


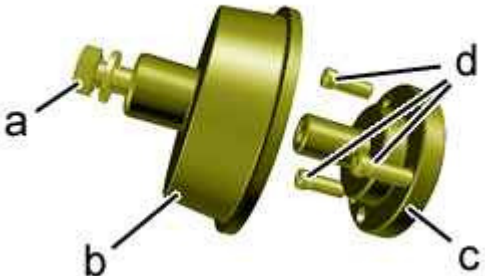
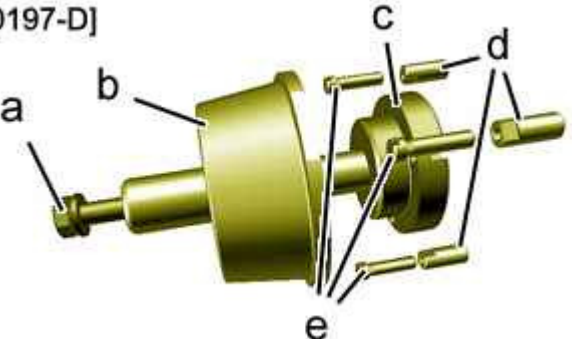


REFITTING : UNDER ENGINE (INDIRECT INJECTION)**1. Tooling**

tool	Reference	Designation
<div data-bbox="164 533 789 898"> <p data-bbox="183 548 297 583">[0197-J]</p>  </div> <p data-bbox="167 905 342 930">Figure : E5AB0SZT</p>	[0197-J]	Piston fitting cone
<div data-bbox="164 1052 789 1417"> <p data-bbox="183 1066 297 1102">[0197-K]</p>  </div> <p data-bbox="167 1423 342 1449">Figure : E5AB0T1T</p>	[0197-K]	Conrod half shell centring tool (43 and 48 mm diameter)
	[0197-L]	Tool for centring plain half shell crankshaft bearings

<p>[0197-L]</p>  <p>Figure : E5AB0T2T</p>		
<p>[0197-C]</p>  <p>Figure : E5AG03WT</p>	<p>[0197-C]</p>	<p>Crankshaft ring seal fitting drift flywheel side</p> <ul style="list-style-type: none"> - "a" : Bolt for tightening the ring seal fitting drift "b" - "b" : Seal fitting mandrel - "c" : Fitting guide for the drift "b" and the ogive of the ring seal - "d" : Guide assembly bolt "c"
<p>[0197-D]</p>  <p>Figure : E5AG03XT</p>	<p>[0197-D]</p>	<p>Crankshaft ringed seal, fitting drift timing side</p> <ul style="list-style-type: none"> - "a" : Ring seal fitting drift "b" tightening bolt - "b" : Seal fitting mandrel - "c" : Fitting guide for the drift "b" and the ogive of the ring seal - "d" : Guide and assembly bush "c" - "e" : Guide assembly bolt "c"

2. Preparation of the con rods

CAUTION : Adhere to the tightening torques  .

URGENT : Observe the safety and cleanliness recommendations ⓘ .

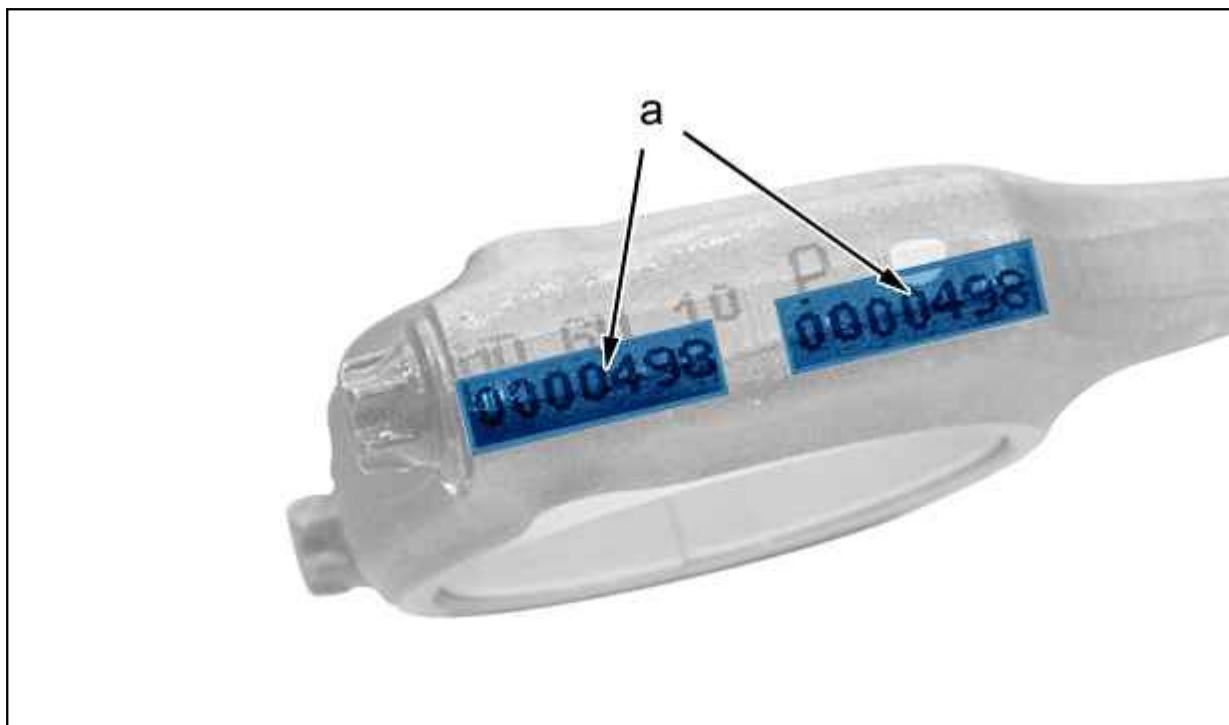


Figure : B1BB105D

N.B. : The maximum difference between the weights of the con rods of the same engine is 3 grammes.

CAUTION : Identify the fitting direction of the big end bearing caps on the con rod (paint marks at removal or marking (at "a") on new con rod).

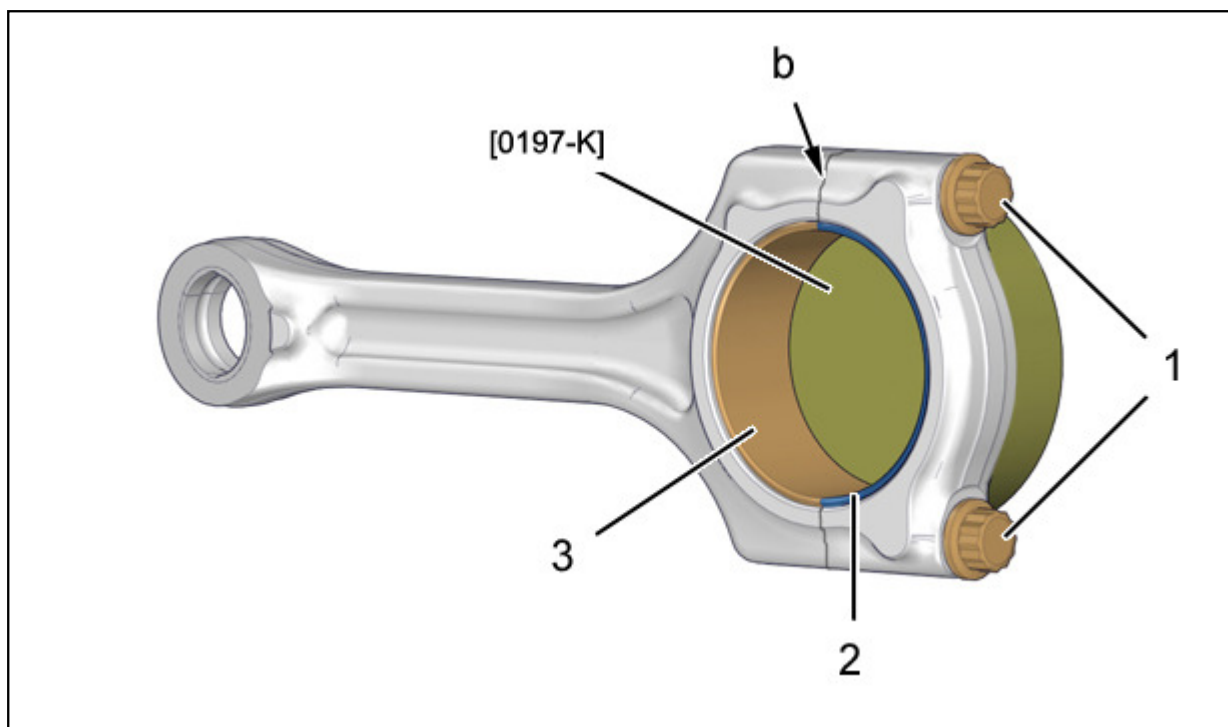


Figure : B1BG1VXD

Oil and refit the big end half shell bearings (2), (3) onto the con rod and the big end bearing cap.

Pretighten the big end bearing by hand, without forcing it.

Centre the big end shell bearings (2), (3) ; Using tool [0197-K].

Remove the bolts (1) and the big end bearing cap; mark it.

Repeat the operation on the 3 other assemblies.

CAUTION : Do not put any oil on the breaks in the con rods (at "b") or under the heads of the big end bolts (1).

CAUTION : The big end bolts (1) are delivered prelubricated; do not oil or grease the bolts before refitting.

