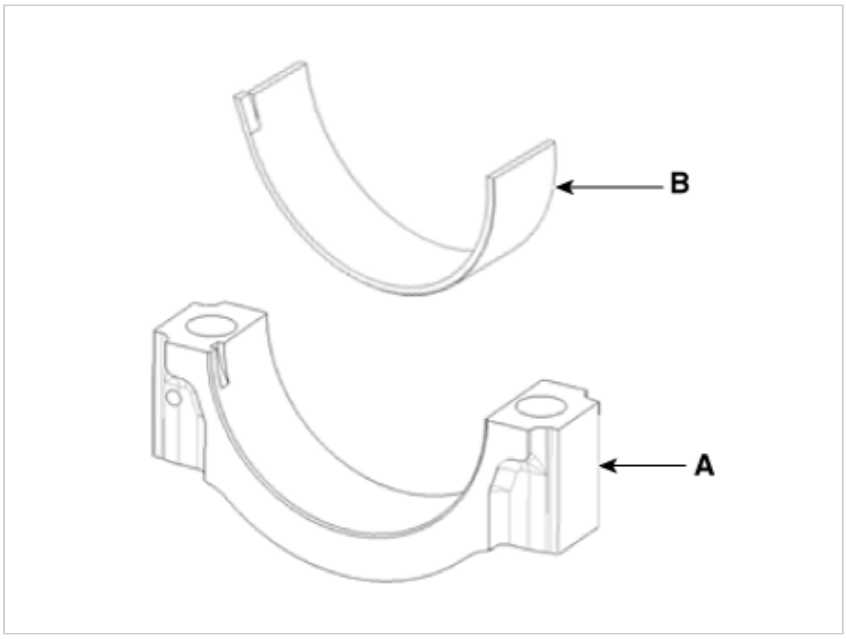
[RH Piston]



2. Install the piston rings.
   (1) Install the coil spring and oil ring by hand.
   (2) Using a piston ring expander, install the 2 compression rings with the code mark facing upward.
   (3) Position the piston rings so that the ring ends are as shown.



3. Install the connecting rod bearings.
   (1) Align the bearing claw with the groove of the connecting rod or connecting rod cap.
   (2) Install the bearings (A) in the connecting rod and connecting rod cap (B).



NOTICE

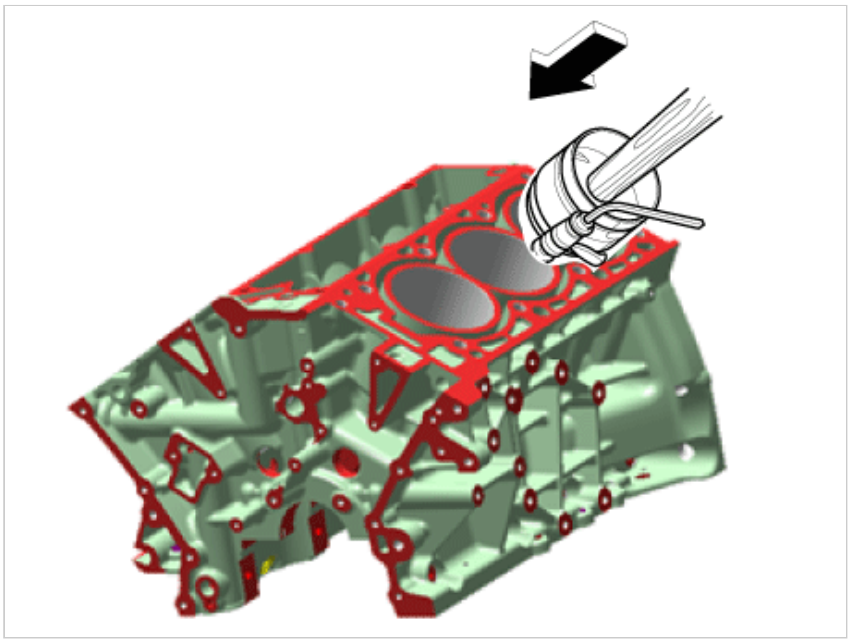
When reassembling the connecting rods and caps, check the front marks and the number of cylinder.

4. Attach the piston and connecting rod assemblies on the cylinder block.

NOTICE

Before installing the pistons, apply a coat of engine oil to the ring grooves and cylinder bores.

