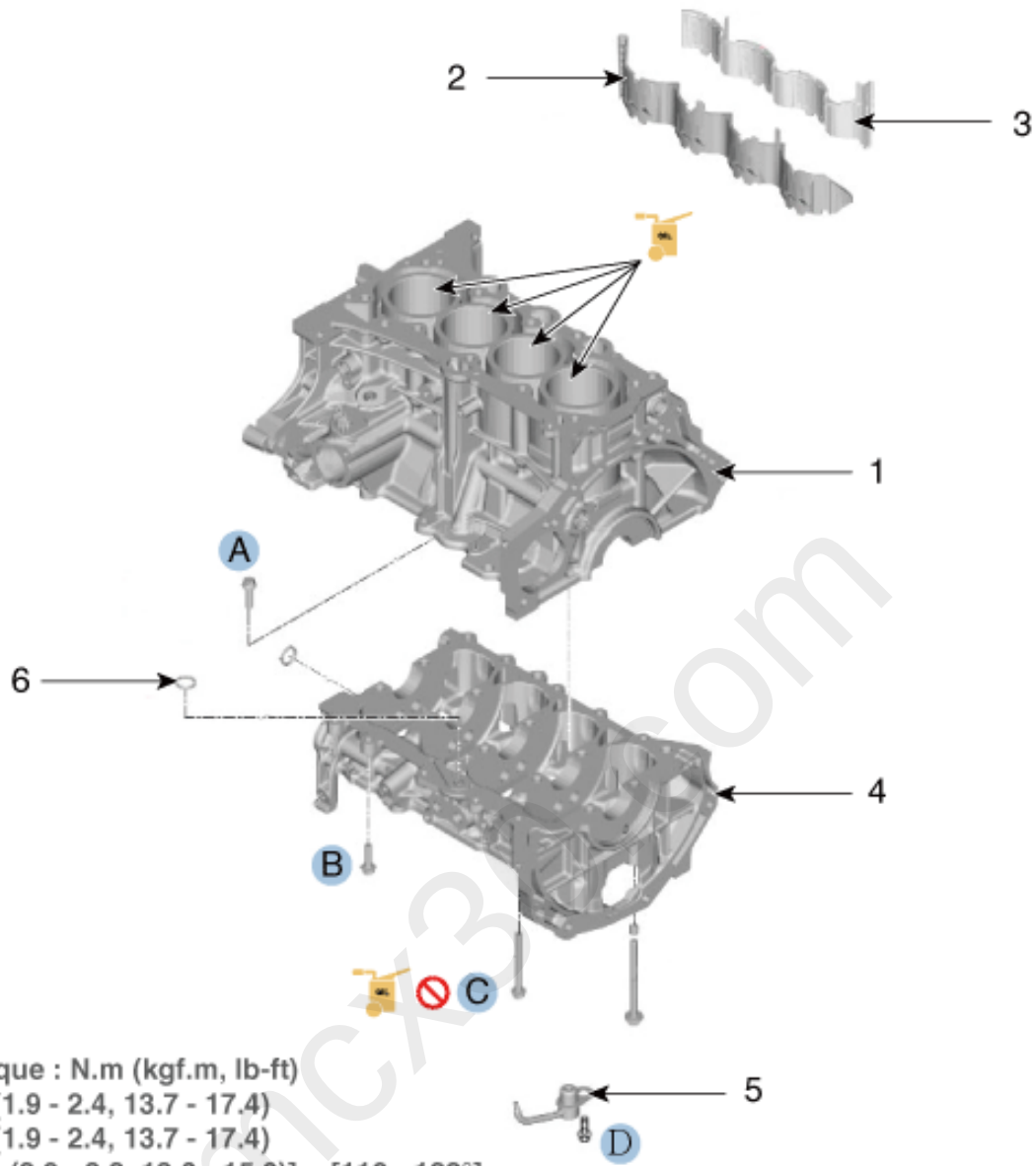
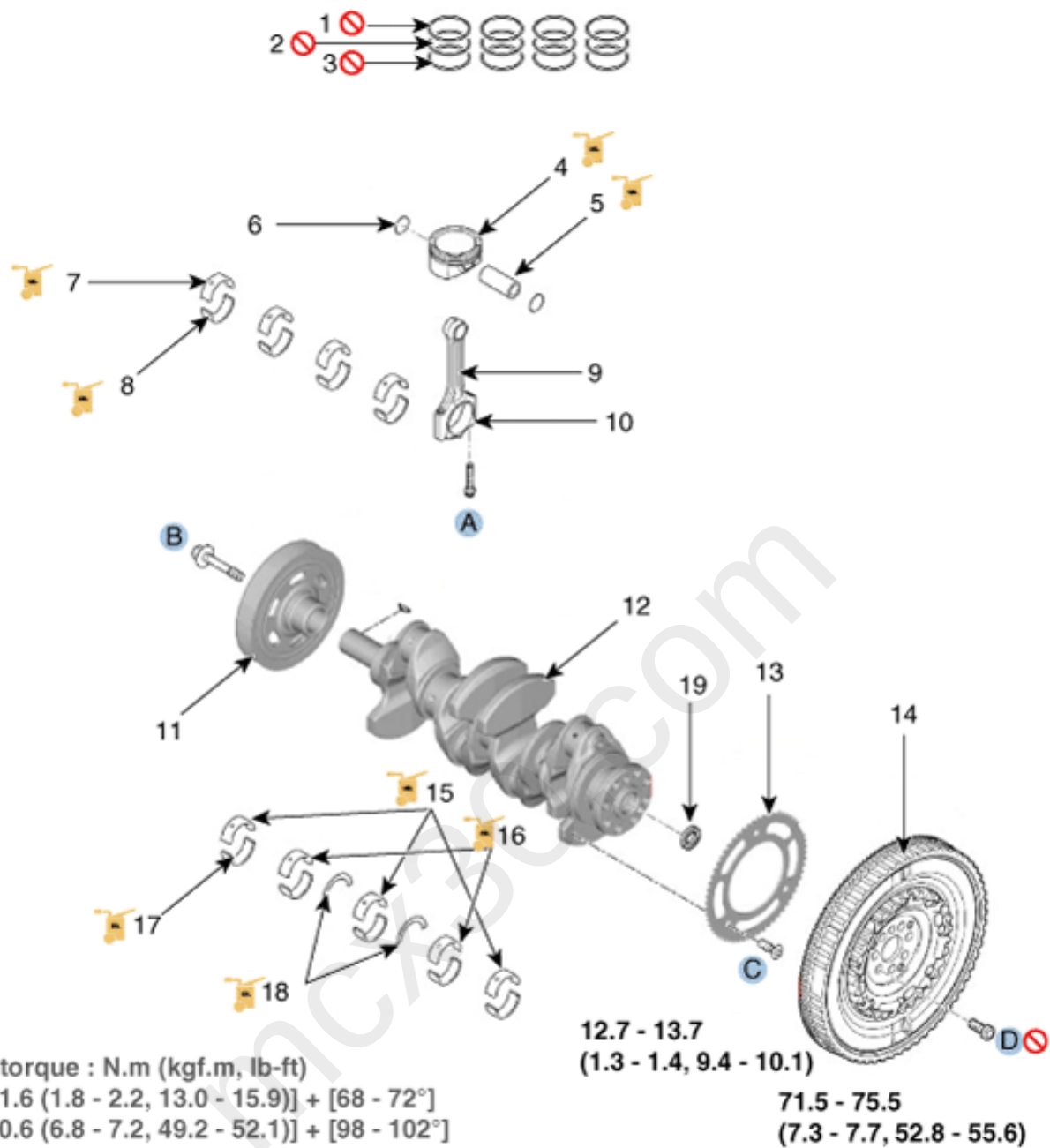


## Components



- 1. Cylinder block
- 2. Water jacket insert (Exhaust)
- 3. Water jacket insert (Intake)

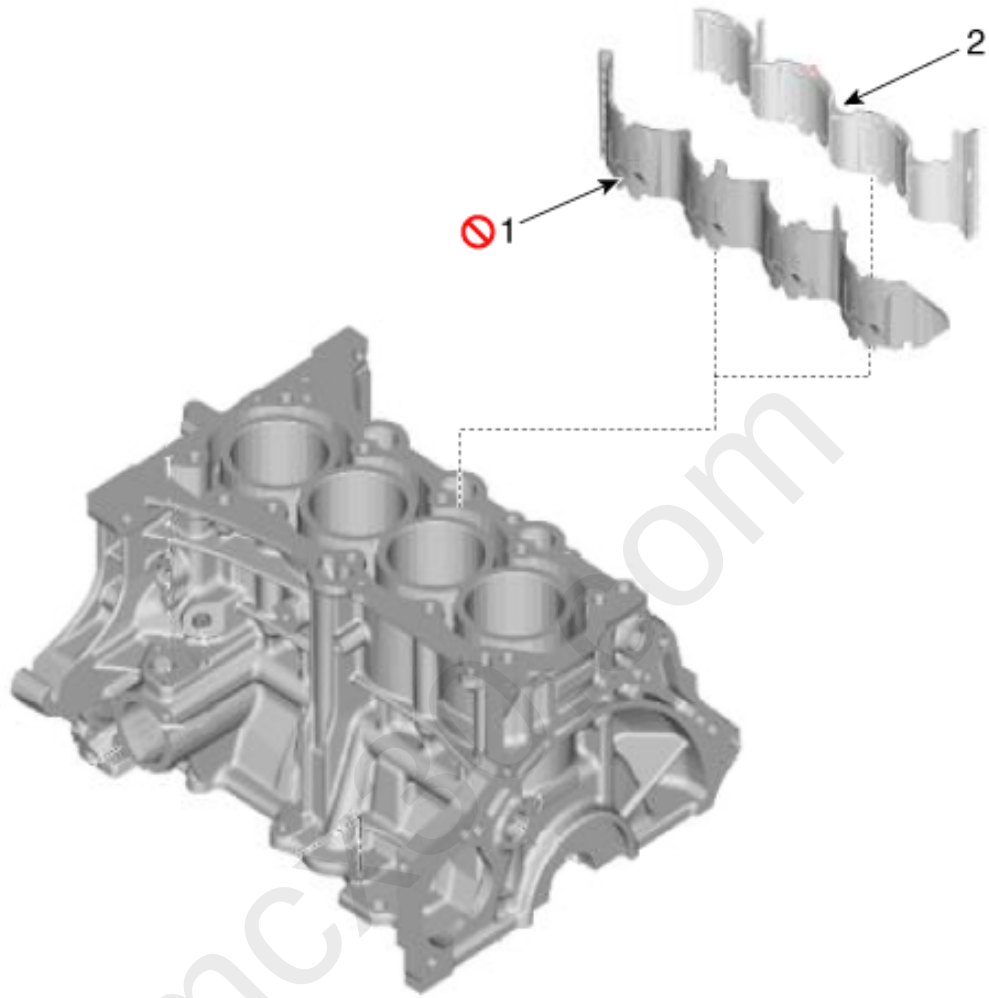
- 4. Lower crankcase
- 5. Oil jet
- 6. O-ring



- |                            |                                 |                                                           |                                             |
|----------------------------|---------------------------------|-----------------------------------------------------------|---------------------------------------------|
| 1. Piston ring (No.1 ring) | 6. snap ring                    | 11. Crankshaft damper pulley                              | 16. Crankshaft upper bearing(No.2 and No.4) |
| 2. Piston ring (No.2 ring) | 7. Connecting rod upper bearing | 12. Crankshaft                                            | 17. Crankshaft lower bearing                |
| 3. Piston ring(Oil ring)   | 8. Connecting rod lower bearing | 13. Crankshaft position sensor wheel                      | 18. Crankshaft thrust bearing               |
| 4. Piston                  | 9. Connecting rod               | 14. Flywheel                                              | 19. Pilot bearing (DCT only)                |
| 5. Piston                  | 10. Connecting rod bearing cap  | 15. Crankshaft upper bearing(No.1 and No.3, No.5 journal) |                                             |

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## Components

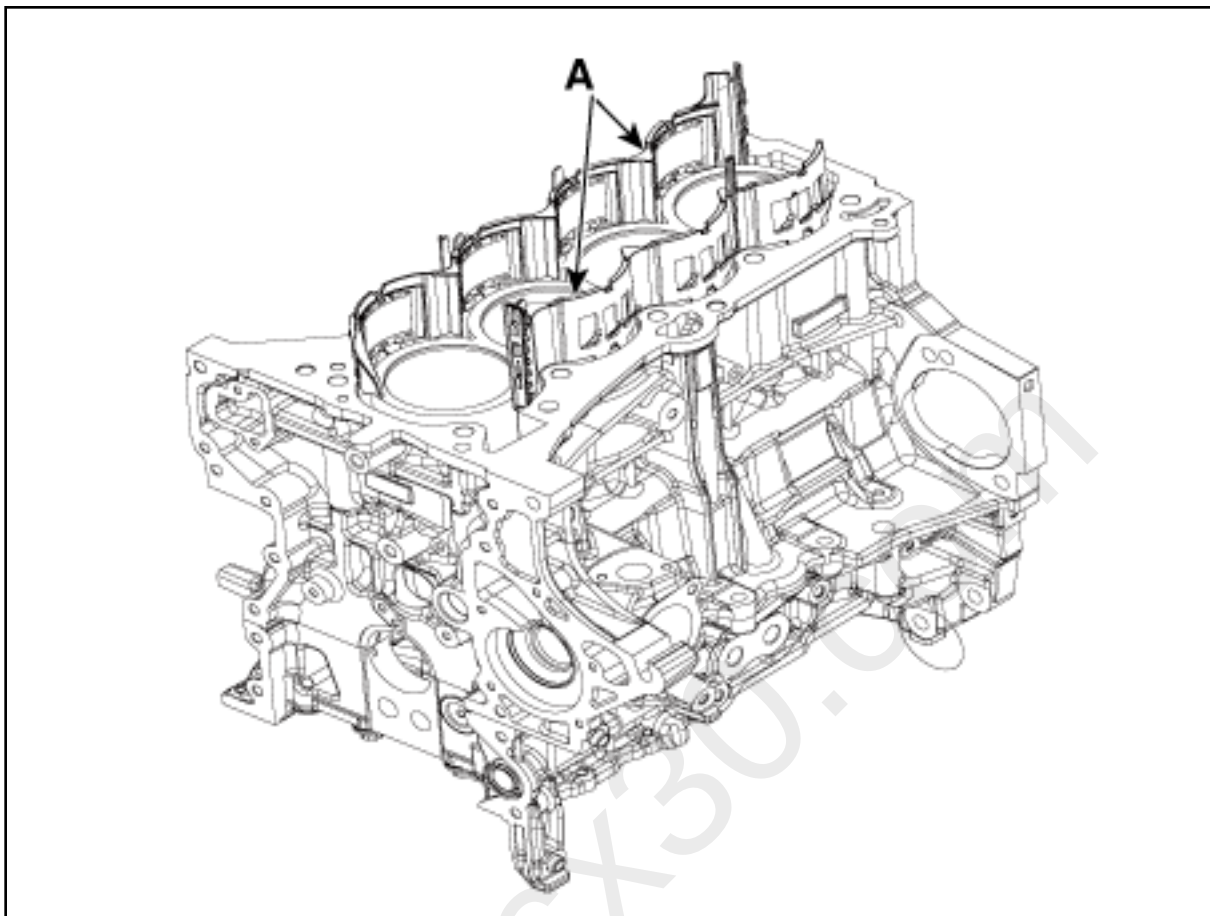


1. LH Water jacket insert

2. RH Water jacket insert

## Removal and Installation

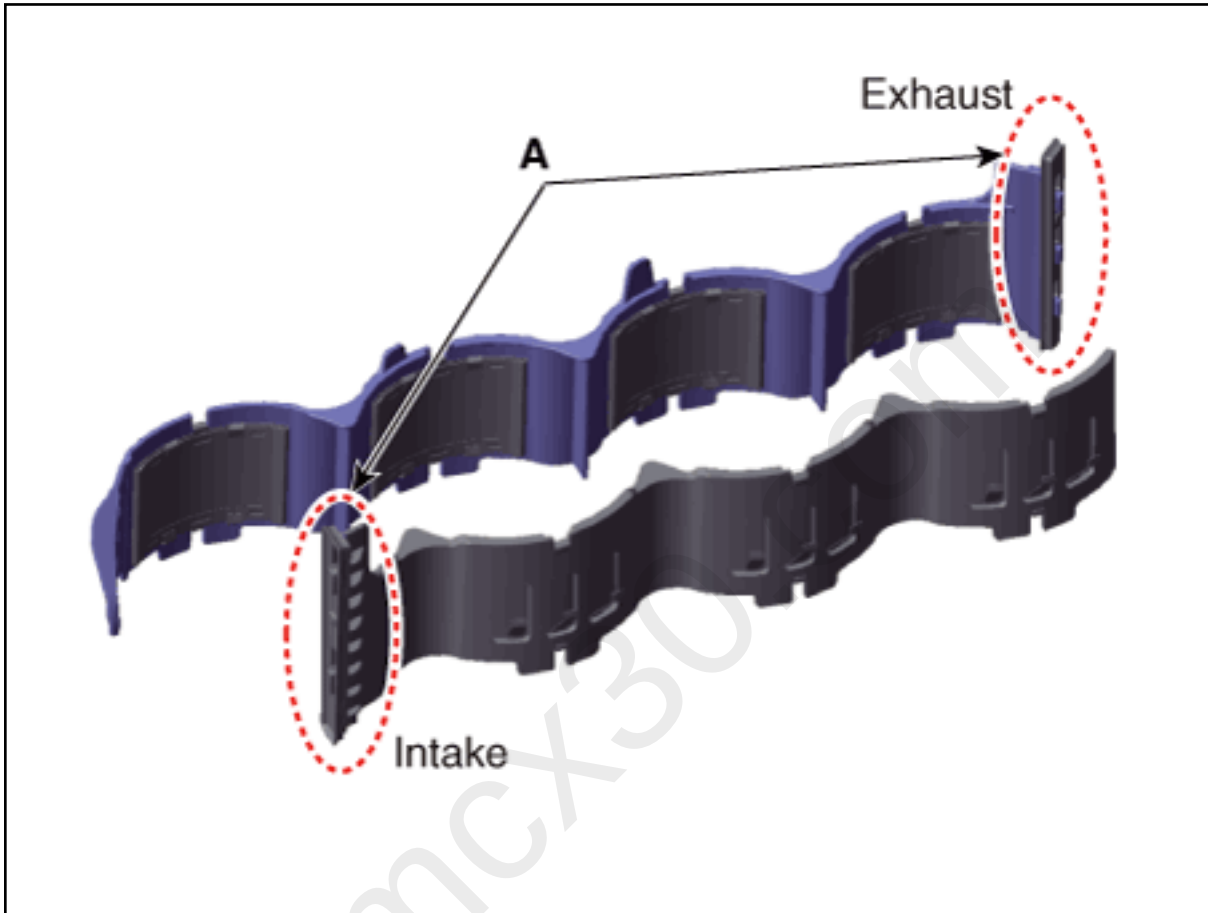
1. Remove the cylinder head.  
**(Refer to Cylinder Head Assembly - "Cylinder Head")**
2. Remove the RH water jacket insert and LH water jacket insert (A).



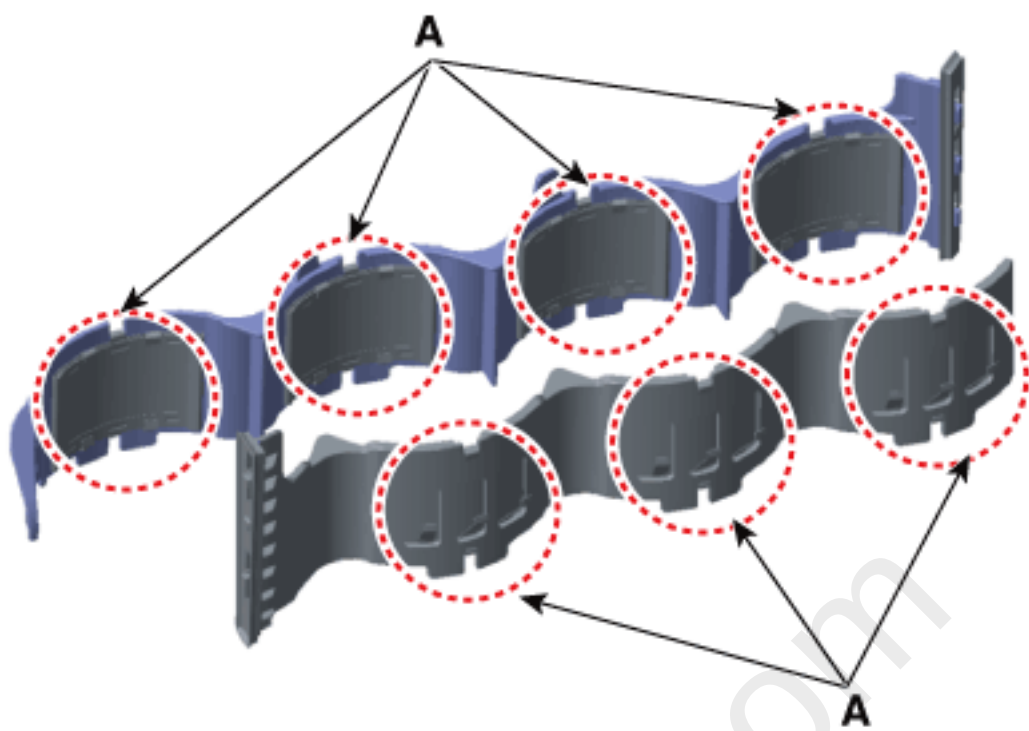
- When removing the water jacket insert, Be careful not to damage the top surfaces of the cylinder block.

3. Install in the reverse order of removal.

- Always use a new water jacket insert.
- Install the upper surface of the water jacket insert below the upper surface of the cylinder block.
- When installing water jacket insert, check LH, RH classification and installing direction.
- When installing a new water jacket insert, check the lip seal (A) and the cylinder block mounting surface for foreign matters.



- When installing a new water jacket insert, do not press the sus spring (A).



Removal and  
Installation

1. Remove the automatic transaxle.

**(Refer to Manual Transaxle System - "Manual Transaxle")**

**(Refer to DCT (Dual Clutch Transmission) System - "Dual Clutch Transmission Assembly")**

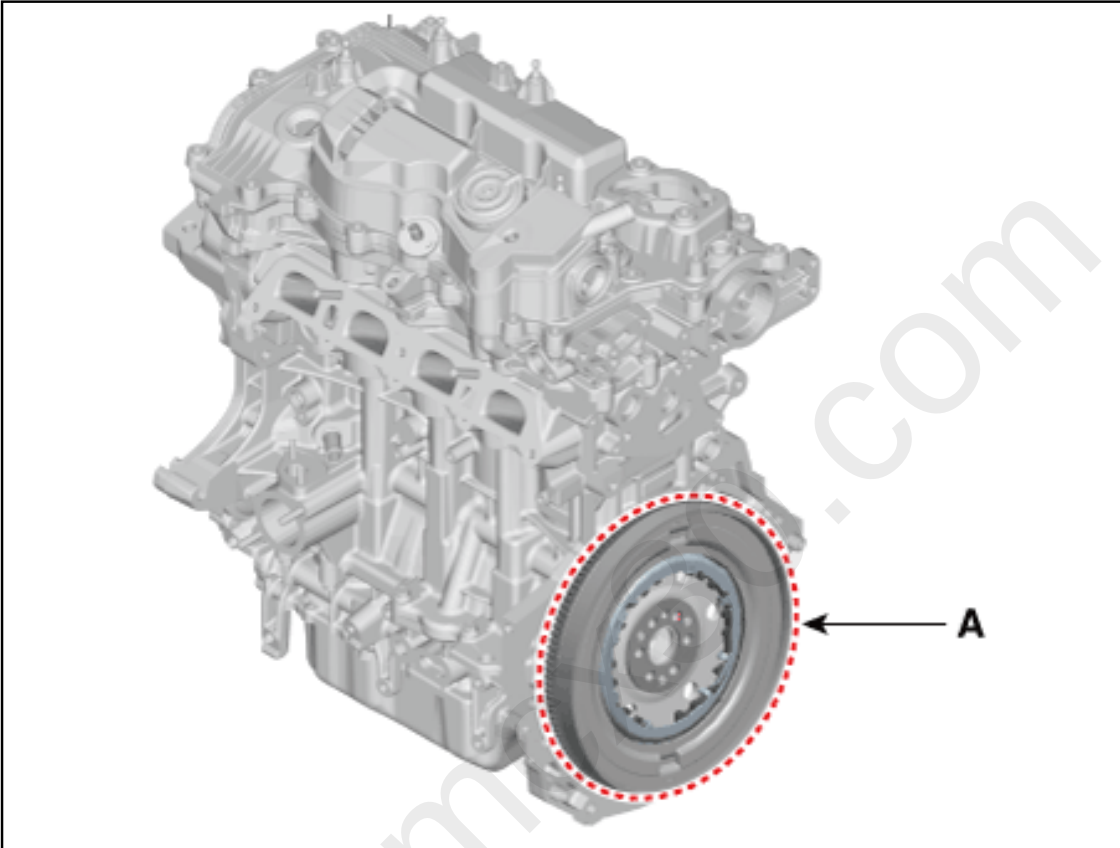
2. Remove the fly wheel (A).

