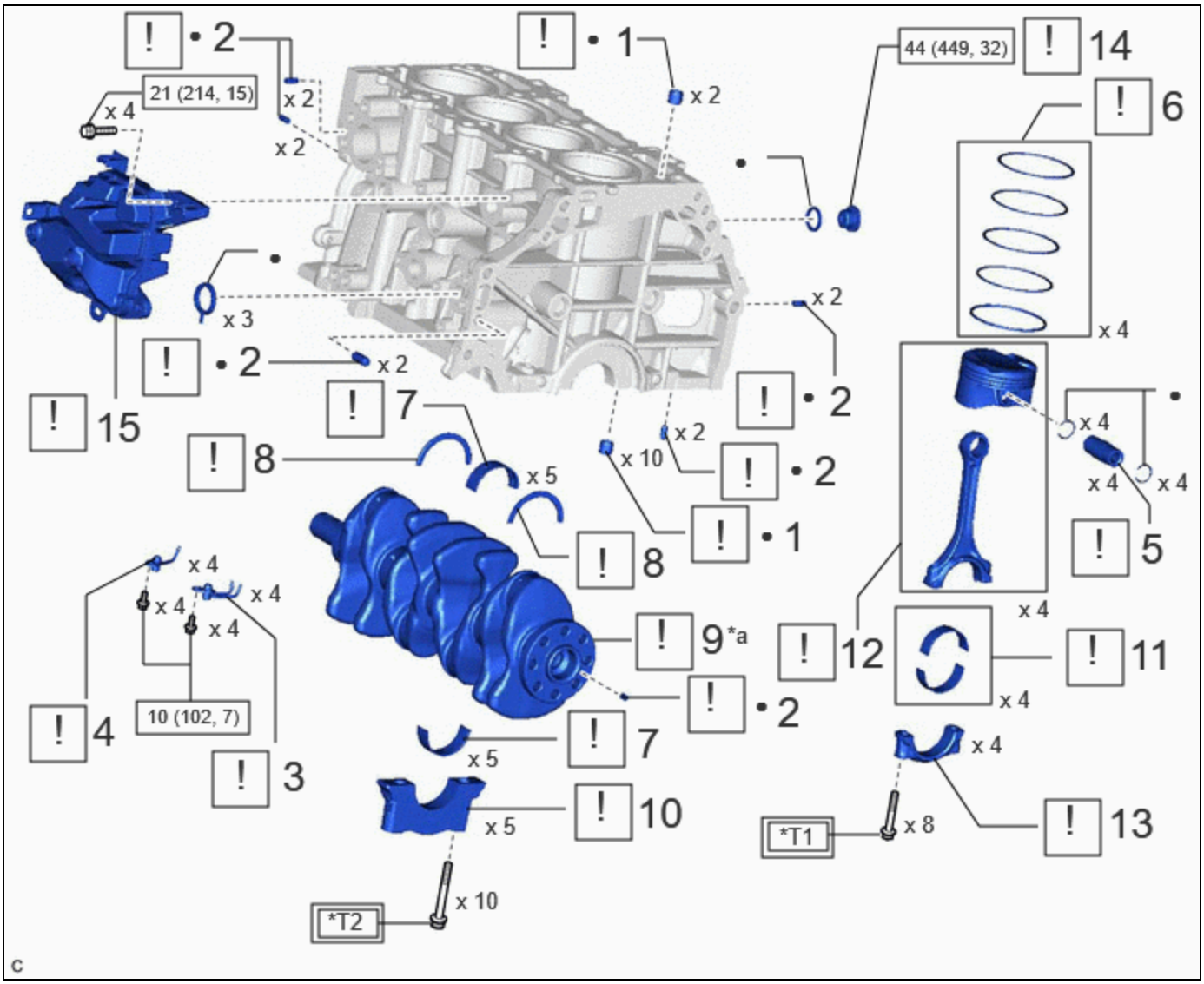
Last Modified: 12-04-2024	6.11:8.1.0	**Doc ID:** RM1000000029YCV
Model Year Start: 2023	**Model:** Prius Prime	**Prod Date Range:** [12/2022 -]
Title: M20A-FXS (ENGINE MECHANICAL): CYLINDER BLOCK: REASSEMBLY; 2023 - 2024 MY Prius Prius Prime [12/2022 -]		

REASSEMBLY

CAUTION / NOTICE / HINT

COMPONENTS (REASSEMBLY)



	PROCEDURE	PART NAME CODE	!		
1	RING PIN	-	INFO	-	-
2	STRAIGHT PIN	-	INFO	-	-

	PROCEDURE	PART NAME CODE			
3	NO. 2 OIL NOZZLE SUB-ASSEMBLY	15709	INFO	-	-
4	NO. 1 OIL NOZZLE SUB-ASSEMBLY	15708	INFO	-	-
5	PISTON PIN	-	INFO	-	-
6	PISTON RING SET	13011	INFO	-	-
7	CRANKSHAFT BEARING	11711	INFO	-	-
8	CRANKSHAFT THRUST WASHER	11791	INFO	-	-
9	CRANKSHAFT	13411	INFO	-	-
10	CRANKSHAFT BEARING CAP	-	INFO	-	-
11	CONNECTING ROD BEARING	13041	INFO	-	-
12	PISTON WITH CONNECTING ROD	-	INFO	-	-
13	CONNECTING ROD BEARING CAP	-	INFO	-	-
14	CYLINDER BLOCK WITH HEAD STRAIGHT SCREW PLUG	11432R	INFO	-	-
15	NO. 1 VENTILATION CASE	12211	INFO	-	-

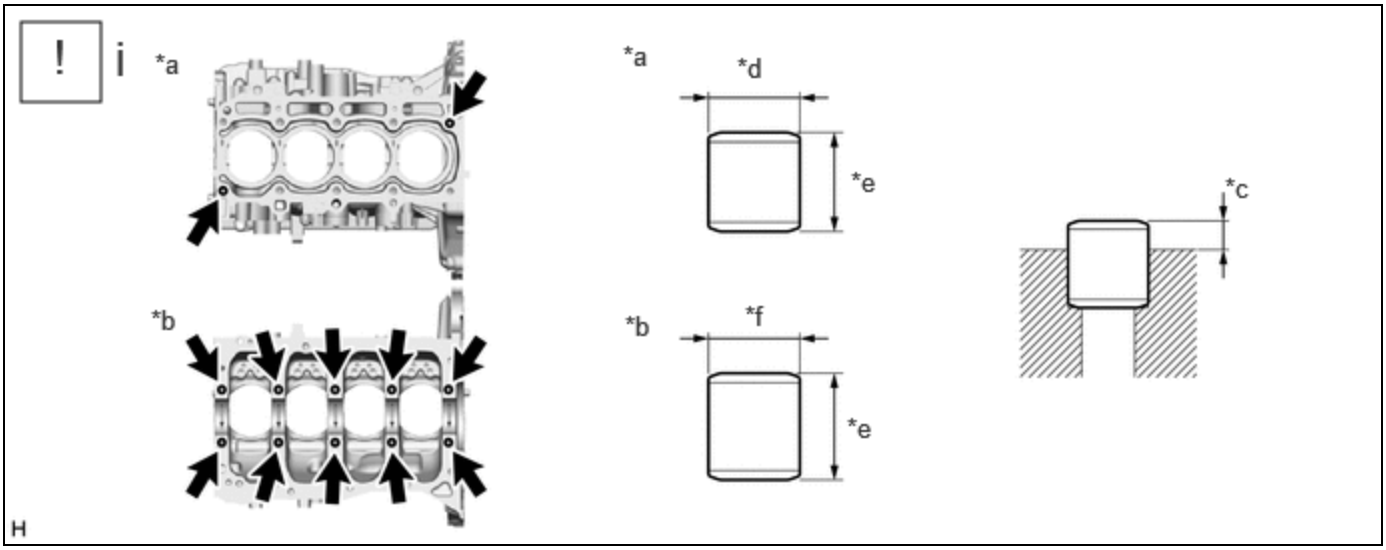
*a	**HINT:** As the illustration shown is an example, the actual details may differ.	-	-
	Tightening torque for "Major areas involving basic vehicle performance such as moving/turning/stopping": N*m (kgf*cm, ft.*lbf)		N*m (kgf*cm, ft.*lbf): Specified torque
•	Non-reusable part	-	-
*T1	1st: 38 (387, 28) 2nd: Turn 90°	*T2	1st: 61 (622, 45) 2nd: Turn 90°

PROCEDURE

1. INSTALL RING PIN

NOTICE:

It is not necessary to remove the ring pins unless they are being replaced.