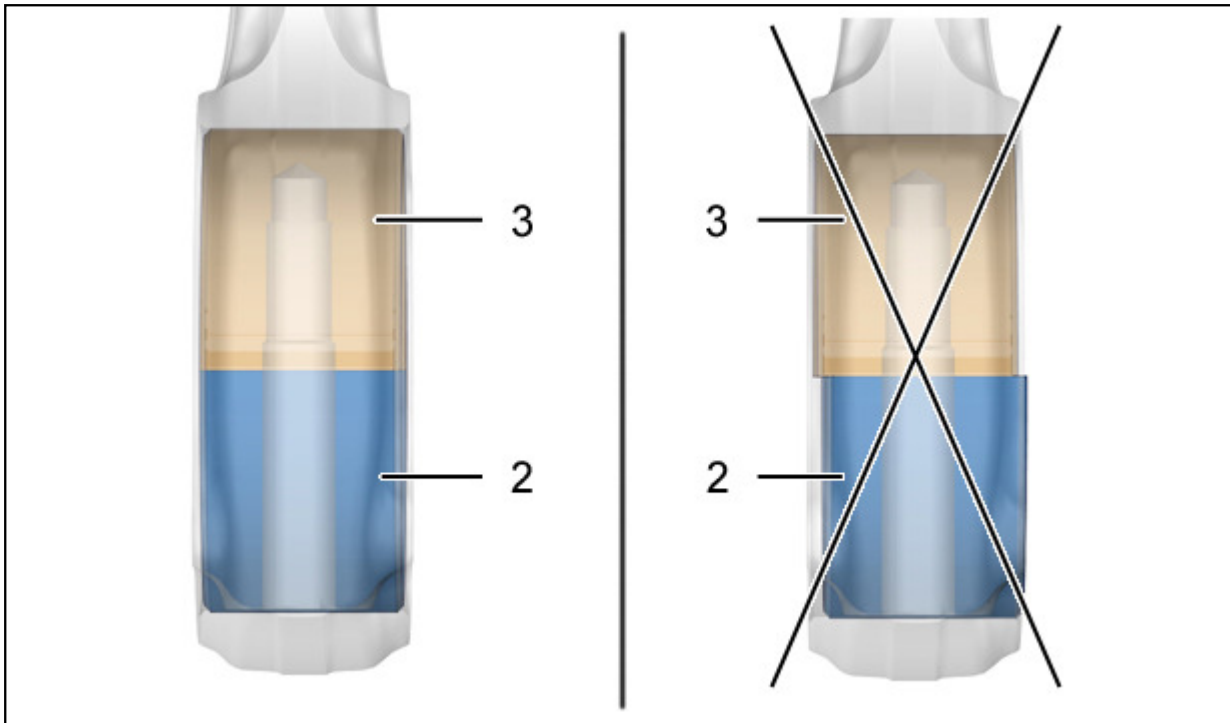


Figure : B1BD05ND

CAUTION : The big end half shell bearings (2), (3) must be aligned and centred on the con rod.

3. Refitting the piston

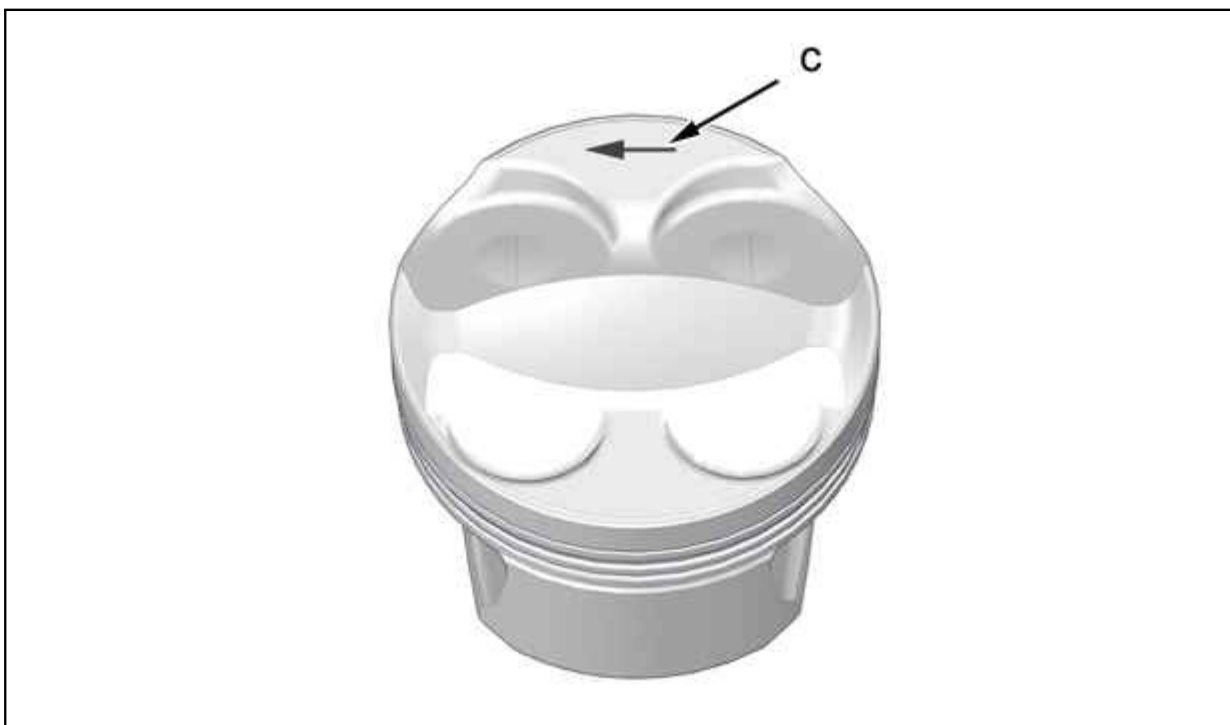


Figure : B1BG1VYD

Identify the direction of fitting of the piston ; Arrow (at "c") towards the timing.

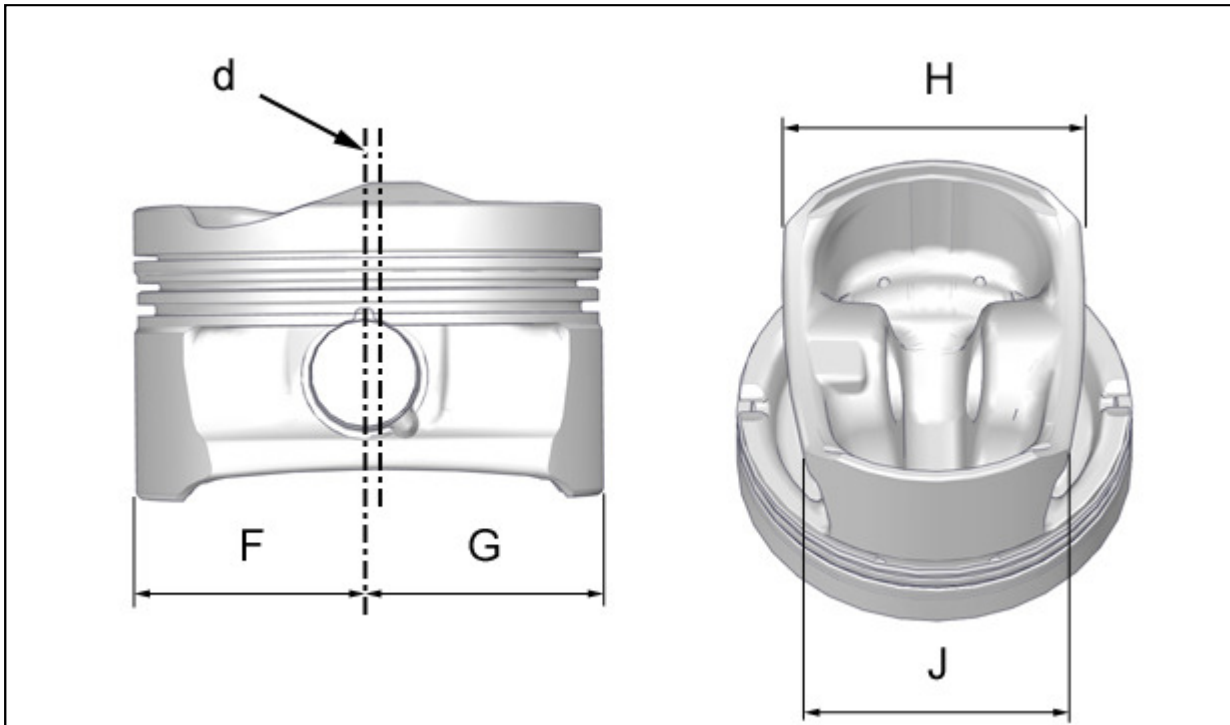


Figure : B1BD05OD

If the arrow (at "c") can no longer be seen, position the piston according to :

- The offset (at "d") of the gudgeon pin ; Shortest distance "F" towards the inlet side
- The width of the piston skirt ; Largest dimension "H" towards the inlet side

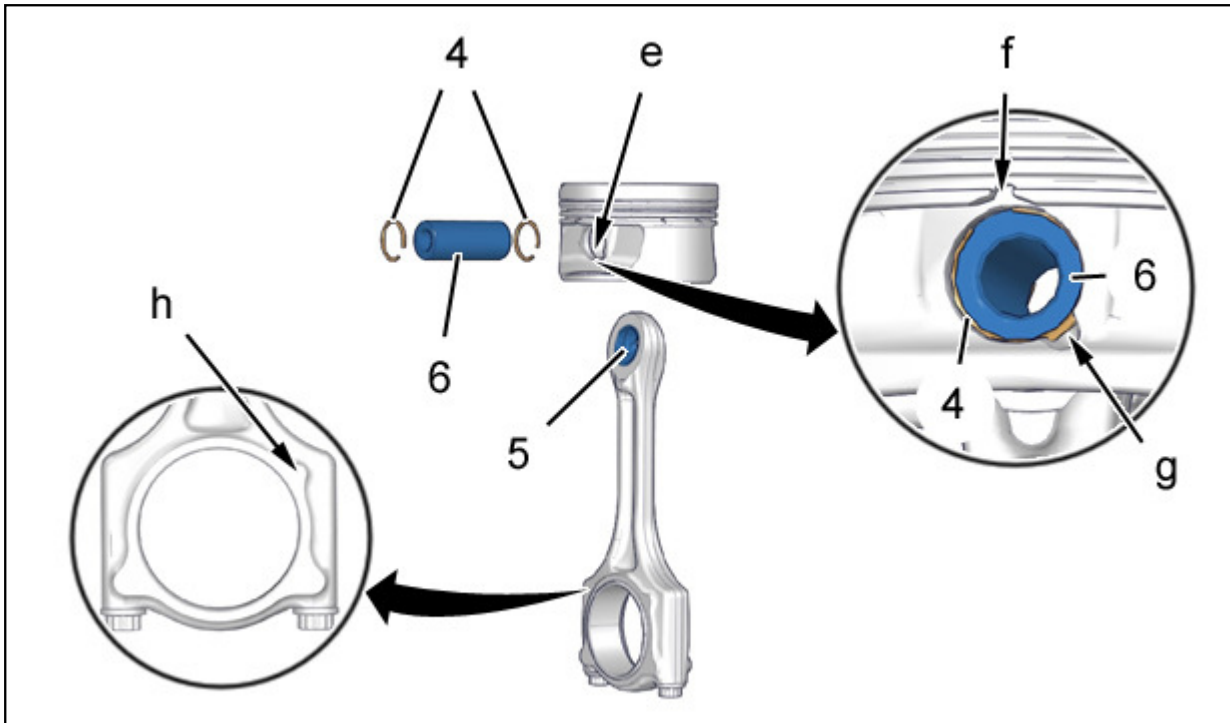


Figure : B1BG1VZD

Oil :

- The gudgeon pin (6)
- The little end bush (5)

Oil the piston (at "e").

CAUTION : Orient the third boss of the con rod (at "h") (timing side).