---

**Tightening torque :**

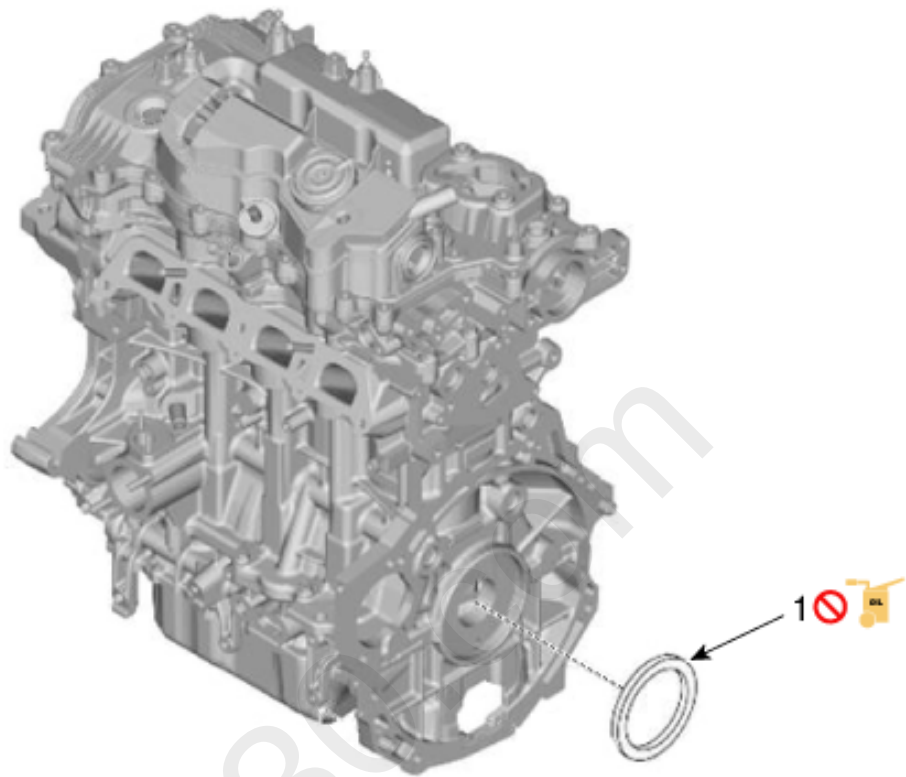
71.5 - 75.5 N.m (7.3 - 7.7 kgf.m, 52.8 - 55.6 lb-ft)

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- Always use a new fly wheel mounting bolts.

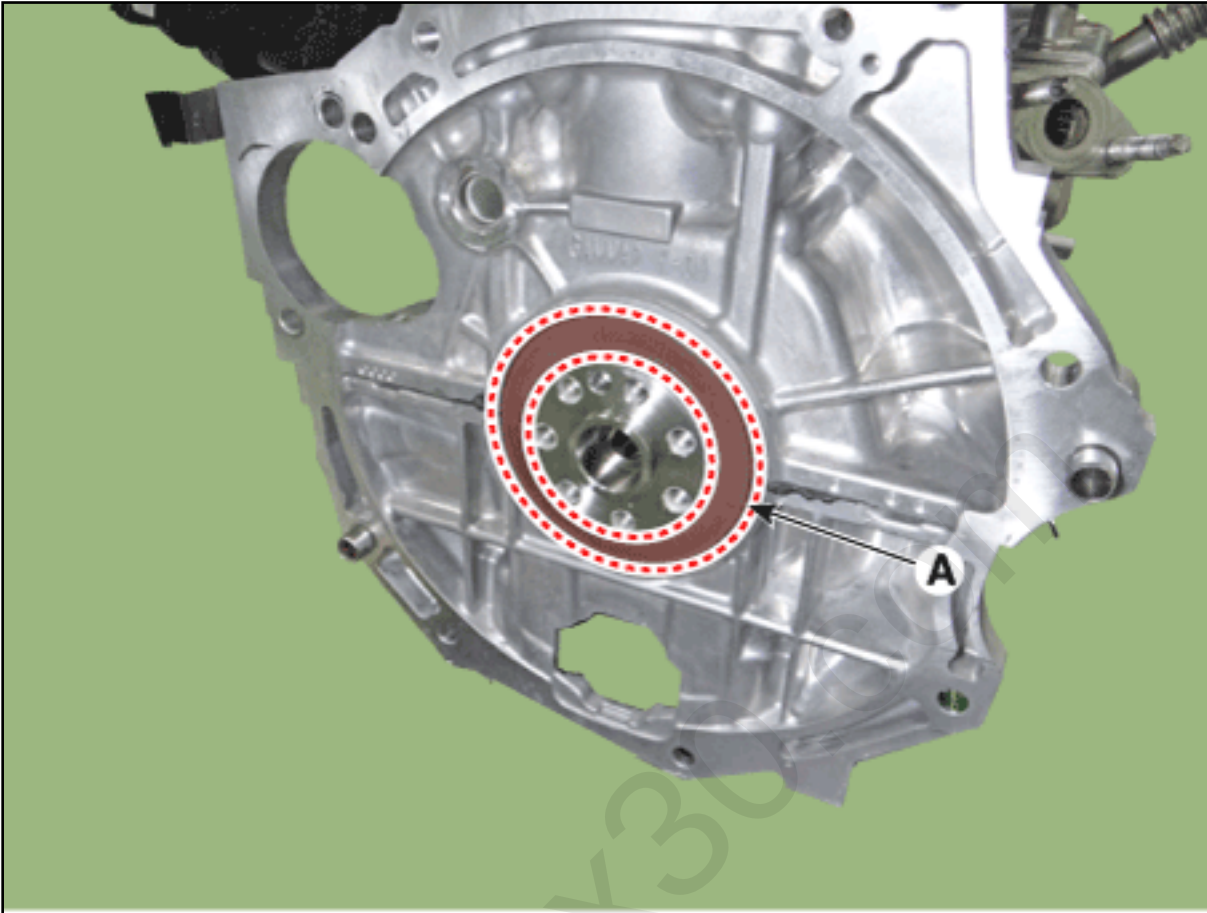
3. Install in the reverse order of removal.



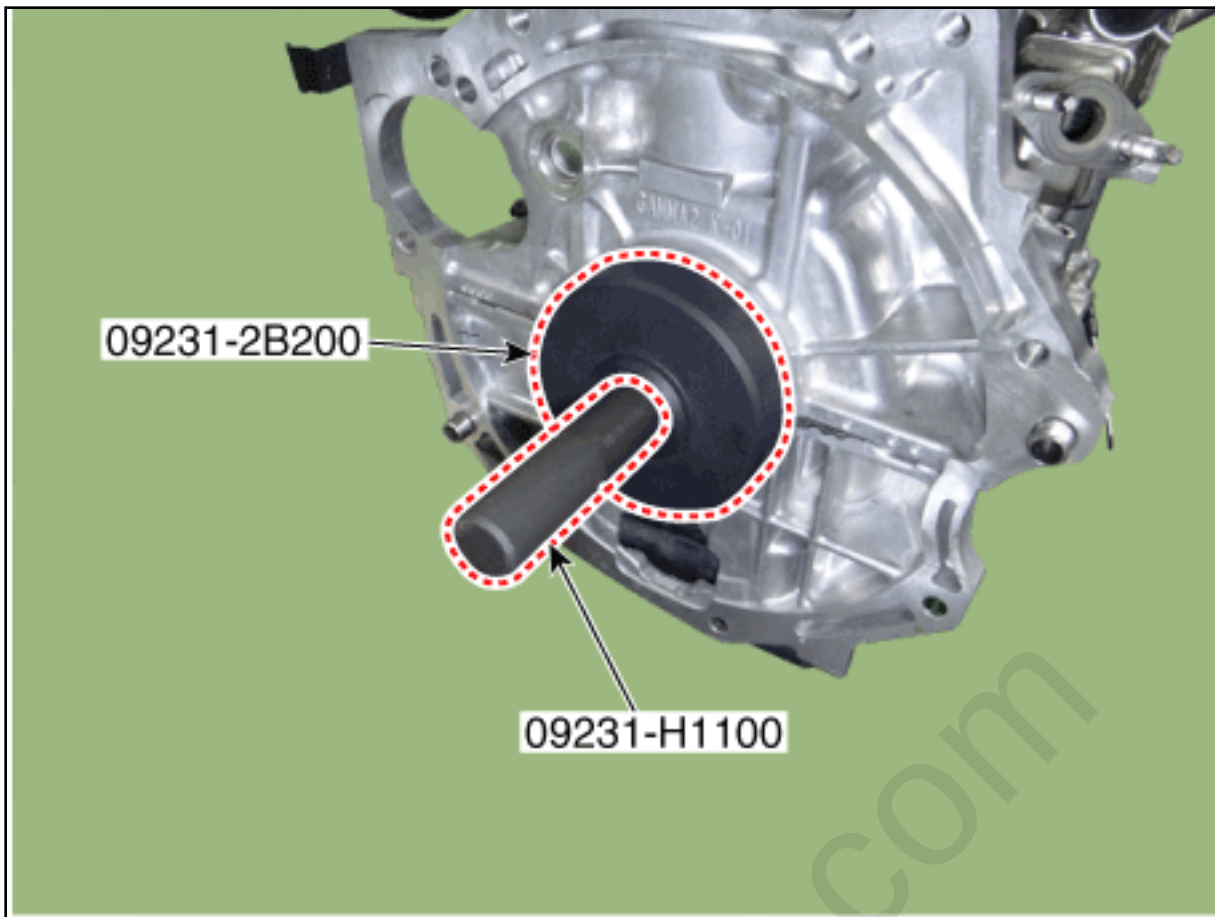
1. Rear oil seal

## Replacement

1. Remove the fly wheel.  
**(Refer to Cylinder Block - "Fly Wheel")**
2. Remove the rear oil seal (A).



3. Apply engine oil on the edge of new rear oil seal.
4. Using SSTs (09231-H1100, 09231-2B200), install the new rear oil seal.  
When assembling, the surface of the oil seal shall coincide with the surface of the cylinder block.



- Always use a new rear oil seal.

5. Install the other parts in the reverse order of removal.

## Disassembly



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



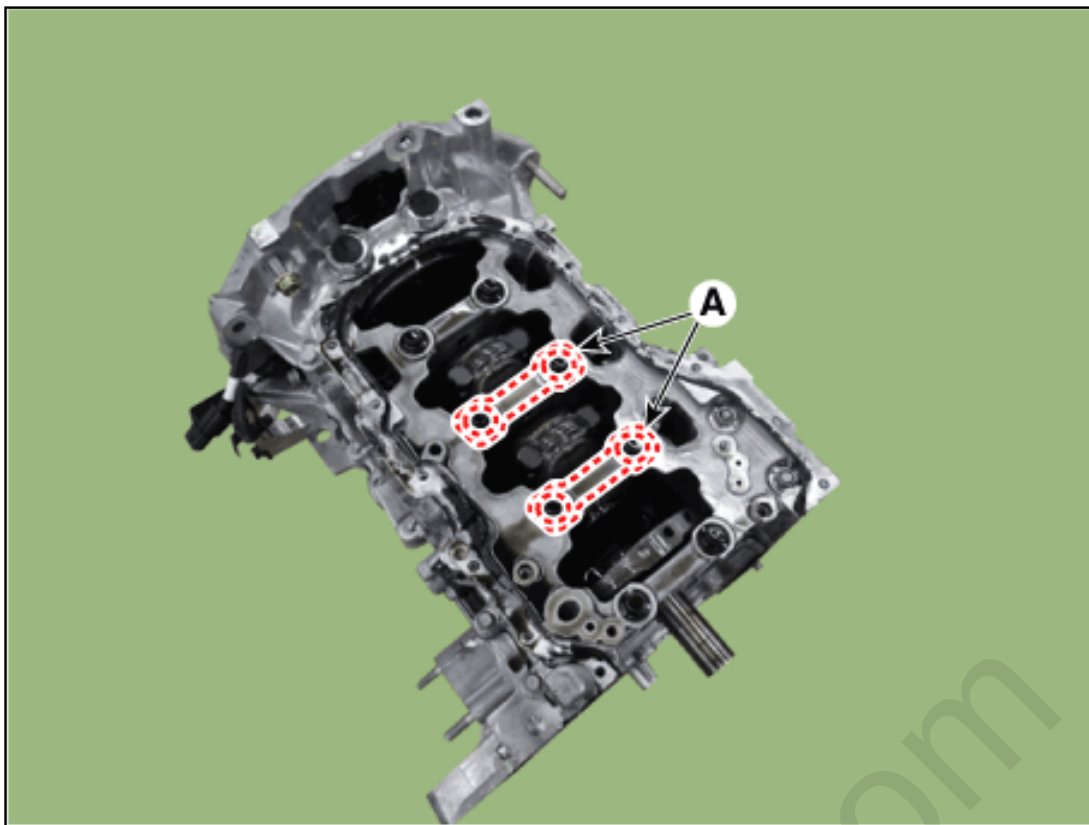
- Mark all wiring connector and hoses to avoid misconnection.
- To release the fuel system pressure before removing the engine assembly, start the engine without fuel pump relay. Then, switch "OFF" the ignition when engine stops.

1. Remove the engine and transaxle assembly.  
**(Refer to Engine and Transaxle Assembly - "Engine and Transaxle Assembly")**
2. Remove the rear oil seal.  
**(Refer to Cylinder Block - "Rear Oil Seal")**
3. Install the engine assembly to engine stand for disassembly.
4. Remove the cylinder head.  
**(Refer to Cylinder Head Assembly - "Cylinder Head")**



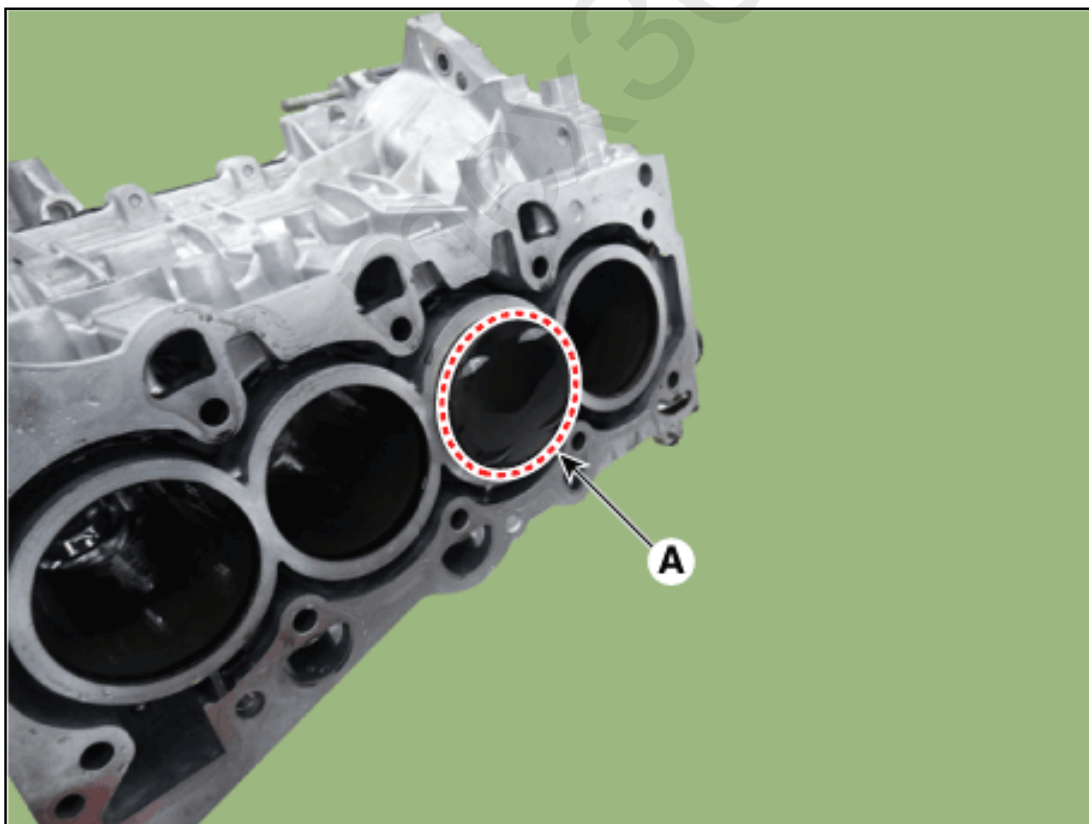
- Turn the crankshaft pulley so that the No. 1 piston is at top dead center.

5. Remove the oil filter body.  
**(Refer to Lubrication System - "Oil Filter & Oil Cooler")**
6. Remove the oil pump.  
**(Refer to Lubrication System - "Oil Pump")**
7. Remove the piston and connecting rod assembly.
  - (1) Using a ridge reamer, remove all the carbon from the top of the cylinder.
  - (2) Remove the connecting rod bearing caps (A).



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

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





- Keep the connecting rod and cap with their bearings assembled together.
- Arrange the piston and connecting rod assemblies in the correct order.

8. Check fit between piston and piston pin.

Try to move the piston back and forth on the piston pin.

If any movement is felt, replace the piston and piston pin as a set.

9. Disassemble the piston rings.

(1) Using a piston ring expander, remove the 2 piston rings (A).

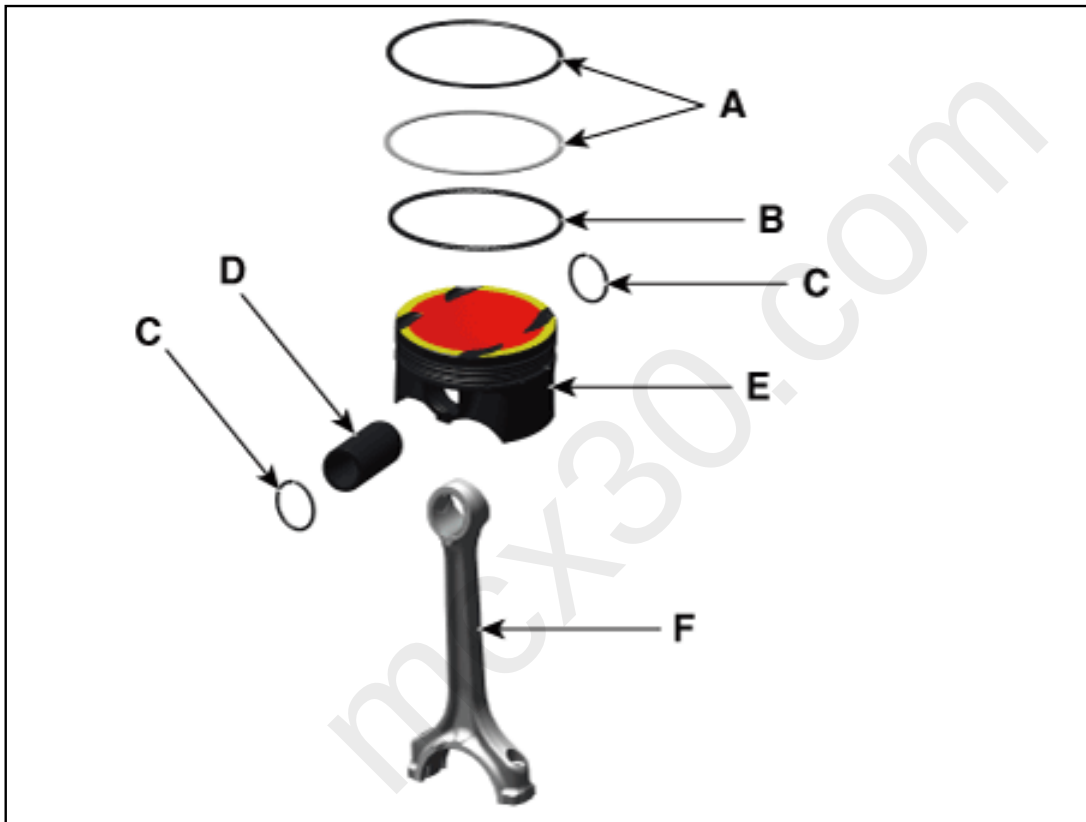
(2) Remove the oil ring (B) by hand.

10. 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 (E) and connecting rod (F).



Inspection

Connecting Rod

1. Check the side clearance between piston and connecting rod.  
Using feeler gauge, measure the side clearance while moving the connecting rod back and forth.

---

**Side clearance**

Standard : 0.1 - 0.25 mm (0.0039 - 0.0098 in.)

Maximum : 0.35 mm (0.0138 in.)

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- If out-of-tolerance, install a new connecting rod.
  - If still out-of-tolerance after connecting rod replacement, replace the crankshaft.
2. Check the connecting rod bearing oil clearance.
    - (1) Check the match marks on the connecting rod and cap are aligned to ensure correct reassembly.
    - (2) Remove the 2 connecting rod cap bolts.
    - (3) Remove the connecting rod cap and lower bearing.
    - (4) Clean the crankshaft pin journal and bearing.
    - (5) Place a plastic gauge across the crankshaft pin journal.
    - (6) Reinstall the lower bearing and connecting rod cap, and torque the bolts.

---

**Tightening torque :**

17.7 - 21.6 N.m (1.8 - 2.2 kgf.m, 13.0 - 15.9 lb-ft) + 68° - 72°

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- Do not turn the crankshaft.

- (7) Remove the connecting rod cap.

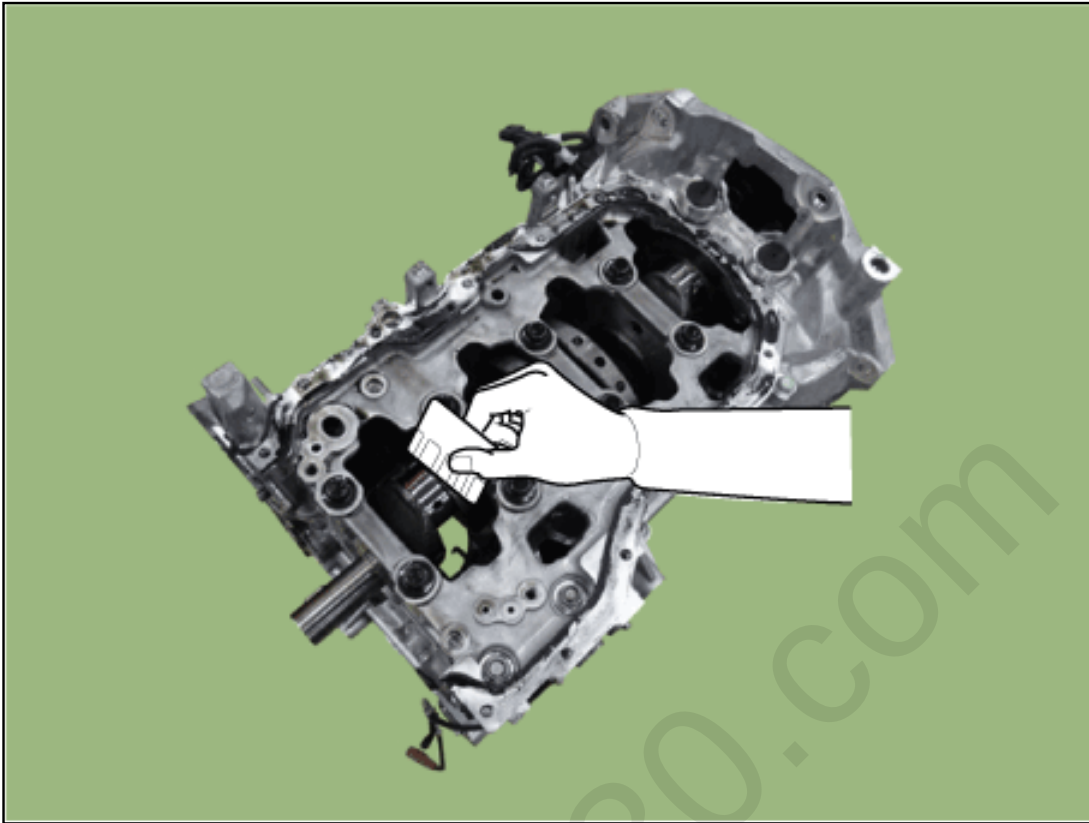
(8) Measure the plasticgauge at its widest point.

---

**Bearing oil clearance :**

0.037 - 0.055 mm (0.0015 - 0.0022 in.)

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(9) If the measurement from the plasticgauge is too wide or too narrow, remove the upper and lower bearing and then install a new bearings with the same color mark. Recheck the oil clearance.



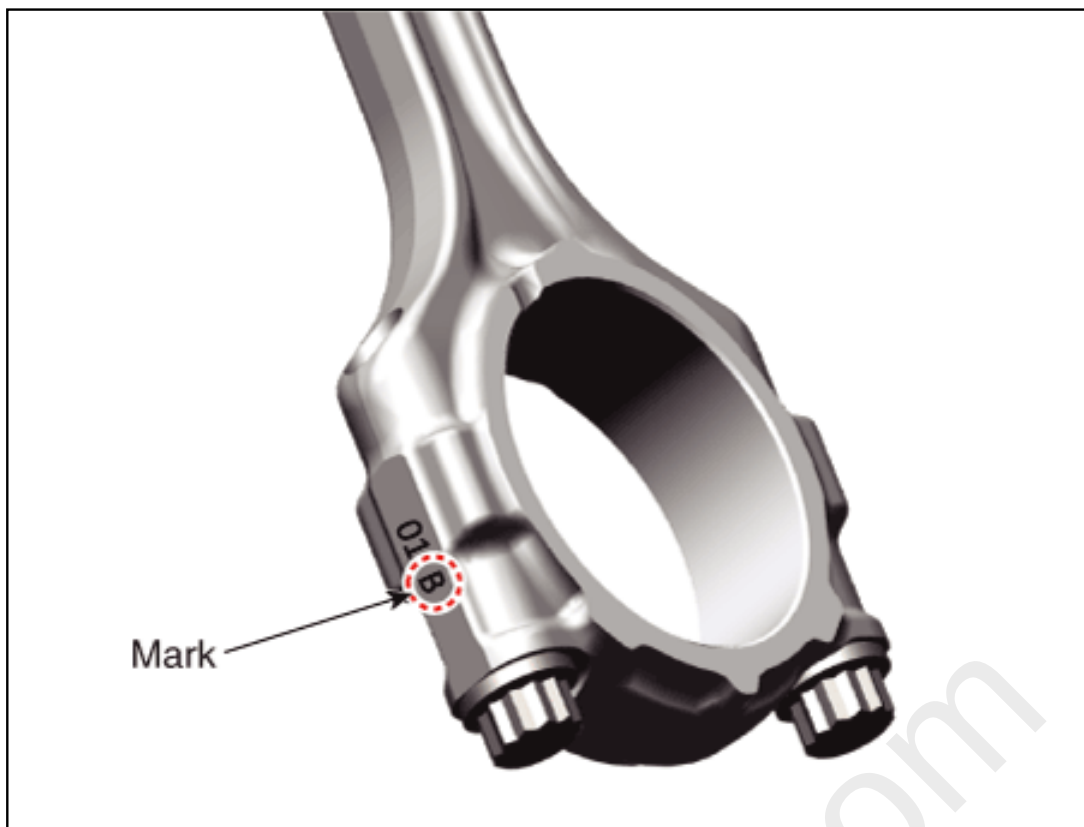
- Do not file, shim, of scrape the bearings or the caps to adjust clearance.