*a	Top Side	*b	Bottom Side
*c	Protrusion Height	*d	13 mm (0.512 in.)
*e	12 mm (0.472 in.)	*f	14 mm (0.551 in.)

(1) Using a plastic hammer, install 12 new ring pins.

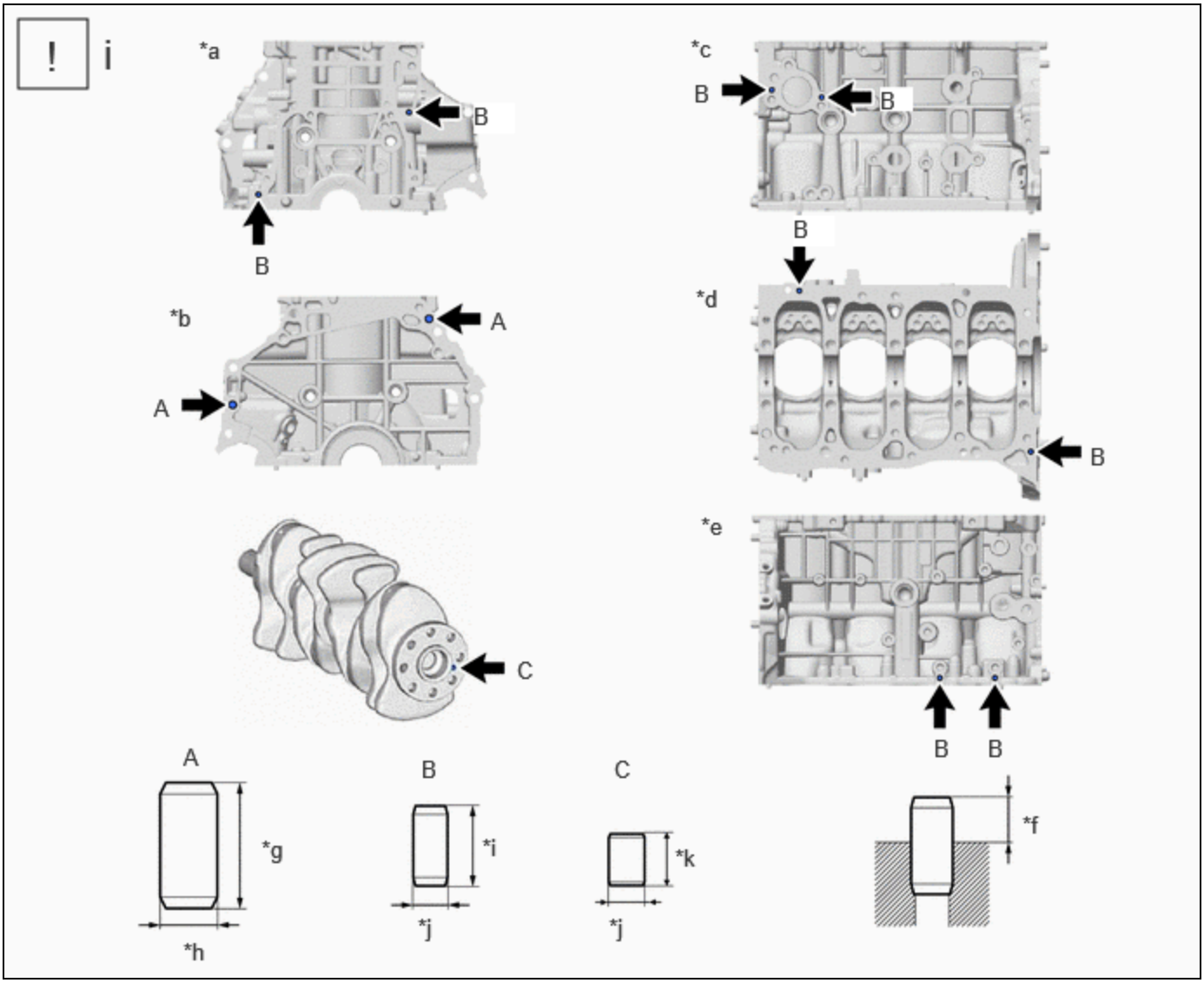
Standard Protrusion Height:

5.0 to 7.0 mm (0.197 to 0.276 in.)

2. INSTALL STRAIGHT PIN

NOTICE:

It is not necessary to remove the straight pins unless they are being replaced.



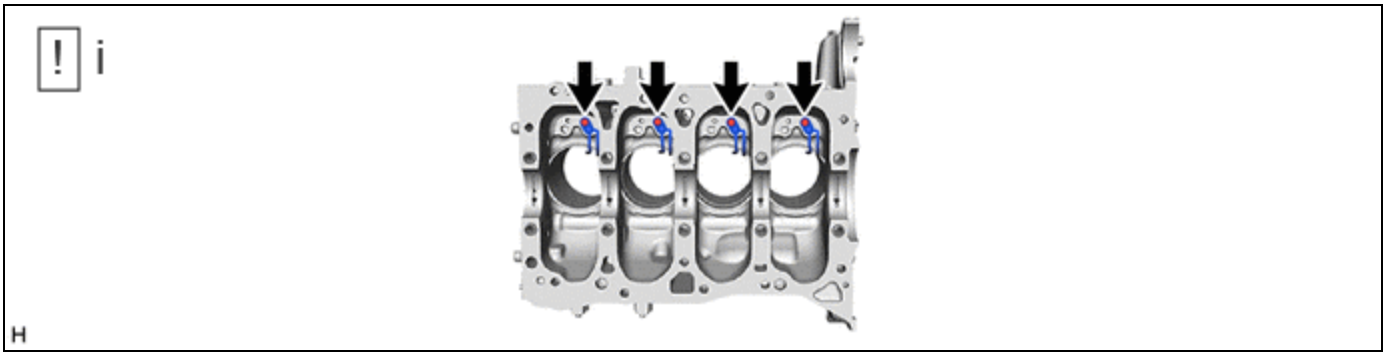
*a	Front Side	*b	Rear Side
*c	LH Side	*d	Bottom Side
*e	RH Side	*f	Protrusion Height
*g	22 mm (0.866 in.)	*h	10 mm (0.394 in.)
*i	14 mm (0.551 in.)	*j	6.0 mm (0.236 in.)
*k	7.4 mm (0.291 in.)	-	-

(1) Using a plastic hammer, install 11 new straight pins.

Standard Protrusion Height:

STRAIGHT PIN	SPECIFIED CONDITION
(A)	11.0 to 13.0 mm (0.433 to 0.512 in.)
(B)	5.0 to 7.0 mm (0.197 to 0.276 in.)
(C)	1.2 to 2.2 mm (0.0472 to 0.0866 in.)

3. INSTALL NO. 2 OIL NOZZLE SUB-ASSEMBLY

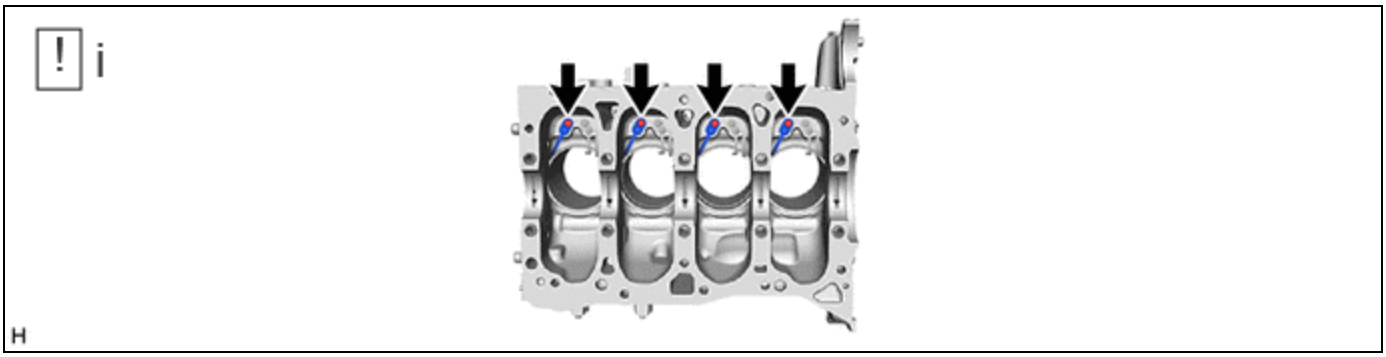


(1) Using a 5 mm hexagon socket wrench, install the 4 No. 2 oil nozzle sub-assemblies to the cylinder block sub-assembly with the 4 bolts.