Fit :

- The gudgeon pin (6)
- The circlips (4)

CAUTION : Position the opening in the retention rings (at "f" opposite the groove (at "g")).

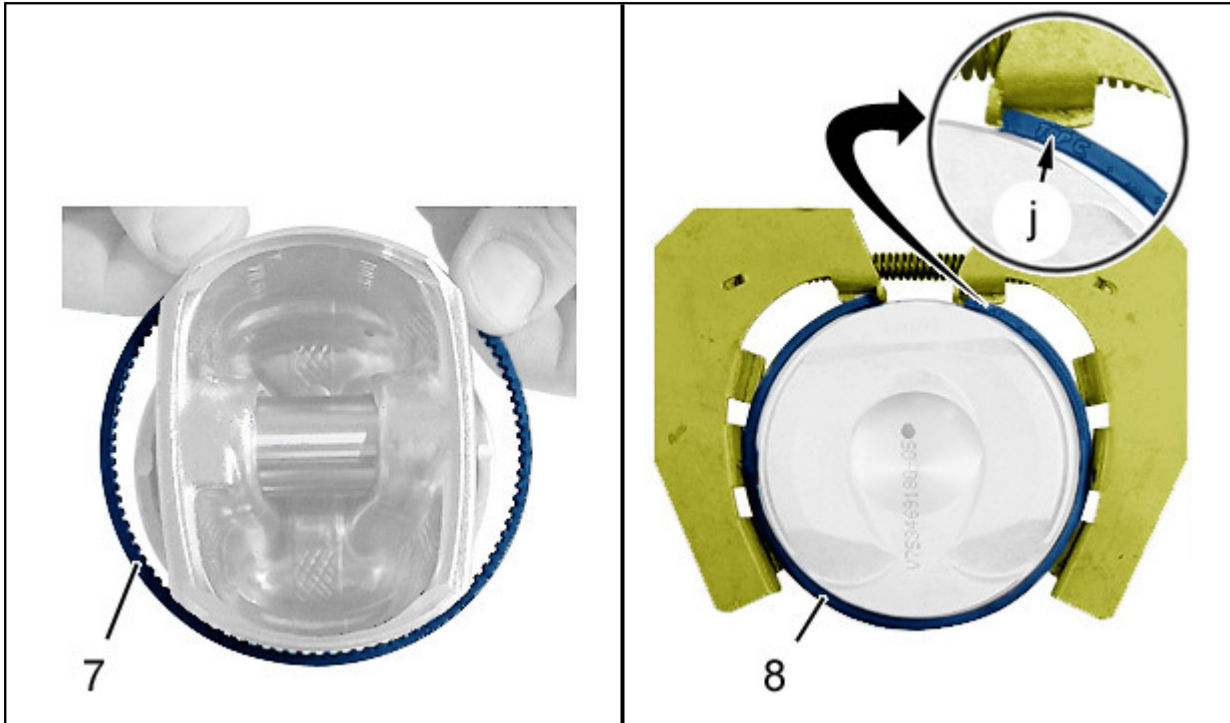


Figure : B1BG1W0D

Position :

- The scraper ring (7), opening it gently
- The compression ring (8) ; Using tool

Position the ring (8) ; Mark "TOP" (at "j") at the top.

Repeat the operation for the top compression ring ; Mark "TOP" (at "j") at the top.

N.B. : Check that the rings rotate freely in the grooves before introducing the pistons into the sleeves; no tight point must be felt when rotating them.

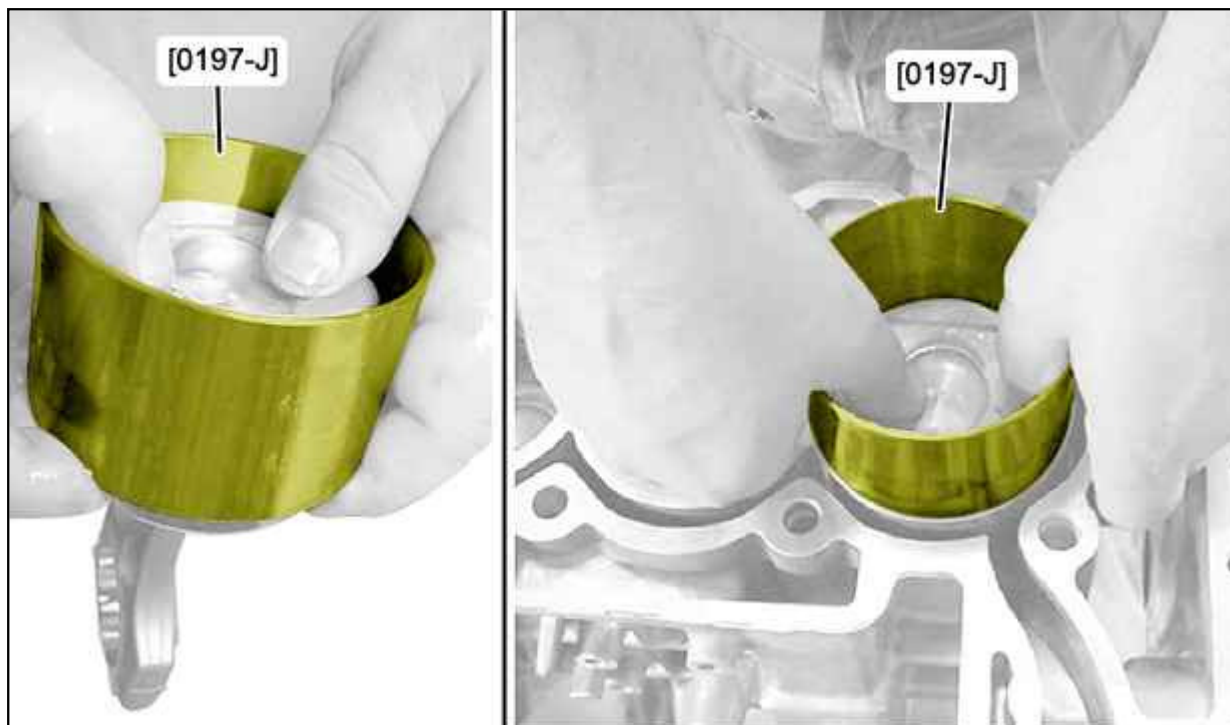


Figure : B1BG1W1D

CAUTION : Position the rings by thirds so that the gaps in them are at 120°.

Turn the cylinder block over.

Oil :

- The linings
- The pistons
- The piston rings
- The tool [0197-J]

Have the piston sleeve protruding by about 15 mm to make it easier to introduce it into the liners.

Push evenly on the head of the piston until it enters the liner fully.

CAUTION : If there is a tight point, do not force it; withdraw the assembly, check the pistons and the grooves, then repeat the operation.

CAUTION : If a scratch is noticed in the liner, remove the assembly and check that no ring is broken.

4. Classification of upper half-shells on cylinder block (grooved)

Pair up the 1/2 main bearings in accordance with the marks on the cylinder block assembly and on the crankshaft ⓘ.

4.1. Main bearings No.1 2 No.4

CAUTION : Tightening the main bearing bolt on the timing side increases the diameter of main journal n°5 (timing side). The following table is only valid for bearings n°1 to n°4.

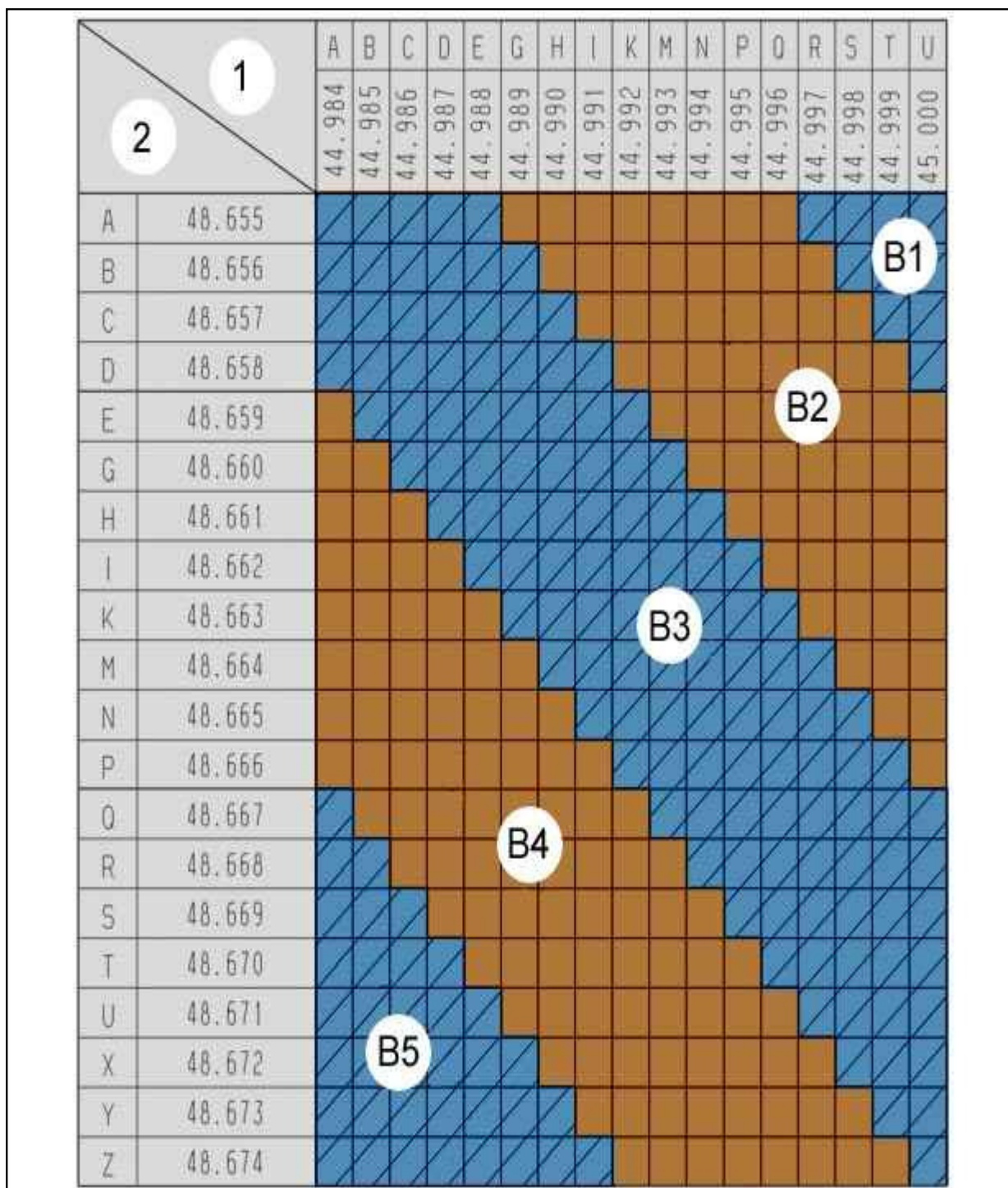


Figure : B1BG1W2P

- (1) Diameter of the main bearing journals n°1 to n°4.
 (2) Diameter of the cylinder block.