(10) If the plasticgauge shows the clearance is still incorrect, try the next larger or smaller bearing. Recheck the oil clearance.



- If the proper clearance cannot be obtained by using the appropriate larger or smaller bearings, replace the crankshaft and start over.
- If the marks are indecipherable because of an accumulation of dirt and dust, do not scrub them with a wire brush or scraper. Clean them only with solvent or detergent.

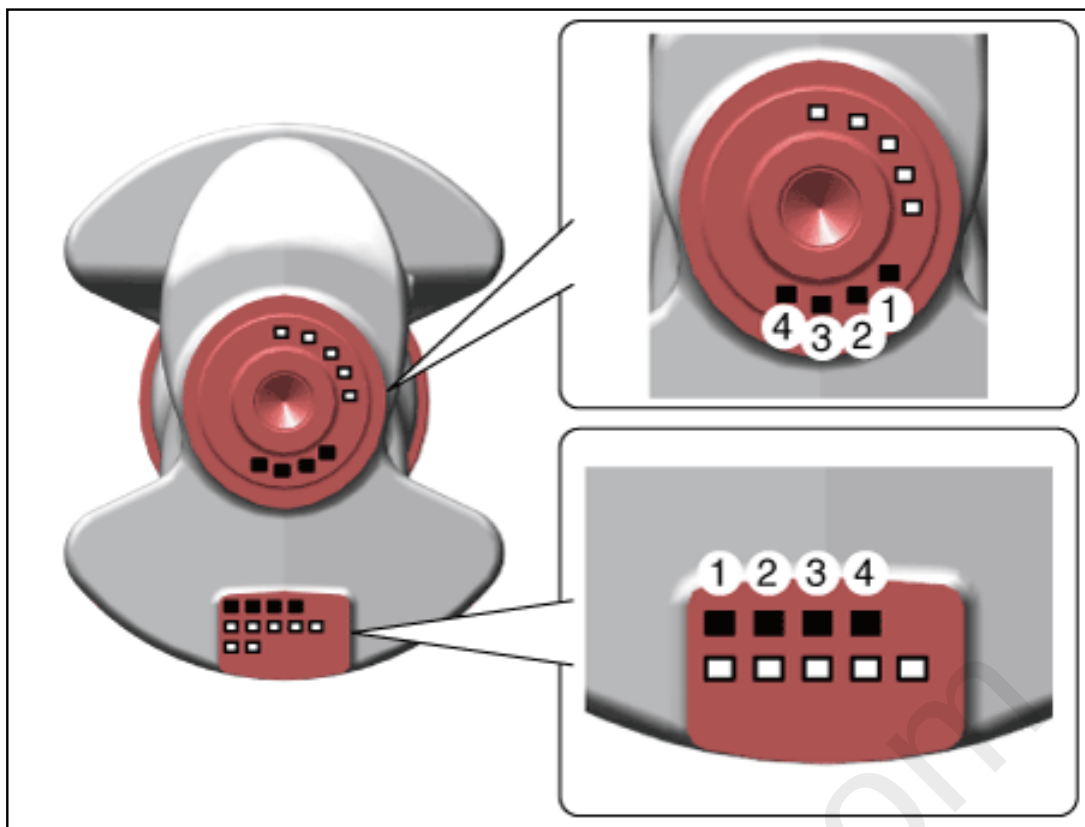
Connecting Rod Identification Mark



Identification Of Connecting Rod

| Class | Mark | Connecting rod big-end inner diameter       |
|-------|------|---------------------------------------------|
| A     | 0    | 45.000 - 45.006 mm<br>(1.7717 - 1.7719 in.) |
| B     | 1    | 45.006 - 45.012 mm<br>(1.7719 - 1.7721 in.) |
| C     | 2    | 45.012 - 45.018 mm<br>(1.7721 - 1.7724 in.) |

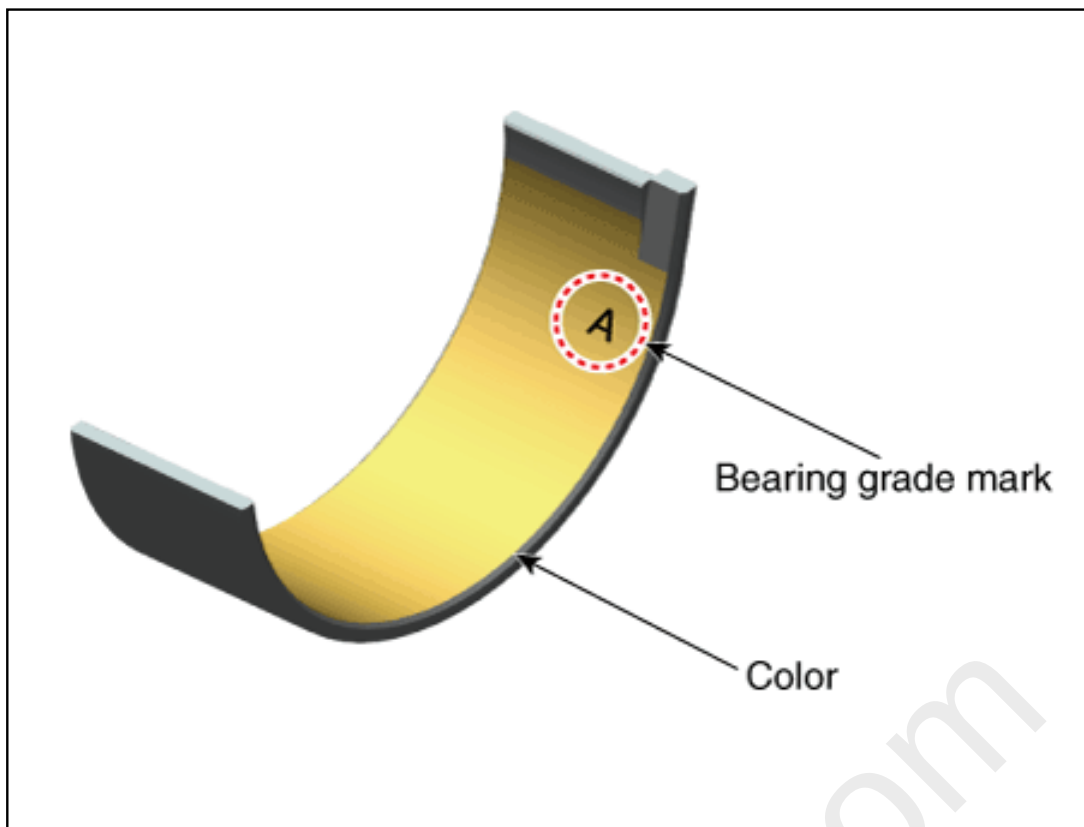
Crankshaft Pin Outside Diameter Identification Mark



Identification Of Crankshaft Pin Outside Diameter

| Class | Mark | Crankshaft pin journal outer diameter       |
|-------|------|---------------------------------------------|
| I     | 1    | 41.972 - 41.966 mm<br>(1.6524 - 1.6522 in.) |
| II    | 2    | 41.966 - 41.960 mm<br>(1.6522 - 1.6520 in.) |
| III   | 3    | 41.960 - 41.954 mm<br>(1.6520 - 1.6517 in.) |

Connecting Rod Bearing Identification Mark



Discrimination of Connecting Rod Bearing

| Class | Color | Connecting rod bearing thickness          |
|-------|-------|-------------------------------------------|
| A     | Blue  | 1.510 - 1.513 mm<br>(0.0594 - 0.0596 in.) |
| B     | Black | 1.507 - 1.510 mm<br>(0.0593 - 0.0594 in.) |
| C     | None  | 1.504 - 1.507 mm<br>(0.0592 - 0.0593 in.) |
| D     | Green | 1.501 - 1.504 mm<br>(0.0591 - 0.0592 in.) |
| E     | Red   | 1.498 - 1.501 mm<br>(0.0590 - 0.0591 in.) |

(11) Use the bearing selection table below to select a suitable connecting rod bearing.

Connecting Rod Bearing Selection Table

|                                                     |   | Connecting Rod Identification Mark |           |           |
|-----------------------------------------------------|---|------------------------------------|-----------|-----------|
|                                                     |   | A                                  | B         | C         |
| Crankshaft Pin<br>Journal<br>Identification<br>Mark | 1 | E (Red)                            | D (Green) | C (None)  |
|                                                     | 2 | D (Green)                          | C (None)  | B (Black) |
|                                                     | 3 | C (None)                           | B (Black) | A (Blue)  |

3. Check the connecting rods.

- (1) When reinstalling, make sure that cylinder numbers put on the connecting rod and cap at disassembly match. When a new connecting rod is installed, make sure that the notches for holding the bearing in place are on the same side.
- (2) Replace the connecting rod if it is damaged on the thrust faces at either end. Also if step wear or a severely rough surface of the inside diameter of the small end is apparent, the rod must be replaced as well.
- (3) Using a connecting rod aligning tool, check the rod for bend and twist. If the measured value is close to the repair limit, correct the rod by a press. Any connecting rod that has been severely bent or distorted should be replaced.

**Allowable bend of connecting rod :**

0.05 mm (0.0020 in.) / 100 mm (3.94 in.)

**Allowable twist of connecting rod :**

0.1 mm (0.0039 in.) / 100 mm (3.94 in.)

☐

- When the connecting rods installed without bearings, there should be no difference on side surface.

**Piston**

1. Clean the piston.

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

☐

- 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.
- 

**Piston-to-cylinder clearance :**

0.035 - 0.055 mm (0.0014 - 0.0022 in.)

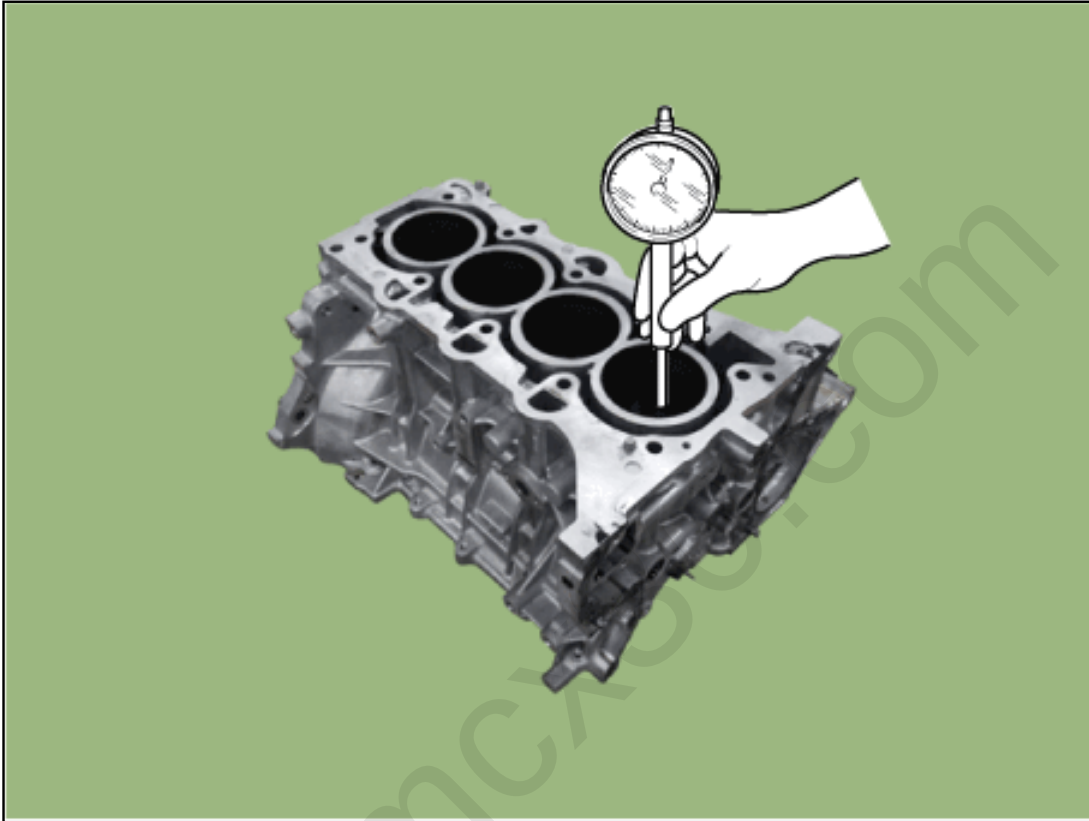
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- (1) Using a cylinder bore gauge, measure the cylinder bore diameter at position in the thrust and axial direction.
- 

**Cylinder bore diameter :**

75.60 - 75.63 mm (2.9764 - 2.9776 in.)

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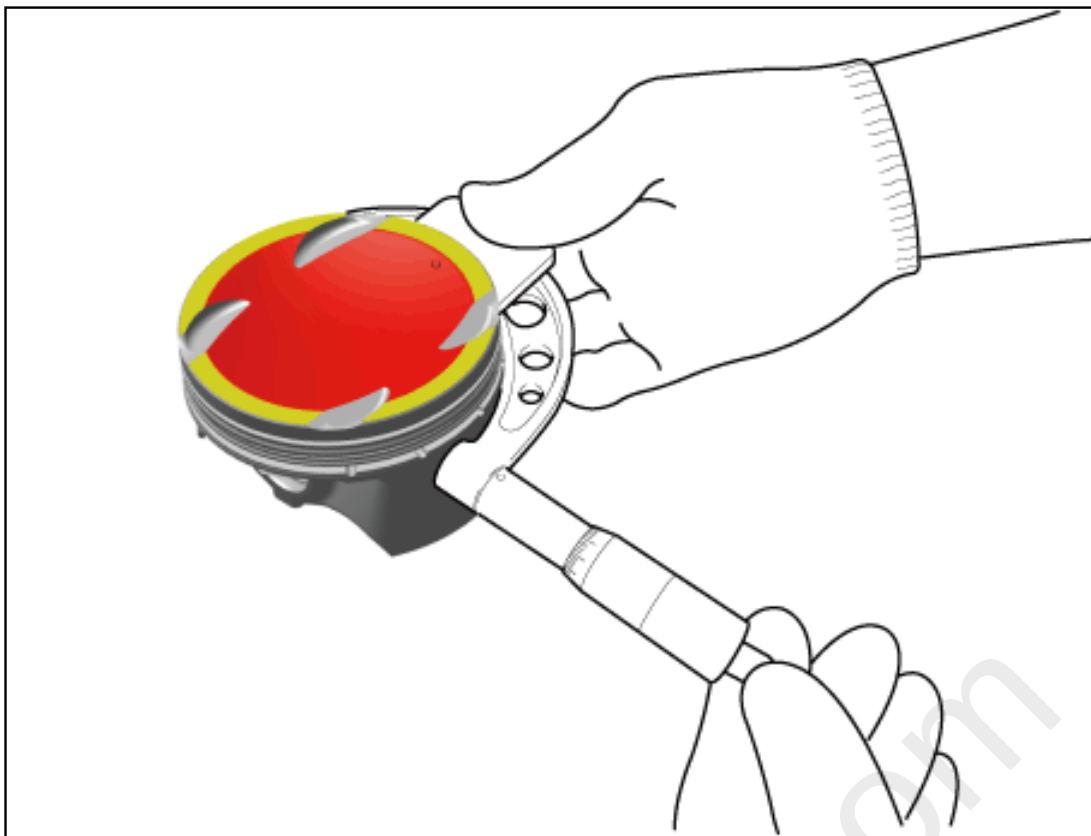


- (2) Measure the piston outside diameter at 13.0 mm (0.5118 in.) from top land of the piston.
- 

**Piston outside diameter :**

75.555 - 75.585mm (2.9746 - 2.9758 in.)

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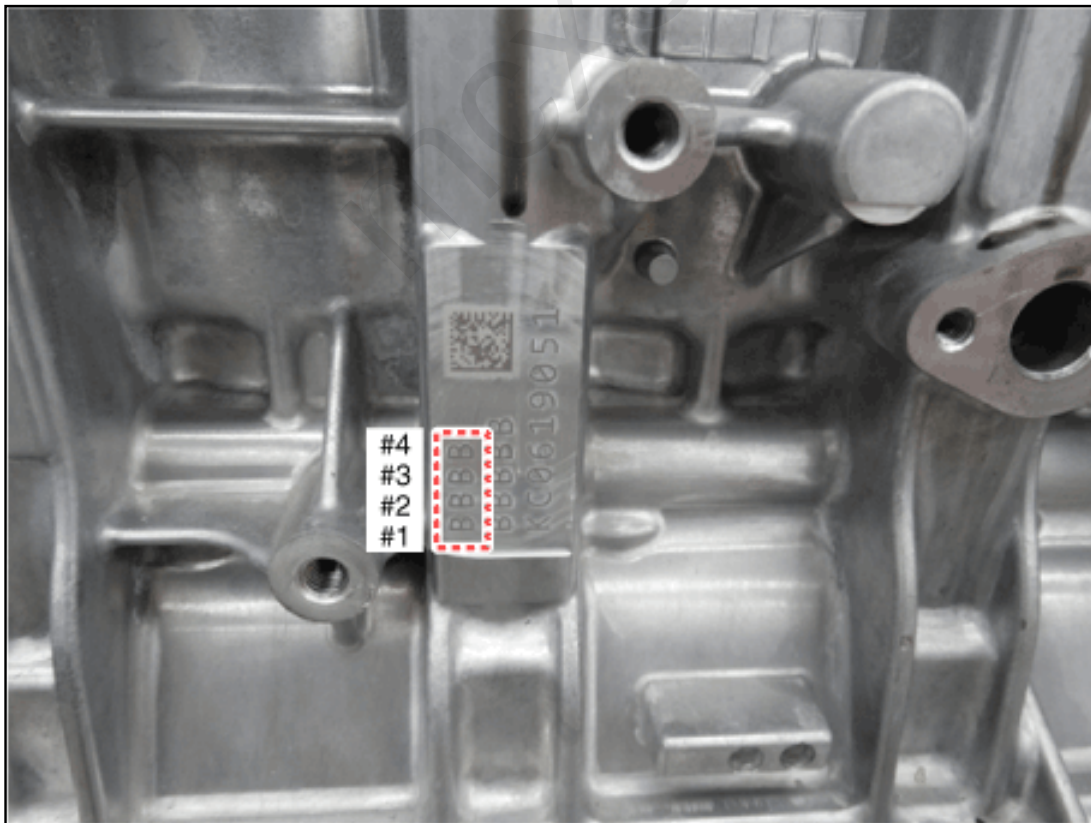


3. Select the piston matching with cylinder bore class. (match classification mark)

**Piston-to-cylinder clearance :**

0.035 - 0.055 mm (0.0014 - 0.0022 in.)

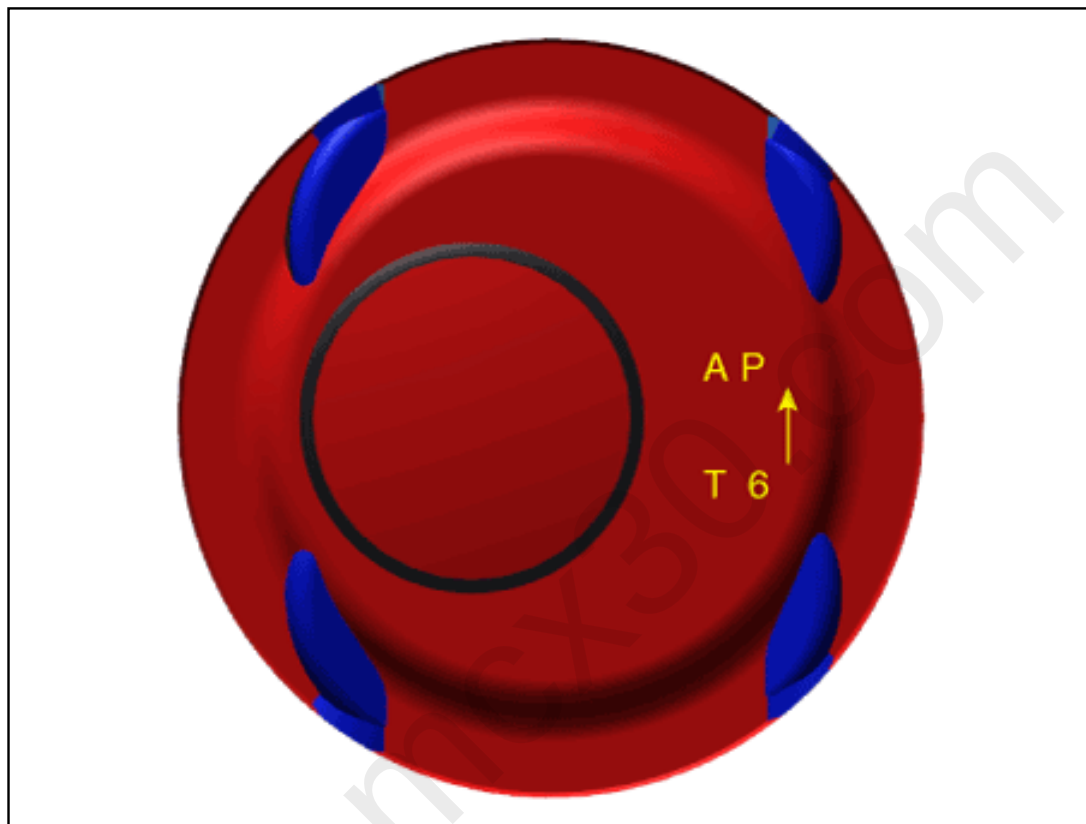
- (1) Check the cylinder bore size mark on the side of the cylinder block.



### Discrimination of Cylinder Bore Size

| Class | Mark | Cylinder bore inner diameter              |
|-------|------|-------------------------------------------|
| a     | A    | 75.60 - 75.61 mm<br>(2.9764 - 2.9768 in.) |
| b     | B    | 75.61 - 75.62 mm<br>(2.9768 - 2.9772 in.) |
| c     | C    | 75.62 - 75.63 mm<br>(2.9772 - 2.9776 in.) |

(2) Check the piston outer diameter size mark (A) on the piston top face.



A : GRADE MARK (A,B, C)

T : T-GDI

5 : 1.6L

P : Specification

### Discrimination of Piston Outer Diameter

| Mark | Piston outer diameter                       |
|------|---------------------------------------------|
| A    | 75.555 - 75.565 mm<br>(2.9746 - 2.9750 in.) |
| B    | 75.565 - 75.575 mm<br>(2.9750 - 2.9754 in.) |
| C    | 75.575 - 75.585 mm<br>(2.9754 - 2.9758 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 ring groove.

---

#### **Piston ring groove width dimension of piston**

No.1 ring : 1.230 - 1.250 mm (0.0484 - 0.0492 in.)

No.2 ring : 1.030 - 1.050 mm (0.0406 - 0.0413 in.)

Oil ring : 2.030 - 2.045 mm (0.0799 - 0.0805 in.)

#### **Piston ring width dimension**

No.1 ring : 1.170 - 1.190 mm (0.0461 - 0.0469 in.)

No.2 ring : 0.970 - 0.990 mm (0.0382 - 0.0390 in.)

Oil ring : 1.920 - 1.960 mm (0.0756 - 0.0772 in.)

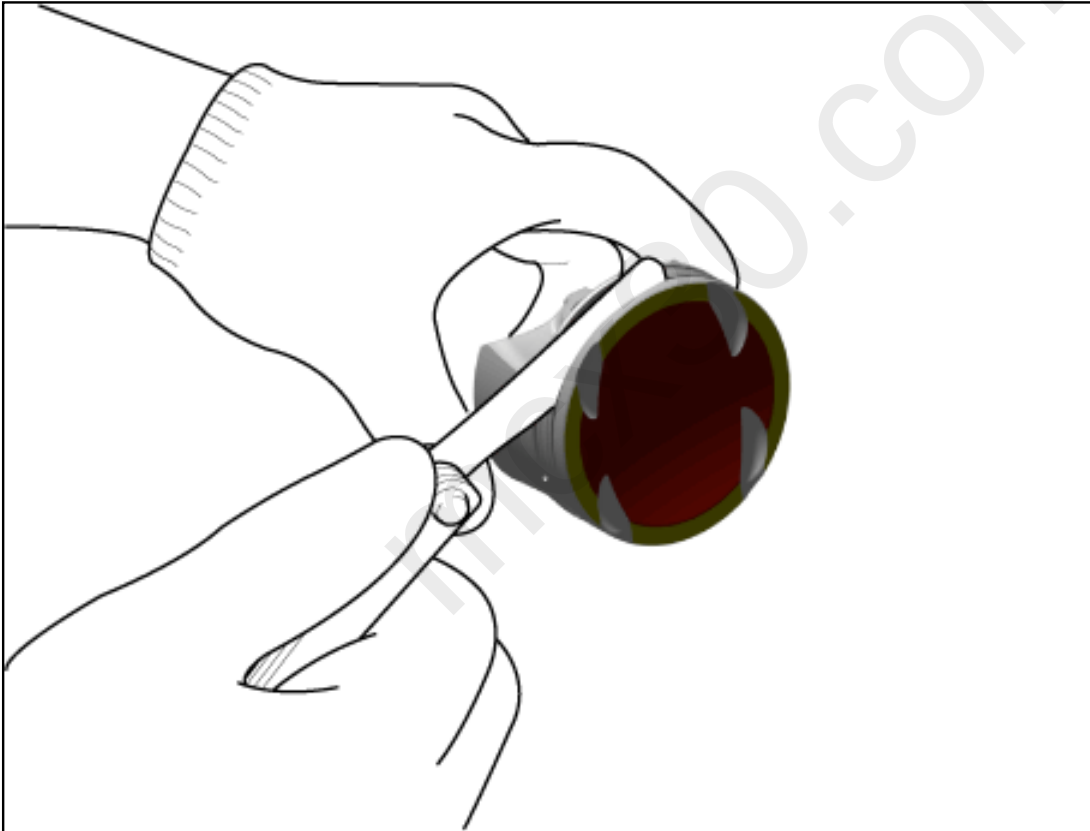
#### **Piston and piston ring side clearance**

No.1 ring : 0.040 - 0.080 mm (0.0016 - 0.0031 in.)