Torque:

10 N·m {102 kgf·cm, 7 ft·lbf}

4. INSTALL NO. 1 OIL NOZZLE SUB-ASSEMBLY

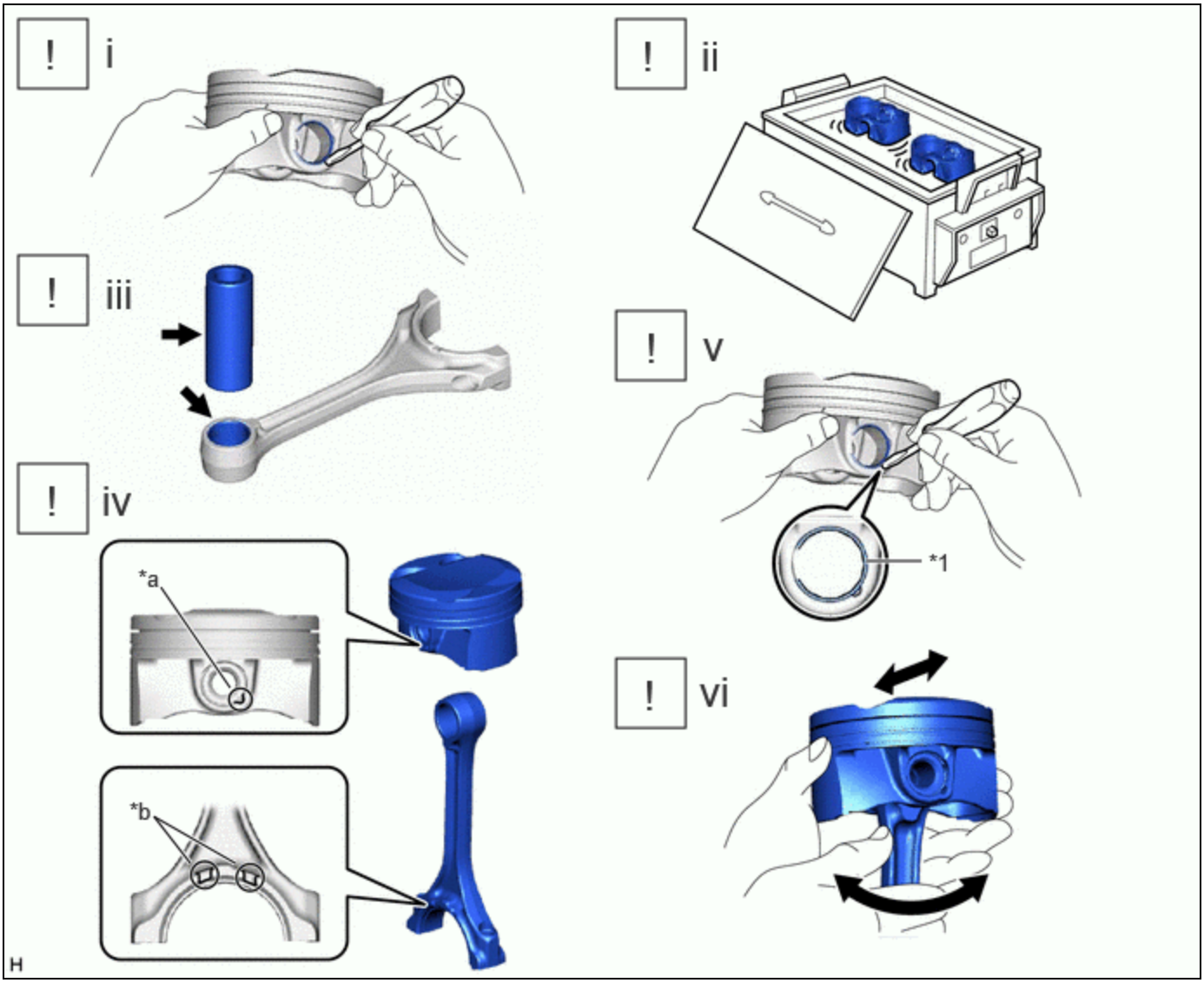


(1) Using a 5 mm hexagon socket wrench, install the 4 No. 1 oil nozzle sub-assemblies to the cylinder block sub-assembly with the 4 bolts.

Torque:

10 N·m {102 kgf·cm, 7 ft·lbf}

5. INSTALL PISTON PIN



*1	Piston Pin Hole Snap Ring	-	-
*a	Cutout	*b	Front Mark

(1) Using a screwdriver with its tip wrapped with protective tape, install a new piston pin hole snap ring to the piston pin hole on the rear side of the piston.

(2) Gradually heat the piston to between 80 and 90°C (176 and 194°F).

CAUTION:

Be sure to wear protective gloves.

(3) Apply a light coat of engine oil to the piston pin and connecting rod.

(4) Align the cutout of the piston and front mark of the connecting rod, insert the connecting rod into the piston, and then push in the piston pin with your thumb until the piston pin comes into contact with the piston pin hole snap ring.

NOTICE:

Do not change the combination of the pistons and piston pins.

(5) Using a screwdriver with its tip wrapped with protective tape, install a new piston pin hole snap ring to the piston pin hole on the front side of the piston.

NOTICE:

Be sure that the end gap of the piston pin hole snap ring is not aligned with the cutout of the piston.

(6) Check the fitting condition between the piston and piston pin.

1. Move the connecting rod back and forth on the piston pin. Check the fitting condition.

If abnormal movement is felt, replace the piston with pin sub-assembly.

2. Rotate the piston back and forth on the piston pin. Check the fitting condition.

If abnormal movement is felt, replace the piston with pin sub-assembly.

(b) Perform "Inspection After Repair" after replacing the piston.

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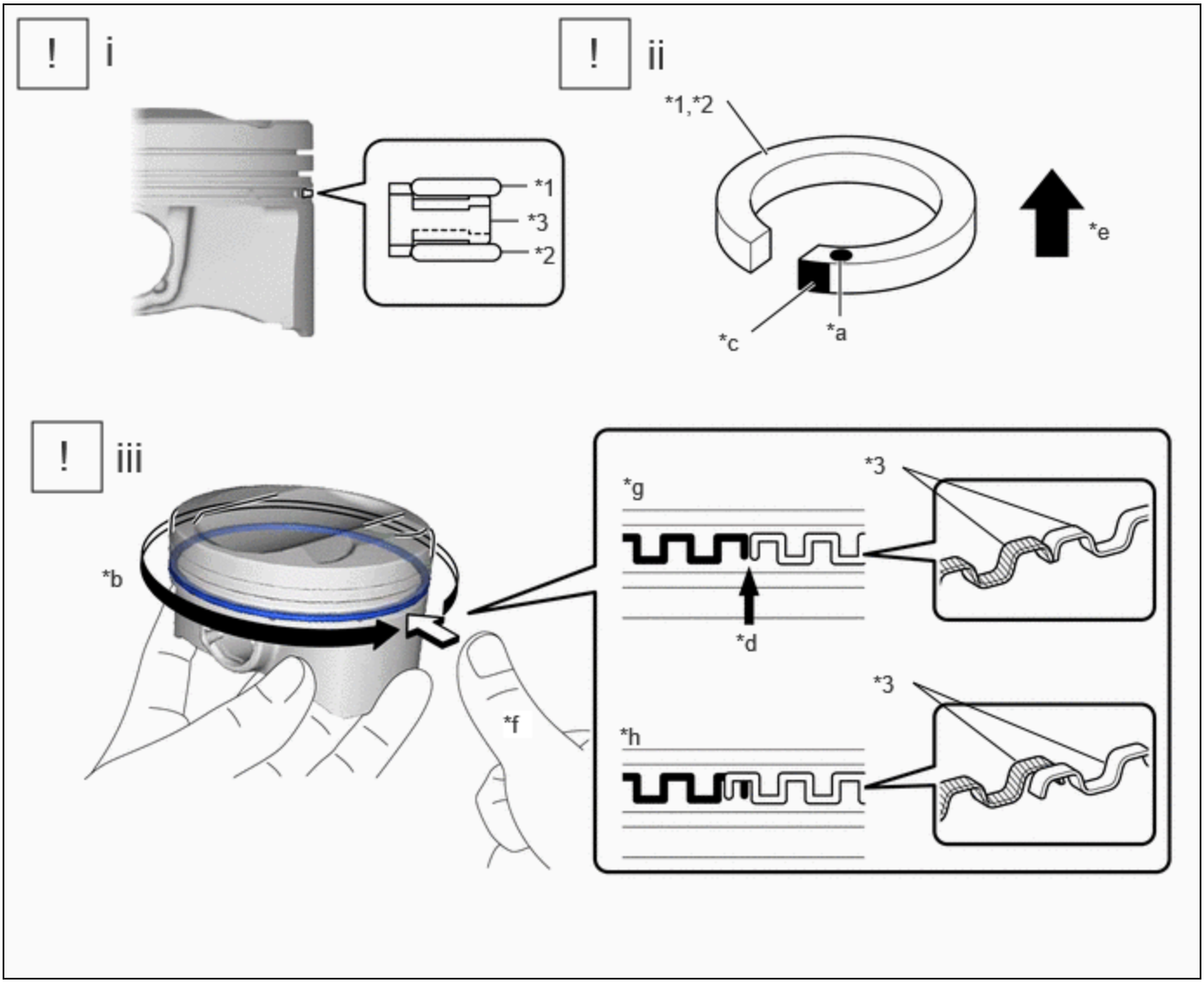
6. INSTALL PISTON RING SET