Reference	Nominal dimension
CLASS "B1" (black colour)	1,822 - 1,826 mm
CLASS "B2" (Green)	1,826 - 1,830 mm
CLASS "B3" (Coloured yellow)	1,830 - 1,834 mm

CLASS "B4" (Orange colour)	1,834 - 1,838 mm
CLASS "B5" (Brown in colour)	1,838 - 1,842 mm

4.2. Main bearing No.5

CAUTION : Tightening the main bearing bolt on the timing side increases the diameter of journal No.5 (timing side). The set of half shell bearings No.5 must be increased (maximum 0,008 mm) In accordance with the following table.

<div>1</div> <div>2</div>		A	B	C	D	E	G	H	I	K	M	N	P	Q	R	S	T	U
		44.984	44.985	44.986	44.987	44.988	44.989	44.990	44.991	44.992	44.993	44.994	44.995	44.996	44.997	44.998	44.999	45.000
A	48.655																	
B	48.656																	
C	48.657																	
D	48.658																	
E	48.659																	
G	48.660																	
H	48.661																	
I	48.662																	
K	48.663																	
M	48.664																	
N	48.665																	
P	48.666																	
Q	48.667																	
R	48.668																	
S	48.669																	
T	48.670																	
U	48.671																	
X	48.672																	
Y	48.673																	
Z	48.674																	

Figure : B1BG1W3P

(1) Diameter of crankshaft journal No.5.

(2) Diameter of the cylinder block.

Reference	Nominal dimension
CLASS "C1" (black colour)	1,822 - 1,826 mm
CLASS "C2" (Green)	1,826 - 1,830 mm
CLASS "C3" (Coloured yellow)	1,830 - 1,834 mm
CLASS "C4" (Orange colour)	1,834 - 1,838 mm
CLASS "C5" (Brown in colour)	1,838 - 1,842 mm

5. Classification main bearing cap plain lower half shell bearings (plain)

5.1. Main bearings No.1 2 No.4

CAUTION : Tightening the main bearing bolt on the timing side increases the diameter of main journal n°5 (timing side). The following table is only valid for bearings n°1 to n°4.

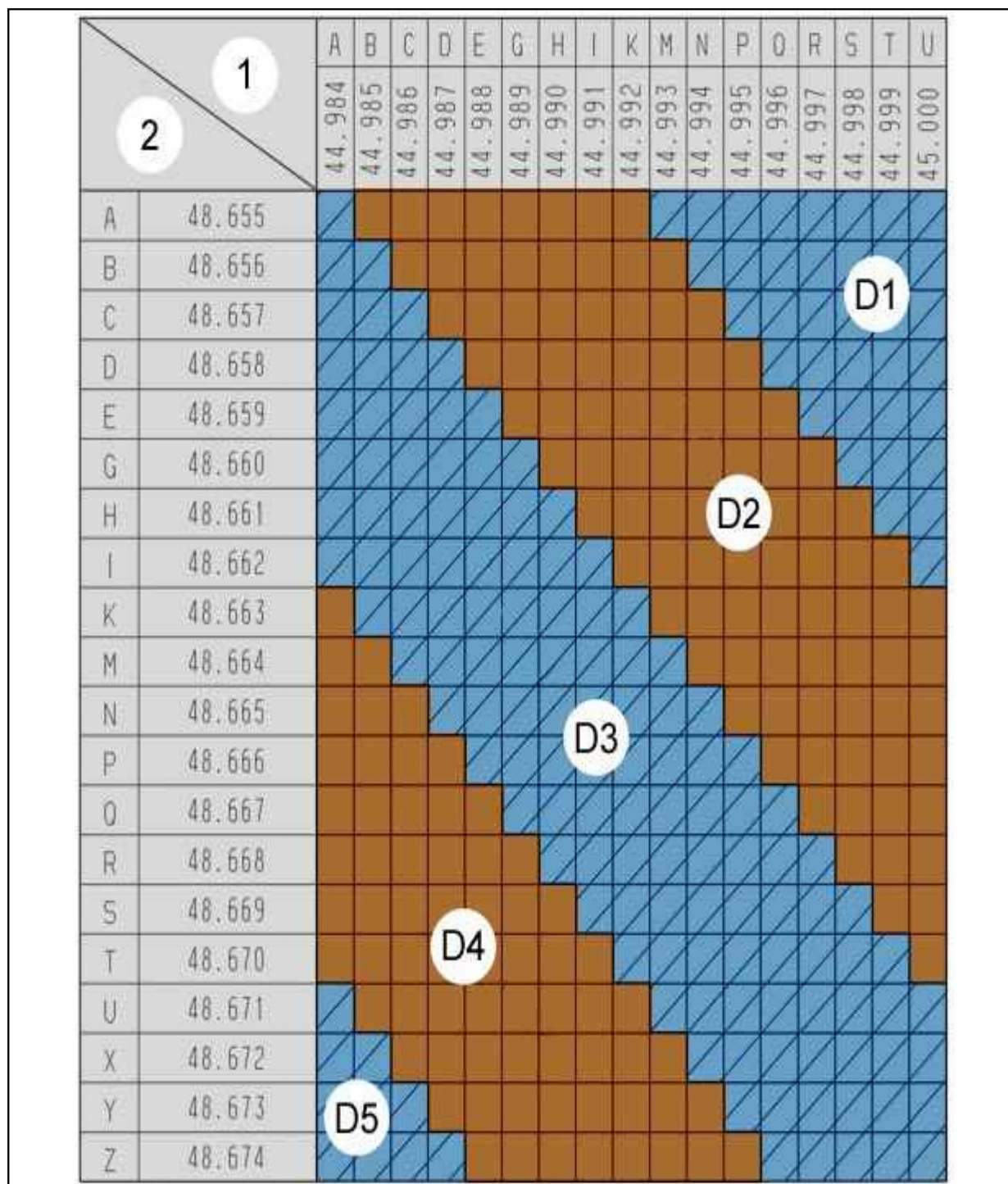


Figure : B1BG1W4P

- (1) Diameter of the main bearing journals n°1 to n°4.
 (2) Bearing cap diameter.

Reference	Nominal dimension
CLASS "D1" (black colour)	1,822 - 1,826 mm
CLASS "D2" (Green)	1,826 - 1,830 mm
CLASS "D3" (Coloured yellow)	1,830 - 1,834 mm

CLASS "D4" (Orange colour)	1,834 - 1,838 mm
CLASS "D5" (Brown in colour)	1,838 - 1,842 mm

5.2. Main bearing No.5

CAUTION : Tightening the main bearing bolt on the timing side increases the diameter of journal No.5 (timing side). The set of half shell bearings No.5 must be increased (maximum 0,008 mm) In accordance with the following table.

<div>1</div> <div>2</div>		A	B	C	D	E	G	H	I	K	M	N	P	O	R	S	T	U
		44.984	44.985	44.986	44.987	44.988	44.989	44.990	44.991	44.992	44.993	44.994	44.995	44.996	44.997	44.998	44.999	45.000
A	48.655																	
B	48.656																	
C	48.657																	
D	48.658																	
E	48.659																	
G	48.660																	
H	48.661																	
I	48.662																	
K	48.663																	
M	48.664																	
N	48.665																	
P	48.666																	
O	48.667																	
R	48.668																	
S	48.669																	
T	48.670																	
U	48.671																	
X	48.672																	
Y	48.673																	
Z	48.674																	

Figure : B1BG1W5P

(1) Diameter of crankshaft journal No.5.

(2) Bearing cap diameter.

Reference	Nominal dimension
CLASS "E1" (black colour)	1,822 - 1,826 mm
CLASS "E2" (Green)	1,826 - 1,830 mm
CLASS "E3" (Coloured yellow)	1,830 - 1,834 mm
CLASS "E4" (Orange colour)	1,834 - 1,838 mm

5.3. E.g.

CAUTION : Half-shells on the same bearing may have colour references that differ.

Characters read on the crankshaft : PNIPK.

Characters on the cylinder block : KKMPK.

For bearing no. 1 :

- Marked on the crankshaft (P)
- Marked on the cylinder block (K)
- The grooved upper half-shell to be fitted is class "B3" (Coloured yellow)
- The smooth lower half-shell to be fitted is class "D2" (Green)

For bearing no. 5 :

- Marked on the crankshaft (K)
- Marked on the cylinder block (K)
- The grooved upper half-shell to be fitted is class "C2" (Green)
- The smooth lower half-shell to be fitted is class "E2" (Green)

N.B. : Proceed in the same way for the 3 other assemblies.

6. Refitting the crankshaft

6.1. Refitting the upper shell bearings (Grooves)

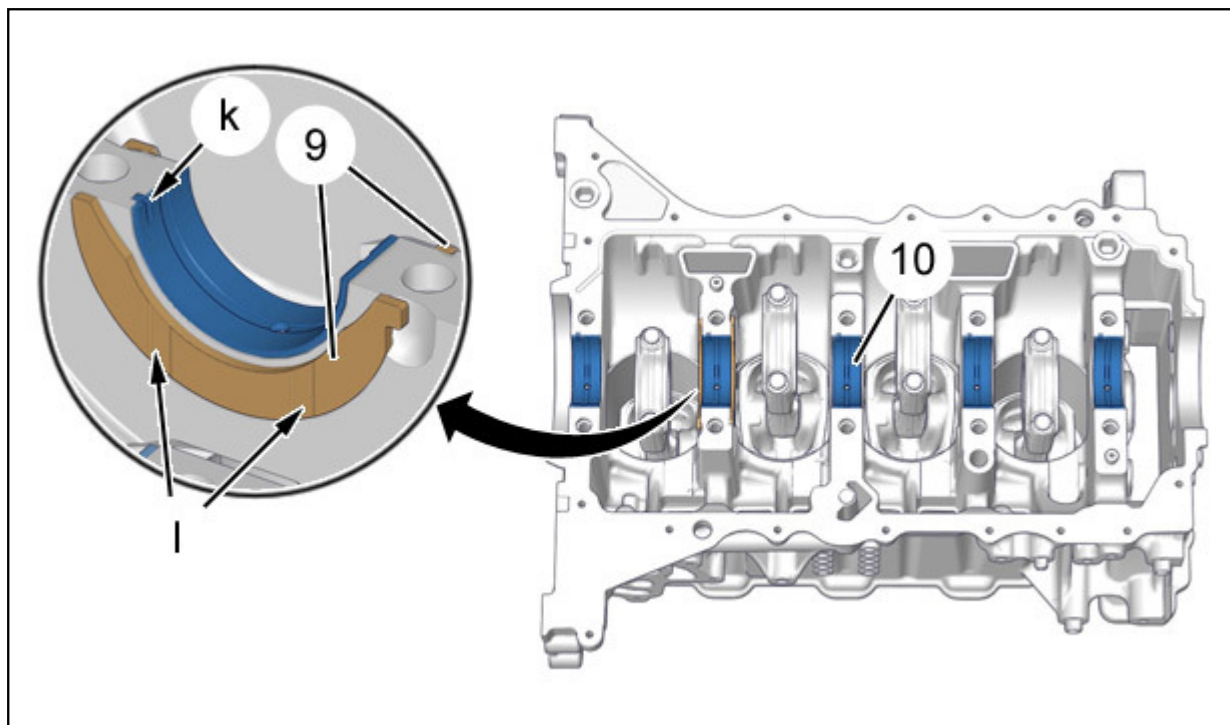


Figure : B1BG1W7D

Oil and refit the grooved upper half shell bearings (10).
Check that the pawls are correctly positioned (at "k").