No.2 ring : 0.040 - 0.080 mm (0.0016 - 0.0031 in.)

Oil ring : 0.050 - 0.105 mm (0.0020 - 0.0041 in.)

---



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

2. Inspect the 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 specifications, replace the piston rings. If the gap is too large, recheck the cylinder bore inner diameter.

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**Piston ring end gap**

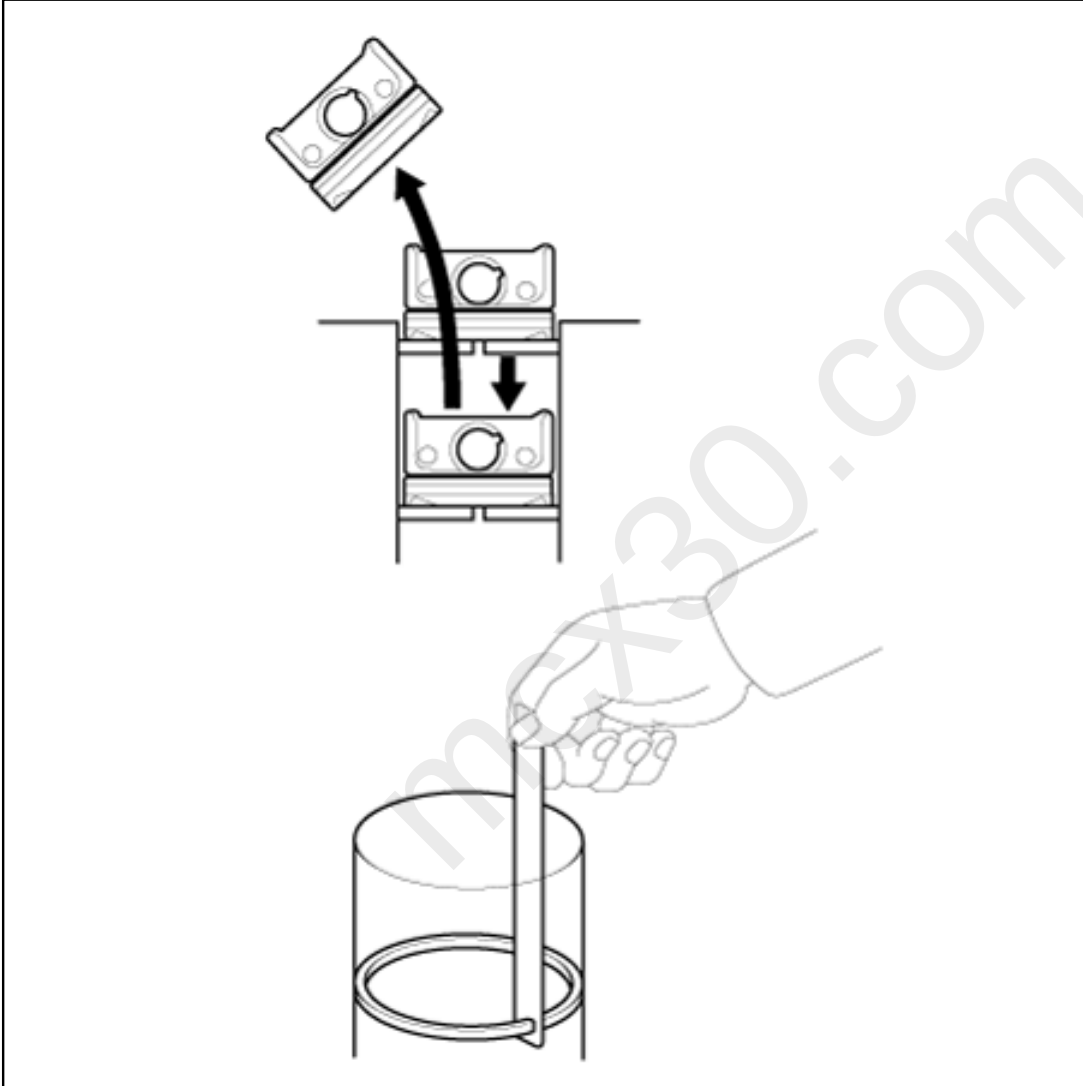
[Standard]

No.1 ring : 0.14 - 0.19 mm (0.0055 - 0.0075 in.)

No.2 ring : 0.20 - 0.30 mm (0.0079 - 0.0118 in.)

Oil ring : 0.10 - 0.40 mm (0.0039 - 0.0157 in.)

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Piston Pin

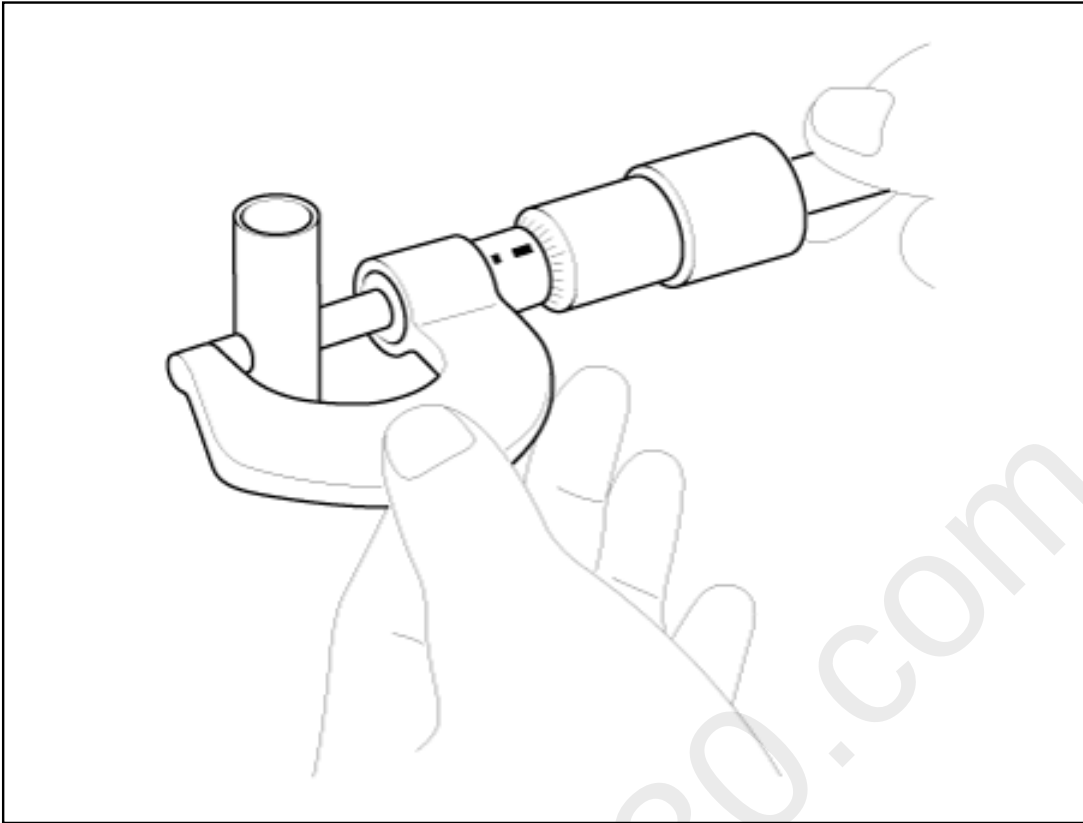
1. Measure the outer diameter of piston pin

---

**Piston pin diameter :**

18.997 - 19.000 mm (0.7479 - 0.7480 in.)

---



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

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**Piston pin-to-piston clearance :**

0.004 - 0.012 mm (0.0002 - 0.0005 in.)

---

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

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**Piston pin-to-connecting rod interference :**

0.005 - 0.014 mm (0.0002 - 0.0006 in.)

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Reassembly



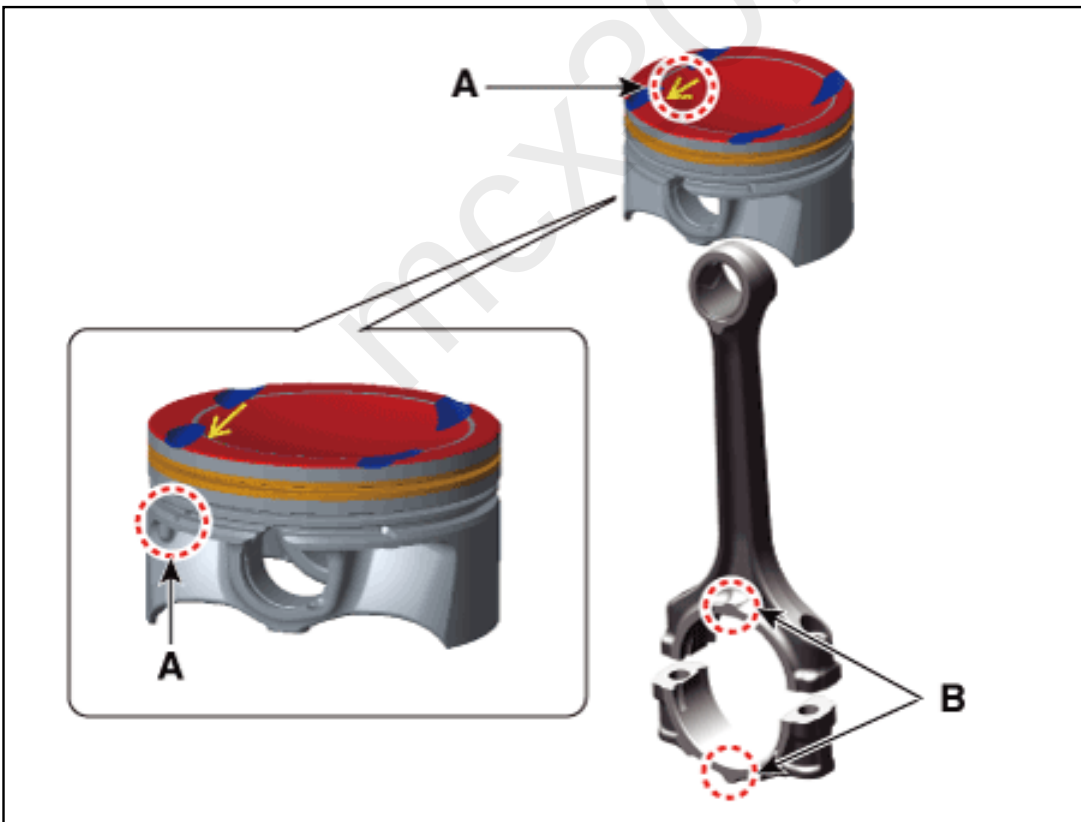
- Thoroughly clean all parts to assembled.
- Before installing the parts, apply fresh engine oil to all sliding and rotating surfaces.
- Always use new gaskets, O-ring and oil seals.

1. Assemble the piston and the connecting rod.

(1) Install the snap ring (A) in one side of the piston pin hole.



(2) Align the piston front mark (A) and the connecting rod front mark (B).

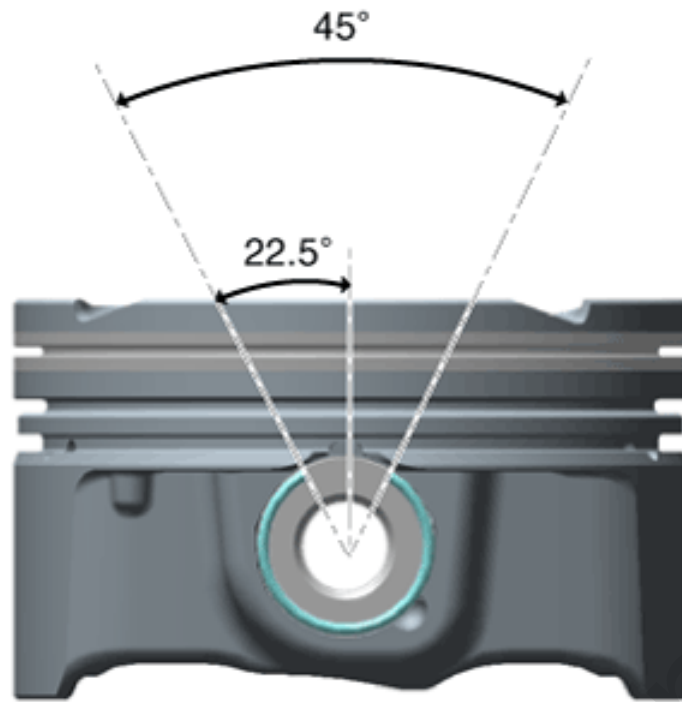


(3) Insert the piston pin (A) into the piston pin hole and the small end bore of connecting rod.

(4) Install the snap ring (B) in the other side after inserting the piston pin.

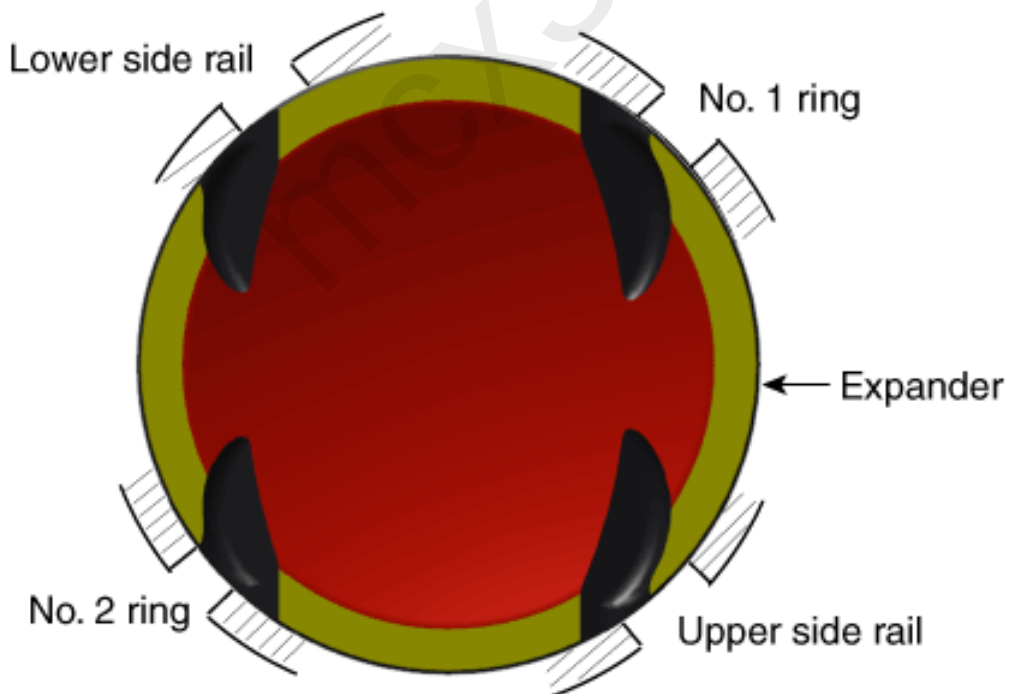


- Before inserting the piston pin, apply sufficient engine oil on the piston's outer surface, piston hole's inner surface and connecting rod's small-end bore.
- When inserting, use caution not to damage or scratch the connecting rods' small-end hole, piston's pin hole and piston pin.
- Install the snap ring surely so that the snap ring contacts the overall groove of the piston's pin hole.
- Assemble so that the cut surface of the snap ring is located within the upper 45° range.



2. Install the piston rings.

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

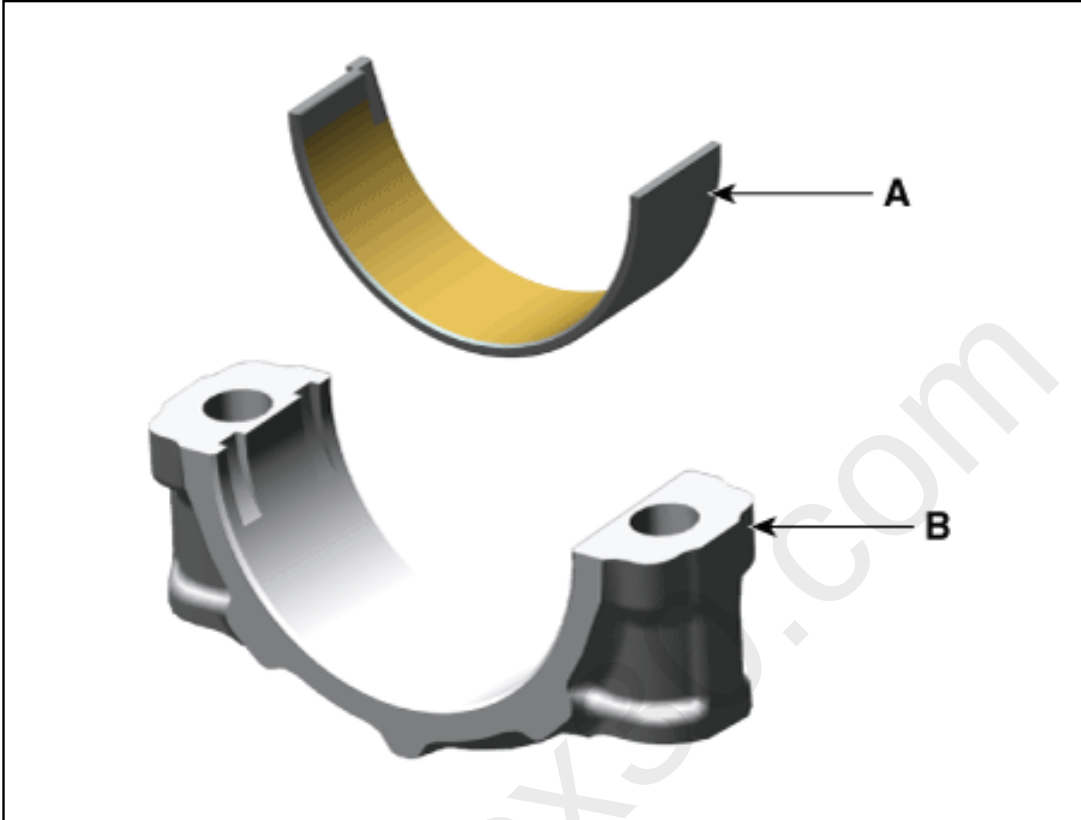




- The side rail is an asymmetric barrel type and install it so that DMC mark faces upward (Cylinder head side).  
At this time, paint identification mark should be positioned at the right side of ring cutting section.

3. Install the connecting rod bearings.

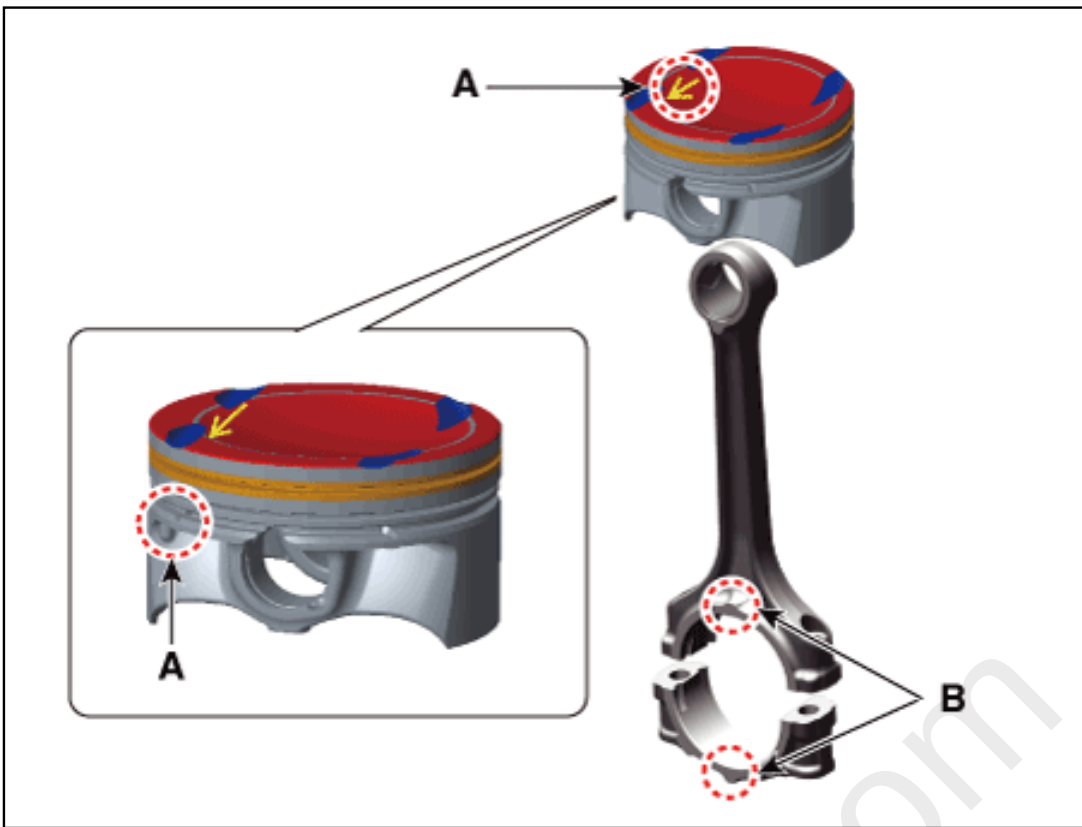
- (1) Align the bearing (B) claw with the groove of the connecting rod or bearing cap (A).
- (2) Install the bearings (B) in the connecting rod and bearing cap (A).



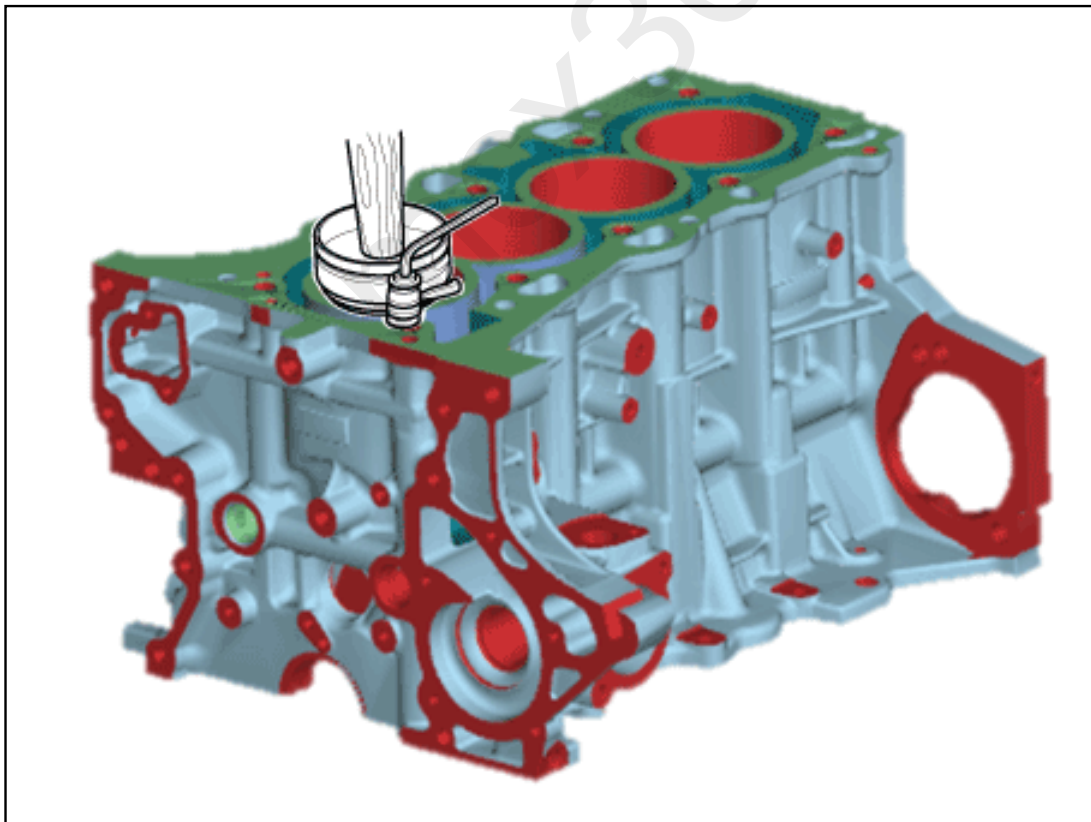
4. Install the piston and connecting rod assembly.



- Before installing the piston, apply a coat of engine oil to the piston ring grooves and cylinder bores.
- The piston front mark (A) and the connecting rod front mark (B) must face the timing chain side of the engine.



- (1) Install the ring compressor, check that the rings are securely in place, then position the piston in the cylinder, and tap it in using the wooden handle of a hammer.
- (2) Stop after the ring compressor pops free, and check the connecting rod-to-crank journal alignment before pushing the piston into place.





- Maintain downward force on the ring compressor to prevent the rings from expanding before entering the cylinder bore.

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

**Tightening torque :**

17.7 - 21.6 N.m (1.8 - 2.2 kgf.m, 13.0 - 15.9 lb-ft) + 68 - 72°



- Always use new connecting rod cap bolts.