*1	Upper Side Rail	*2	Lower Side Rail
*3	Oil Ring Expander	-	-
*a	Code Mark (T)	*b	Press Around the Circumference
*c	Paint (Bright Green)	*d	Ring End
*e	Upper Side	*f	Push with Thumb
*g	Correct	*h	Incorrect

(1) Install the oil ring expander by hand.

(2) Install upper side rail and lower side rail to the piston.

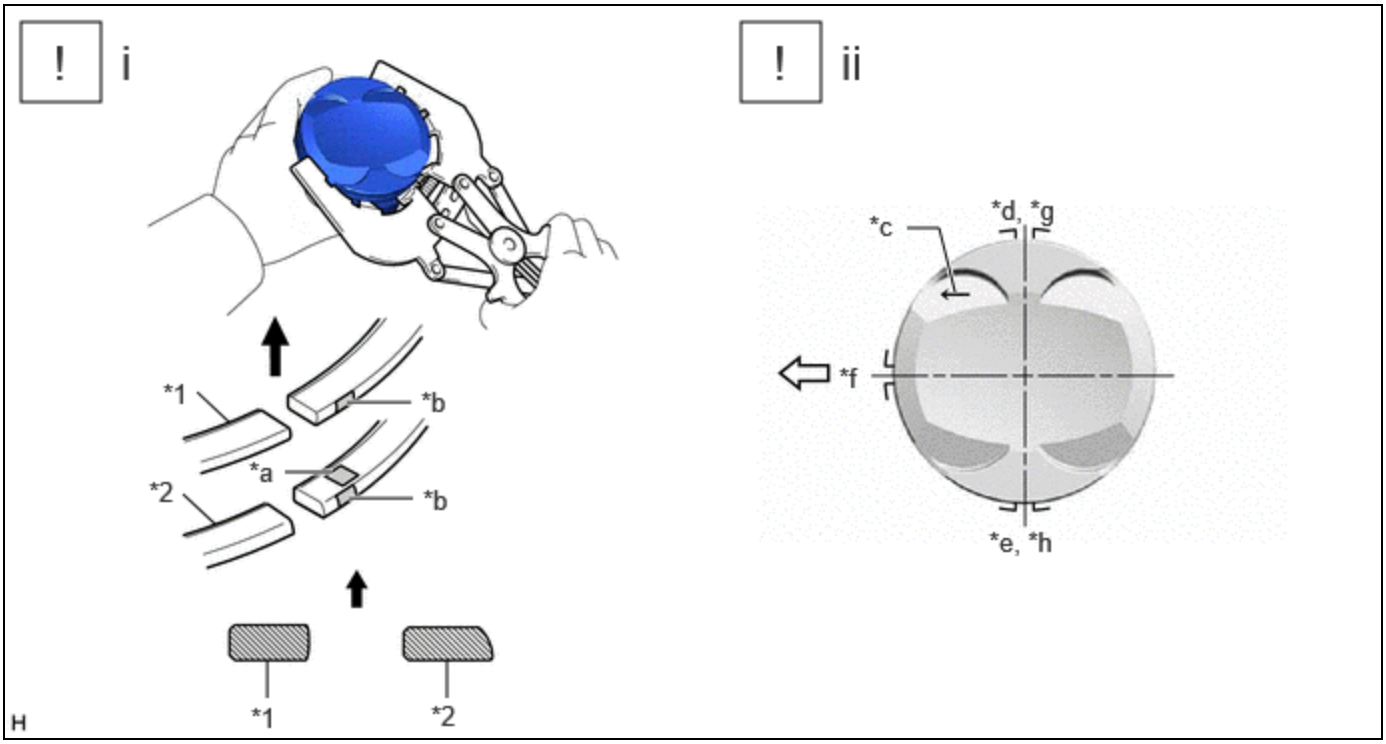
NOTICE:

Make sure to install the upper side rail and lower side rail in the correct direction. Also, when installing the upper side rail and lower side rail, the oil ring expander may move and overlap. If this occurs, part of the side rail may greatly protrude.

(3) Check that the ends of the oil ring expander are not overlapping and that the upper side rail and lower side rail are securely installed into the groove.

NOTICE:

- After installing the oil ring expander, upper side rail and lower side rail, press around the circumference with a finger to check that they are securely installed into the groove.
- If the oil ring expander is not securely installed into the groove, check that the ends of the oil ring expander are not overlapping.
- If the ends of the oil ring expander are overlapping, remove the upper side rail and lower side rail and realign the oil ring expander using a screwdriver.



*1	No. 1 Compression Ring	*2	No. 2 Compression Ring
*a	Code Mark	*b	Paint Mark
*c	Front Mark	*d	No. 1 Compression Ring End Gap
*e	No. 2 Compression Ring End Gap	*f	Oil Ring Expander End Gap
*g	Upper Side Rail End Gap	*h	Lower Side Rail End Gap
➡	Upward	⇨	Front of Engine

(1) Using a piston ring expander, install the No. 1 compression ring and No. 2 compression ring with the code mark positioned as shown in the illustration.

Piston Ring Mark:

ITEM	CODE MARK	PAINT MARK
No. 1 Compression Ring	-	White

ITEM	CODE MARK	PAINT MARK
No. 2 Compression Ring	2T	Sky Blue

(2) Position the piston rings so that the ring ends are as shown in the illustration.

(c) Perform "Inspection After Repair" after replacing the piston and piston ring.