CAUTION : Do not put any oil in the threads.

Oil and refit the 2 thrust washers (9) on bearing No 2.

CAUTION : Fit the thrust washers (9) the right way round ; Grooved side (at "I") towards the crankshaft.

N.B. : There are no thrust washer repair dimensions (9).

6.2. Refitting the lower plain shell bearings

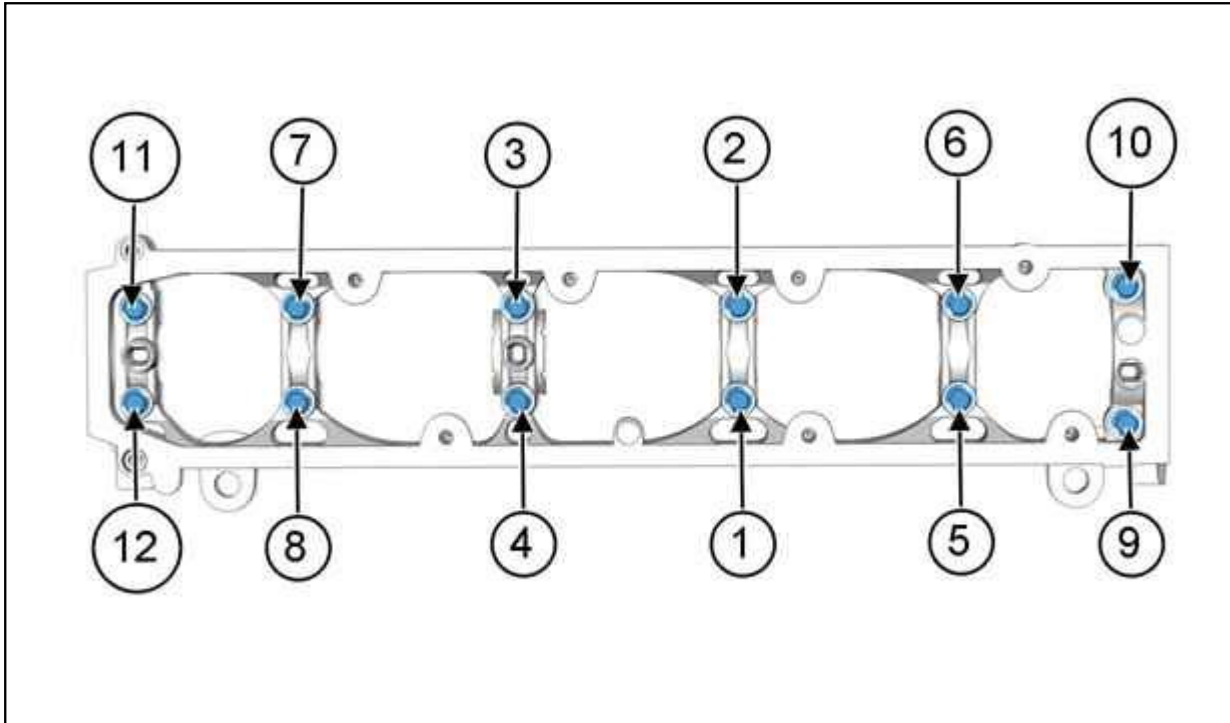


Figure : B1BG1W8D

CAUTION : The thickness of bearing n°2 (facing the lateral play thrust washers) is wider.

Use :

- The face engraved 1,4 mm for the half shells of bearings n° 1, 3, 4, 5
- The face engraved 1,8 mm for the half shell of bearing n° 2

Oil and refit the lower plain half shell bearings (11) ; Using tool [0197-L].
Check that the plain half bearings (11) are correctly centred on the bearing caps (12).

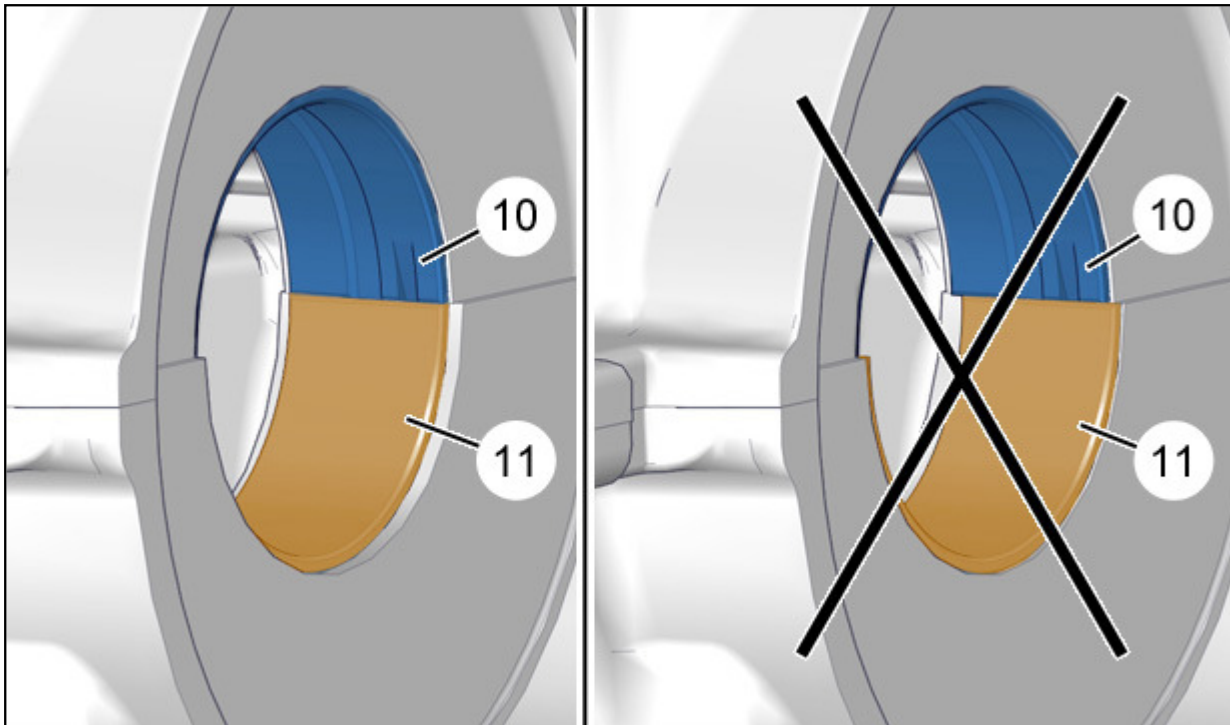


Figure : B1BG1WBD

CAUTION : The plain main bearing half shells (11), must be aligned with the grooved half shells (10).

6.3. Refitting the bearing caps

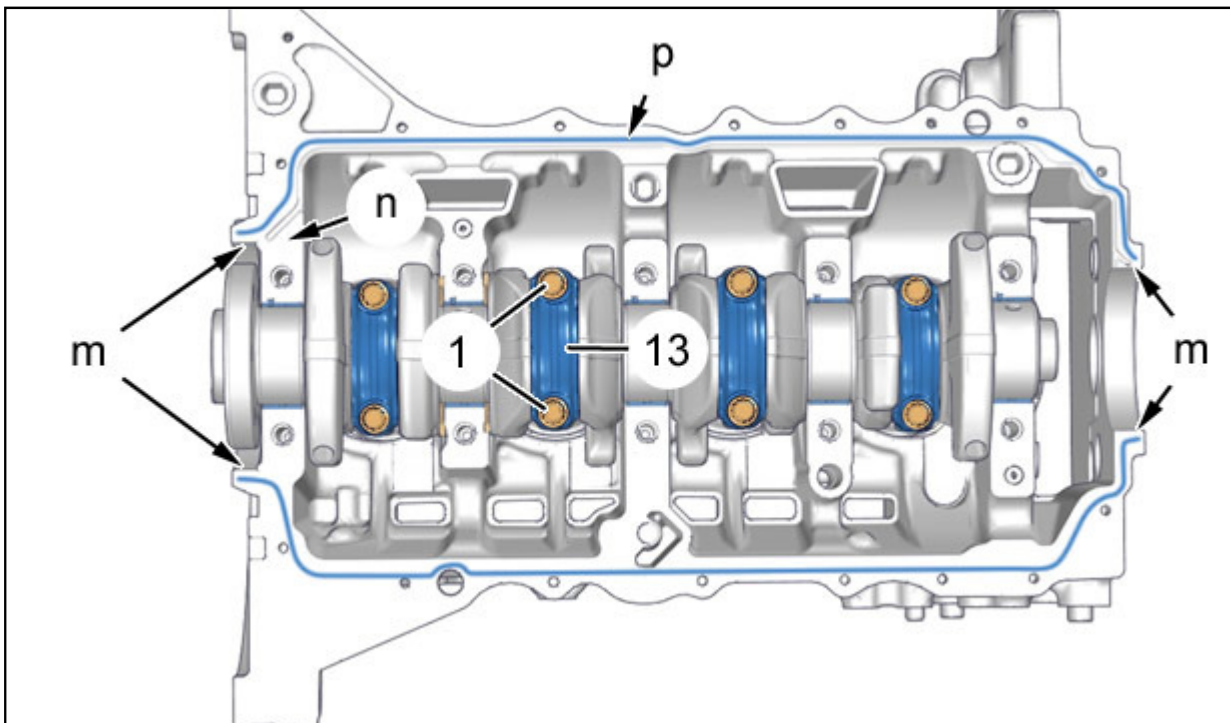


Figure : B1BG1WCD

Oil and refit the crankshaft.

Oil :

- The conrod bearing shells
- The crank pins

Fit :

- The big end caps (13)
- The screws (1) (new)

Tighten the bolts (1).

CAUTION : Make sure the big end bearing caps are the right way round.