5. Assemble the other parts in the reverse order of disassembly.

## Disassembly

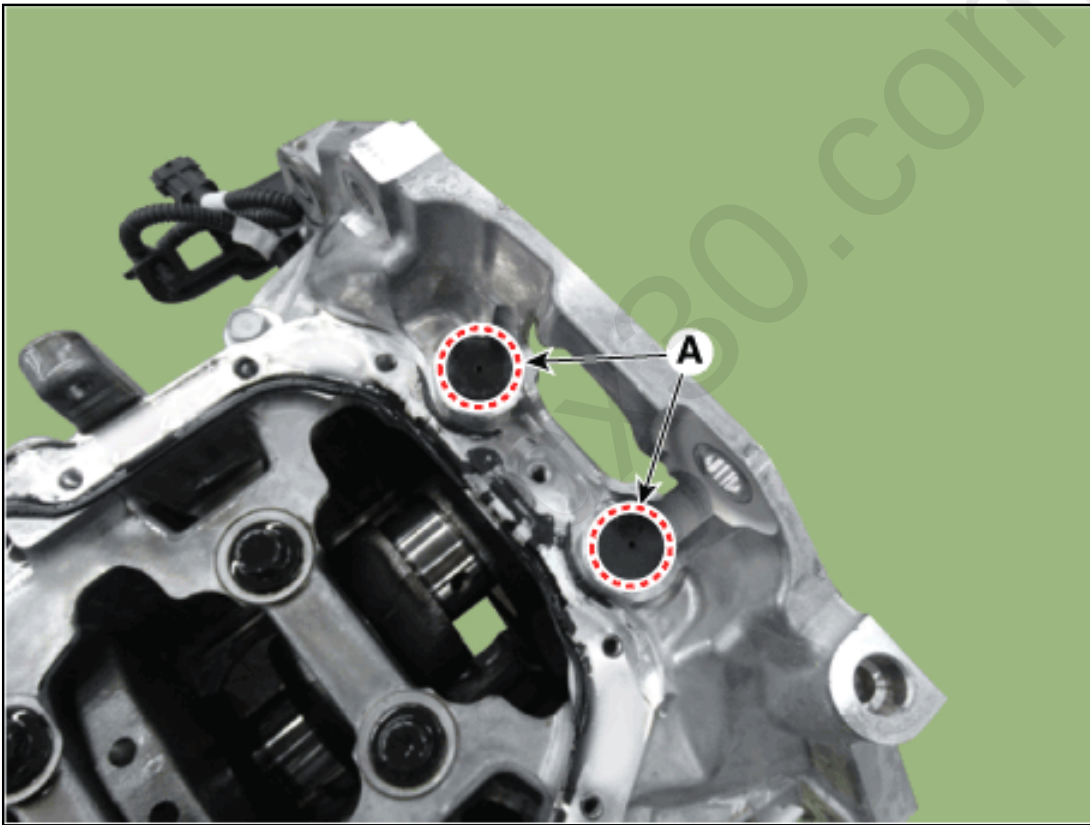


- Use fender covers to avoid damaging painted surfaces.
- To avoid damage, unplug the wiring connectors carefully while holding the connector portion.



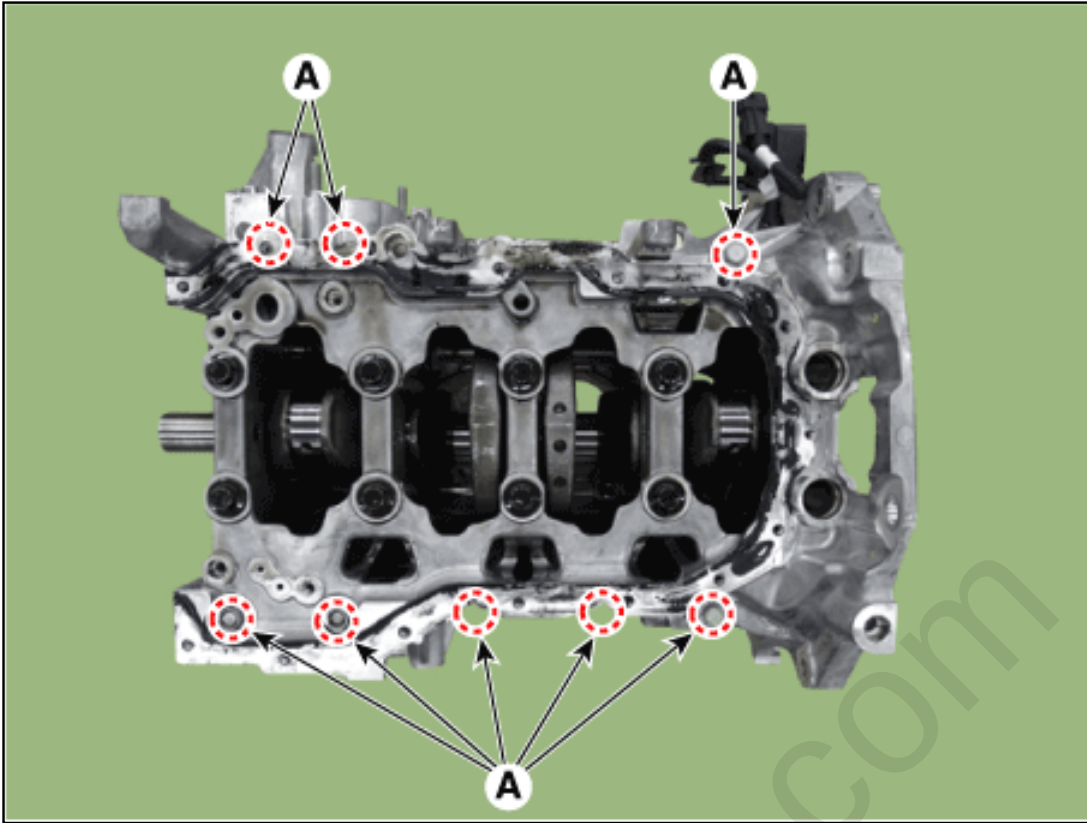
- Mark all wiring connector and hoses to avoid misconnection.
- To release the fuel system pressure before removing the engine assembly, start the engine without fuel pump relay. Then, switch "OFF" the ignition when engine stops.
- Turn the crankshaft pulley so that the No. 1 piston is at top dead center.

1. Remove the piston and connecting rod assembly.  
**(Refer to Cylinder Block - "Piston and Connecting Rod")**
2. Remove the air conditioning compressor.  
**(Refer to Heating, Ventilation and Air Conditioning - "Compressor")**
3. Remove the rear caps (A).

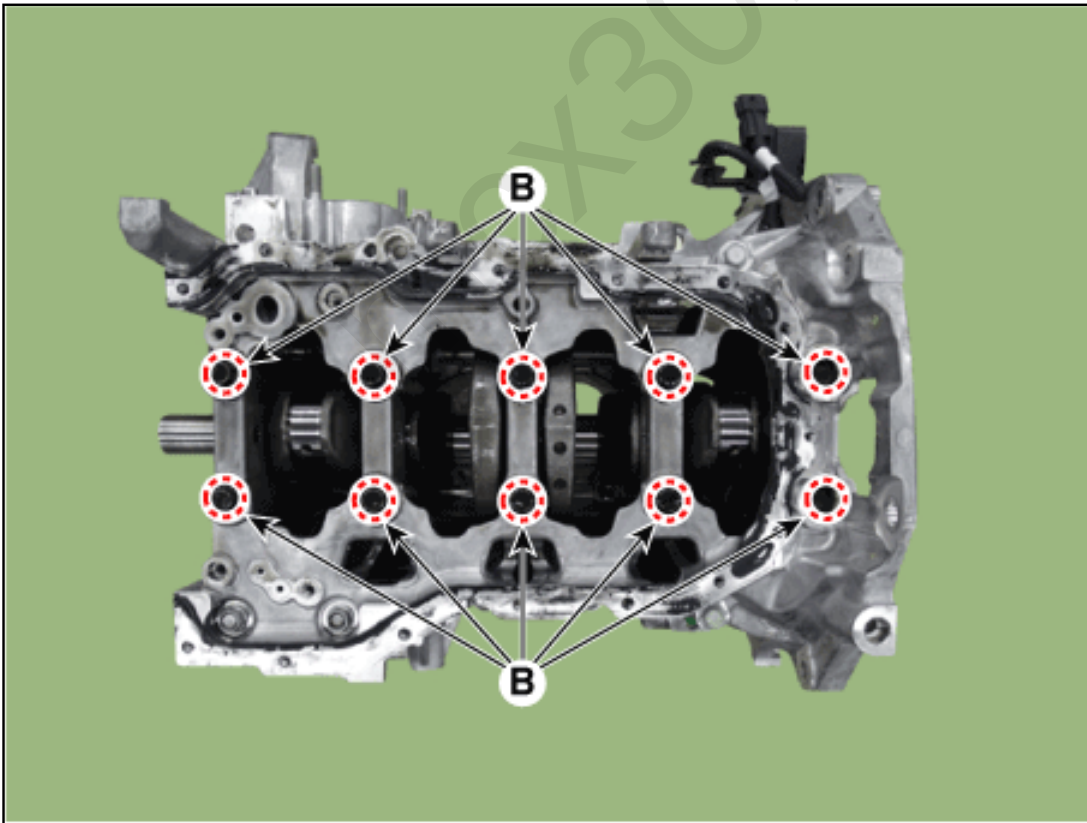


4. Remove the lower crankcase.

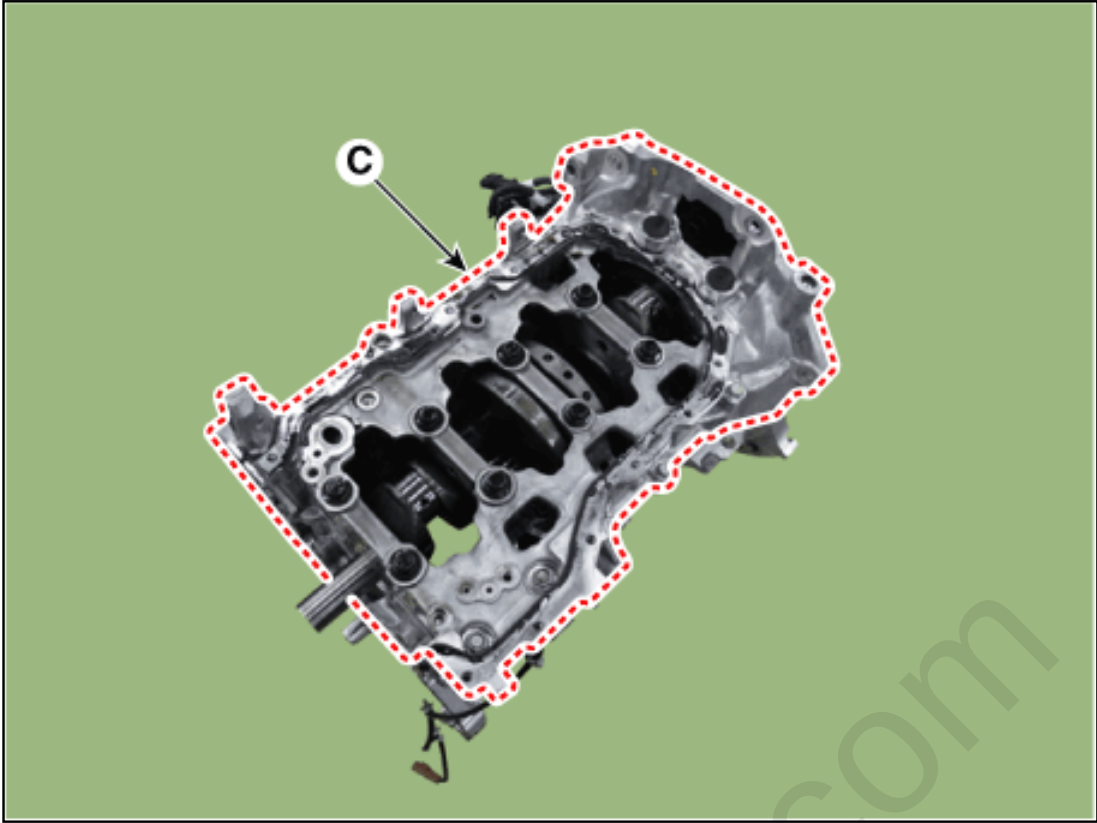
(1) Remove the lower crankcase mounting bolts (A).



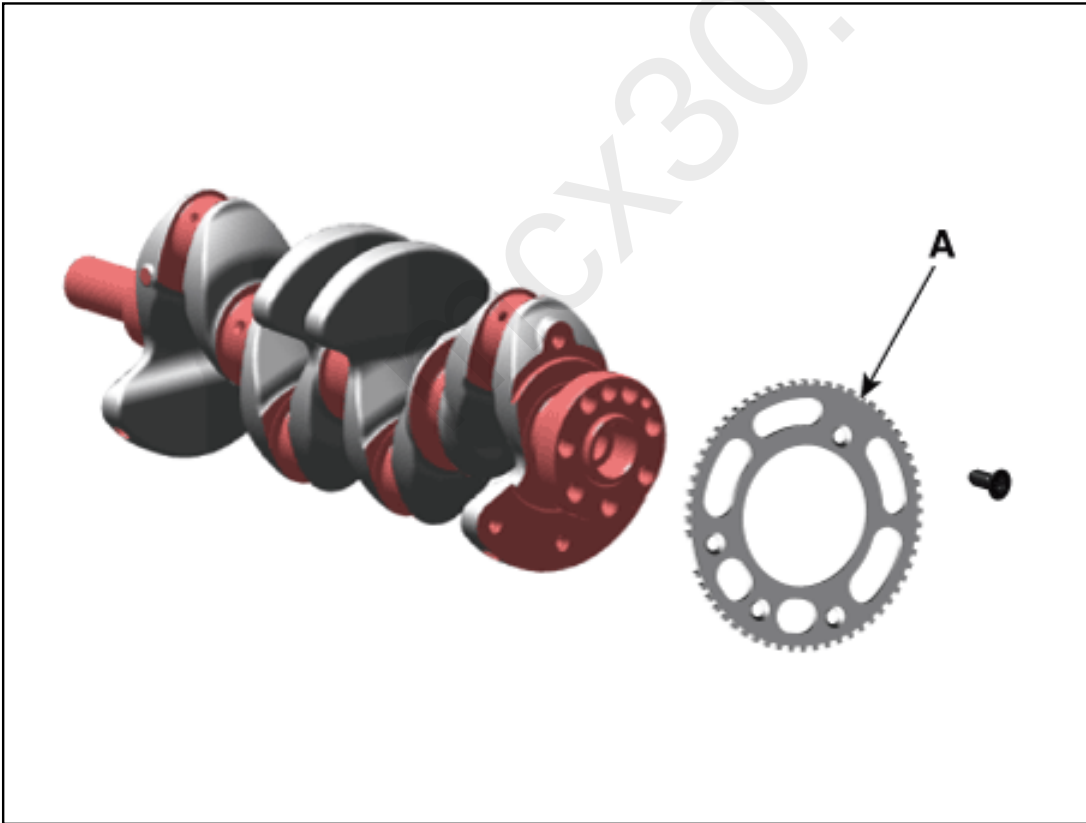
(2) Remove the crankshaft bearing cap bolts (B).



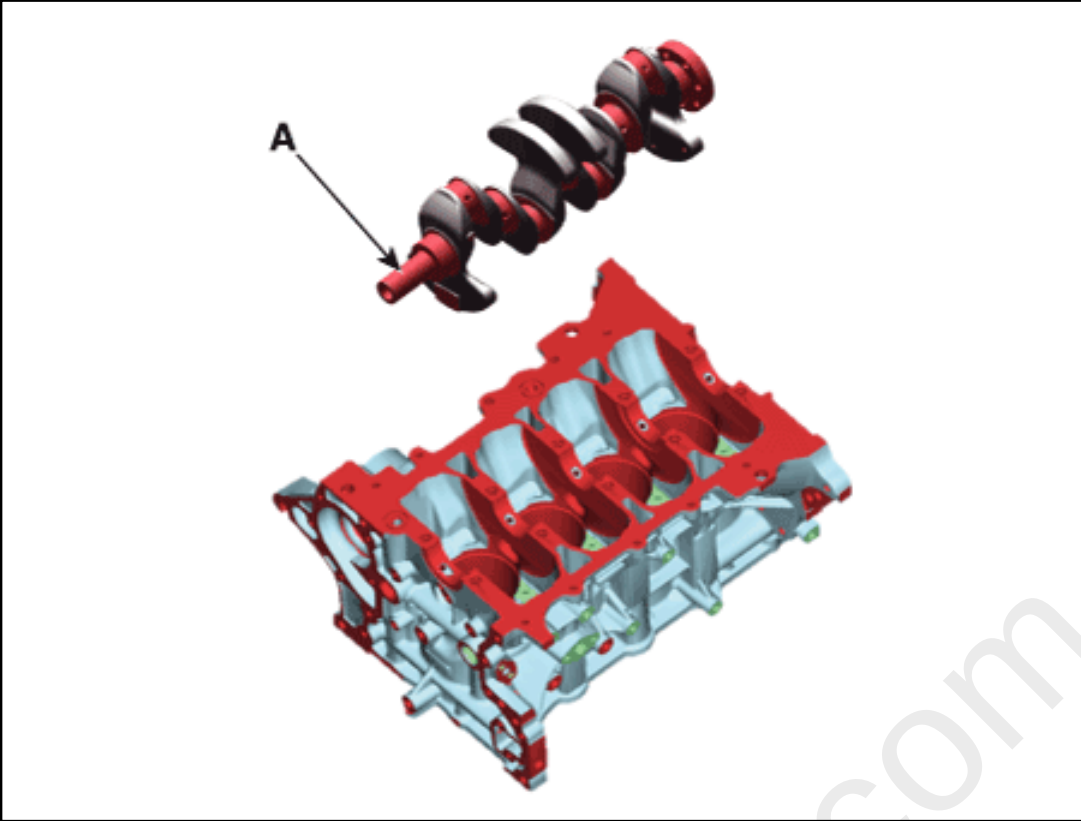
(3) Remove the lower crankcase (A).



5. Remove the crankshaft position sensor wheel (A).



6. Lift the crankshaft (A) out of the engine block, being careful not to damage journals.



#### Inspection

1. Check the crankshaft bearing oil clearance.
  - (1) Clean each main journal and lower bearing with a clean shop towel.
  - (2) Place one strip of plastigauge across each main journal.
  - (3) Reinstall the bearing caps with their lower bearings, then tighten the bolts.

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#### **Tightening torque :**

Crank lower case mounting bolts :

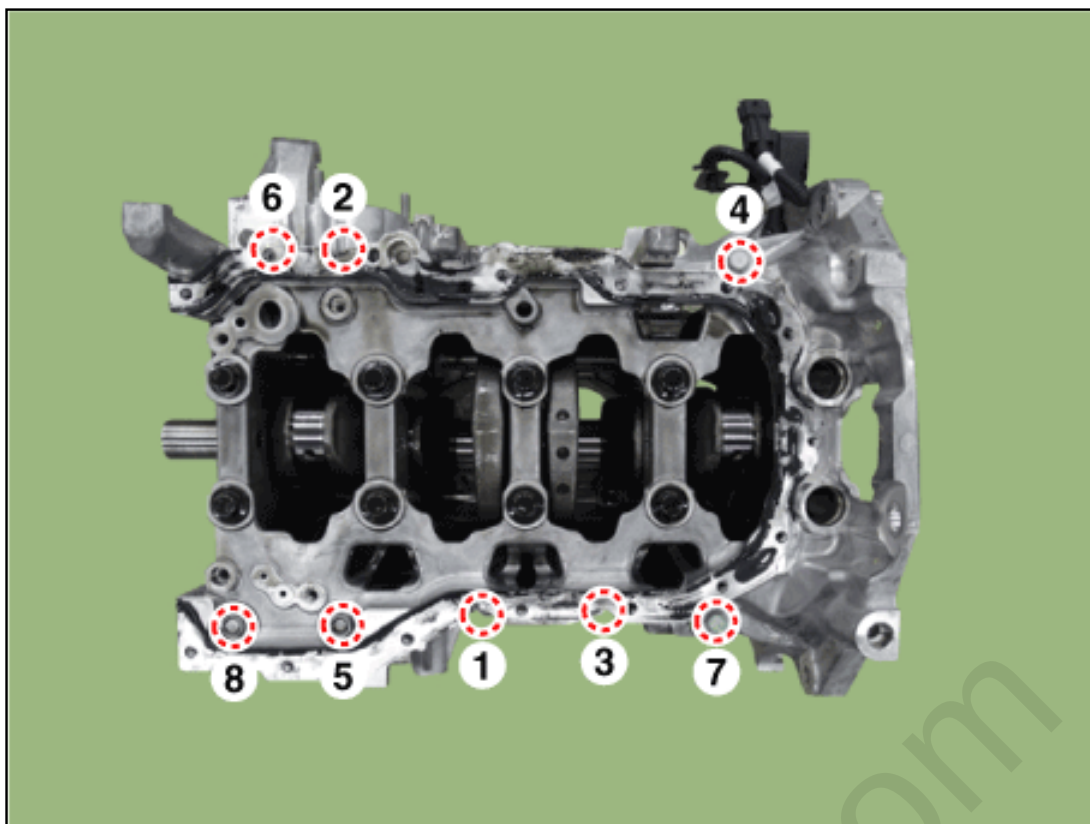
18.6 - 23.5 N.m (1.9 - 2.4 kgf.m, 13.7 - 17.4 lb-ft)

Bearing cap mounting bolts :

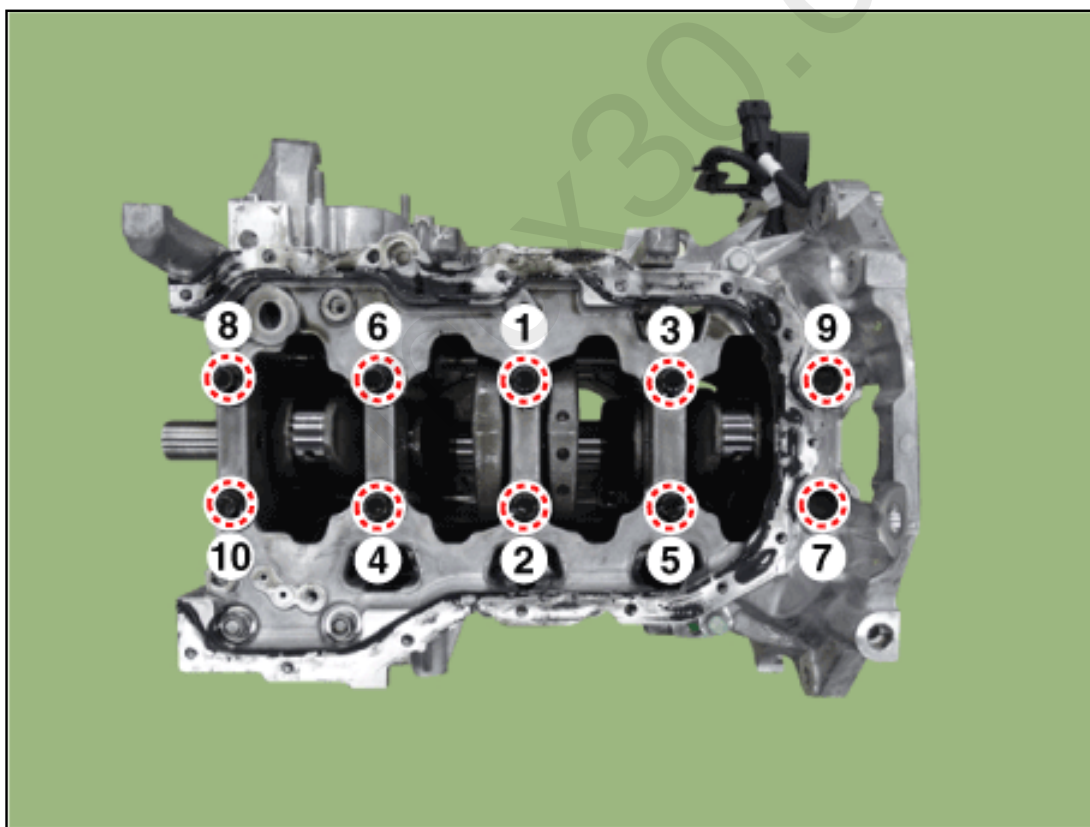
27.5 - 31.4 N.m (2.8 - 3.2 kgf.m, 20.3 - 23.1 lb-ft) + 118 - 122°

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[Crank lower case mounting bolts]



[Bearing cap mounting bolts]



•Do not turn the crankshaft.

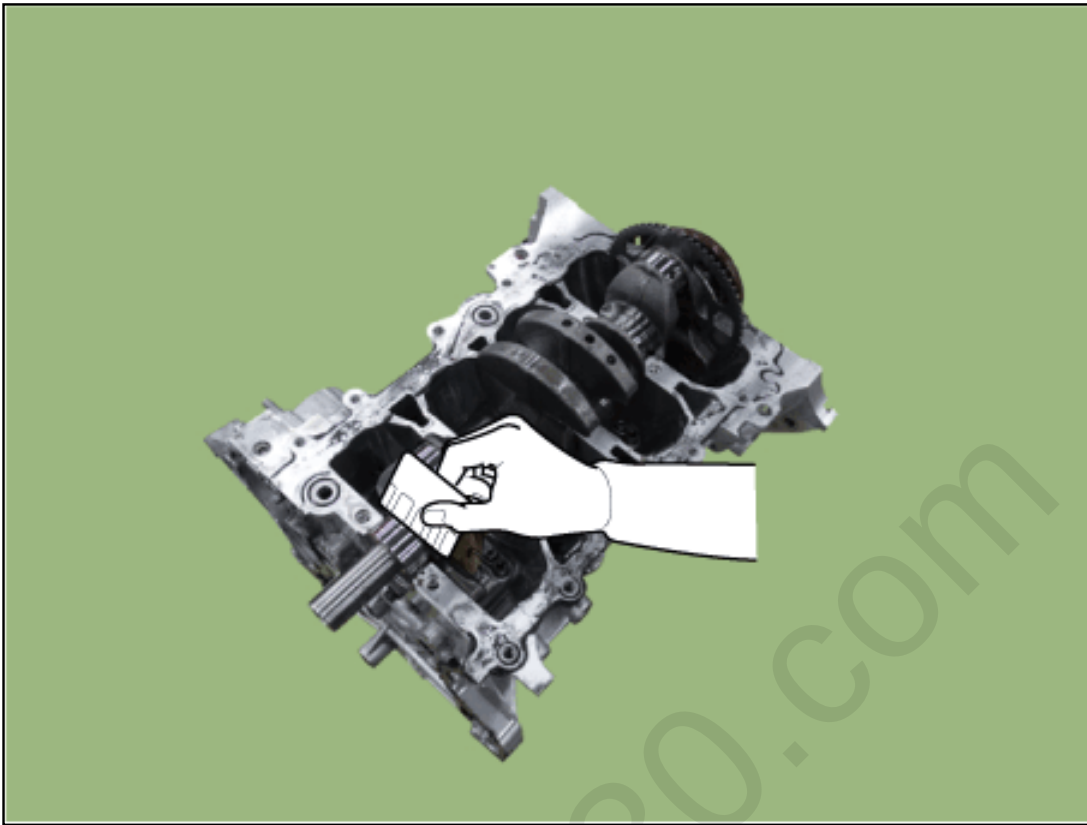
(4) Remove the lower crankcase, and measure the widest part of the plasticgauge.