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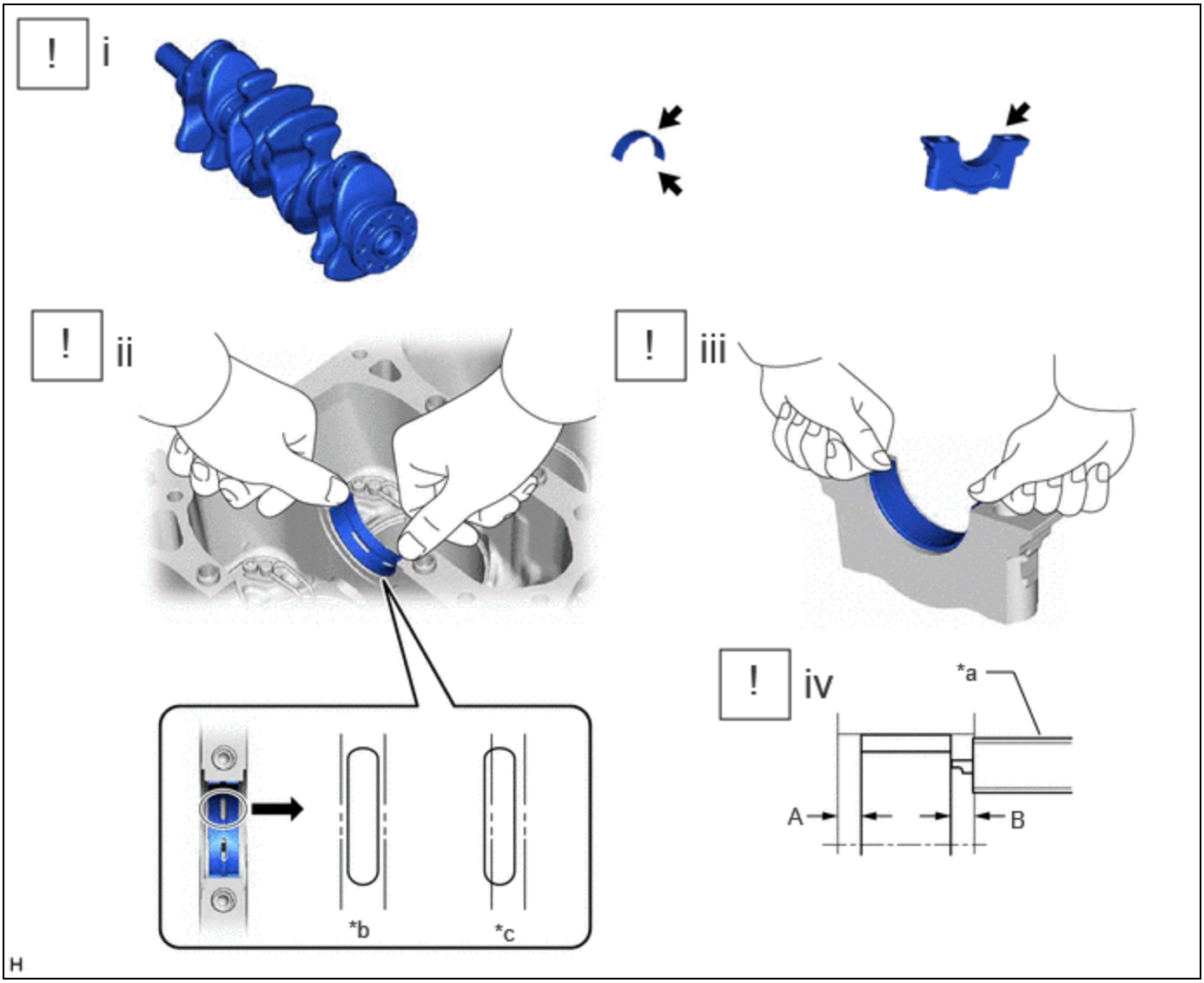
7. INSTALL CRANKSHAFT BEARING



*a	Vernier Caliper	*b	Correct
*c	Incorrect	-	-

(1) Clean the main journal, both surfaces of the No. 1 crankshaft bearings and No. 2 crankshaft bearings and crankshaft bearing caps.

(2) Install the 5 No. 1 crankshaft bearings to the cylinder block sub-assembly as shown in the illustration.

NOTICE:

Do not apply engine oil to the 5 No. 1 crankshaft bearings or the contact surfaces.

(3) Install the 5 No. 2 crankshaft bearings to the 5 crankshaft bearing caps.

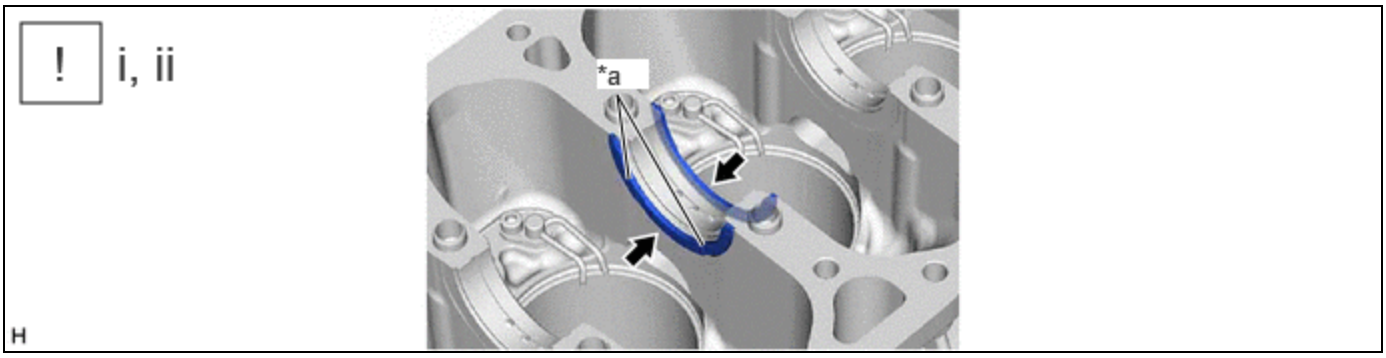
NOTICE:

Do not apply engine oil to the 5 No. 2 crankshaft bearings or the contact surfaces.

(4) Using a vernier caliper, measure the distance between the crankshaft bearing cap edge and No. 2 crankshaft bearing edge.

Difference between (A) and (B):
0 to 0.9 mm (0 to 0.0354 in.)

8. INSTALL CRANKSHAFT THRUST WASHER



*a	Oil Groove	-	-

(1) Install the 2 crankshaft thrust washers to the No. 3 journal position of the cylinder block sub-assembly with the oil grooves facing outward.

(2) Apply engine oil to the crankshaft thrust washers.

NOTICE:

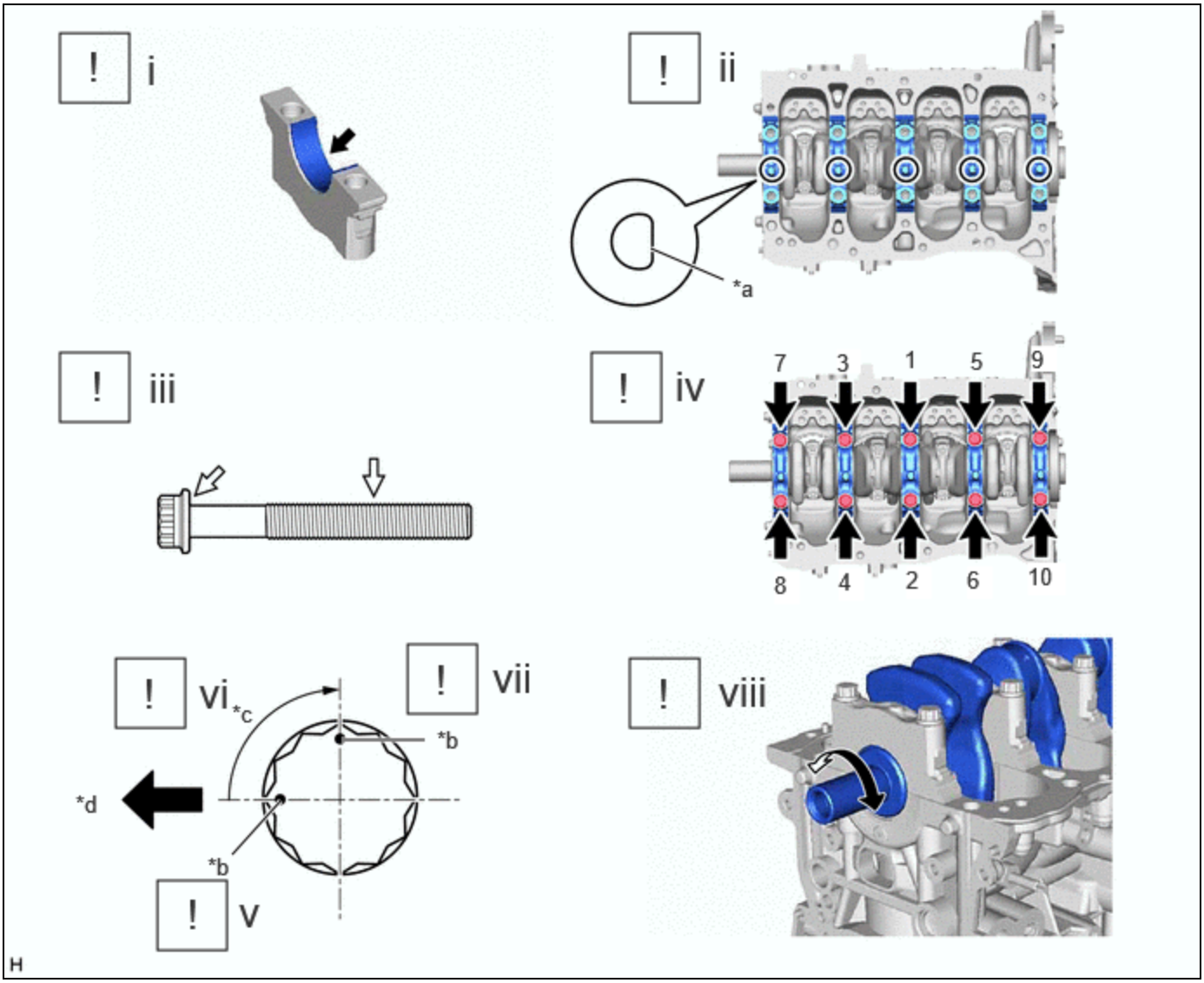
Make sure the crankshaft thrust washers are installed correctly.