CAUTION : Do not put any oil in the threads, on the con rod breaks or under the heads of the big end bolts (1).

CAUTION : The big end bolts are delivered prelubricated; do not oil or grease the bolts before refitting.

Place a bead of sealer (at "p") on the cylinder block.

Do not put a bead of sealer in the reserve groove (at "n").

Refit the main bearing cap (12) fitted with the plain half shells (11).

N.B. : Wipe the excess sealer from the housing of the sealing rings (at "m") before it dries.

CAUTION : If the excess sealer has not been wiped previously, do not pull on it but cut it cleanly.

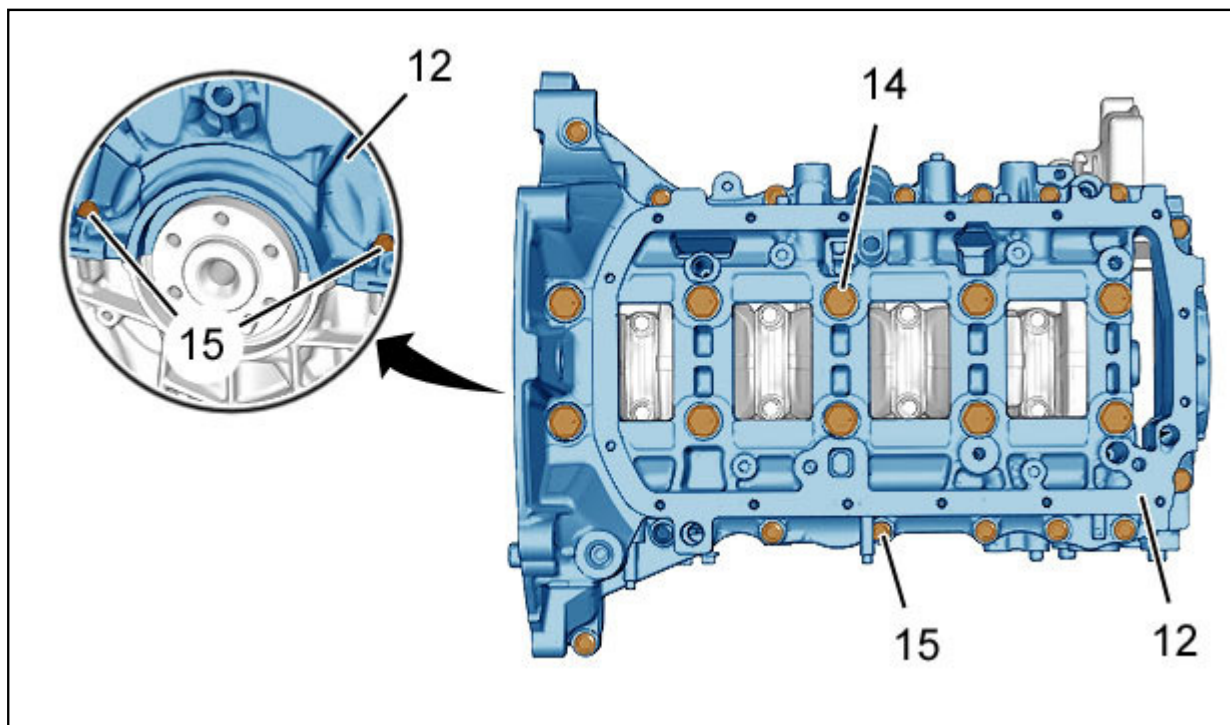


Figure : B1BG1WFD

Refit the bolts (14) (new) of the main bearing cap (12).

Tighten the bolts (14).

Refit the bolts (15) (new) of the main bearing cap (12).

Tighten the bolts (15).

7. Refit the oil pump

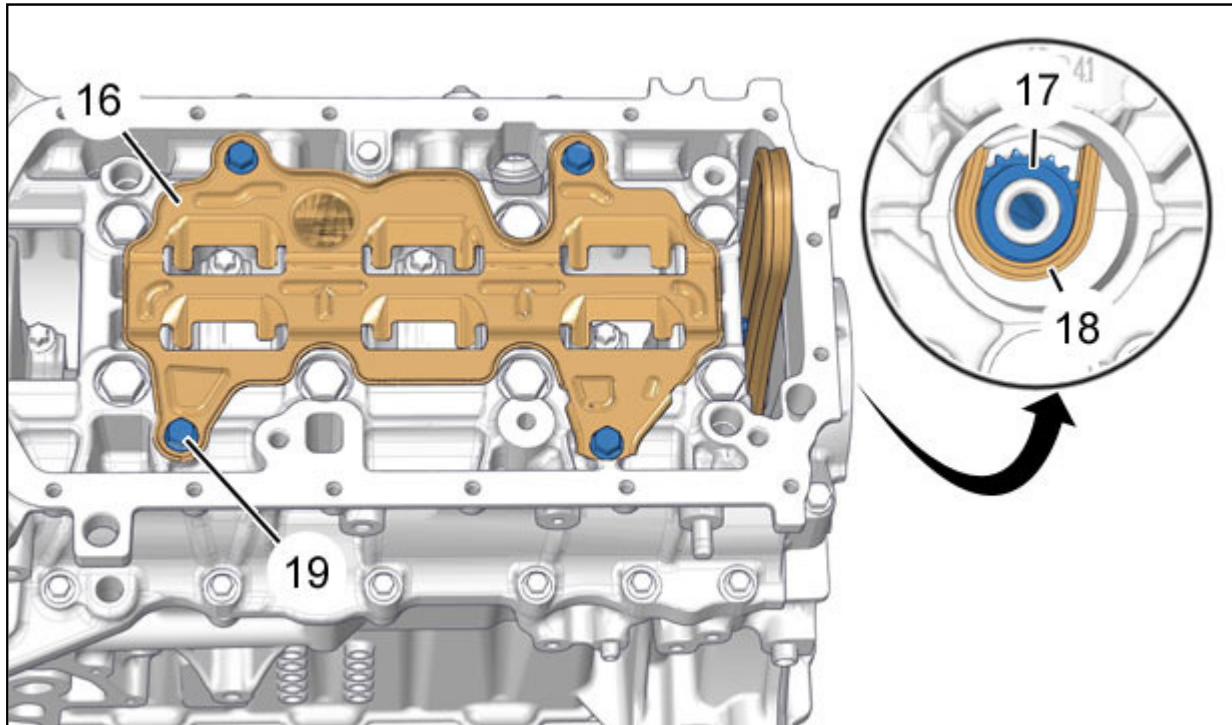


Figure : B1BG1WGD

CAUTION : Degrease the bearing face of the oil pump gear (17) on the crankshaft.

Fit :

- The emulsion prevention plate (16)
- The bolts (19)
- The oil pump drive gear (17)
- The chain (18)

Attach the chain (18).

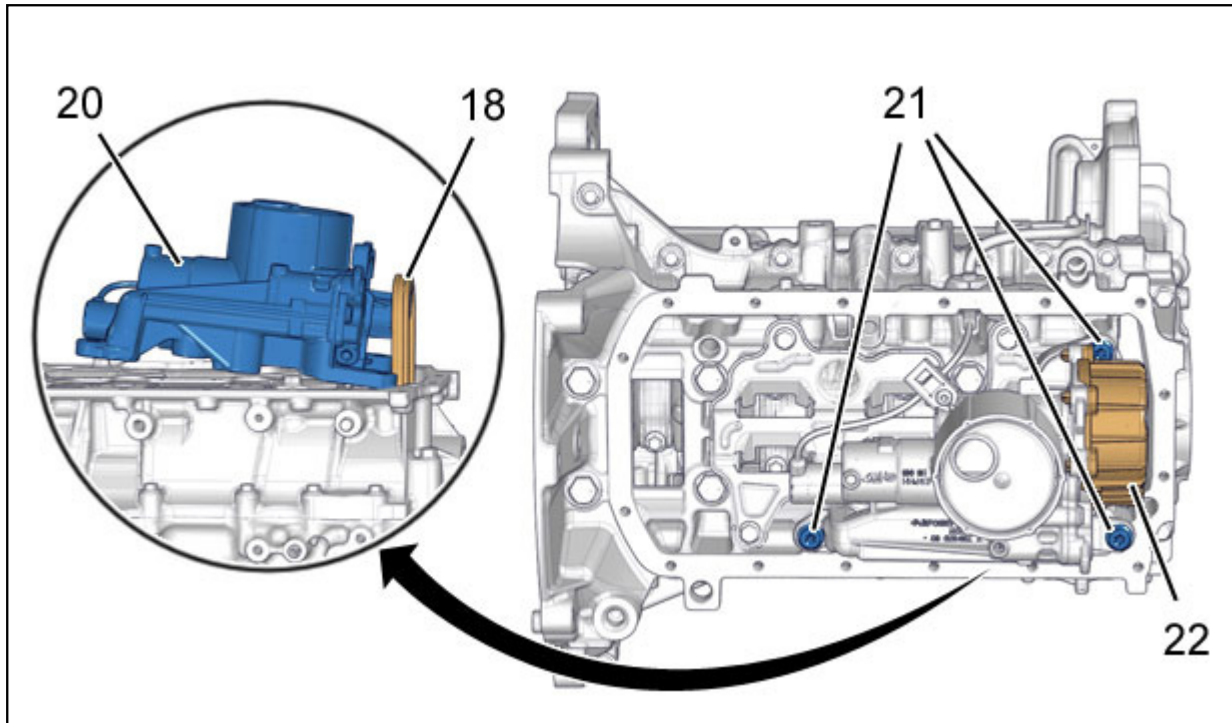


Figure : B1BG1WJD

Incline the oil pump (20) and engage the sprocket in the chain (18).

