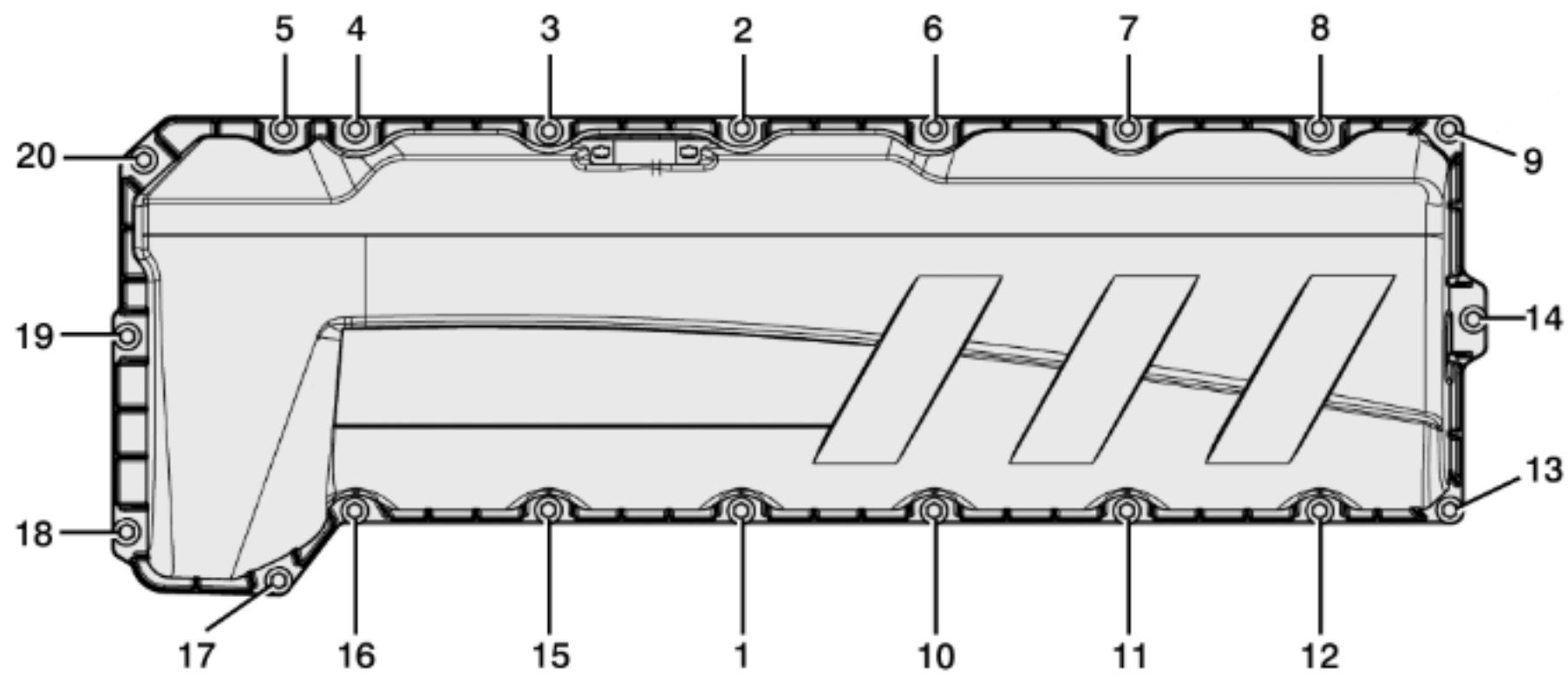


Oil filler pipes, tightening torques

Oil filler pipes

Plastic lock	27±2 Nm
Dipstick guide bolts	20±4 Nm

Cylinder head cover, tightening torques

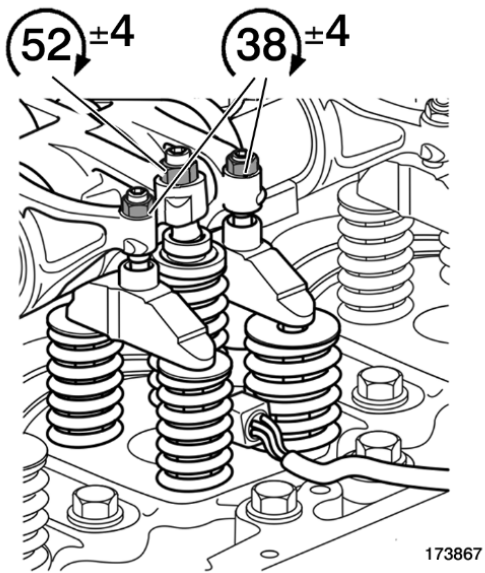


226464

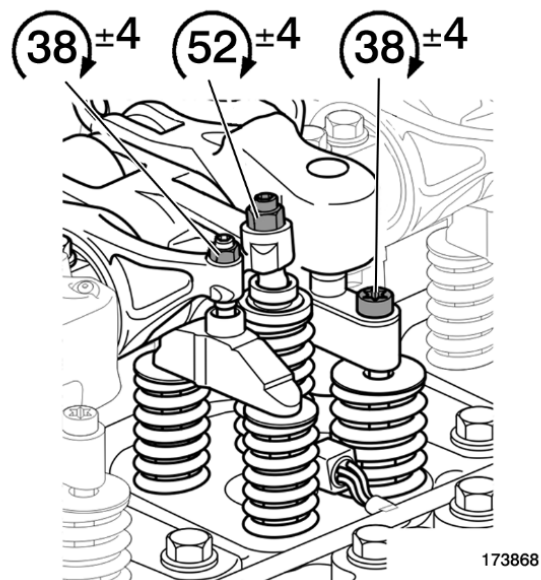
The item numbers indicate the tightening sequence.

Cylinder head cover securing bolts	24±4 Nm
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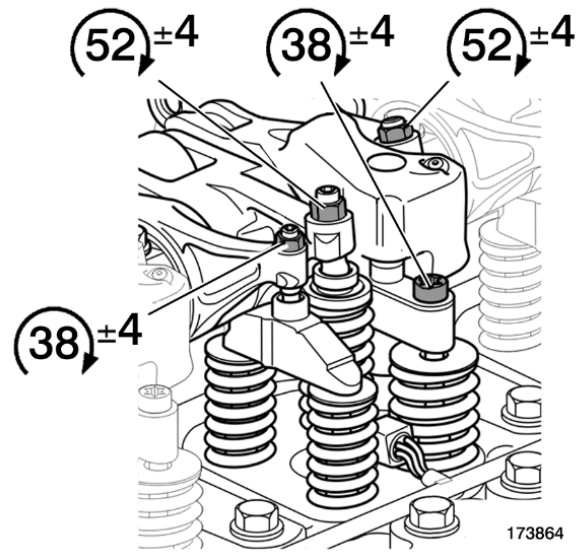
Rocker arms, tightening torques



Without "Optibrake" / "Optibrake +"

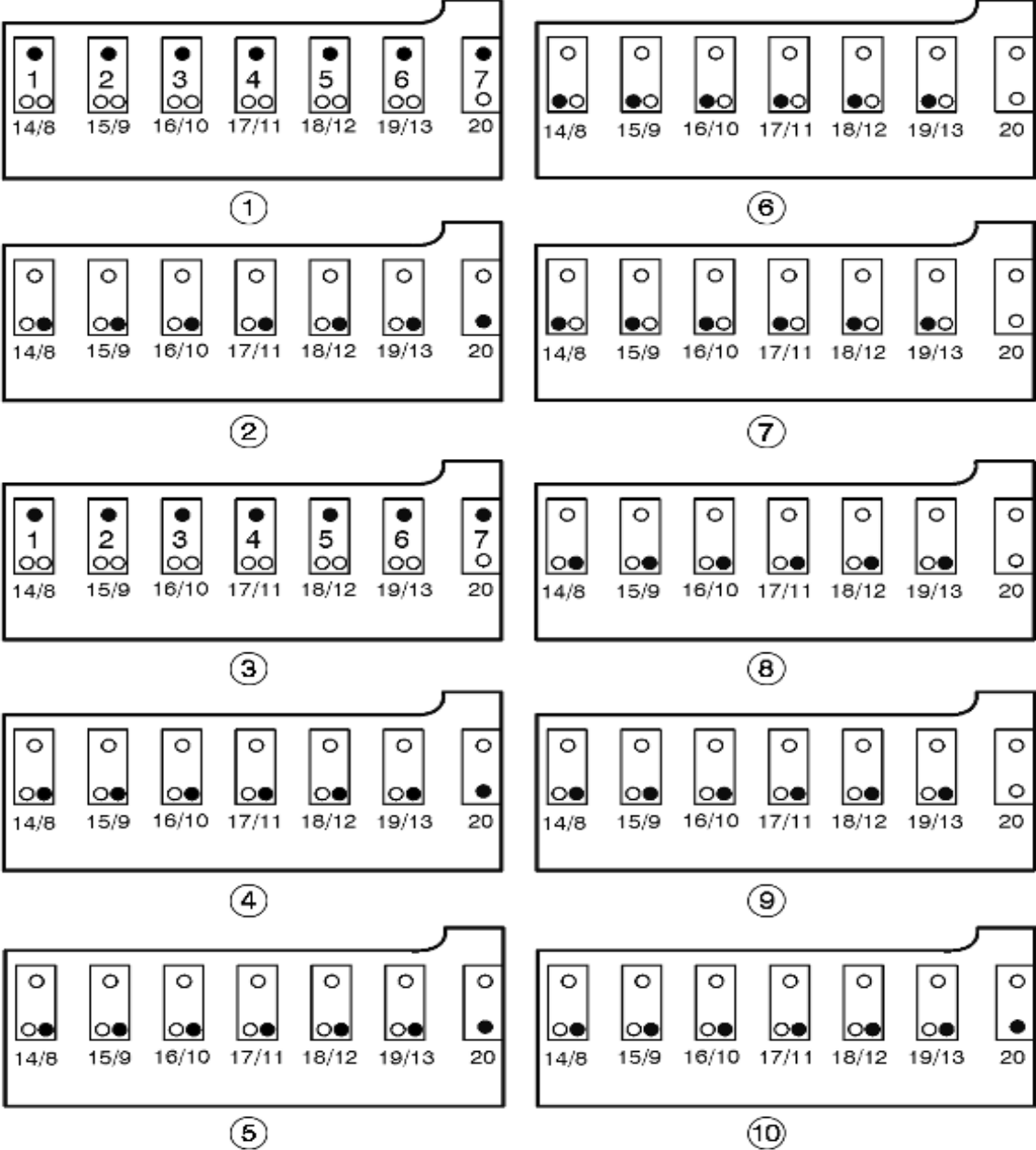


With "Optibrake"



With "Optibrake +"

Rocker shaft and camshaft bearing caps, tightening torques



173846

Stage 1: bolts (1 › 7)	40±3 Nm
Stage 2: bolts (8 › 13 - 20)	60±5 Nm



For the 2th stage, tighten bolts gradually in the following order: 11 - 10 - 12 - 9 - 13 - 8 - 20, so that the rocker shaft can be lowered without being damaged.