9. INSTALL CRANKSHAFT

(1) Apply engine oil to the 5 No. 1 crankshaft bearings.

(2) Install the crankshaft.

10. INSTALL CRANKSHAFT BEARING CAP



*a	Front Mark	*b	Paint Mark
*c	90°	*d	Front of Engine

(1) Apply engine oil to the 5 No. 2 crankshaft bearings.

(2) Confirm the front marks and numbers, and install the 5 crankshaft bearing caps to the cylinder block sub-assembly with the front marks positioned as shown in the illustration.

(3) Apply a light coat of engine oil to the threads and under the heads of the crankshaft bearing cap set bolts.

(4) Uniformly install and tighten the 10 crankshaft bearing cap set bolts in several steps in the order shown in the illustration.

Torque:

61 N·m {622 kgf·cm, 45 ft·lbf}

NOTICE:

While performing tightening, check that the crankshaft continues to turn smoothly.

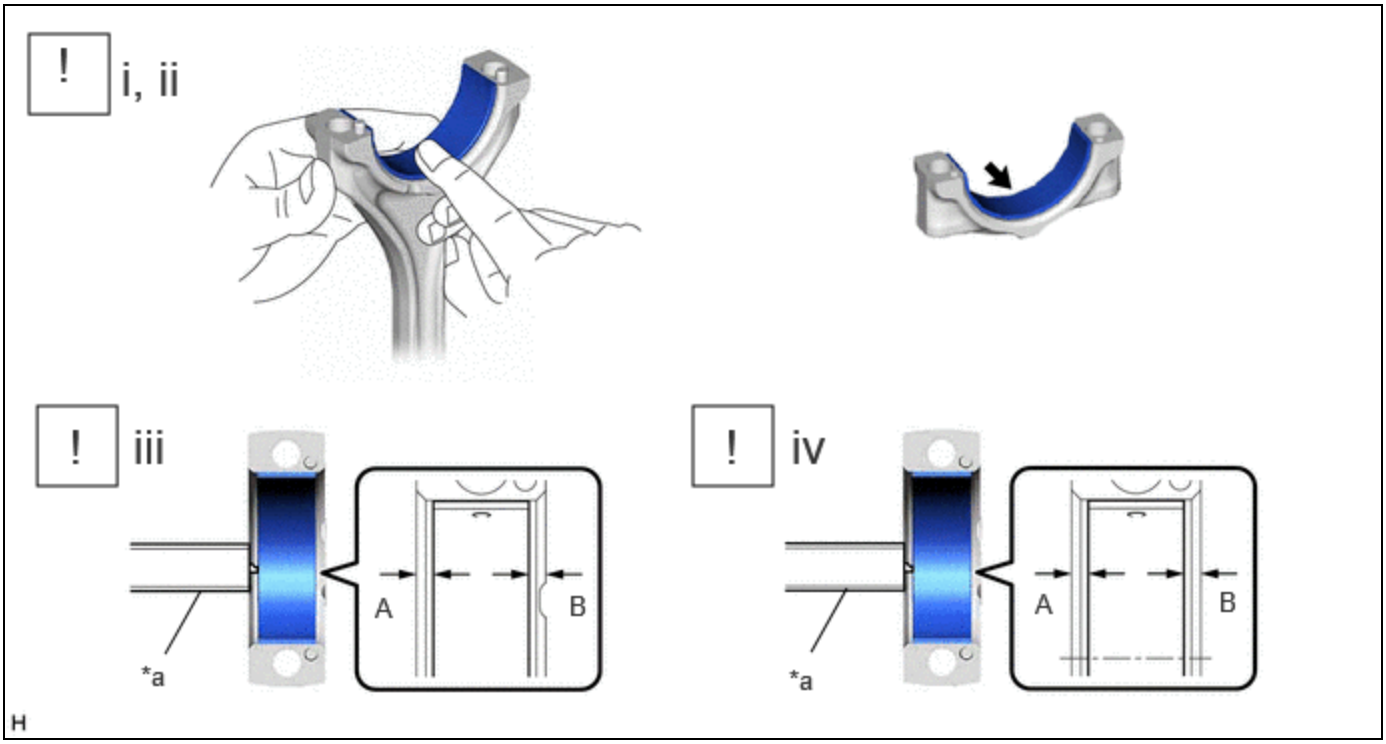
(5) Mark the front of the crankshaft bearing cap set bolts with paint.

(6) Tighten the 10 crankshaft bearing cap set bolts 90° as shown in the illustration.

(7) Check that the paint marks are now at a 90° angle to the front.

(8) Check that the crankshaft turns smoothly.

11. INSTALL CONNECTING ROD BEARING



*a	Vernier Caliper	-	-

(1) Clean the connecting rod bearings contact surfaces of the connecting rods and connecting rod bearing caps, and both surfaces of the connecting rod bearings.

(2) Install the 8 connecting rod bearings to the 4 connecting rods and 4 connecting rod bearing caps.

(3) Using a vernier caliper, measure the distance between the edges of the connecting rod and connecting rod bearing.

Difference between (A) and (B):
0 to 0.7 mm (0 to 0.0276 in.)

NOTICE:

- Do not apply engine oil to the connecting rod bearings or the bearing contact surfaces of the connecting rod.
- This measurement is performed to ensure that the connecting rod bearing is centered in the connecting rod.