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**Bearing oil clearance :**

0.030 - 0.048 mm (0.0012 - 0.0019 in.)

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(5) If the plasticgauge measures too wide or too narrow, remove the upper and lower bearing and then install a new bearings with the same color mark (select the color as shown in the next column). Recheck the oil clearance.



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

(6) If the plasticgauge 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.



- If the plasticgauge 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.
- If the marks are indecipherable because of an accumulation of dirt and dust, do not scrub them with a wire brush or scraper. Clean them only with solvent or detergent.

**Cylinder Block Crankshaft Journal Bore Mark Location**

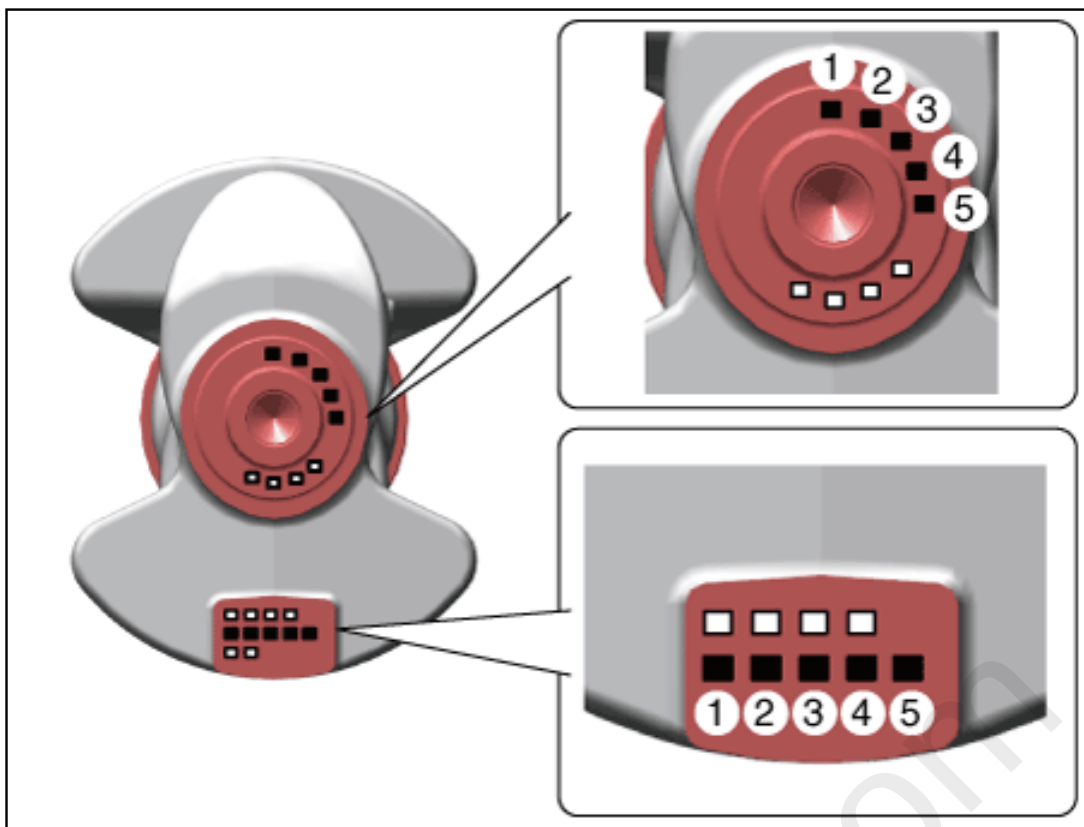
Letters have been stamped on the side surface of the block as a mark for the size of each of the 5 main journal bores.

Use them, and the numbers or letters stamped on the crank (marks for main journal size), to choose the correct bearings.



| Class | Mark | Cylinder block crankshaft journal bore inner diameter |
|-------|------|-------------------------------------------------------|
| a     | A    | 50.000 - 50.006 mm<br>(1.9685 - 1.9687 in.)           |
| b     | B    | 50.006 - 50.012 mm<br>(1.9687 - 1.9690 in.)           |
| c     | C    | 50.012 - 50.018 mm<br>(1.9690 - 1.9692 in.)           |

Crankshaft Main Journal Mark Location

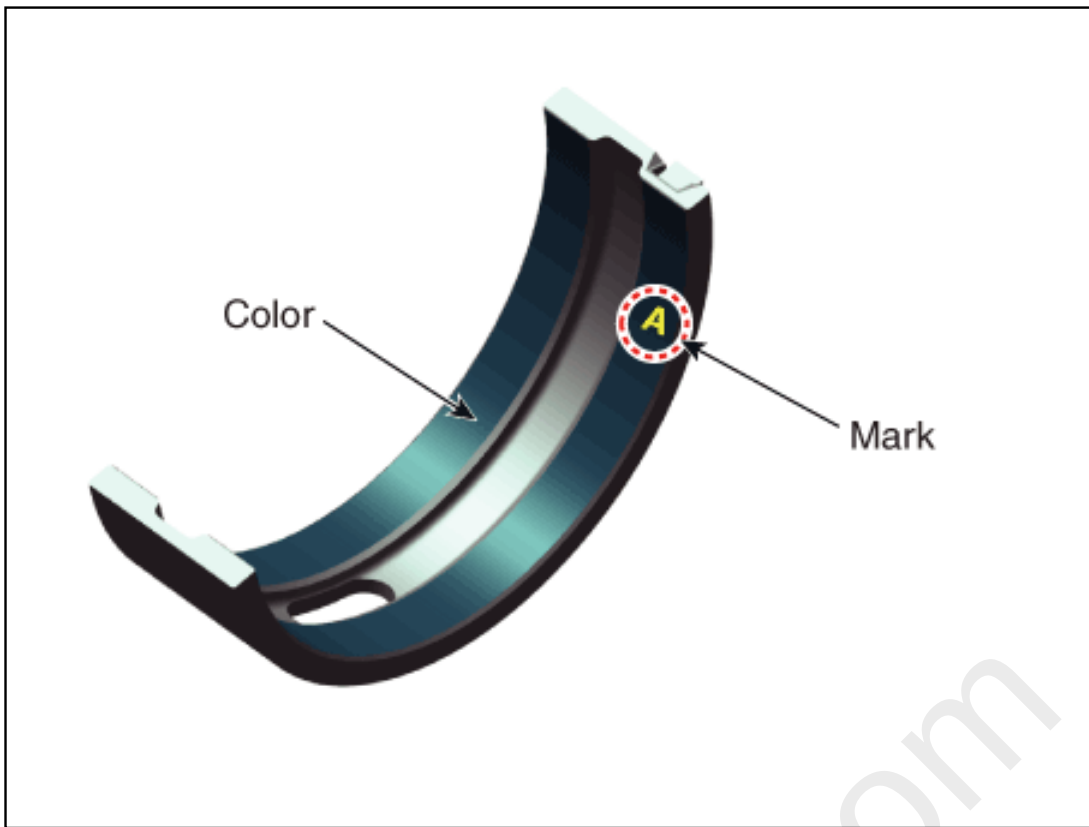


#### Discrimination Of Crankshaft Main Journal

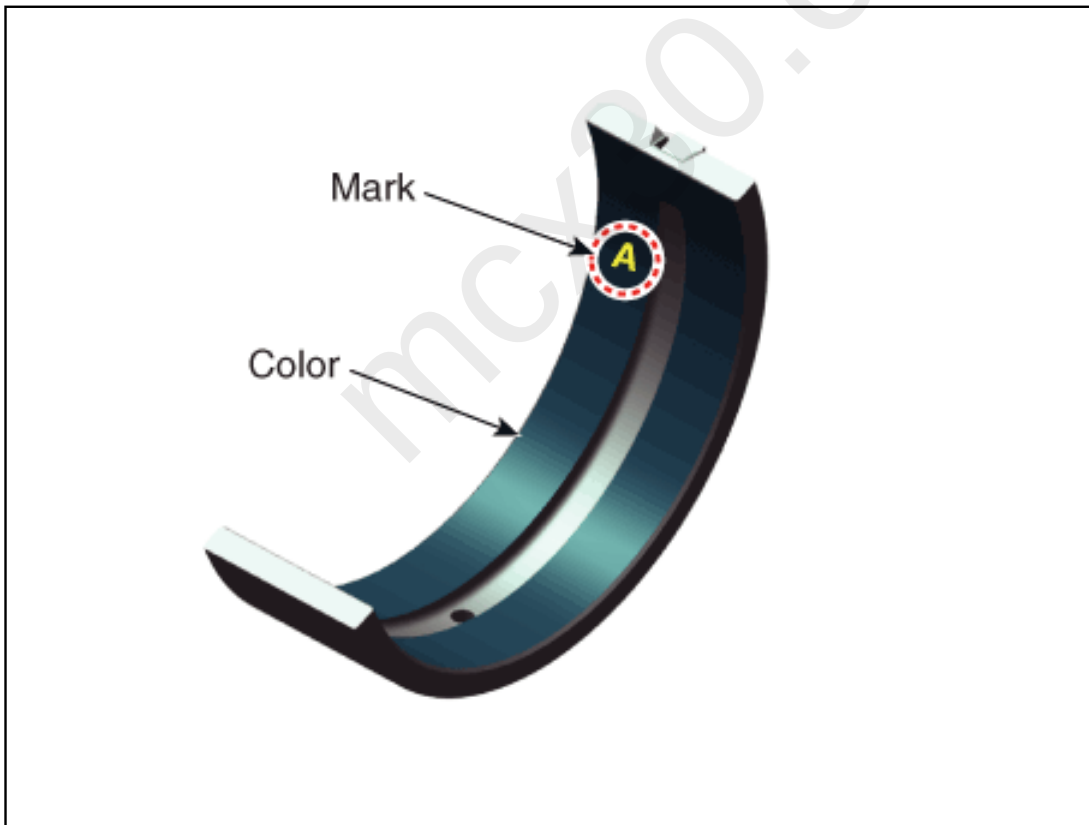
| Class | Mark | Crankshaft main journal outer diameter      |
|-------|------|---------------------------------------------|
| I     | 1    | 44.954 - 44.960 mm<br>(1.7698 - 1.7701 in.) |
| II    | 2    | 44.948 - 44.954 mm<br>(1.7696 - 1.7698 in.) |
| III   | 3    | 44.942 - 44.948 mm<br>(1.7694 - 1.7696 in.) |

#### Crankshaft Bearing Identification Mark Location

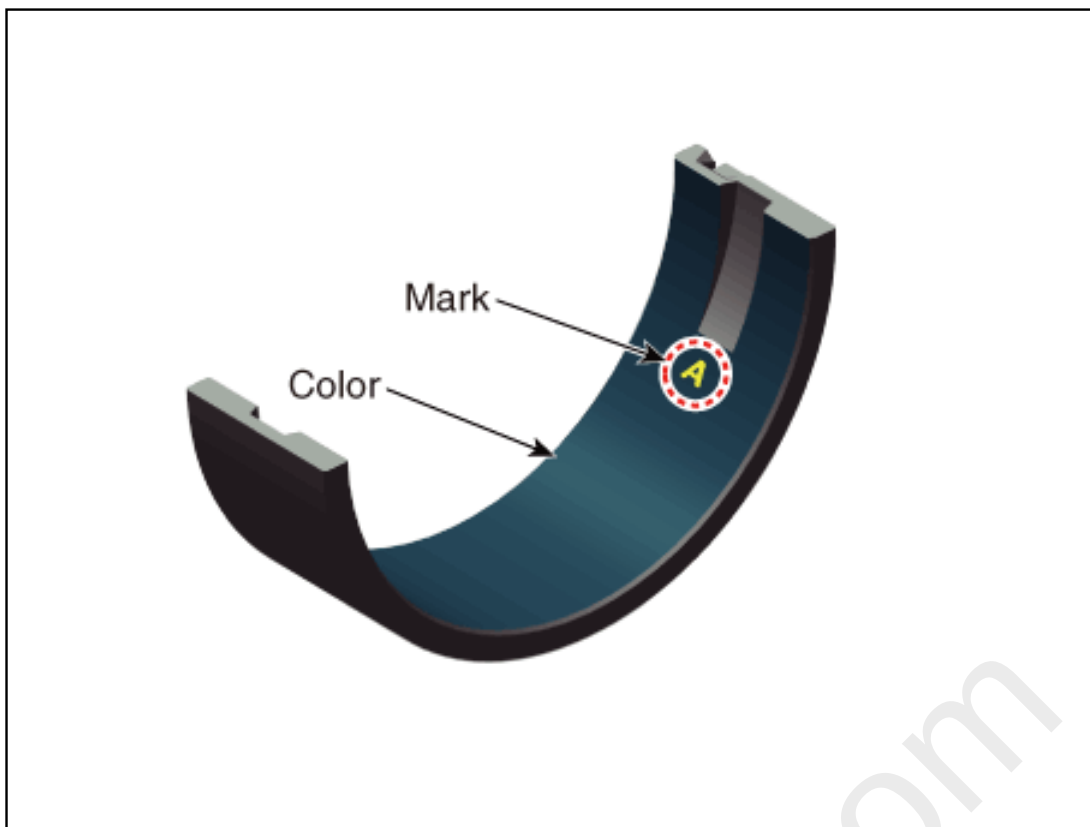
[No. 2, No. 4 Journal Upper Bearing]



[No. 1, No. 3, No. 5 Journal Upper Bearing]



[Lower Bearing]



Discrimination Of Crankshaft Bearing

| Class | Color | Bearing thickness                         |
|-------|-------|-------------------------------------------|
| A     | Blue  | 2.524 - 2.527 mm<br>(0.0994 - 0.0995 in.) |
| B     | Black | 2.521 - 2.024 mm<br>(0.0993 - 0.0797 in.) |
| C     | None  | 2.518 - 2.521 mm<br>(0.0991 - 0.0993in.)  |
| D     | Green | 2.515 - 2.518 mm<br>(0.0990 - 0.0991 in.) |
| E     | Red   | 2.512 - 2.515 mm<br>(0.0989 - 0.0990 in.) |

(7) Select the bearing by using selection table.

Crankshaft Main Bearing Selection Table

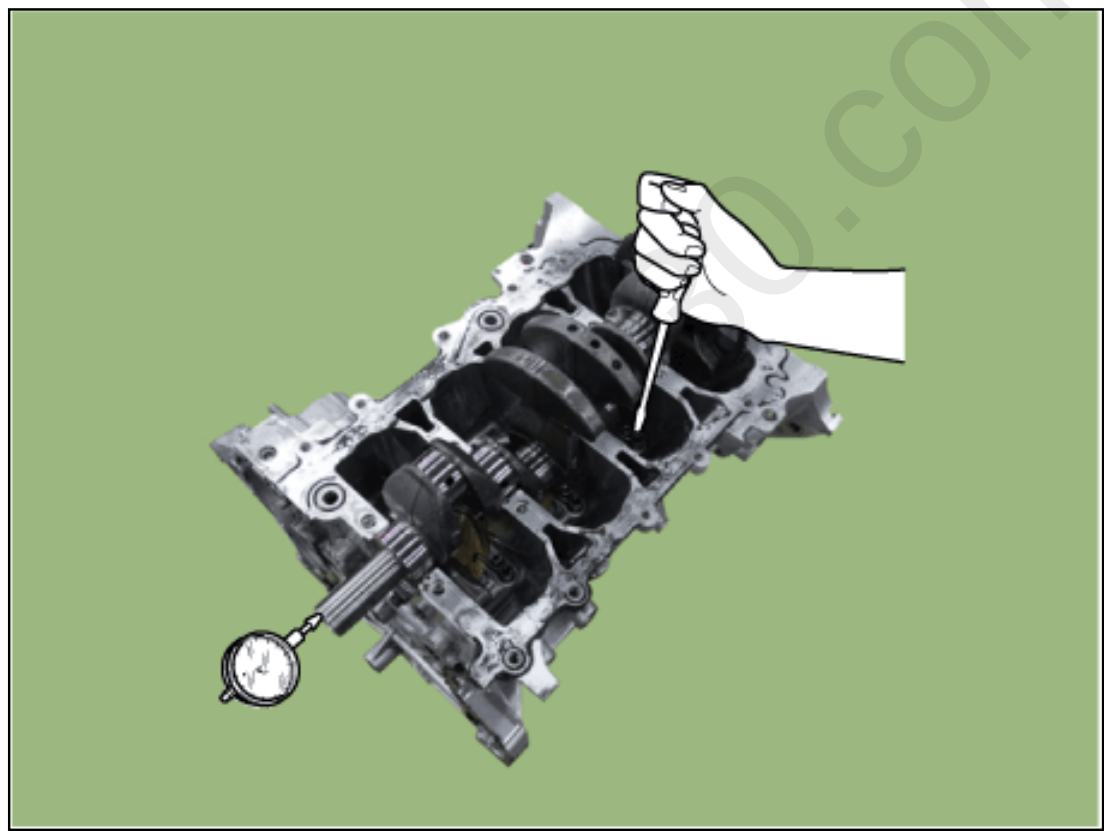
|                               |         | Main journal bore Identification Mark |           |           |
|-------------------------------|---------|---------------------------------------|-----------|-----------|
|                               |         | a (A)                                 | b (B)     | c (C)     |
| Crank shaft main journal mark | I (1)   | E (Red)                               | D (Green) | C (None)  |
|                               | II (2)  | D (Green)                             | C (None)  | B (Black) |
|                               | III (3) | C (None)                              | B (Black) | A (Blue)  |

2. Check the crankshaft end play.

Using a dial indicator, measure the thrust clearance while prying the crankshaft back and forth with a screwdriver.

**Crankshaft end play**

0.100 - 0.280 mm (0.0039 - 0.0110 in.)



If the end play is greater than maximum, replace the thrust bearings as a set.

**Thickness of thrust bearing :**

2.910 - 2.950 mm (0.1146 - 0.1161 in.)

3. Inspect the crankshaft main journals and pin journals.  
Using a micrometer, measure the diameter of each main journal and pin journal.
- 

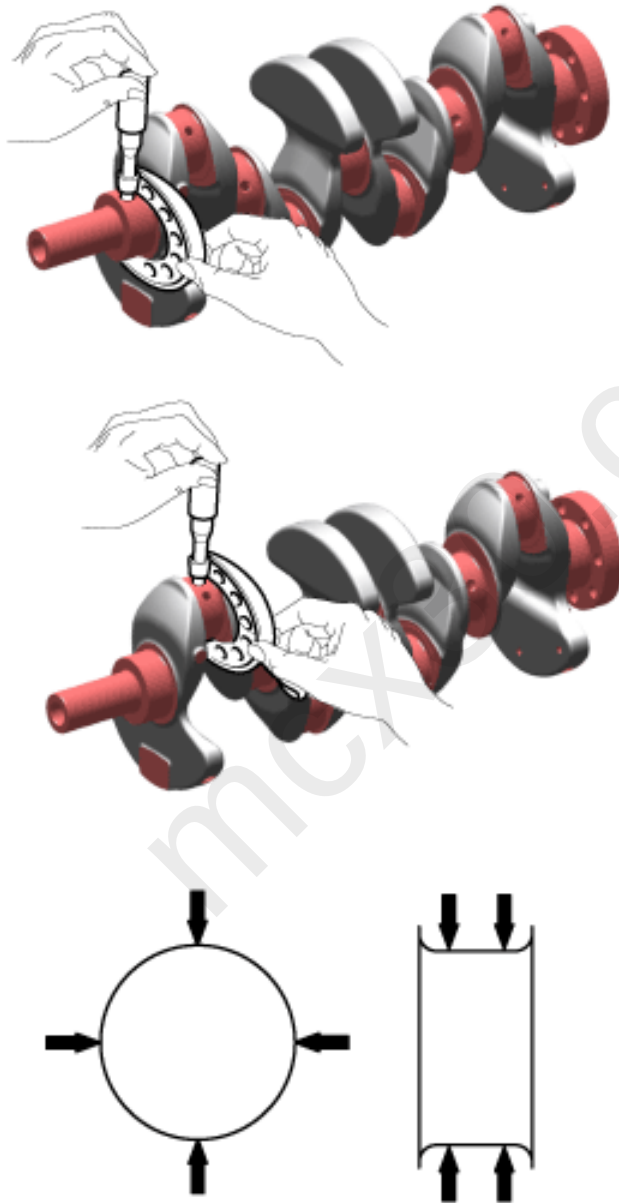
**Main journal diameter :**

44.942 - 44.960 mm (1.7694 - 1.7701 in.)

**Crank pin diameter :**

41.954 - 41.972 mm (1.6517 - 1.6524 in.)

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Reassembly

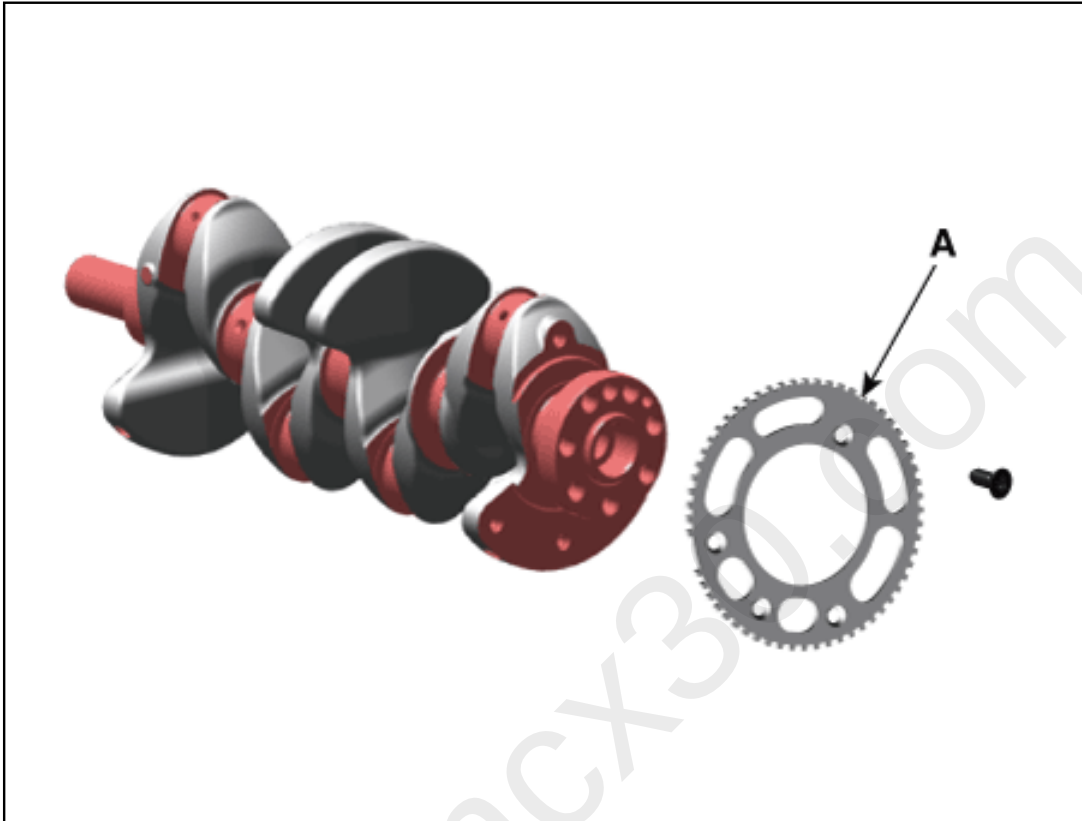


- Thoroughly clean all parts to assembled.
- Before installing the parts, apply fresh engine oil to all sliding and rotating surfaces.
- Always use new gaskets, O-ring and oil seals.