Stage 3: bolts (1 › 7)	90±5 °
Stage 4: bolts (8 › 13 - 20)	Loosen the bolts

Rocker shaft

Stage 5: bolts (8 › 13 - 20)	60±5 Nm
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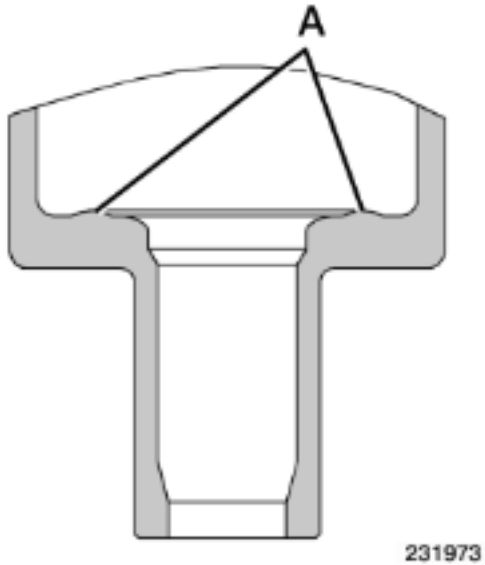
For the 5th stage, tighten bolts gradually in the following order: 11 - 10 - 12 - 9 - 13 - 8 - 20, so that the rocker shaft can be lowered without being damaged.

Stage 6: bolts (14 › 19)	40±3 Nm
Stage 7: bolts (14 › 19)	120±5 °
Stage 8: bolts (8 › 13)	Loosen the bolts
Stage 9: bolts (8 › 13)	40±3 Nm
Stage 10: bolts (8 › 13 - 20)	120±5 °

"Optibrake/Optibrake +" retarder, tightening torques

Control solenoid valve	24±4 Nm
Rocker arms elastic blades securing bolts	25±3 Nm

Pump injector mounting flange, tightening torques

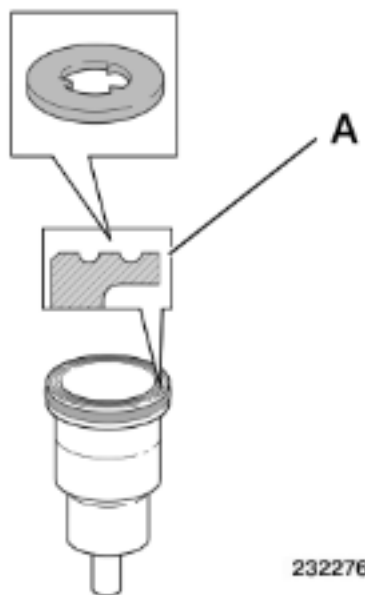


Assembly type A

A = Socket with boss.

Tightening procedure for already used copper injector sleeves

Stage1	20+5 Nm
Stage2	60±5 °



Assembly type B

A = Double groove flat socket with washer.

Tightening procedure for new copper injector sleeves

Stage1	20+5 Nm
Stage2	180±5 °

Fully loosen the yoke securing bolt before proceeding with stage 3.

Stage3	20+5 Nm
Stage4	90±5 °



At each disassembly operation, change the washer.

Tightening procedure for a used injector socket or removing an injector.

Stage1	20+5 Nm
Stage2	180±5 °

Fully loosen the yoke securing bolt before proceeding with stage 3.

Stage3	20+5 Nm
Stage4	90±5 °

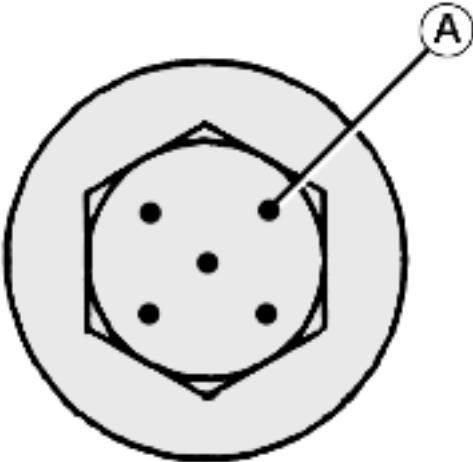


At each disassembly operation, change the washer.

Retightening at valve maintenance

Injector flange attachment bolts	45+5 Nm
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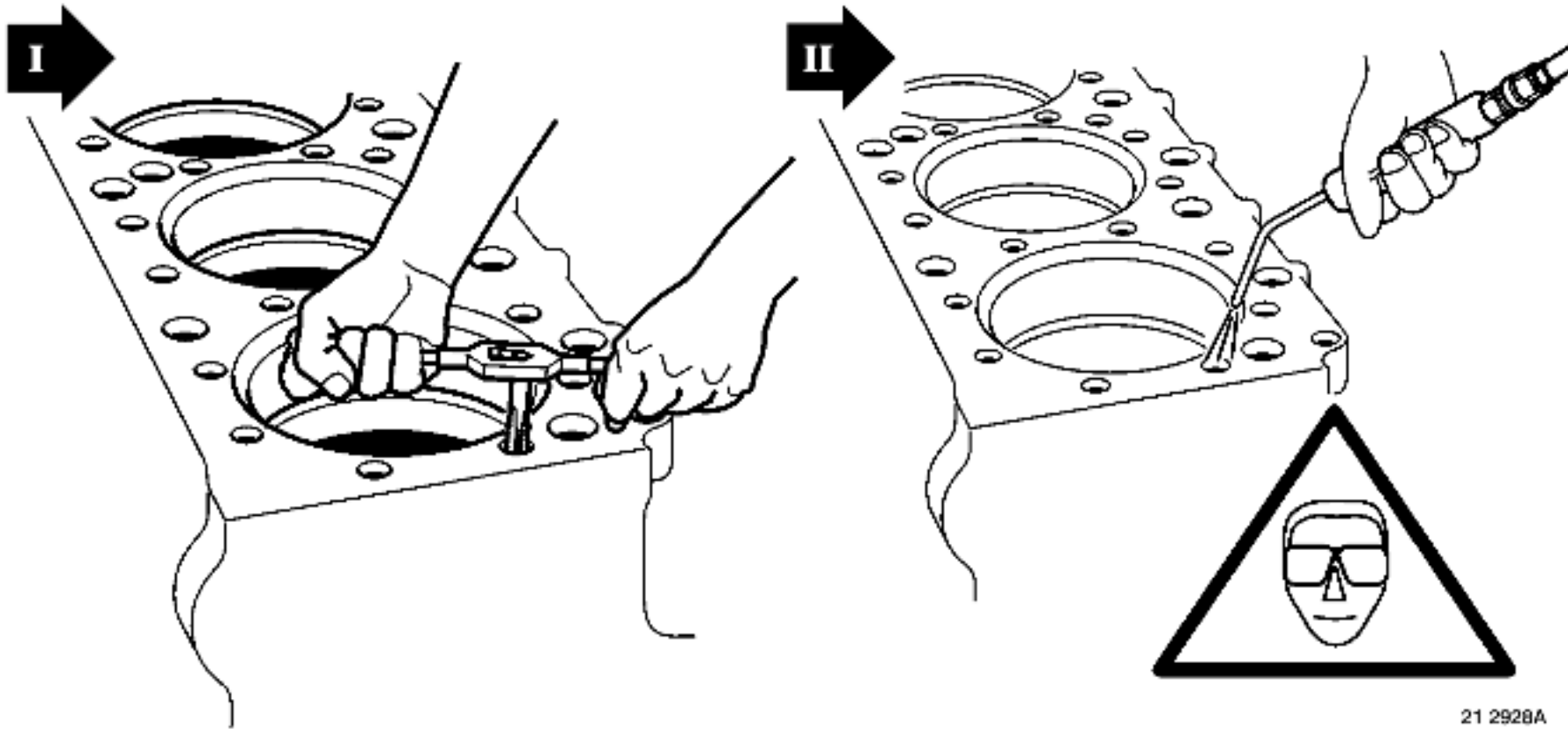
Cylinder head, tightening torques