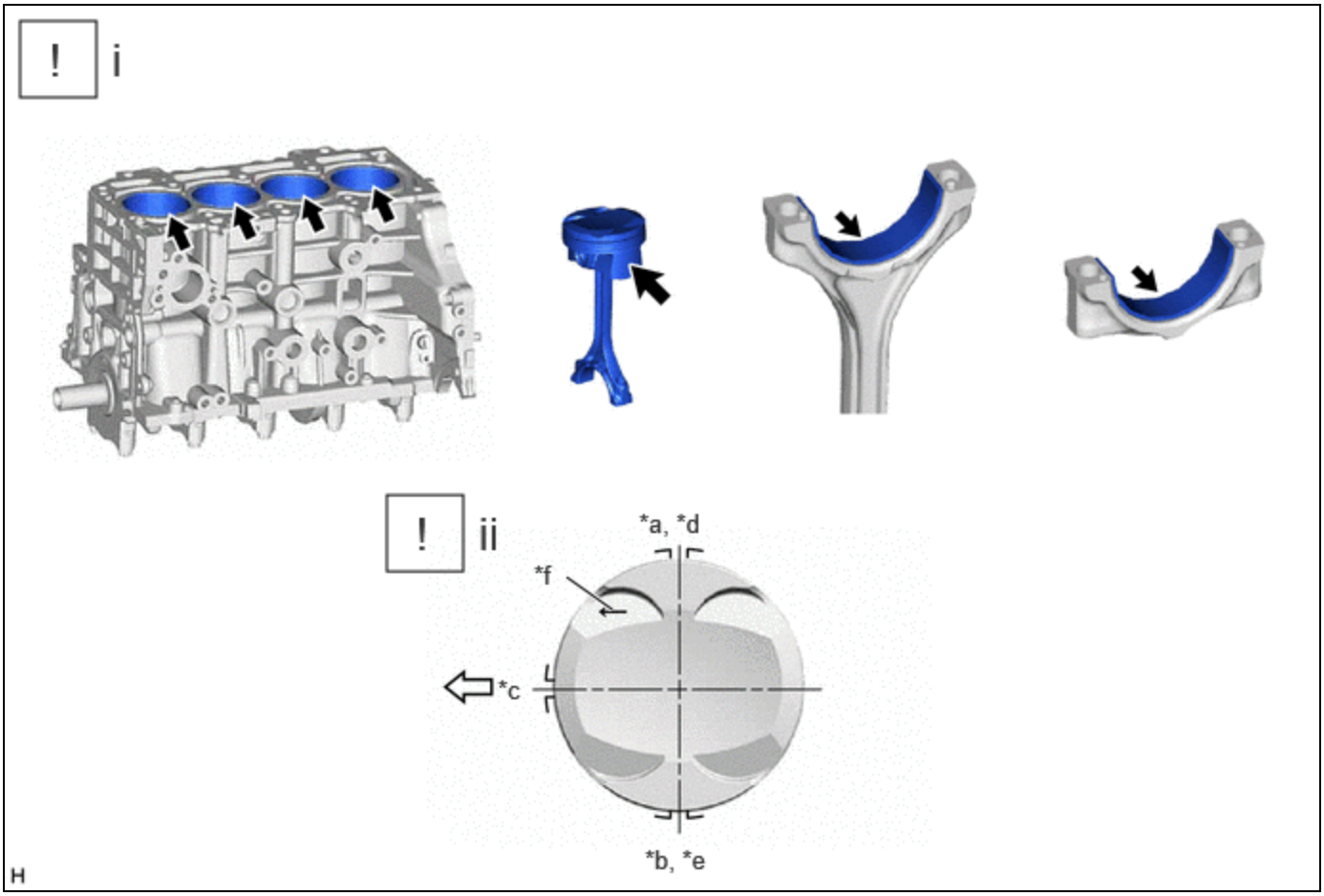
(4) Using a vernier caliper, measure the distance between the edges of the connecting rod bearing caps and connecting rod bearing.

Difference between (A) and (B):
0 to 0.7 mm (0 to 0.0276 in.)

NOTICE:

- Do not apply engine oil to the connecting rod bearings or the bearing contact surfaces of the connecting rod bearing cap.
- This measurement is performed to ensure that the connecting rod bearing is centered in the connecting rod bearing cap.

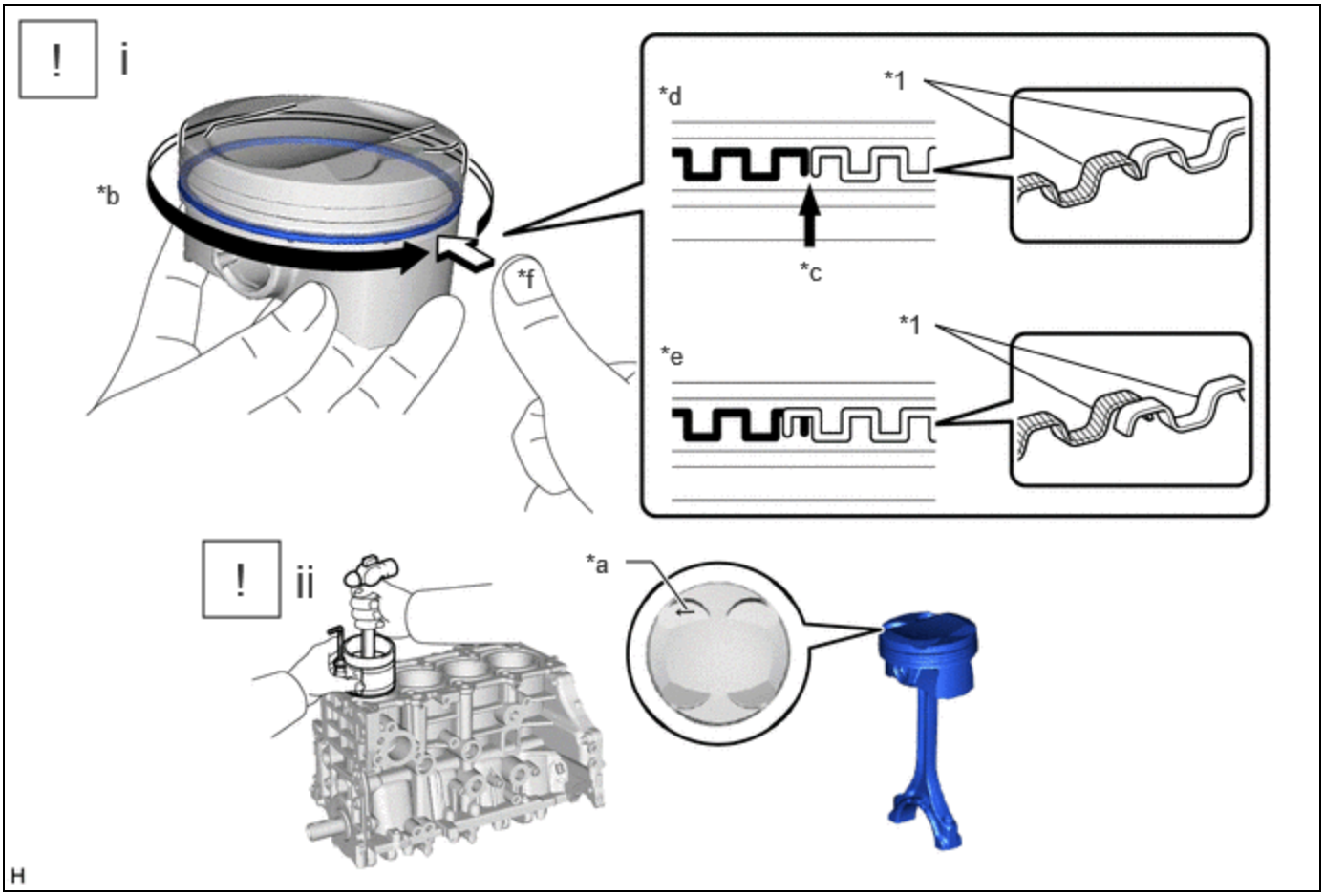
12. INSTALL PISTON WITH CONNECTING ROD



*a	No. 1 Compression Ring End Gap	*b	No. 2 Compression Ring End Gap
*c	Oil Ring Expander End Gap	*d	Upper Side Rail End Gap
*e	Lower Side Rail End Gap	*f	Front Mark
⇨	Front of Engine	-	-

(1) Apply engine oil to the cylinder walls, pistons, and surfaces of the connecting rod bearings.

(2) Position the piston rings so that the ring ends are as shown in the illustration.



*1	Oil Ring Expander	-	-
*a	Front Mark	*b	Press Around the Circumference
*c	Ring End	*d	Correct
*e	Incorrect	*f	Push with Thumb

(1) Confirm that the ends of the oil ring expander are not overlapping and that the upper side rail and lower side rail are securely installed into the groove.