Fit :

- Oil pump attachment screws ((21))
- Oil pump pinion cover (22)

8. Refit the oil sump

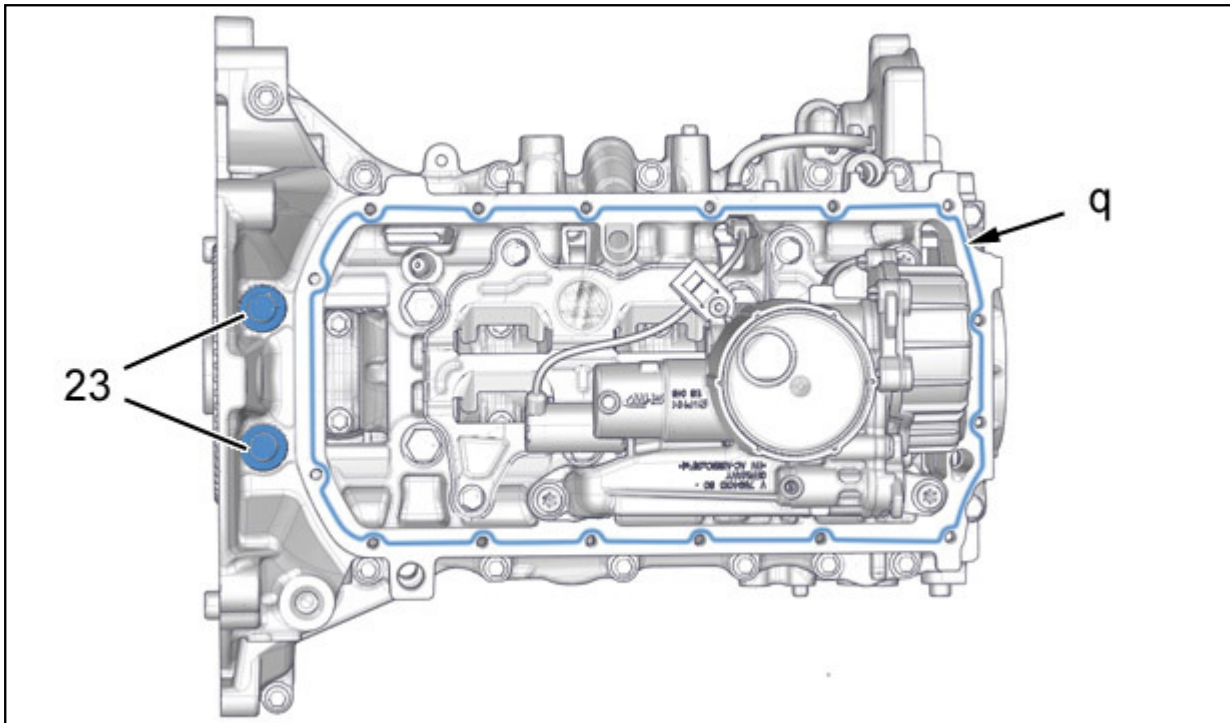


Figure : B1BG1WMD

Refit the blanks (23).

N.B. : Apply a sealing product around the plugs (23) before refitting.

Place a bead of silicone sealer the whole way round (at "q").

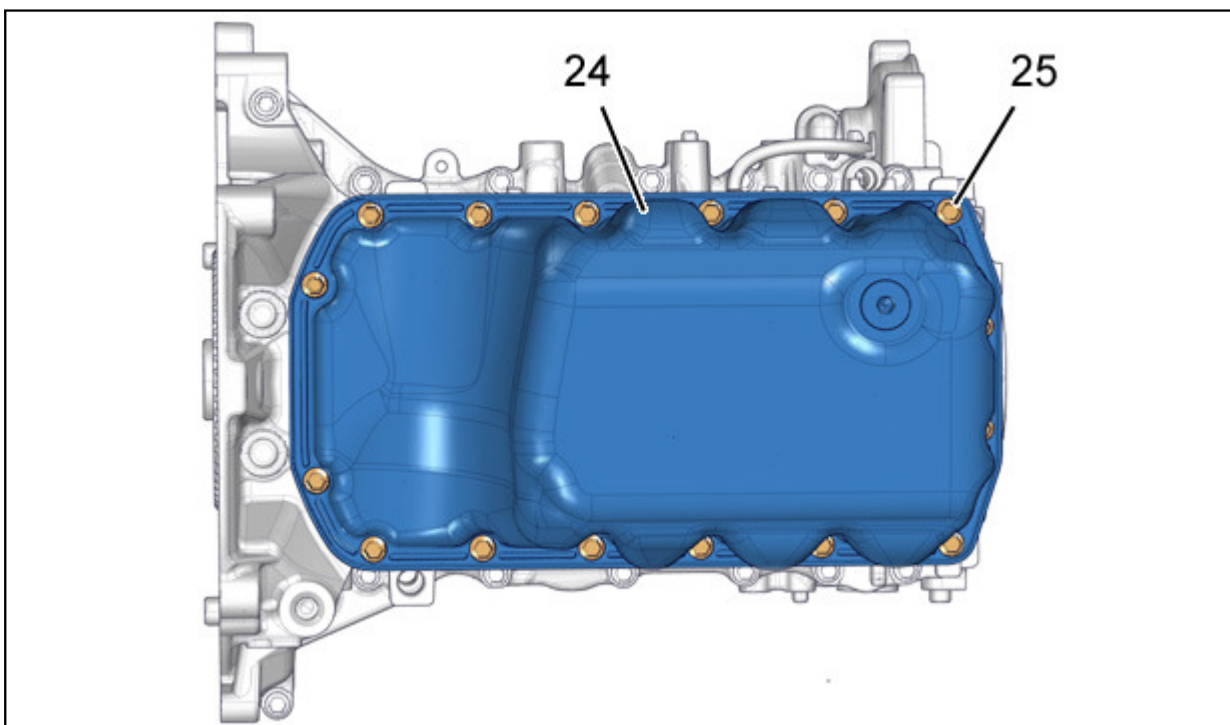


Figure : B1BG1WND

Fit :

- The oil sump (24)
- The bolts (25)

9. Refit the cylinder head

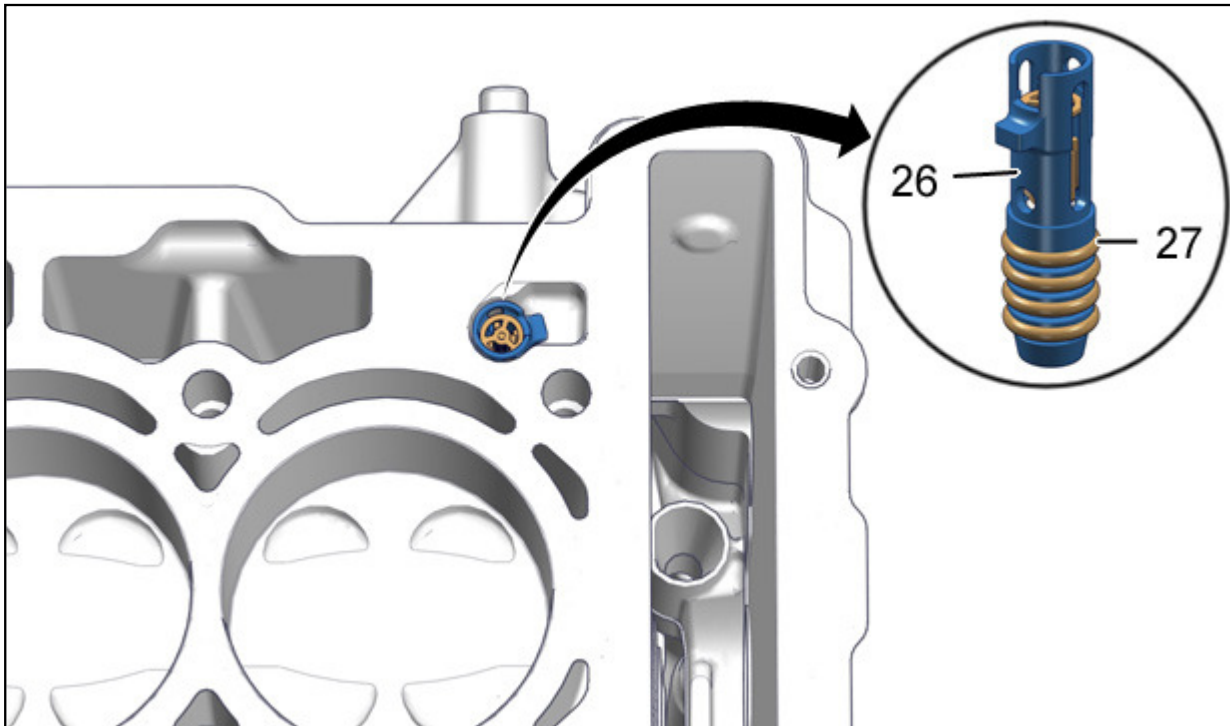


Figure : B1BG1WQD

Turn the cylinder block over.

Oil the O-rings (27).

Refit the oil non-return valve (26).

CAUTION : The valve (26) must not protrude beyond the seal face by more than 1 mm.

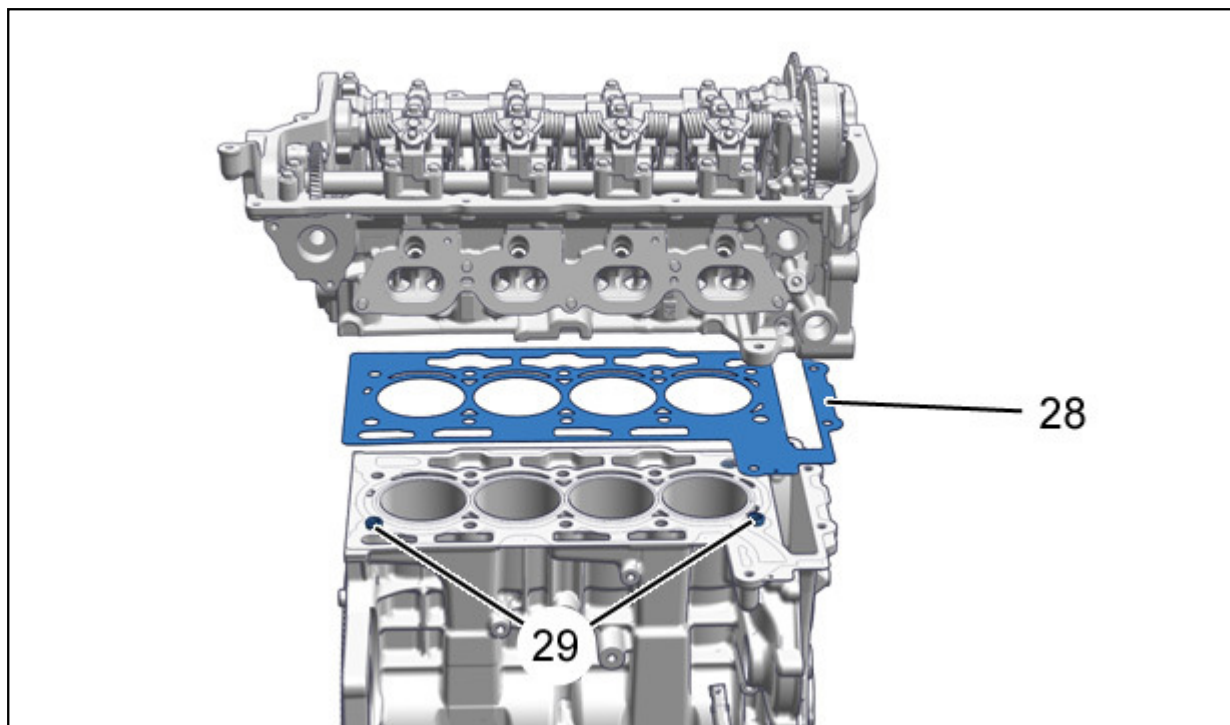


Figure : B1BG1WTD

Check that the centring rings (29) are present.