21 2927B

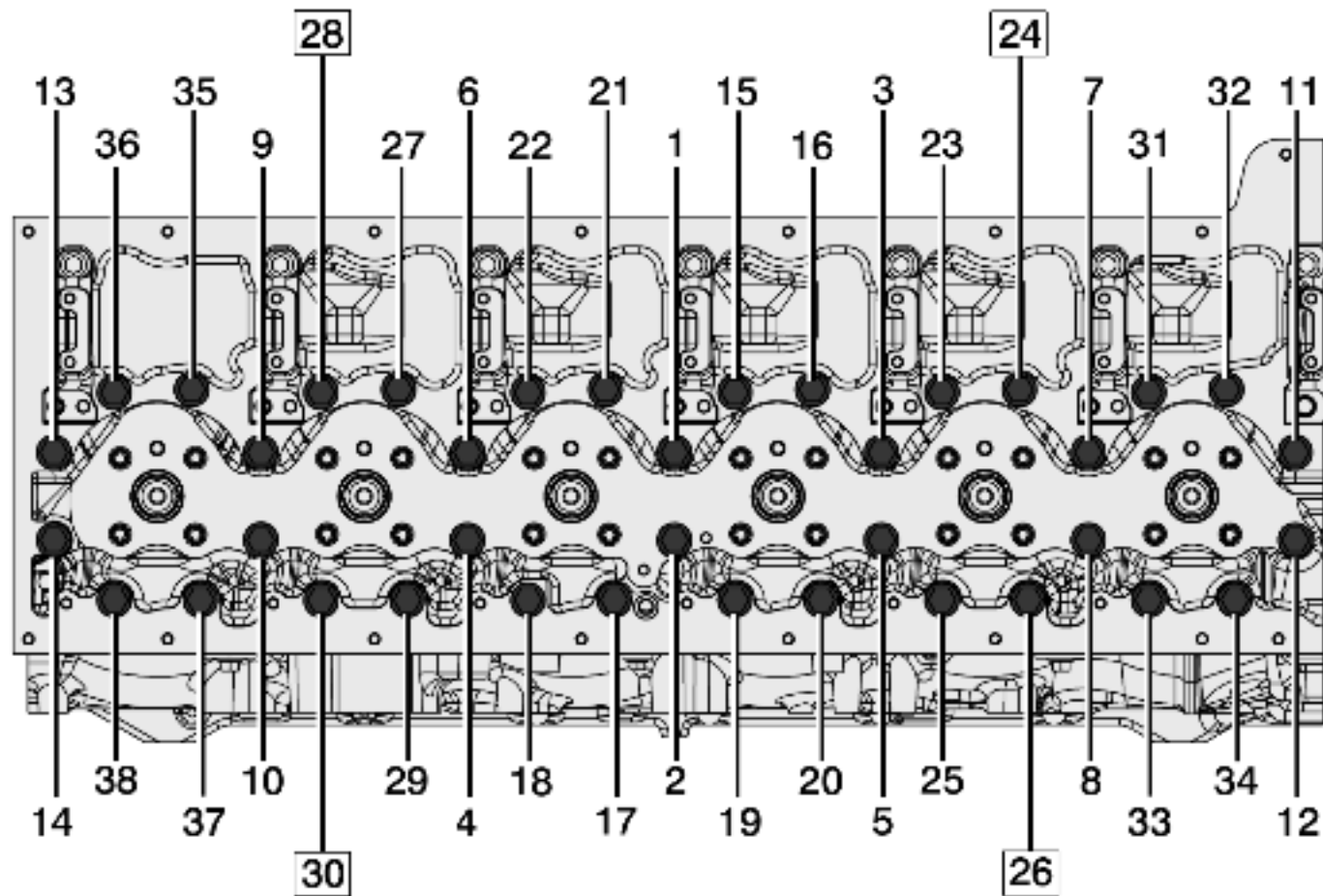


The bolts can be re-used no more than 5 times maximum. Mark the bolt head with an indentation (A) after tightening each time using a centre punch. In this case, apply engine oil to the screw-threads and under the bolt heads. Do not apply engine oil to new bolts, which are already pre-lubricated.



21 2928A

Tap the screw-threads in the cylinder block then blow through with compressed air.



21 3506A



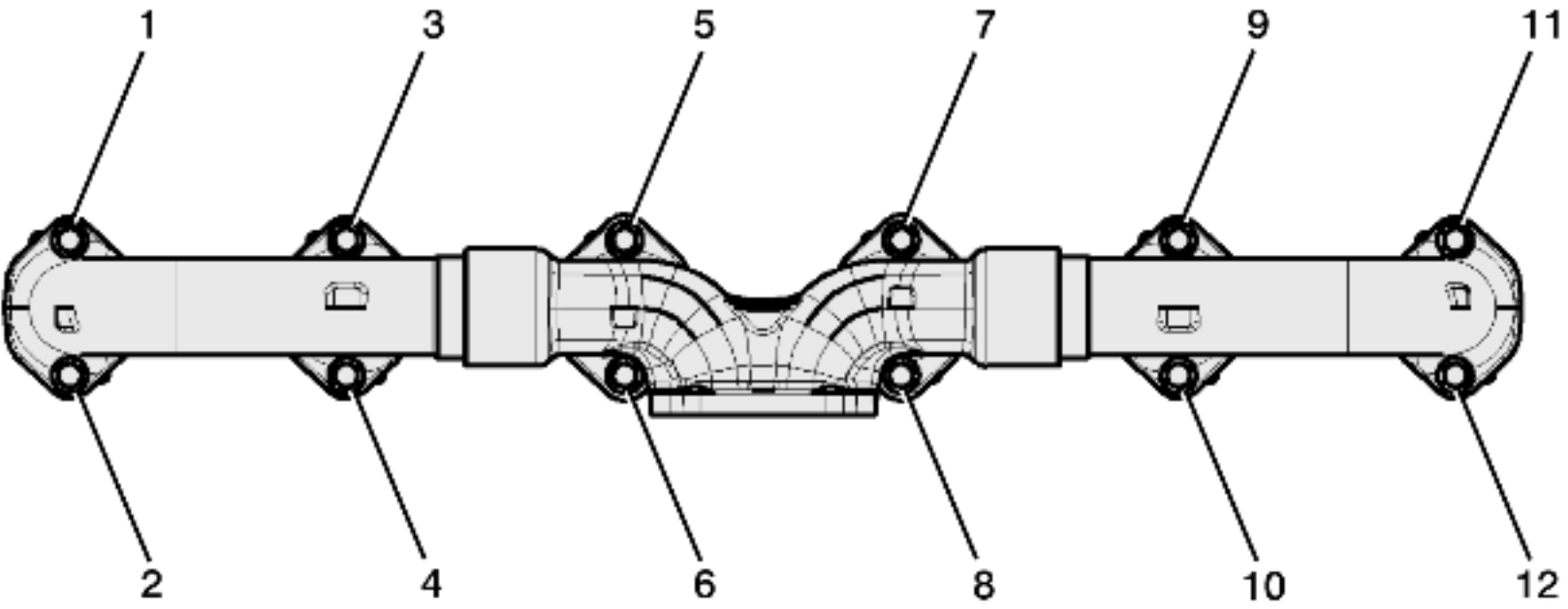
The cylinder head must be positioned and tightened in accordance with the instructions given in the method (see page).
The item numbers indicate the tightening sequence.

Stage1	100±5 Nm
Stage2 (check tightening)	100±5 Nm
Stage3	120±5 °
Stage4	90±5 °

Cylinder head plugs, tightening torques

Plug M10 x 1.00	25±3 Nm
Plug M16 x 1.50	50±3 Nm

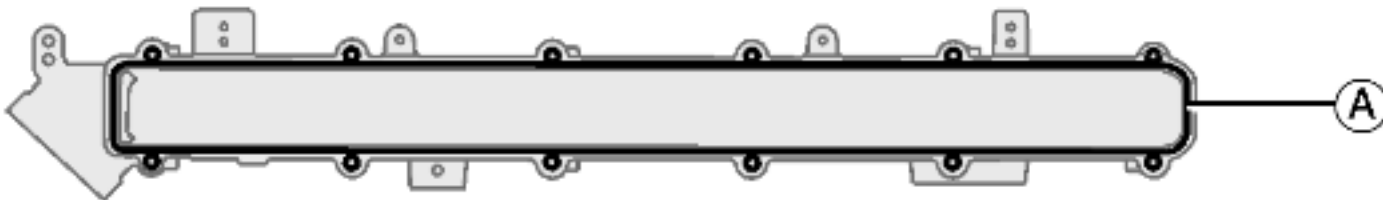
Exhaust manifold, tightening torques



21 3513A

Stage 1: bolts (1 - 12)	5±1.5 Nm
Stage 2: bolts (1 - 4 - 5 - 8 - 9 - 12)	10±1.5 Nm
Stage 3: bolts (3 - 2 - 7 - 6 - 11 - 10 - 1 - 4 - 5 - 8 - 9 - 12)	48±8 Nm

Intake manifold, tightening torques



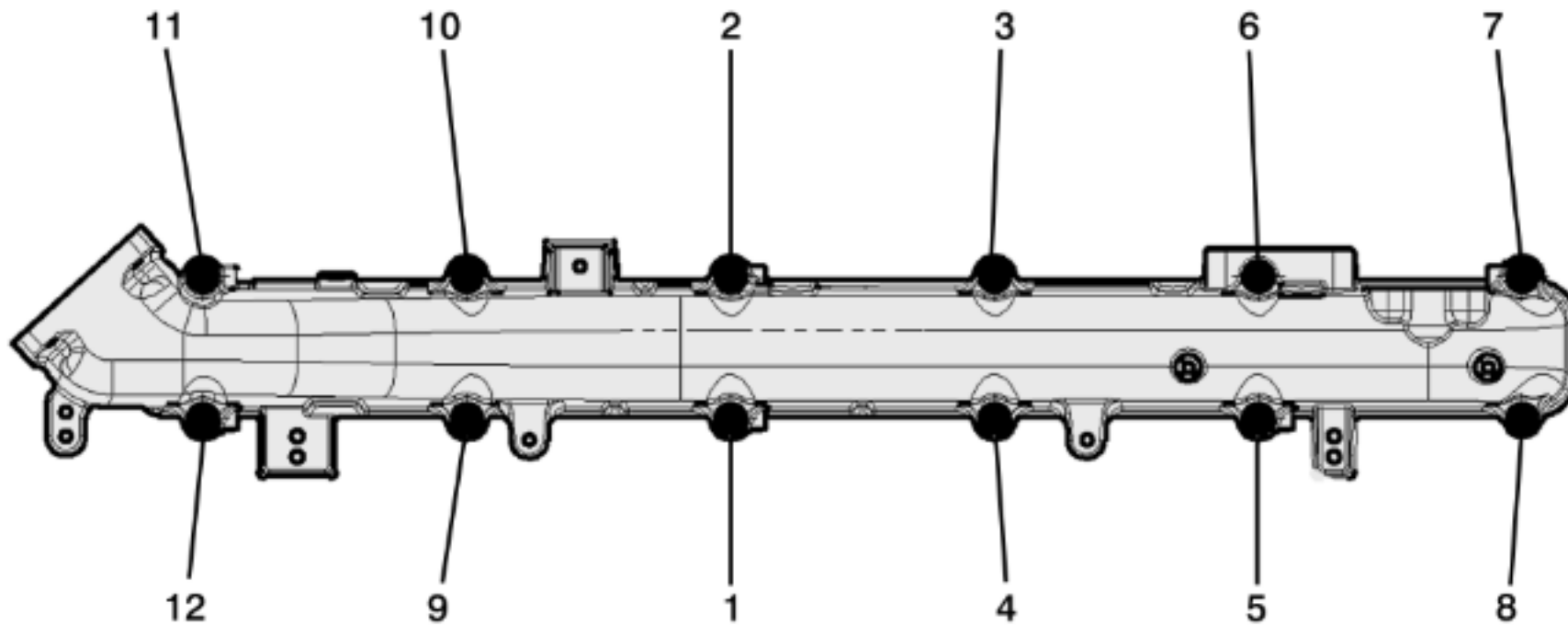
21 2716B

Apply a fine coat of sealing compound in the gasket housing (A).

Apply "
ADHESIF SILICONE 7091

".
Install seal.