1. Install the crankshaft position sensor wheel (A).

**Tightening torque :**

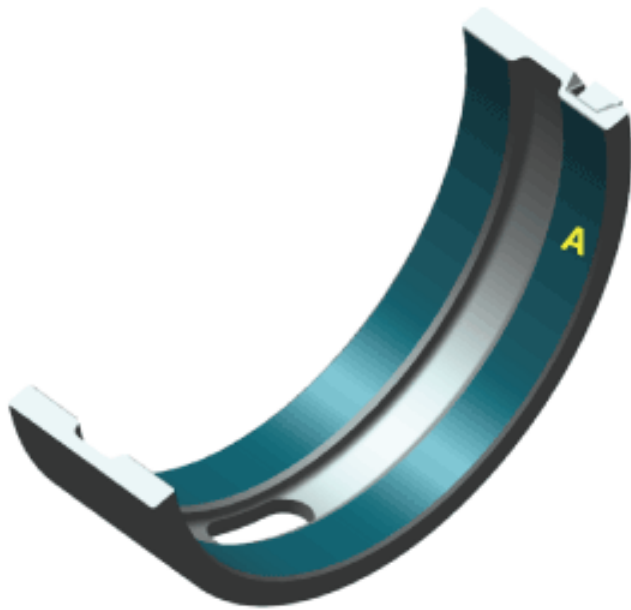
12.7 - 13.7 N.m (1.3 - 1.4 kgf.m, 9.4 - 10.1 lb-ft)



2. Install the main bearing.



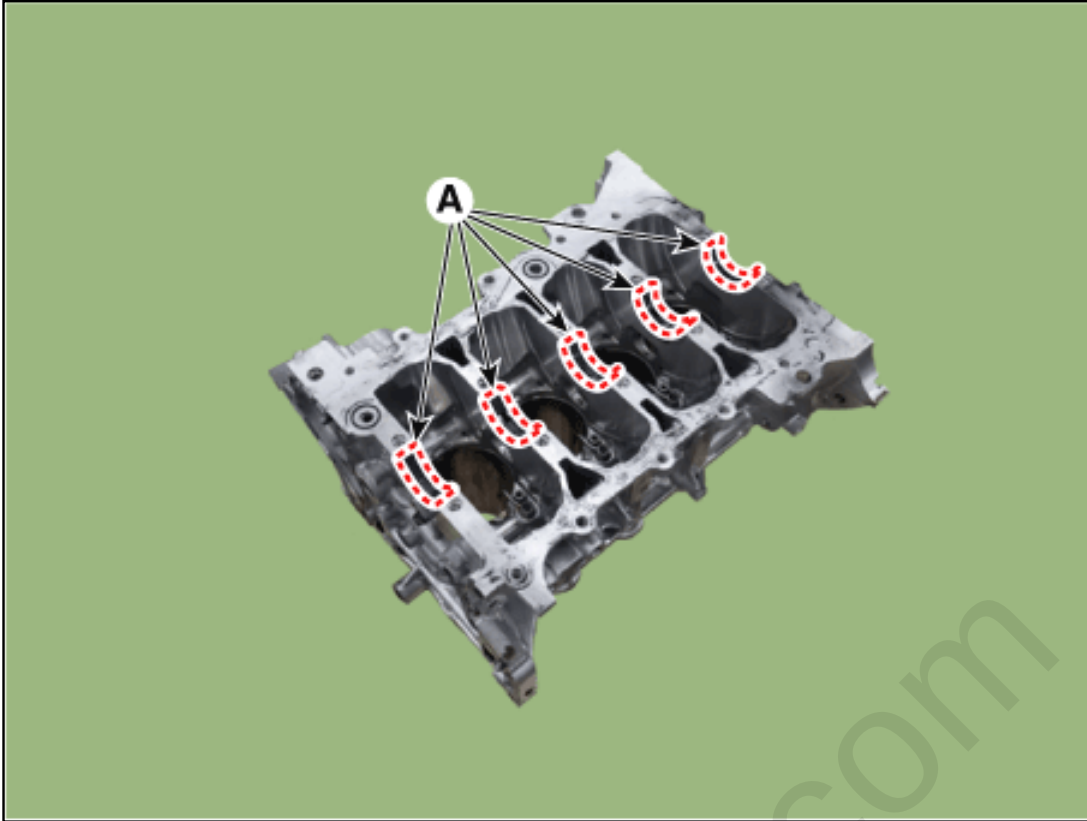
- When installing the crankshaft upper bearings, the upper bearings should fit for each journal.  
[No. 2, No. 4 Journal Upper Bearing]



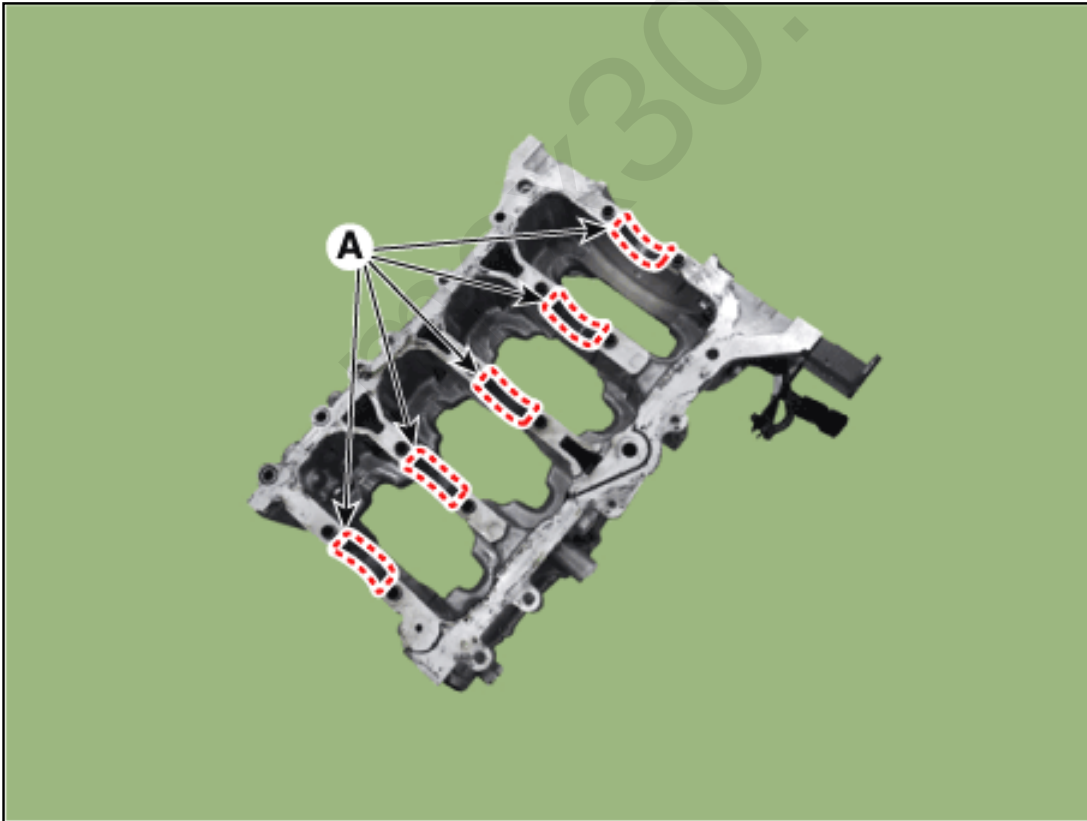
[No. 1, No. 3, No. 5 Journal Upper Bearing]



(1) Align the bearing claw with the groove of the cylinder block, and push in the 5 upper bearings (A).



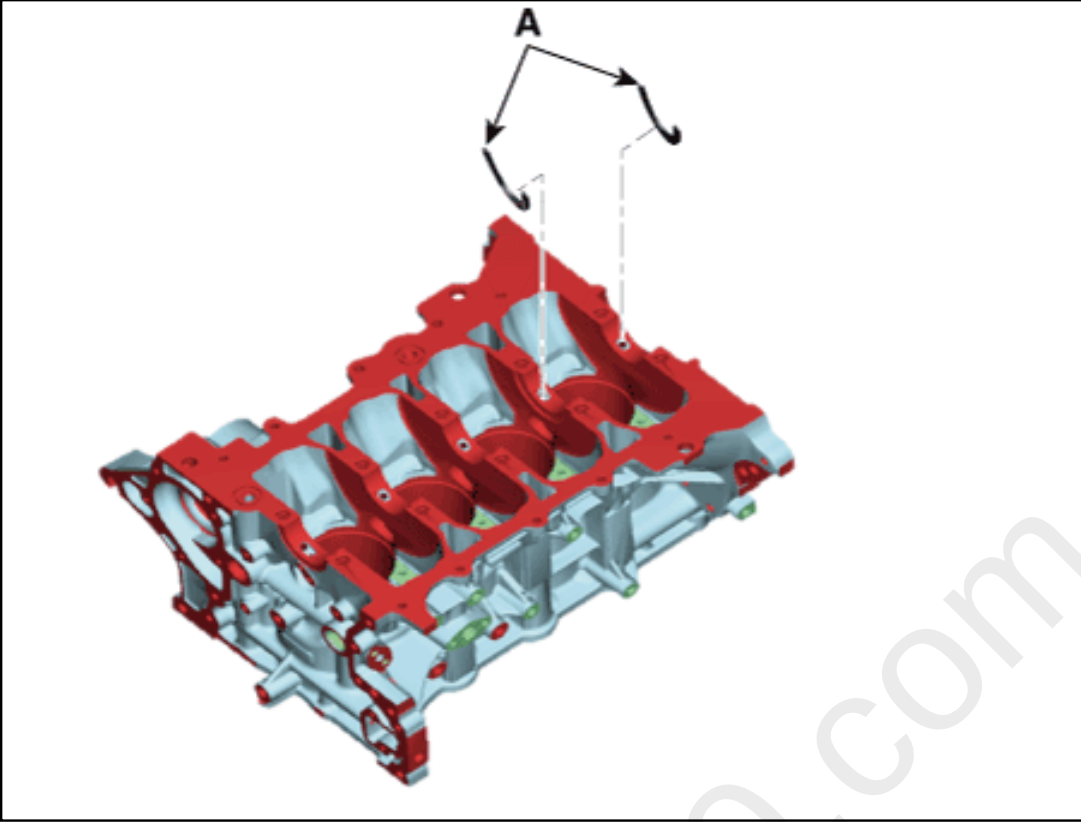
(2) Align the bearing claw with the groove of the crank lower case, and push in the 5 lower bearings (A).



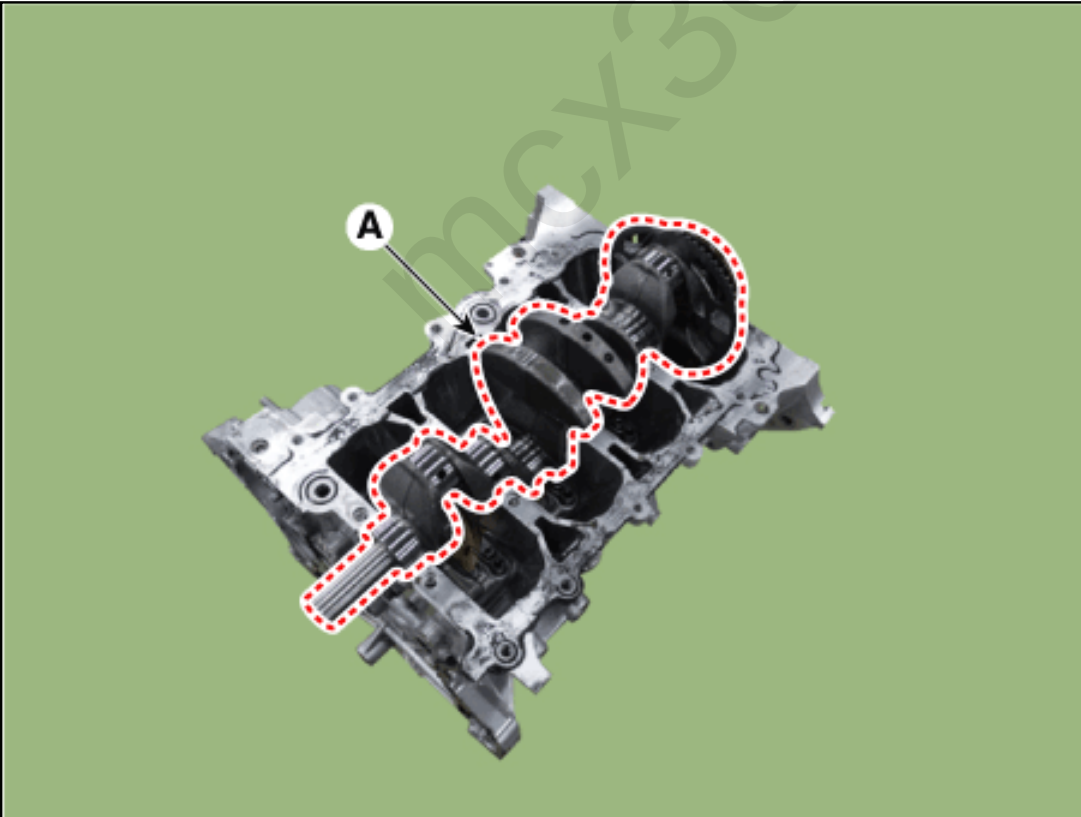
(3) Apply a coat of engine oil after assembling the main bearings.

3. Install the thrust bearings.

Install the 2 thrust bearings (A) on both sides of the No.4 journal of the cylinder block with the oil groove facing out.

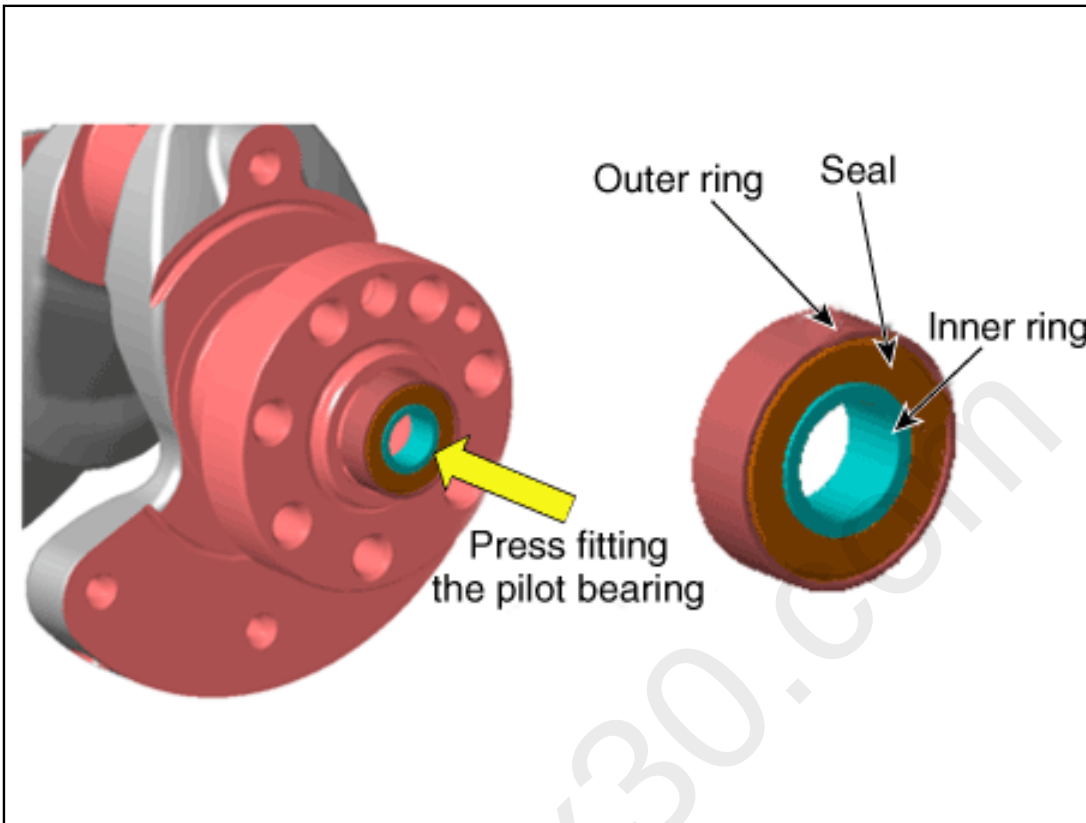


4. Place the crankshaft (A) on the cylinder block.

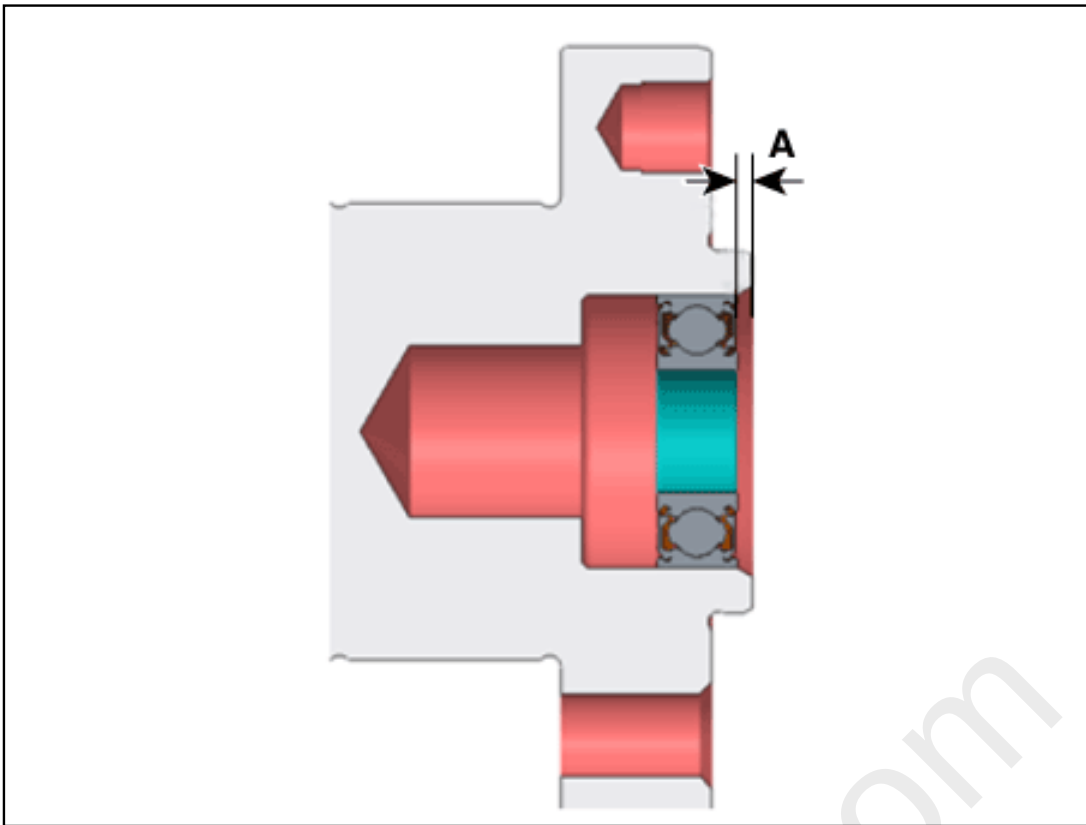




- When exchanging the crankshaft and short engine, apply if the pilot bearing is not assembled. **[DCT Only]**
- When press fitting the pilot bearing, press fit so that the load is applied only to the outer race of the pilot bearing.
  - if load is applied to the seal and inner race, the component or bearing inside may be damaged.



- Press-fit depth of the pilot bearing (A) : 1.5 - 2.0 mm (0.0591 - 0.0787 in) from the end of the crankshaft.

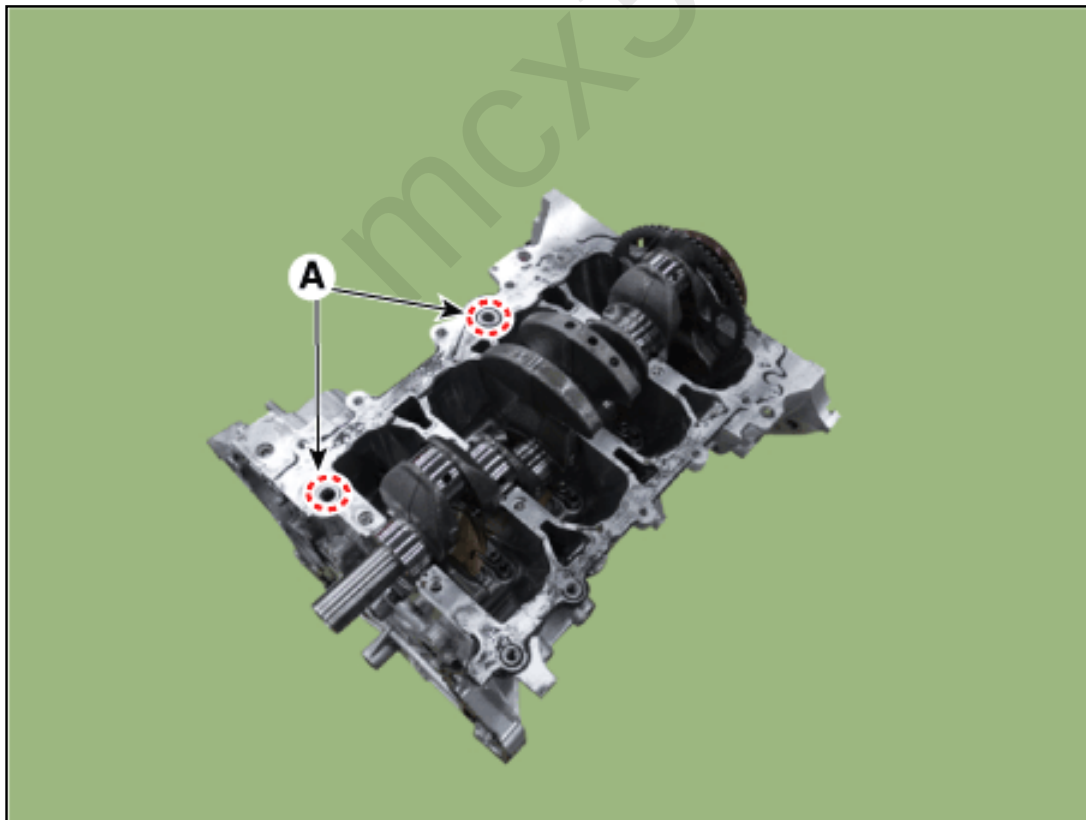


5. Install the lower crankcase.

- (1) Make sure to remove hardened sealant, foreign matters, oil, dust, moisture on the sealing face of the liquid gasket of the lower crankcase.

Spray the cleaner on the sealing surface and wipe it off with a clean cloth.

- (2) Install the new O-ring (A) on the cylinder block.



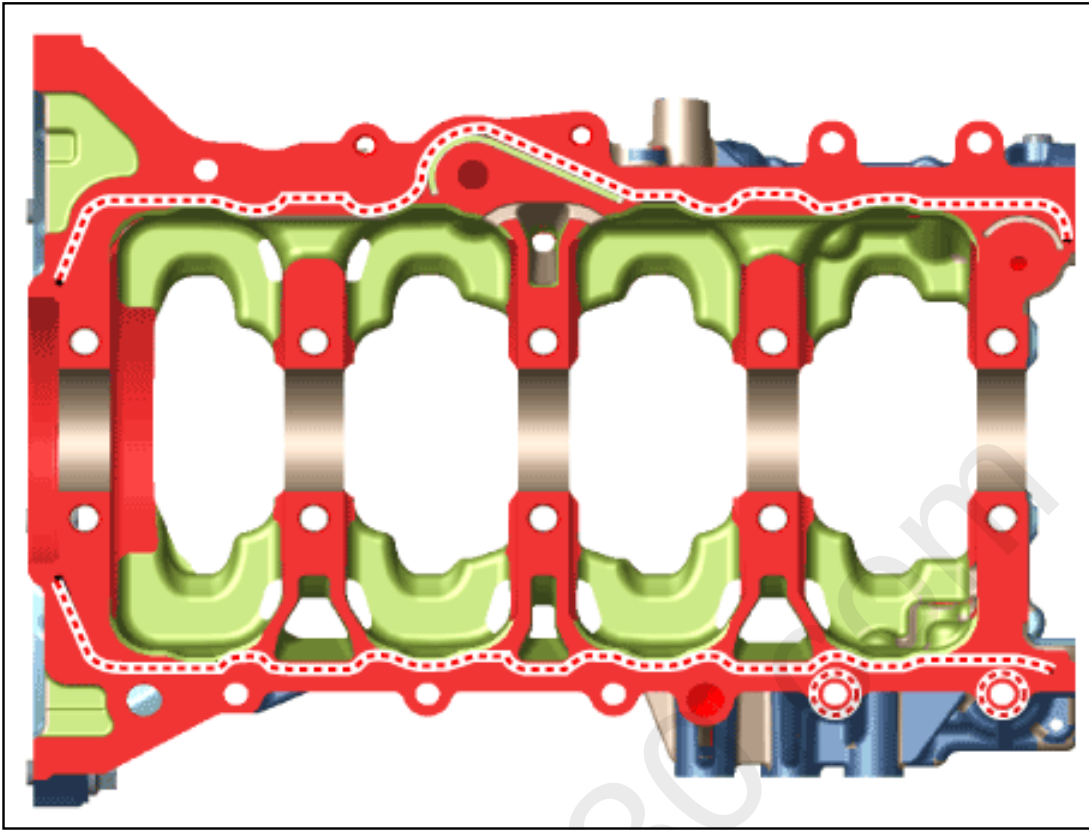
(3) Apply liquid sealant on lower crankcase. Then, assemble the part within 5 minutes of applying sealant.