(1) Install the ring compressor, and check that the bearing is securely in place. Then, position the piston in the cylinder, and tap it in using the wooden handle of a hammer.

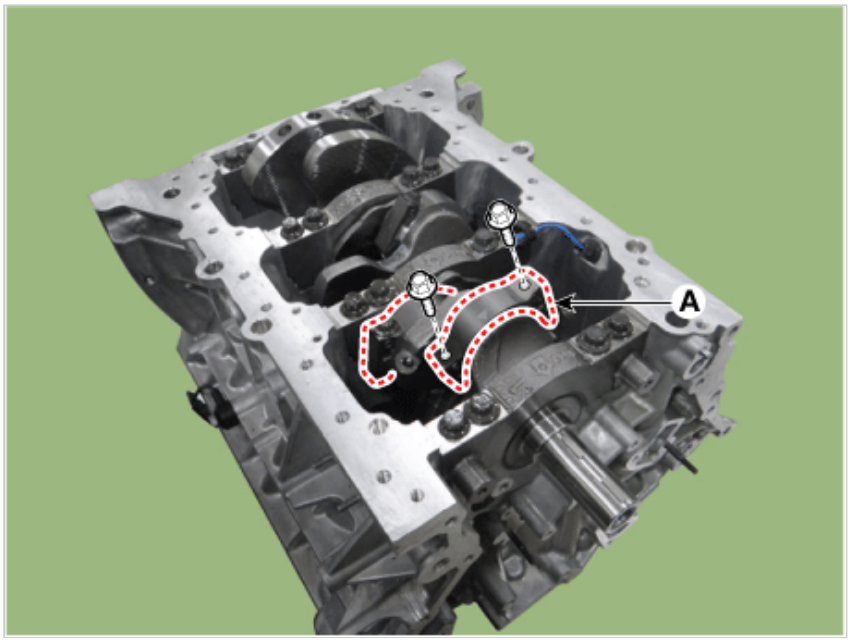


(2) Stop when the ring compressor pops free, and check the connecting rod-to-check journal alignment before pushing the piston into place.

(3) Install the rod caps (A) with bearings, and torque the bolts.

Tightening torque:

[27.5 - 31.4 N·m (2.8 - 3.2 kgf·m, 20.3 - 23.1 lb·ft)] + [68 - 72°]

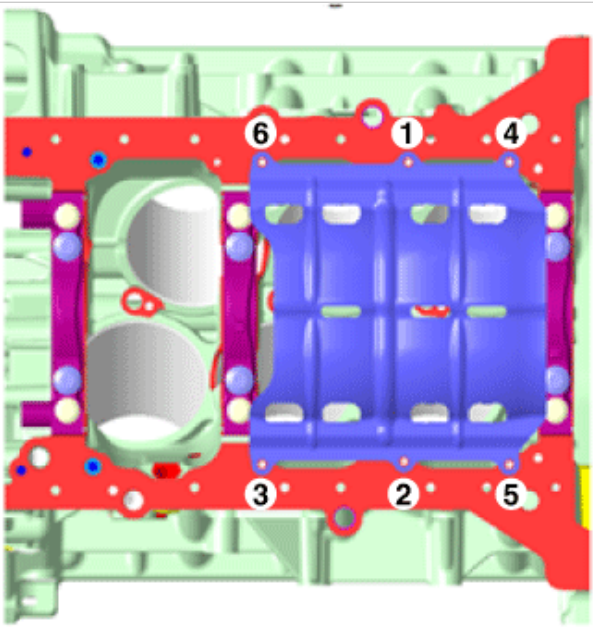


NOTICE

- Always use new connecting rod cap bolts. Connecting rod cap bolts are torque-to-yield bolts designed to be permanently elongated beyond the state of elasticity when torqued, so if the bolts are removed and reused, it may cause the bolts to break or fail to maintain clamping force.
- Maintain downward force on the ring compressor to prevent the rings from expanding before entering the cylinder bore.

5. Install the baffle plate.
   Install and uniformly tighten the baffle plate bolts, in several passes, in the sequence shown.

   Tightening torque:
   9.8 - 11.8 N·m (1.0 - 1.2 kgf·m, 7.2 - 8.7 lb·ft)



6. Assemble the remaining parts in the reverse order of disassembly.