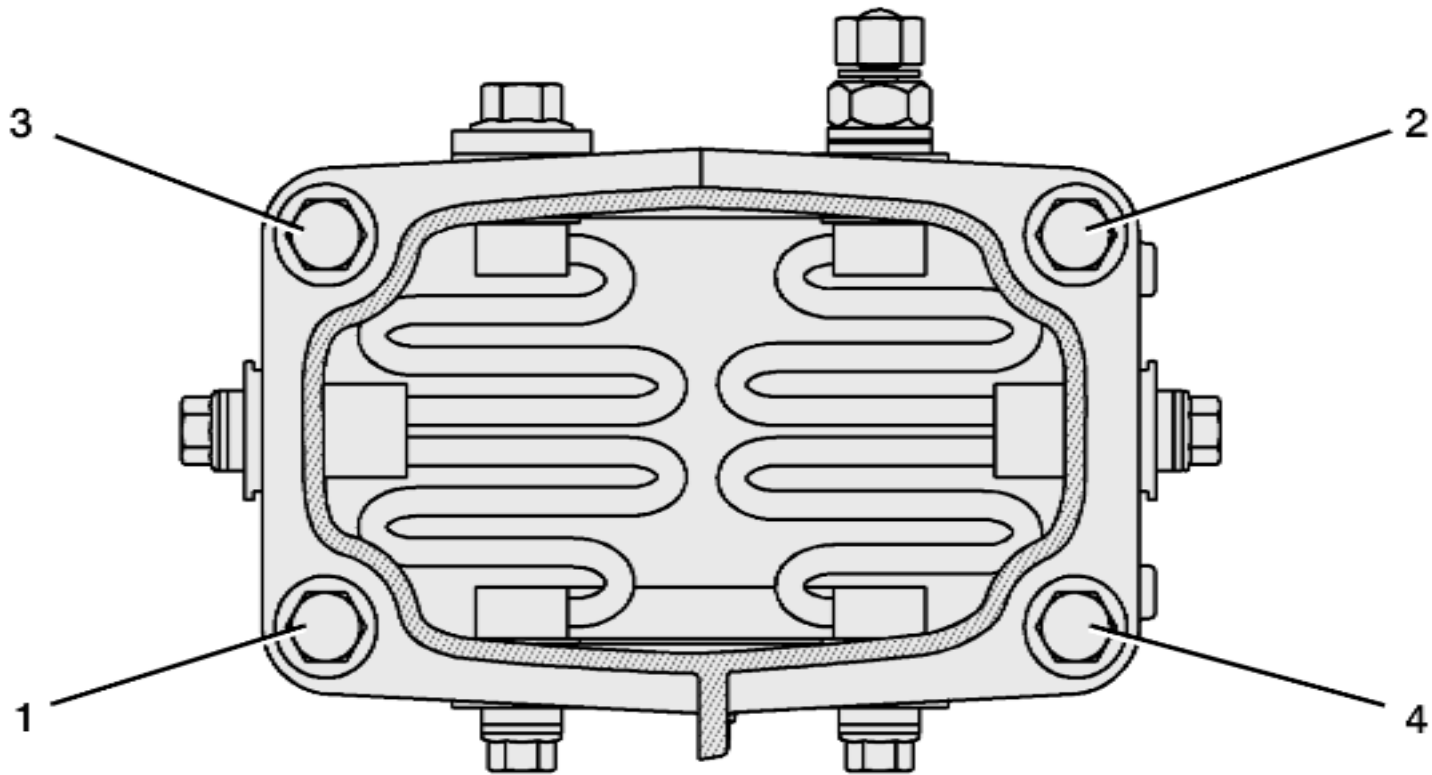
Carry out the assembly work within **20** minutes following application of the sealing compound.



224236

The item numbers indicate the tightening sequence.

Intake manifold securing bolts	24±4 Nm
Plug M10	20±3 Nm
Boost air pressure / temperature sensor	12±2 Nm



21 3525A

The item numbers indicate the tightening sequence.

Stage1	10 ± 2 Nm
Stage2	24 ± 4 Nm
Intake air heater supply cable securing nut	10 ± 1.5 Nm

Consumables

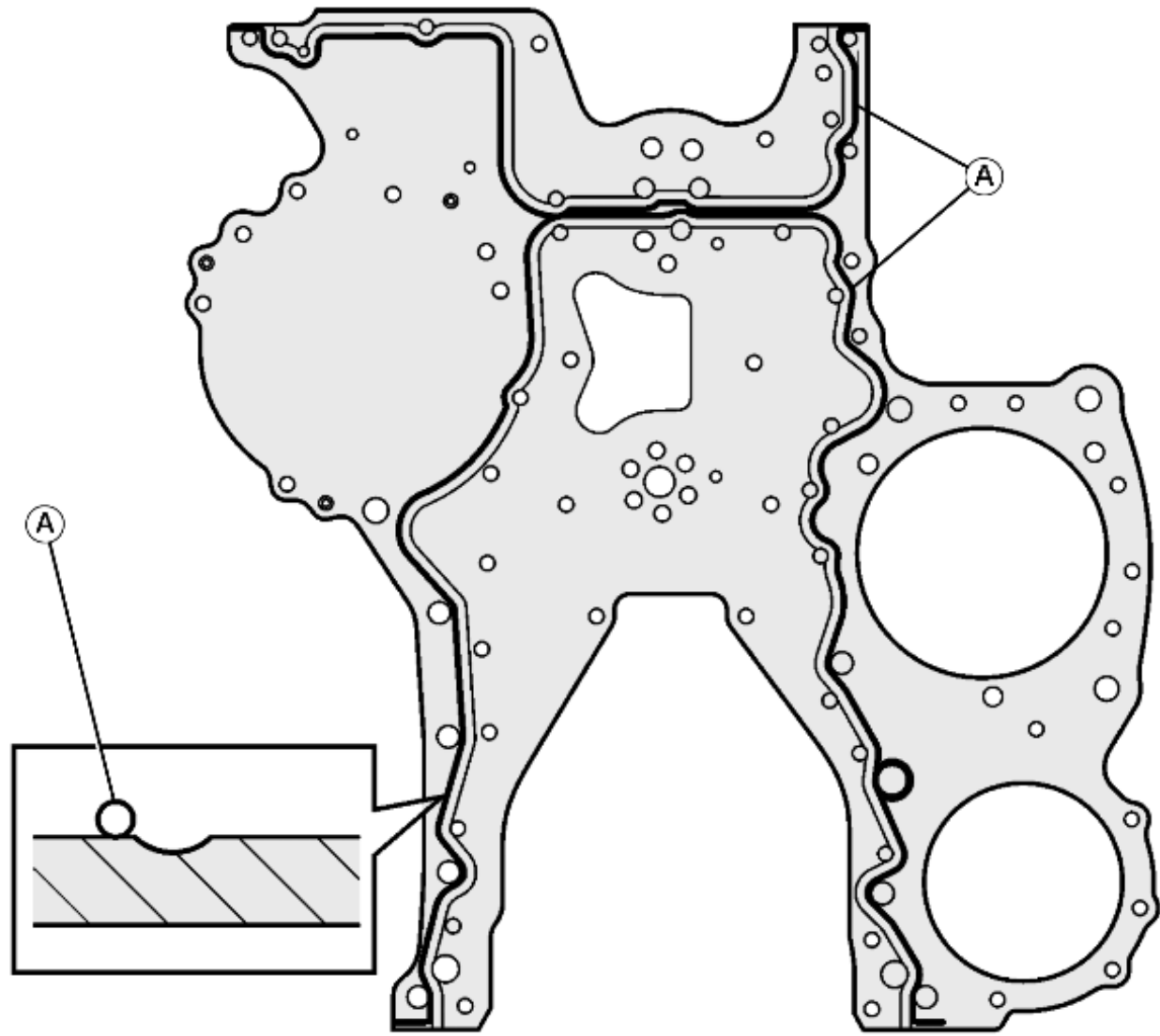
Automotive part N°	Industrial reference N°
56 89 501 292	Silicon adhesive 7091

Air compressor, tightening torques

Air compressor 636 cm ³ drive pinion securing nut	200+ 50 Nm
Air compressor 636 cm ³ securing nut	85±15 Nm
Lubrication union	25±4 Nm

Timing system, tightening torques

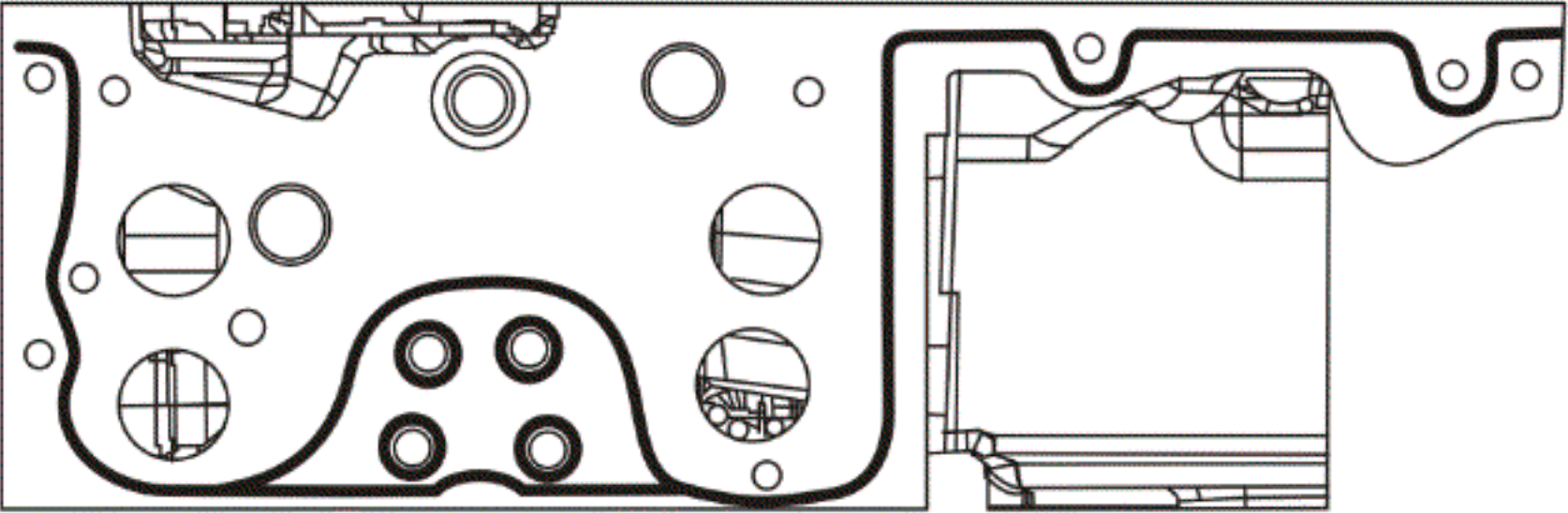
Assembly type A



Apply a bead of silicone **dia. 2 mm (A)** as shown in the drawing. Perform assembly within 20 minutes of application of the silicone.
Use a silicone sealant "

ADHESIF SILICONE 7091

".