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**Width :** 2.5 - 3.5 mm (0.0984 - 0.1378 in)

**Specification :** MS721-40AA or AAO / above.

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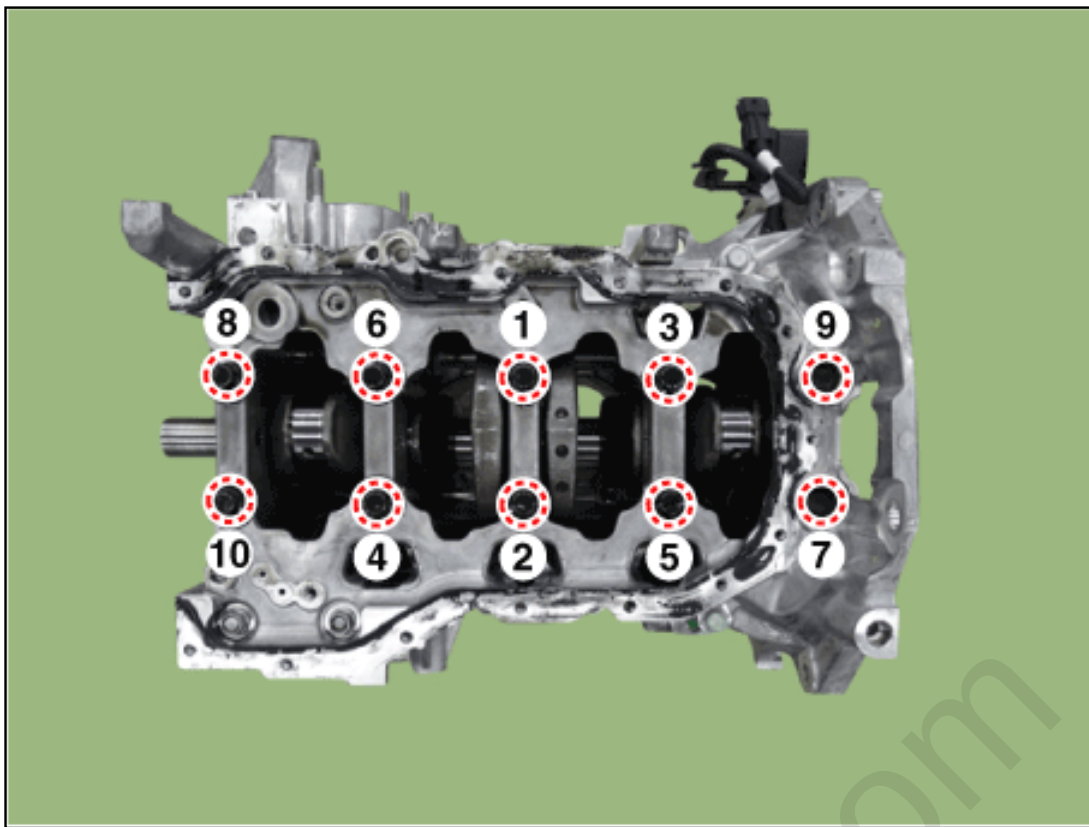
(4) Tighten the crankshaft bearing cap bolts several times according to the tightening sequence shown below.

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**Tightening torque :**

27.5 - 31.4 N.m (2.8 - 3.2 kgf.m, 20.3 - 23.1 lb-ft) + 118 - 122°

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- Always use new bearing cap bolts.

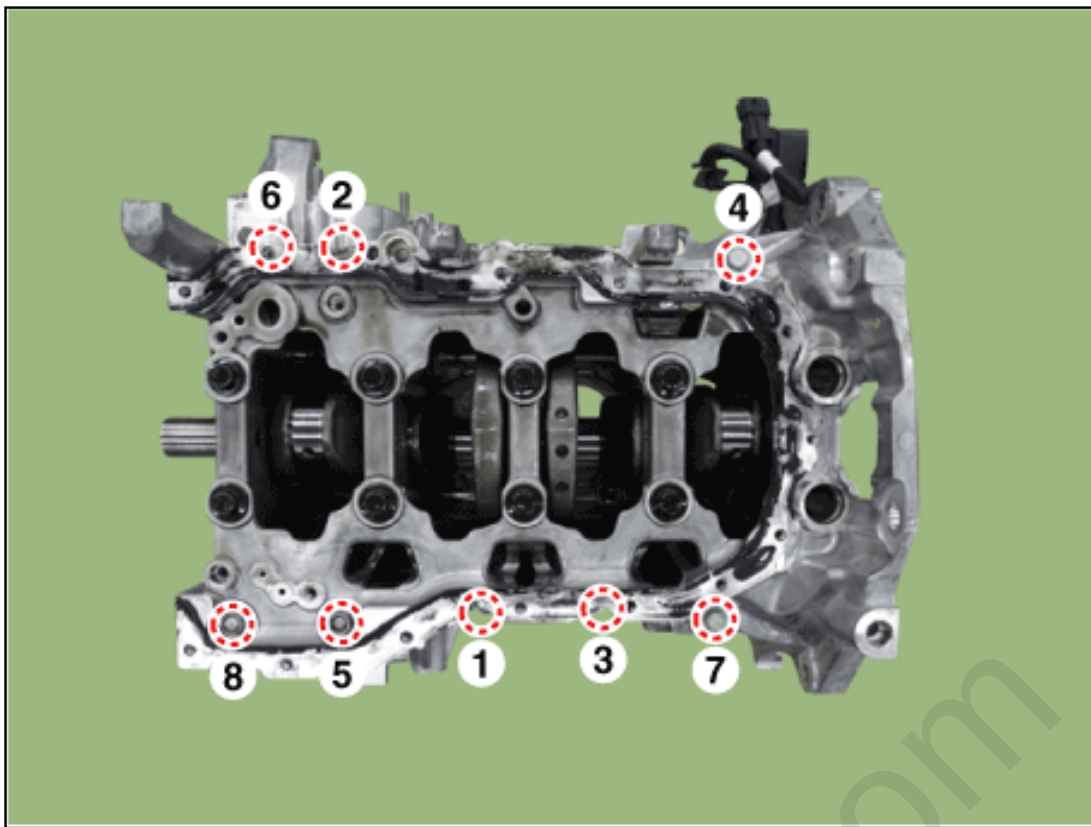
(5) Tighten the lower crankcase mounting bolts several times according to the tightening sequence shown below.

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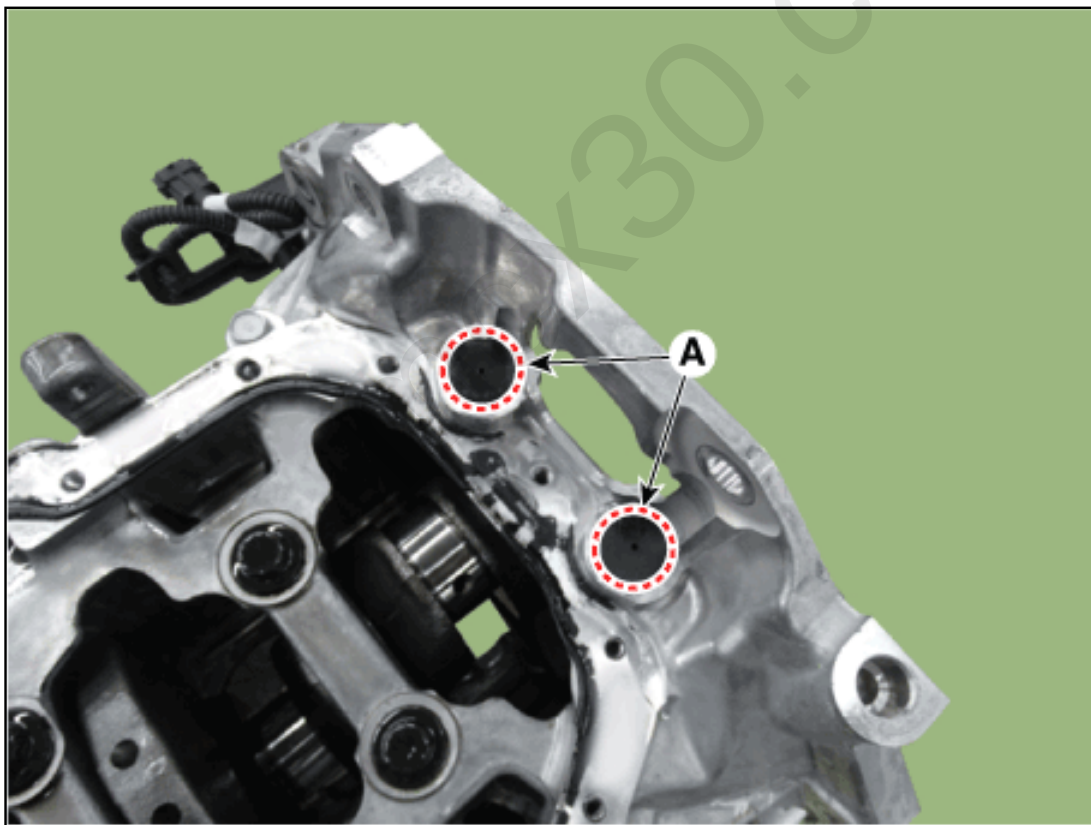
**Tightening torque :**

18.6 - 23.5 N.m (1.9 - 2.4 kgf.m, 13.7 - 17.4 lb-ft)

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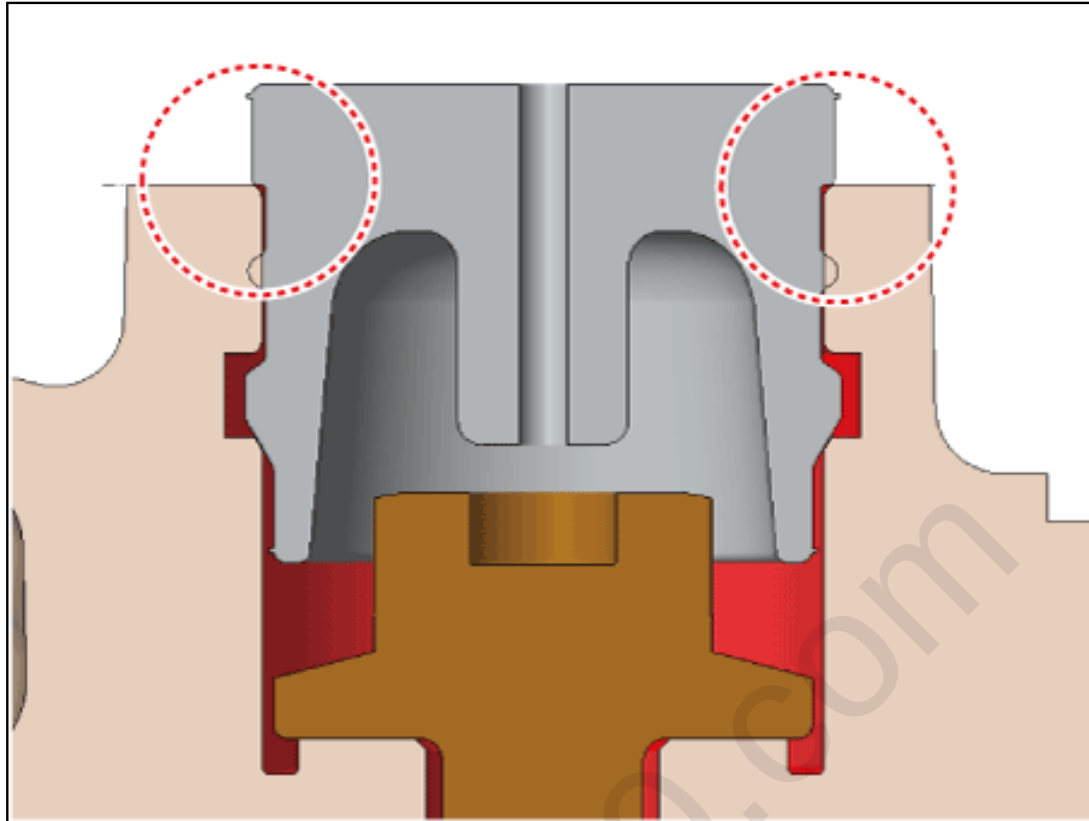


(6) Install the rear caps (A).





- When installing the rear cap, make sure that the cylinder block installed surface and the rear cap installed surface are aligned.



- (1) Check that the crankshaft turns smoothly.
6. Check the crankshaft end play.
7. Install the piston and connecting rod assemblies.  
**(Refer to Cylinder Block - "Piston and Connecting Rod")**
8. Assemble the other parts in the reverse order of disassembly.



- In case the crankshaft is replaced with a new one, select the proper connecting rod bearing according to the pin journal mark on the crankshaft.
- Connecting rod bearing selection  
**(Refer to Cylinder Block - "Piston and Connecting Rod")**

## Disassembly

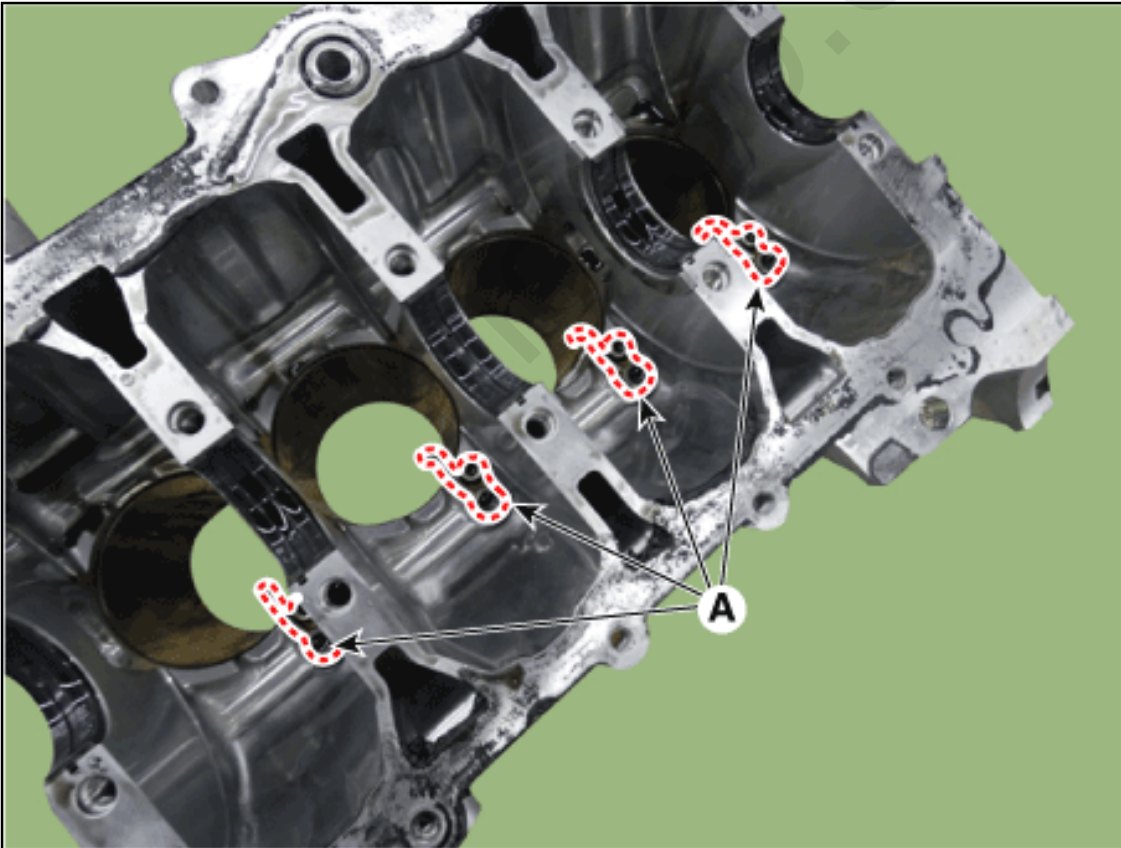


- Use fender covers to avoid damaging painted surfaces.
- To avoid damage, unplug the wiring connectors carefully while holding the connector portion.



- Mark all wiring connector and hoses to avoid misconnection.
- To release the fuel system pressure before removing the engine assembly, start the engine without fuel pump relay. Then, switch "OFF" the ignition when engine stops.
- Turn the crankshaft pulley so that the No. 1 piston is at top dead center.

1. Remove the crankshaft.  
**(Refer to Cylinder Block - "Crankshaft")**
2. Remove the water jacket insert.  
**(Refer to Cylinder Block - "Water Jacket Insert")**
3. Remove the knock sensor.  
**(Refer to Engine Control / Fuel System - "Knock Sensor (KS)")**
4. Remove the crankshaft position sensor (CKPS).  
**(Refer to Engine Control / Fuel System - "Crankshaft Position Sensor (CKPS)")**
5. Remove the piston cooling oil jets (A).



## Inspection

1. Using a gasket scraper, remove all the gasket material from the top surface of the cylinder block.
2. Using a soft brush and solvent, thoroughly clean the cylinder block.

3. Inspect the top surface of cylinder block for flatness.

Using a precision straight edge and feeler gauge, measure the surface contacting the cylinder head gasket for warpage.

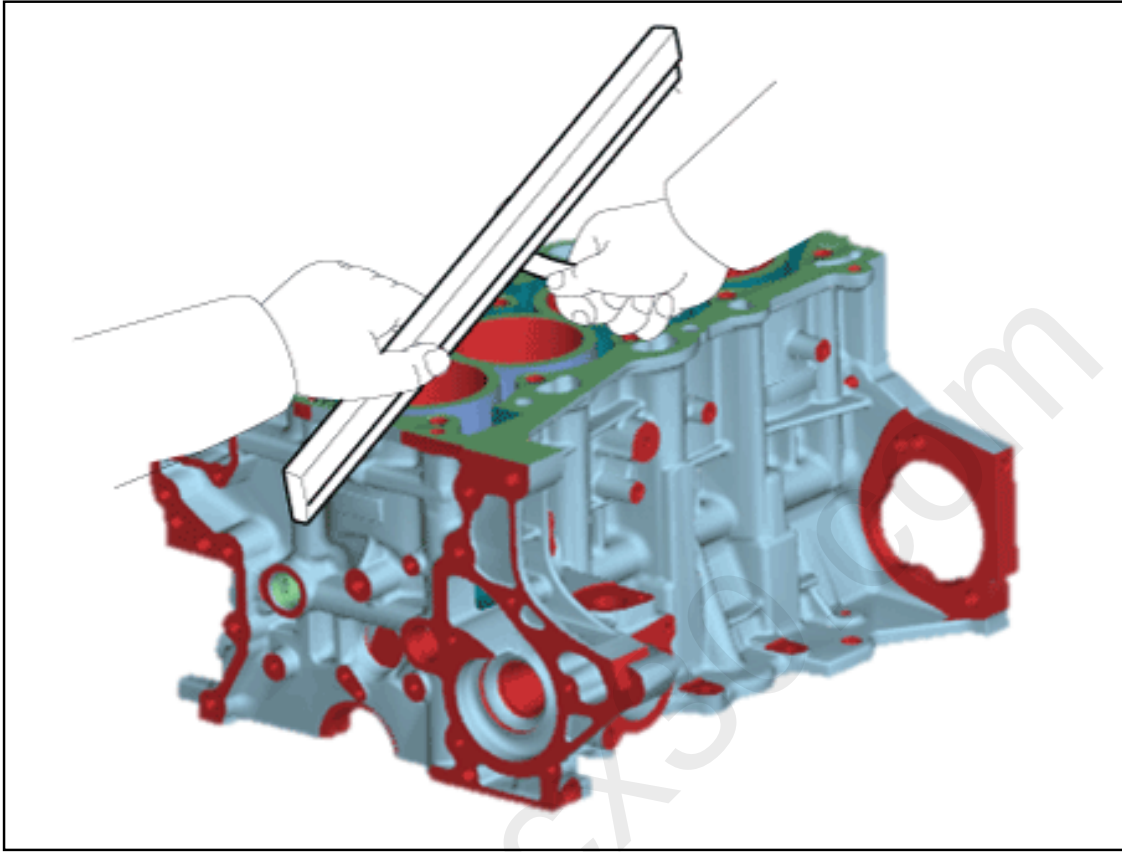
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**Flatness of cylinder block gasket surface :**

Less than 0.05 mm (0.0020 in.) for total area

Less than 0.02 mm (0.0008 in.) for a section of 100 mm x 100 mm (3.9370 in x 3.9370 in.)

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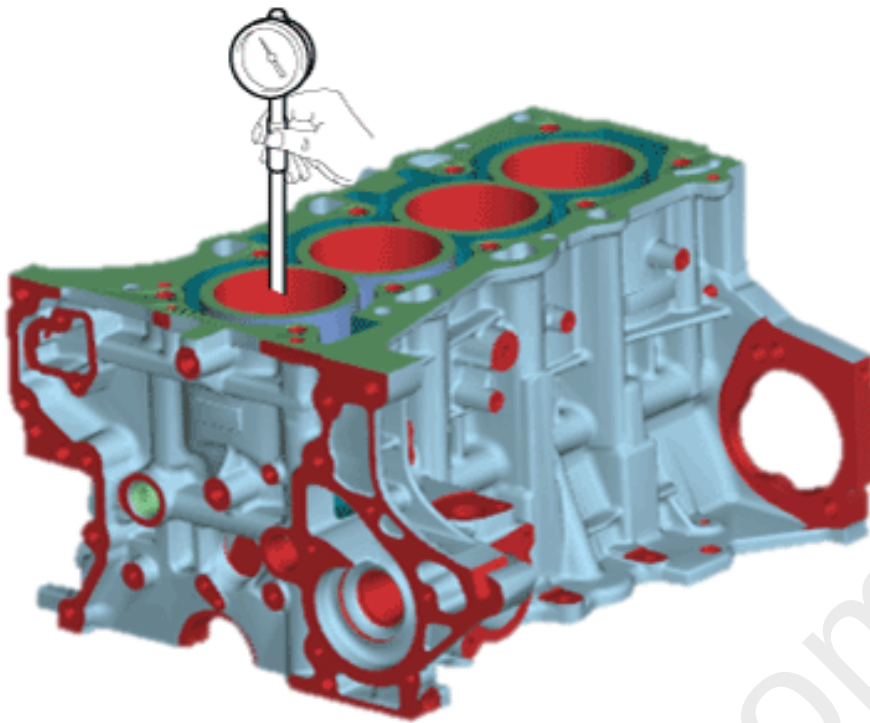


4. Visually check for scratches on the inside surface of the cylinder bore and replace the cylinder block if any noticeable scratch is detected.  
If deep scratches are present, replace the cylinder block.
  5. Using the cylinder bore gauge, measure the cylinder bore's inner diameter to the axial and axial perpendicular directions.
- 

**Cylinder bore diameter :**

75.60 - 75.63 mm (2.9764 - 2.9776 in.)

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## Reassembly



- Thoroughly clean all parts to assembled.
- Before installing the parts, apply fresh engine oil to all sliding and rotating surfaces.
- Always use new gaskets, O-ring and oil seals.

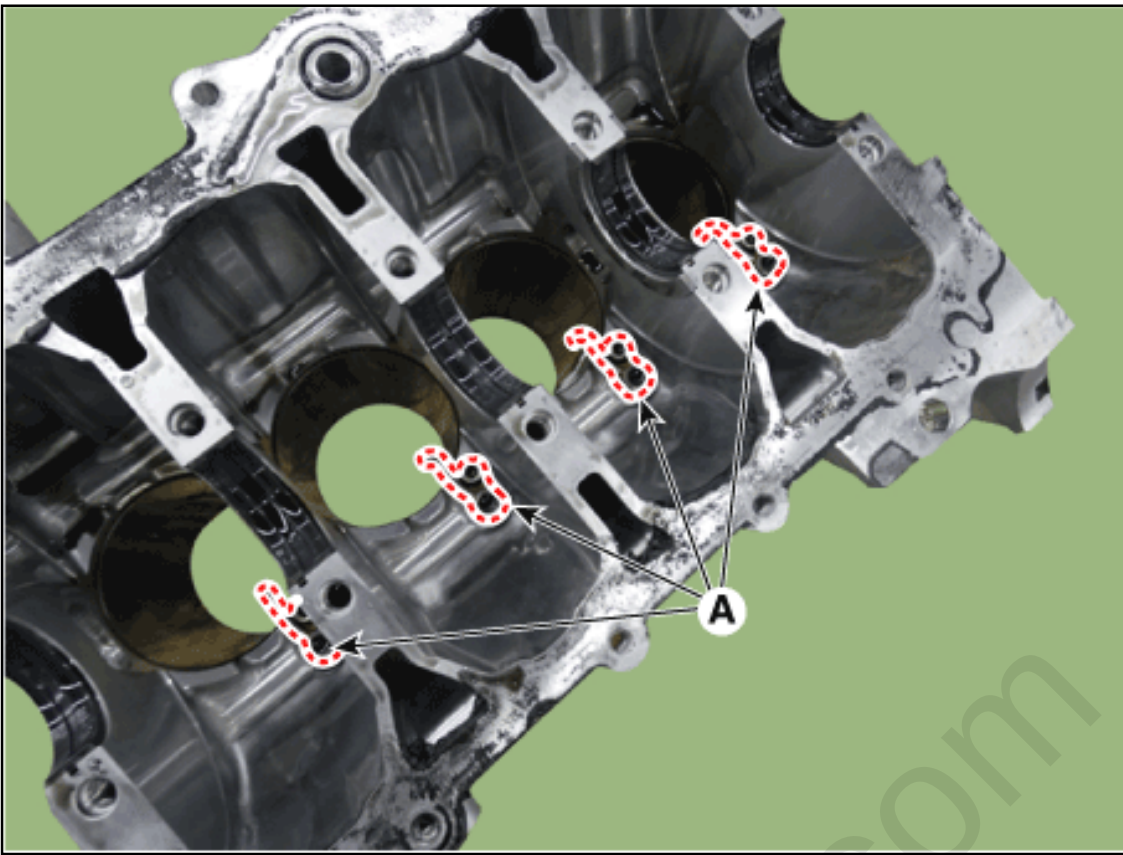
1. Install the piston cooling oil jets (A).

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### **Tightening torque :**

8.8 - 12.7 N.m (0.9 - 1.3 kgf.m, 6.5 - 9.4 lb-ft)

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2. Install the crankshaft.  
**(Refer to Cylinder Block - "Crankshaft")**
3. Check the crankshaft end play.  
**(Refer to Cylinder Block - "Crankshaft")**
4. Disconnect the lower crankcase and check crankshaft bearing oil clearance.  
**(Refer to Cylinder Block - "Crankshaft")**
5. Install the piston and connecting rod assembly.  
**(Refer to Cylinder Block - "Piston and Connecting Rod")**
6. Check the connecting rod bearing cap oil clearance.  
**(Refer to Cylinder Block - "Piston and Connecting Rod")**
7. Check the connecting rod end play.  
**(Refer to Cylinder Block - "Piston and Connecting Rod")**
8. Assemble the other parts in the reverse order of disassembly.



- In case the cylinder block is replaced with a new one, select the proper crankshaft main bearing and the piston according to the crankshaft journal bore mark and the cylinder bore mark on the cylinder block.
- Crankshaft main bearing selection  
(Refer to Cylinder Block - "Crankshaft")  
**(Refer to Cylinder Block - "Crankshaft")**
- Piston selection  
**(Refer to Cylinder Block - "Piston and Connecting Rod")**