NOTICE:

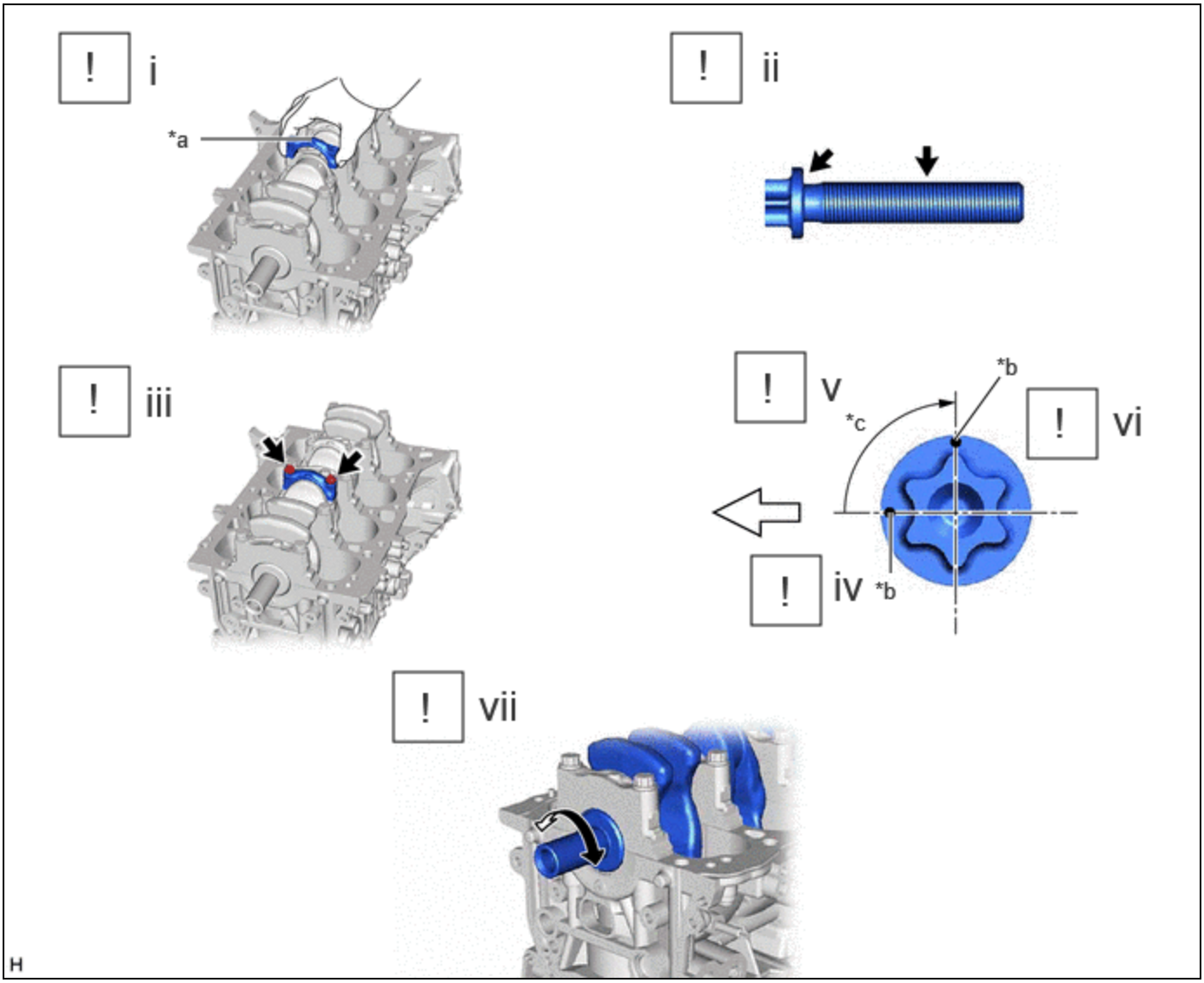
- After installing the oil ring expander, upper side rail and lower side rail, press around the circumference with a finger to check that they are securely installed into the groove.
- If the oil ring expander is not securely installed into the groove, check that the ends of the oil ring expander are not overlapping.
- If the ends of the oil ring expander are overlapping, remove the upper side rail and lower side rail and realign the oil ring expander using a screwdriver.

(2) Using a piston ring compressor, push the correctly numbered piston with connecting rod into the cylinder with the front marks of each piston with connecting rod facing the front of the engine.

NOTICE:

- When inserting the piston with connecting rod into the cylinder block sub-assembly, make sure the connecting rod does not contact the No. 1 oil nozzle sub-assembly and No. 2 oil nozzle sub-assembly.
- Match each connecting rod bearing cap to the correct connecting rod.

13. INSTALL CONNECTING ROD BEARING CAP



*a	Front Mark	*b	Paint Mark
*c	90°	-	-
⇨	Front of Engine	-	-

(1) Check that the front mark of the connecting rod bearing cap is facing the correct direction.

(2) Apply a light coat of engine oil to the threads and under the heads of the connecting rod bolts.

(3) Using an E12 "TORX" socket wrench, alternately tighten the 8 connecting rod bolts in several steps.

Torque:

38 N·m {387 kgf·cm, 28 ft·lbf}

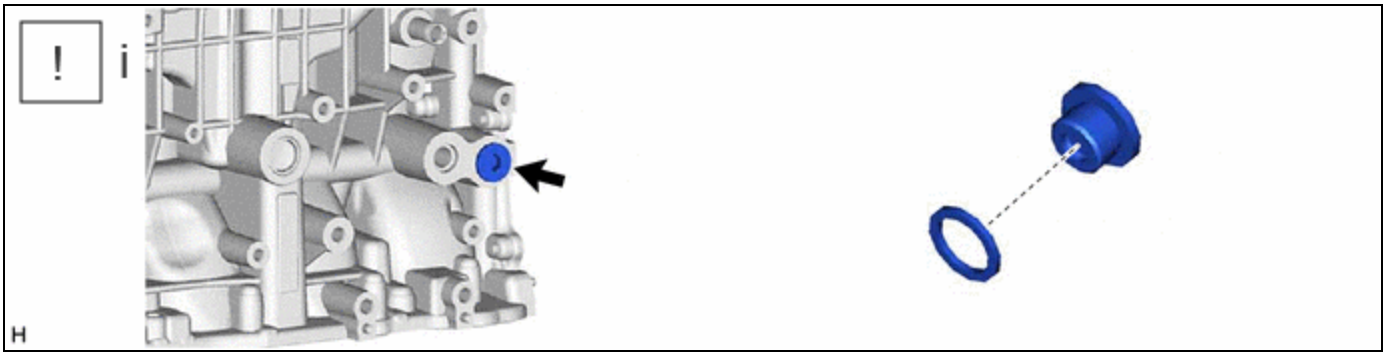
(4) Mark the front of the connecting rod bolts with paint.

(5) Tighten the connecting rod bolts 90° as shown in the illustration.

(6) Check that the paint marks are now at a 90° angle to the front.

(7) Check that the crankshaft turns smoothly.

14. INSTALL CYLINDER BLOCK WITH HEAD STRAIGHT SCREW PLUG



(1) Using a 10 mm hexagon socket wrench, install the cylinder block with head straight screw plug and a new gasket to the cylinder block sub-assembly.

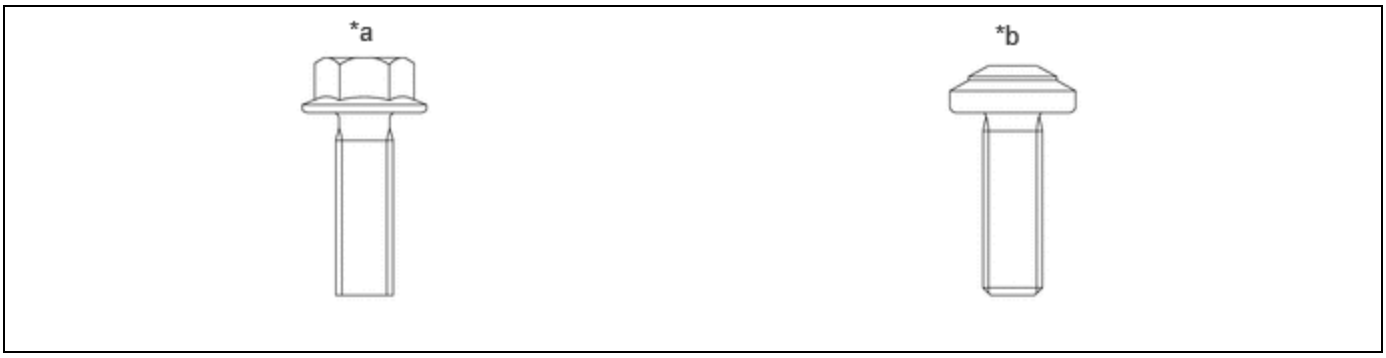
Torque:

44 N·m {449 kgf·cm, 32 ft·lbf}

15. INSTALL NO. 1 VENTILATION CASE

CAUTION:

- When the No. 1 ventilation case is fastened using only bolt A:
  Perform this procedure only when replacement of the No. 1 ventilation case is necessary.
- When the No. 1 ventilation case is fastened using bolt B:
  Do not remove and install the No. 1 ventilation case.



*a	Bolt A	*b	Bolt B

Torque:

21 N·m {214 kgf·cm, 15 ft·lbf}