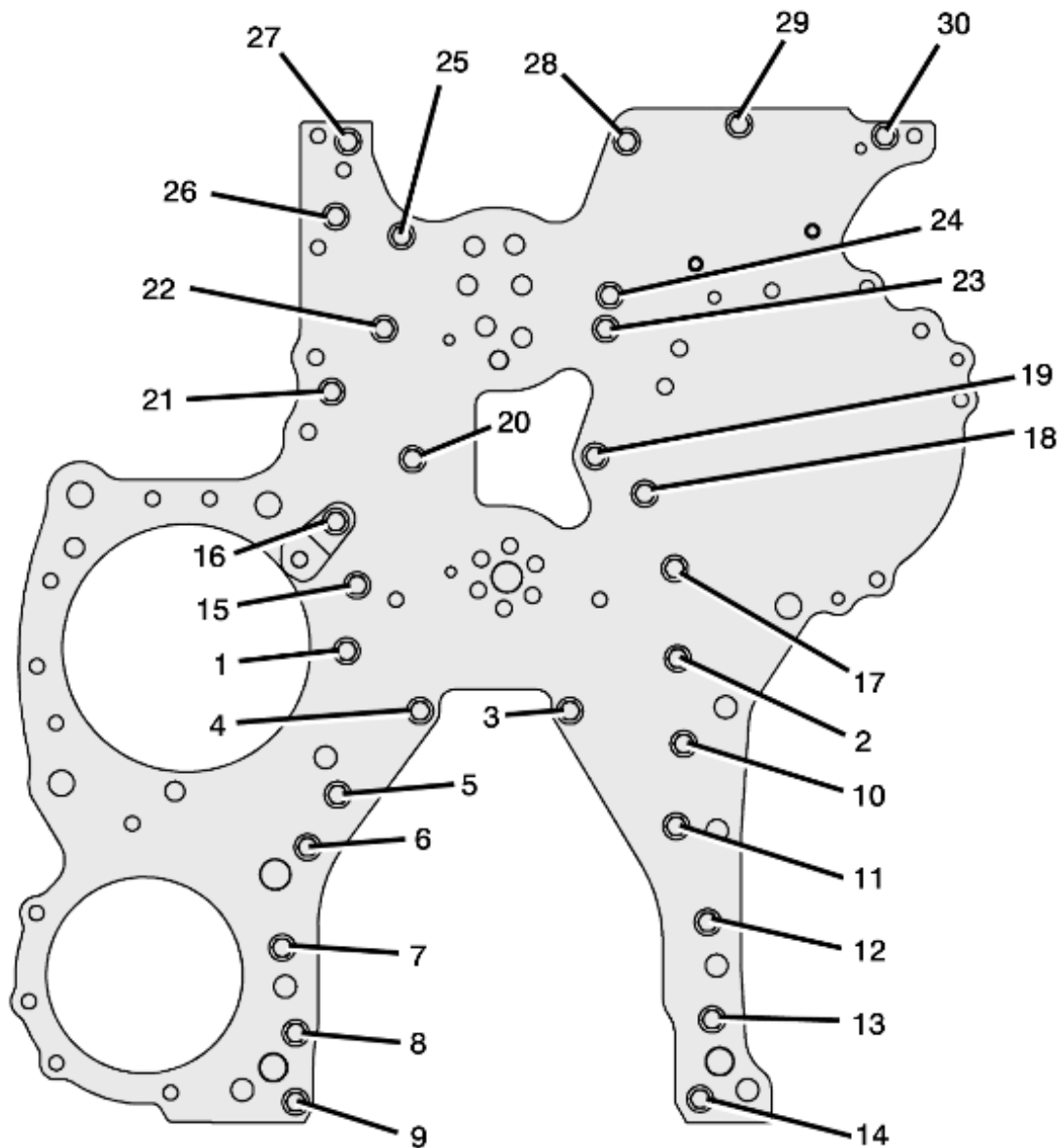


224377

Apply a bead of silicone **dia. 2 mm (A)** as shown in the drawing. Perform assembly within 20 minutes of application of the silicone.
Use a silicone sealant "

ADHESIF SILICONE 7091

".



21 3511A

The item numbers indicate the tightening sequence.

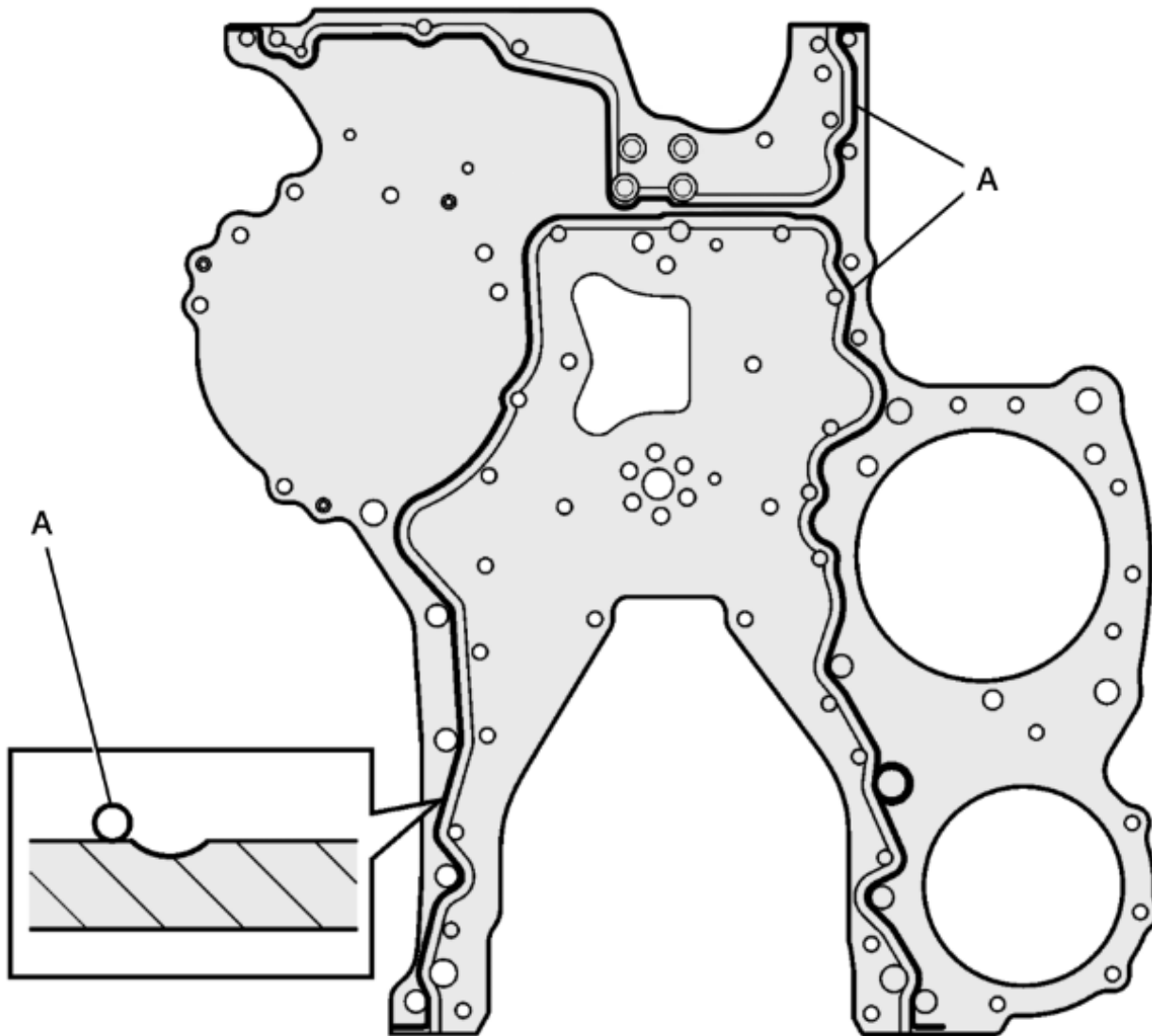
Timing plate securing bolts

28±4 Nm



The bolts must not be re-used. Use new bolts.

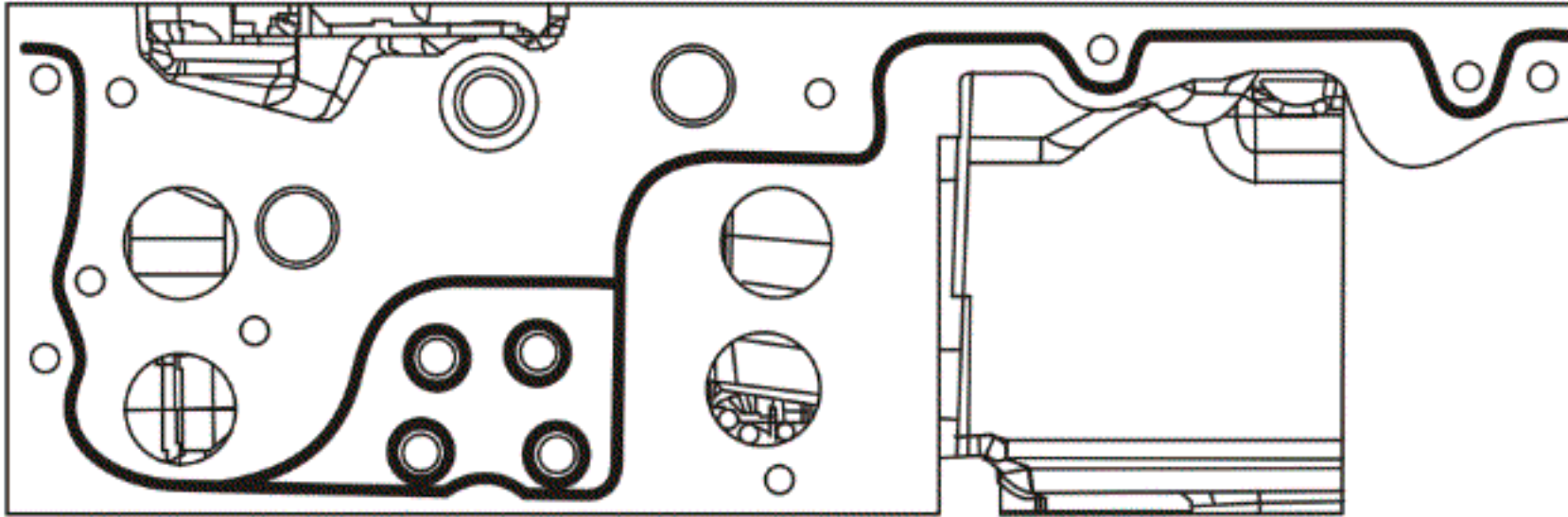
Assembly type B



224389

Apply a bead of silicone **dia. 2 mm (A)** as shown in the drawing. Perform assembly within 20 minutes of application of the silicone.
Use a silicone sealant "