Fit :

- A new cylinder head gasket (28)
- The cylinder head

10. Refitting the ring seal (timing side)

CAUTION : Before refitting, clean and degrease the housing in the cylinder block ; Using an approved degreasing product.

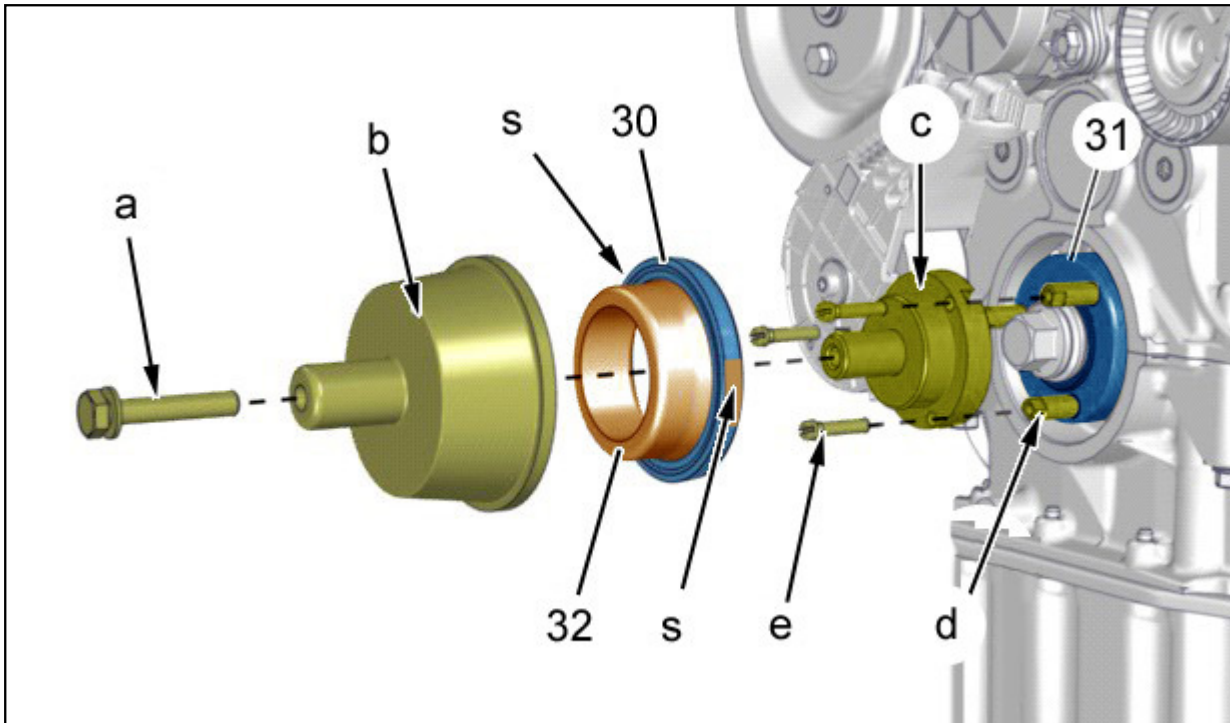


Figure : B1BG1WUD

CAUTION : Before fitting a new ring seal in the cylinder block : Lightly coat, following the bead (at "s"), the outside of the new ring seal (30) on both sides of the cylinder block/main bearing cap seal face ; With an approved sealing product of type CAF50.

Fit ; Using tool [0197-D] :

- The threaded inserts "d" into the crankshaft hub (31)
- The fitting guide "c" on the crankshaft pulley (31) ; Using the 3 bolts "e"
- Ogive (32) fitted with its new ring seal (32) onto the crankshaft (31)
- The tool "b" ; With the bolt "a"

Tighten the bolt "a" of the tool "b" until the surface of the tool "b" comes into contact with the surface of the cylinder block ; Using tool [0197-D].

Remove the tools [0197-D].

11. Refitting the ring seal (flywheel side)

CAUTION : Before refitting, clean and degrease the housing in the cylinder block ; Using an approved degreasing product.

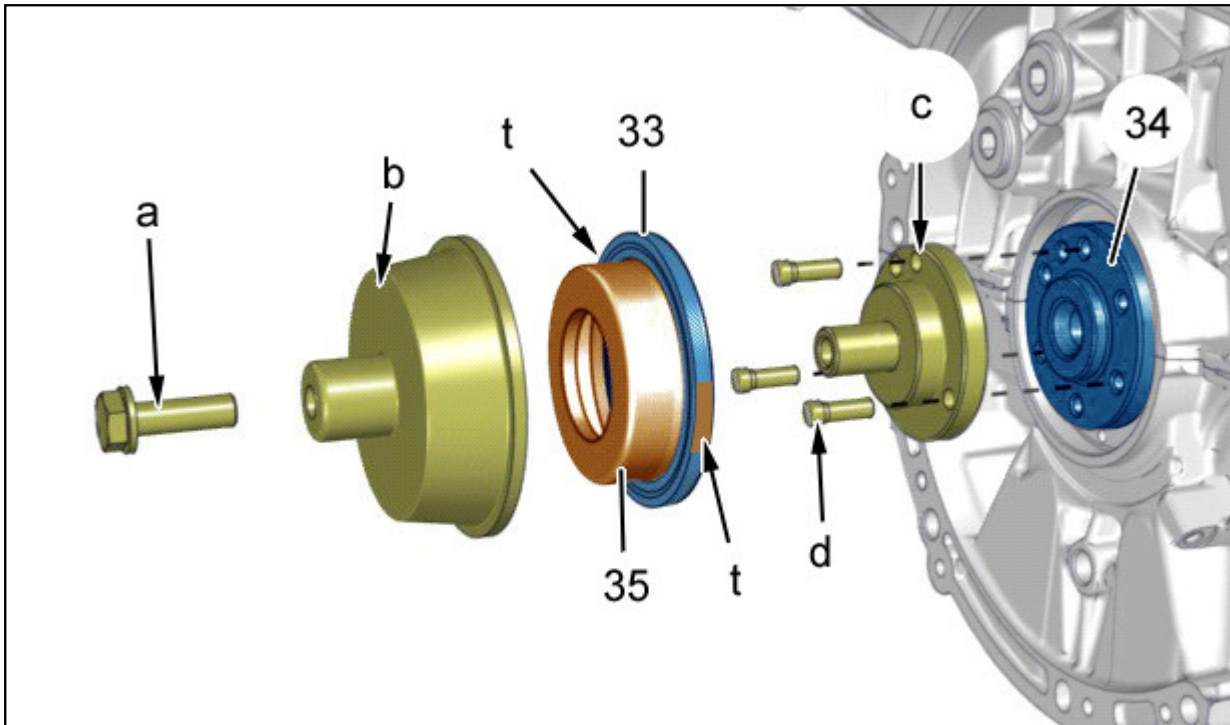


Figure : B1BG1WXD

CAUTION : Before fitting a new ring seal in the cylinder block : Lightly coat, following the bead (at "t"), the outside of the new ring seal (35) on both sides of the cylinder block/main bearing cap seal face ; With an approved sealing product of type CAF50.

Fit ; Using tool [0197-C] :

- Befitting guide "c" onto the crankshaft (34) ; Using the 3 bolts "d"
- The ogive (35) fitted with its new rings seal (33) onto the crankshaft (34)
- The tool "b" ; With the bolt "a"

Tighten the bolt "a" of the tool "b" until the surface of the tool "b" comes into contact with the surface of the cylinder block ; Using tool [0197-C].

Remove the tools [0197-C].

12. Refitting the flywheel

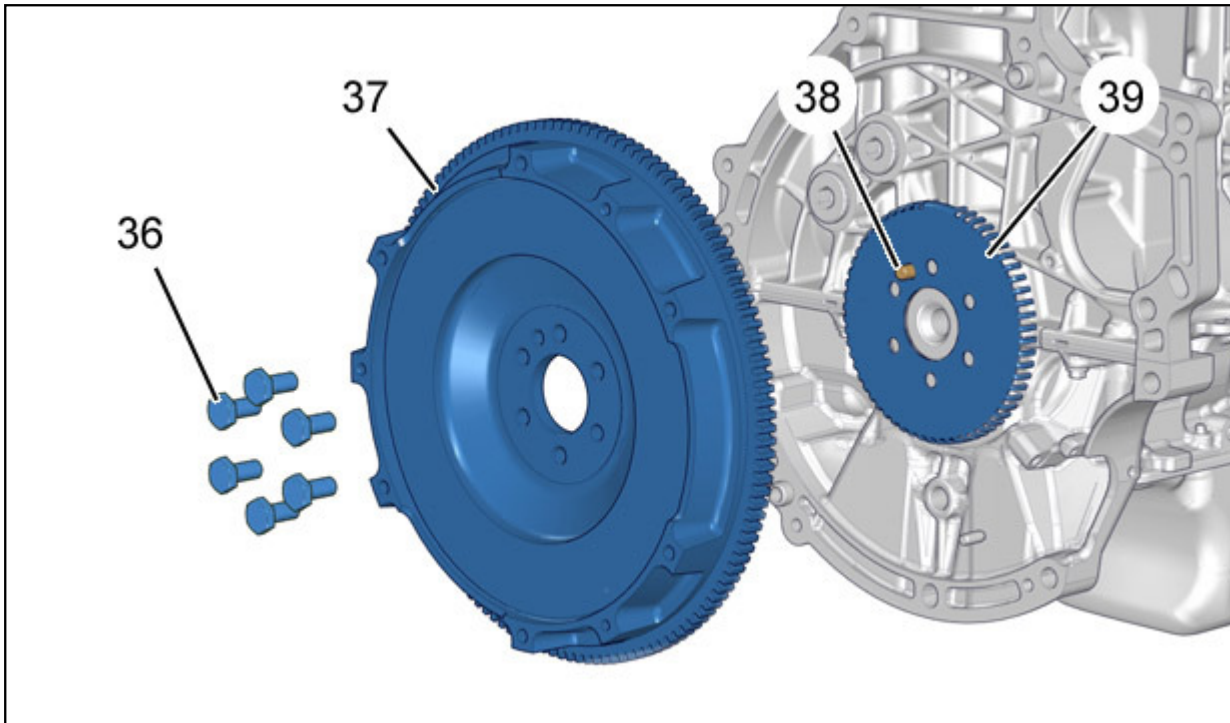


Figure : B1BG1X0D

CAUTION : It is essential to replace the bolts (36).

Check for the presence of the centring pin (38).

Fit :

- The engine speed fibre ring (39)
- The flywheel (37)
- The screws (36) (new)