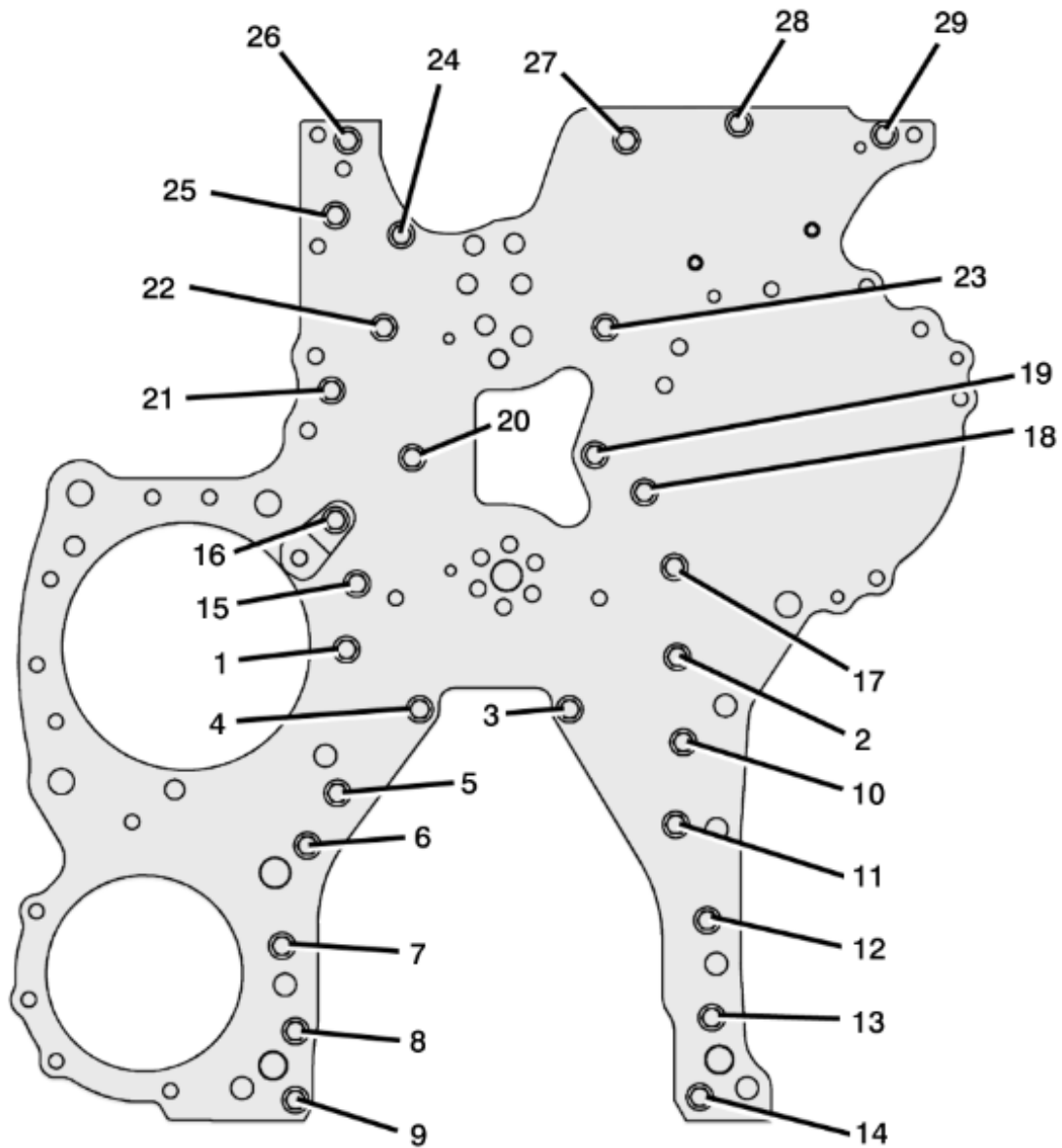
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224376

Apply a bead of silicone **dia. 2 mm (A)** as shown in the drawing. Perform assembly within 20 minutes of application of the silicone.
Use a silicone sealant "

ADHESIF SILICONE 7091



224388

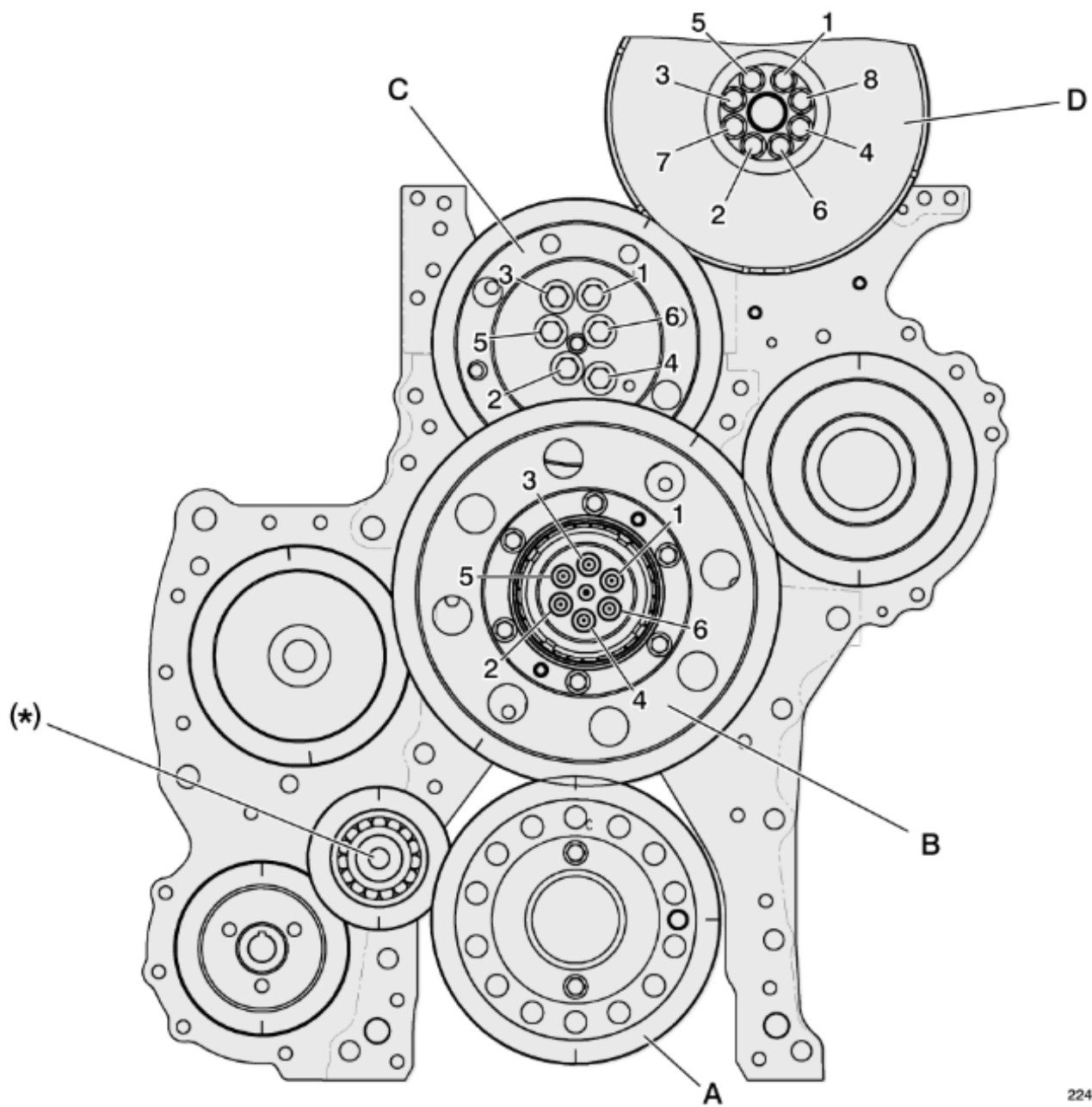
The item numbers indicate the tightening sequence.

Timing plate securing bolts

28±4 Nm



The bolts must not be re-used. Use new bolts.



224708

The item numbers indicate the tightening sequence.

Crankshaft pinion securing bolt (A)	24±4 Nm
Idler gear hub securing bolt (B)	25±3 Nm + 110±5 °

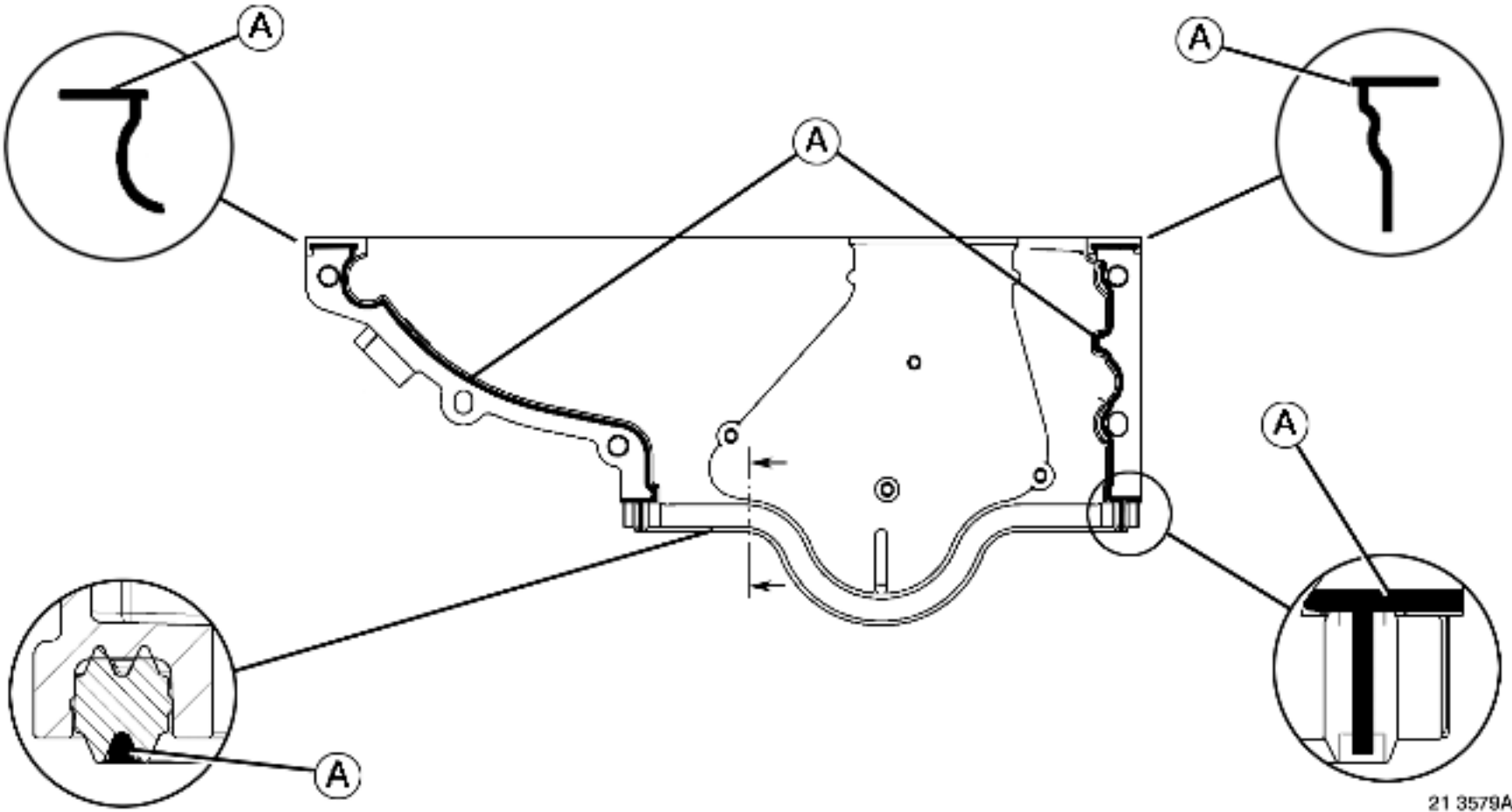


The bolts must not be re-used. Use new bolts.

Adjustable idler gear hub securing bolt (C)	35±4 Nm + 120±5 °
Camshaft pinion securing bolt (D)	45±5 Nm + 90±5 °

(*)Depending on the assembly.

Idler pinion shaft securing bolts	140±10 Nm
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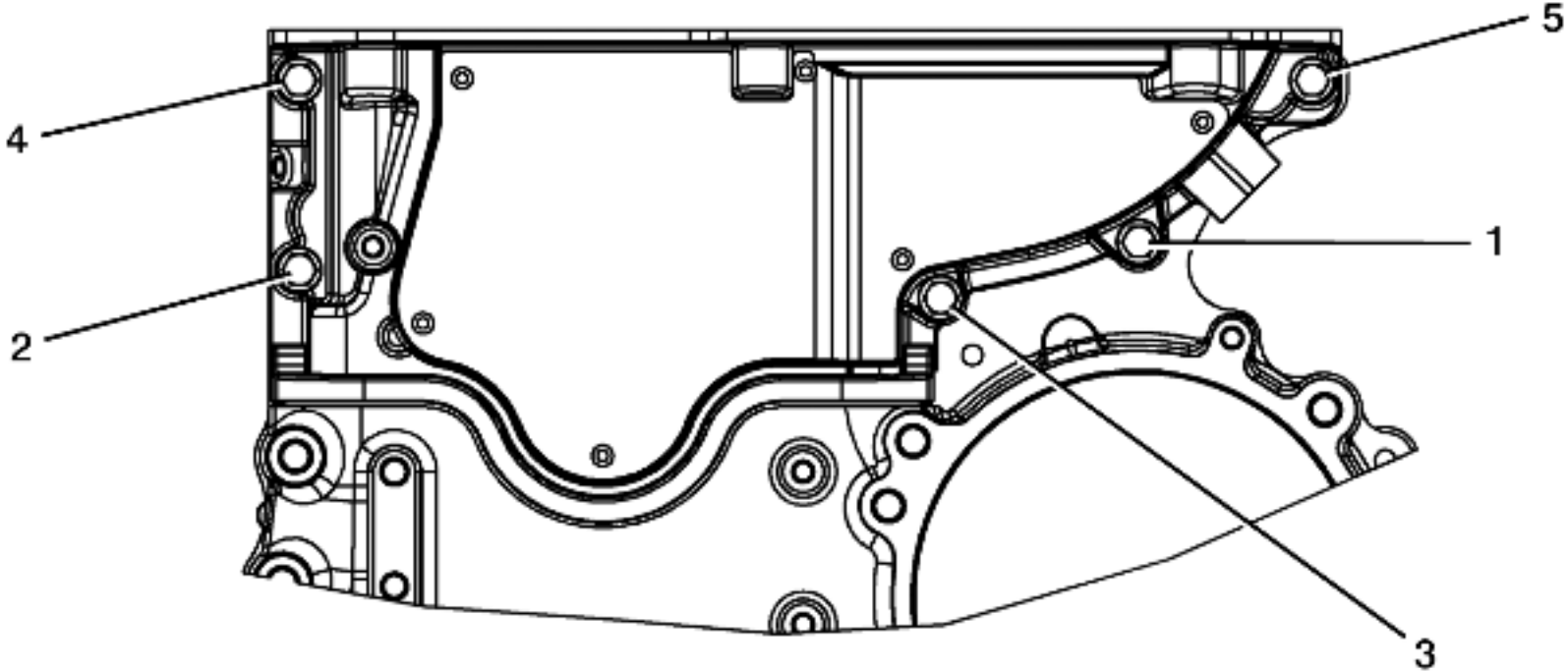


21 3579A

Apply a bead of silicone **dia. 2 mm (A)** as shown in the drawing. Proceed with assembly within 20 minutes following application of the silicone.

Use a sealing product

ADHESIF SILICONE 7091



21 3580A

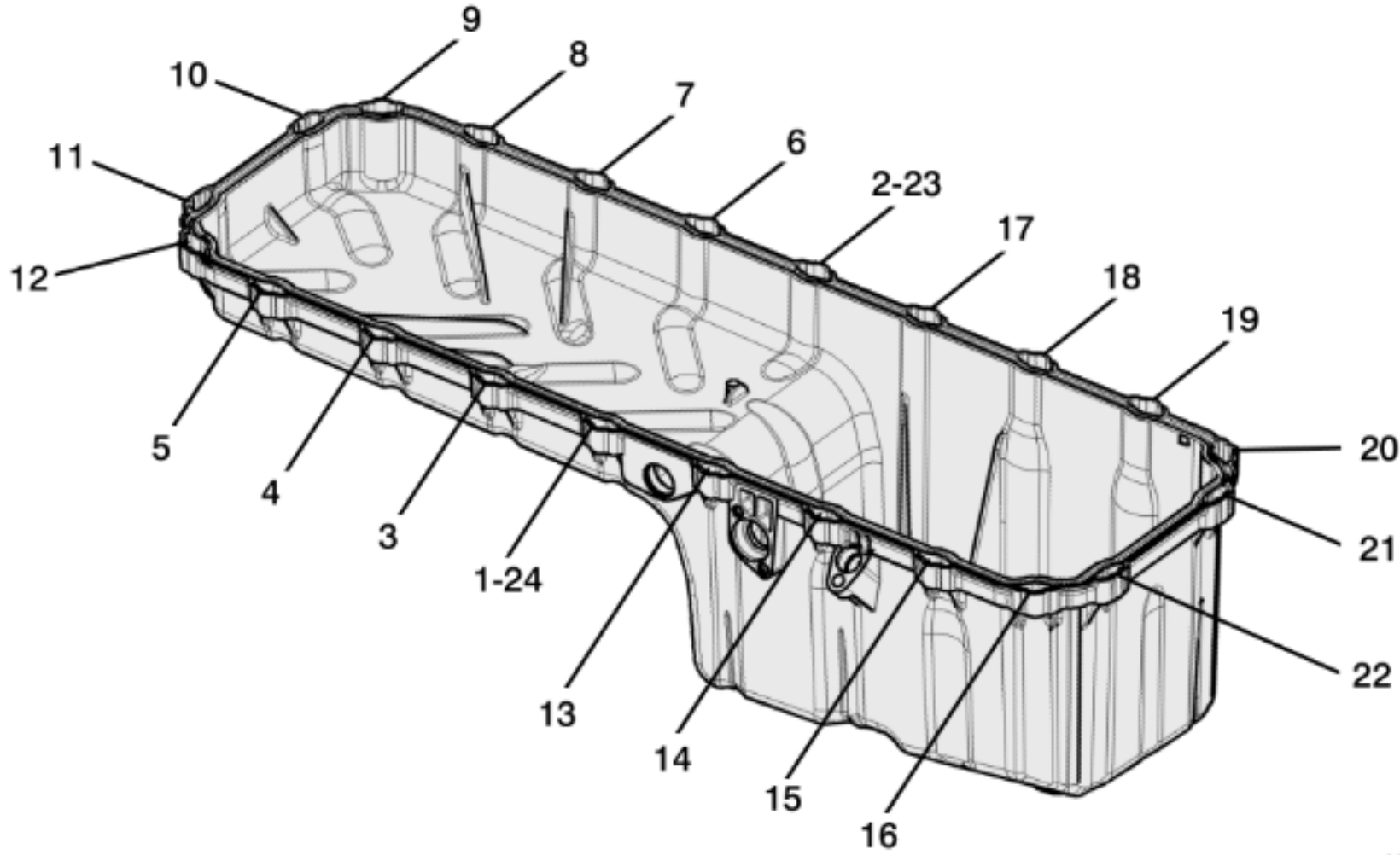
The item numbers indicate the tightening sequence.

Timing case to cylinder head securing bolts	24±4 Nm
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Consumables

Automotive part N°	Industrial reference N°
56 89 501 292	Silicon adhesive 7091

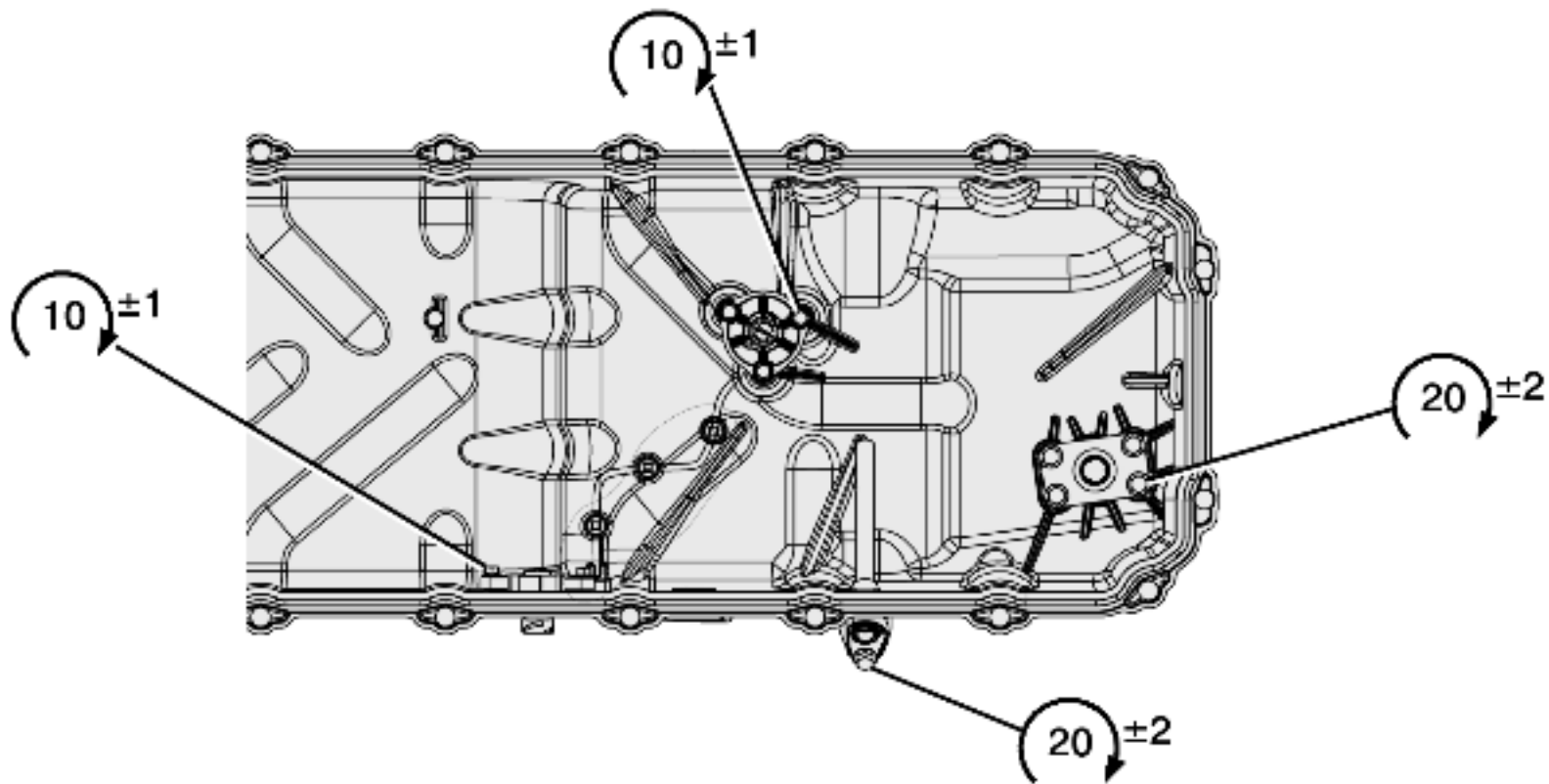
Oil pan, tightening torques



224380

The item numbers indicate the tightening sequence.

Oil sump securing bolts	24±4 Nm
Oil sump drain plug	60±10 Nm

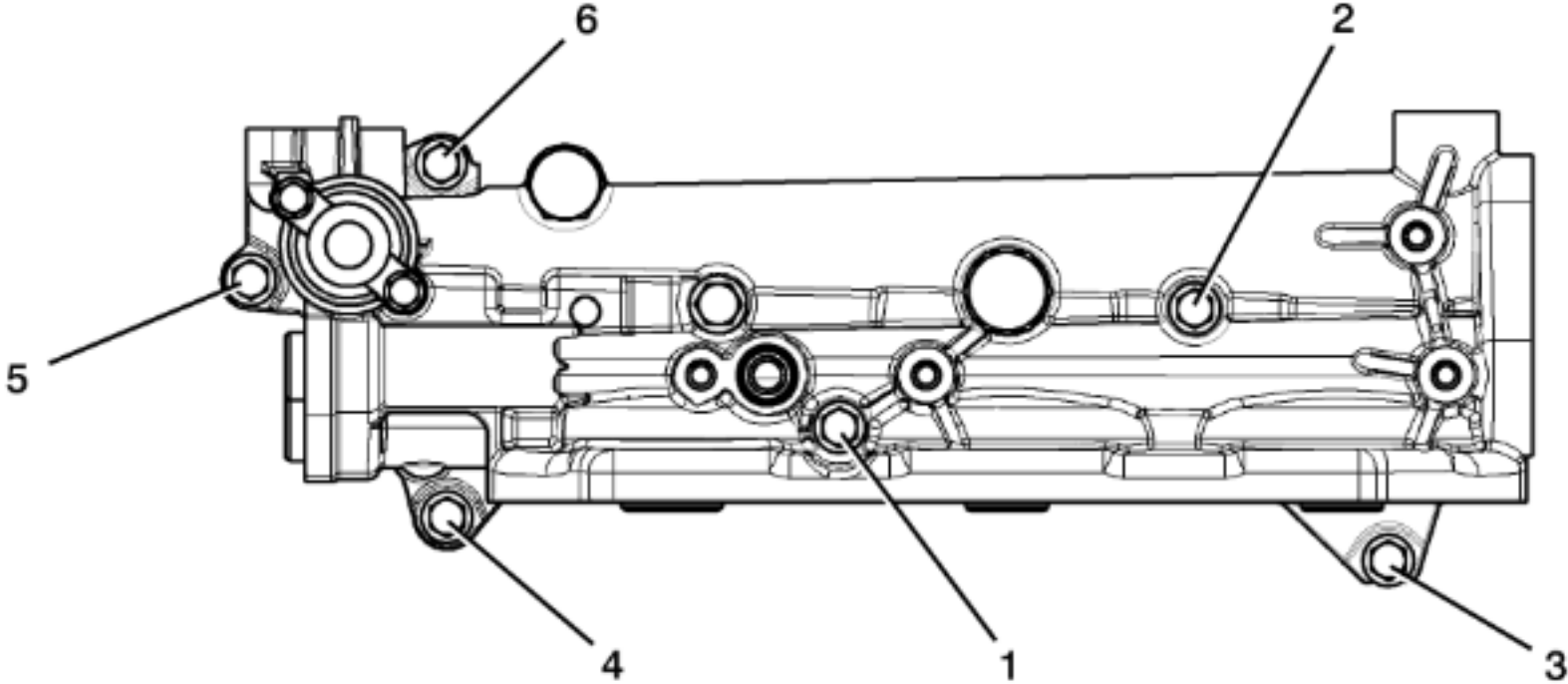


21 3670A

Oil filter head, tightening torques

Oil filter	25+5 Nm
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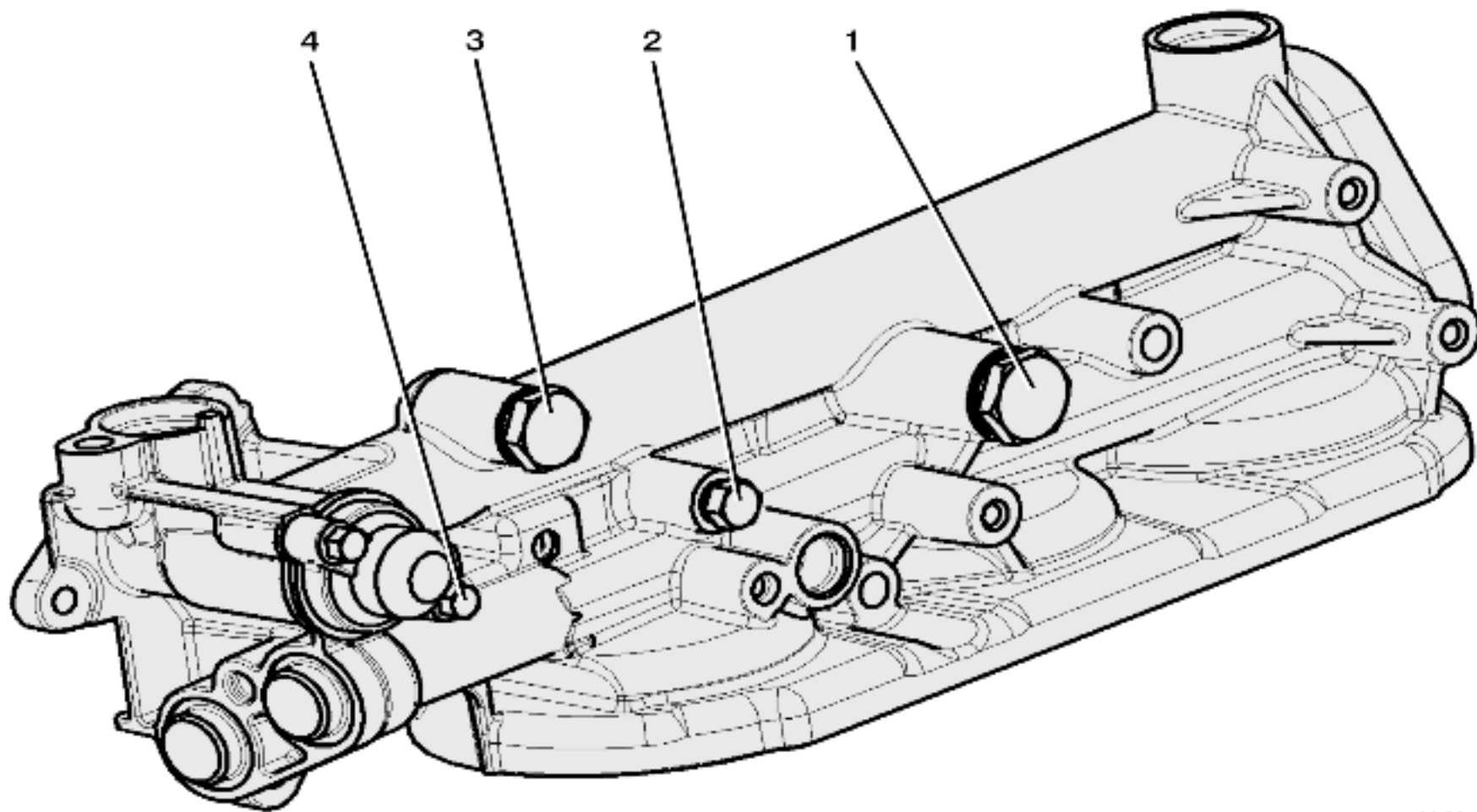
Euro 3 / 4



224374

The item numbers indicate the tightening sequence.

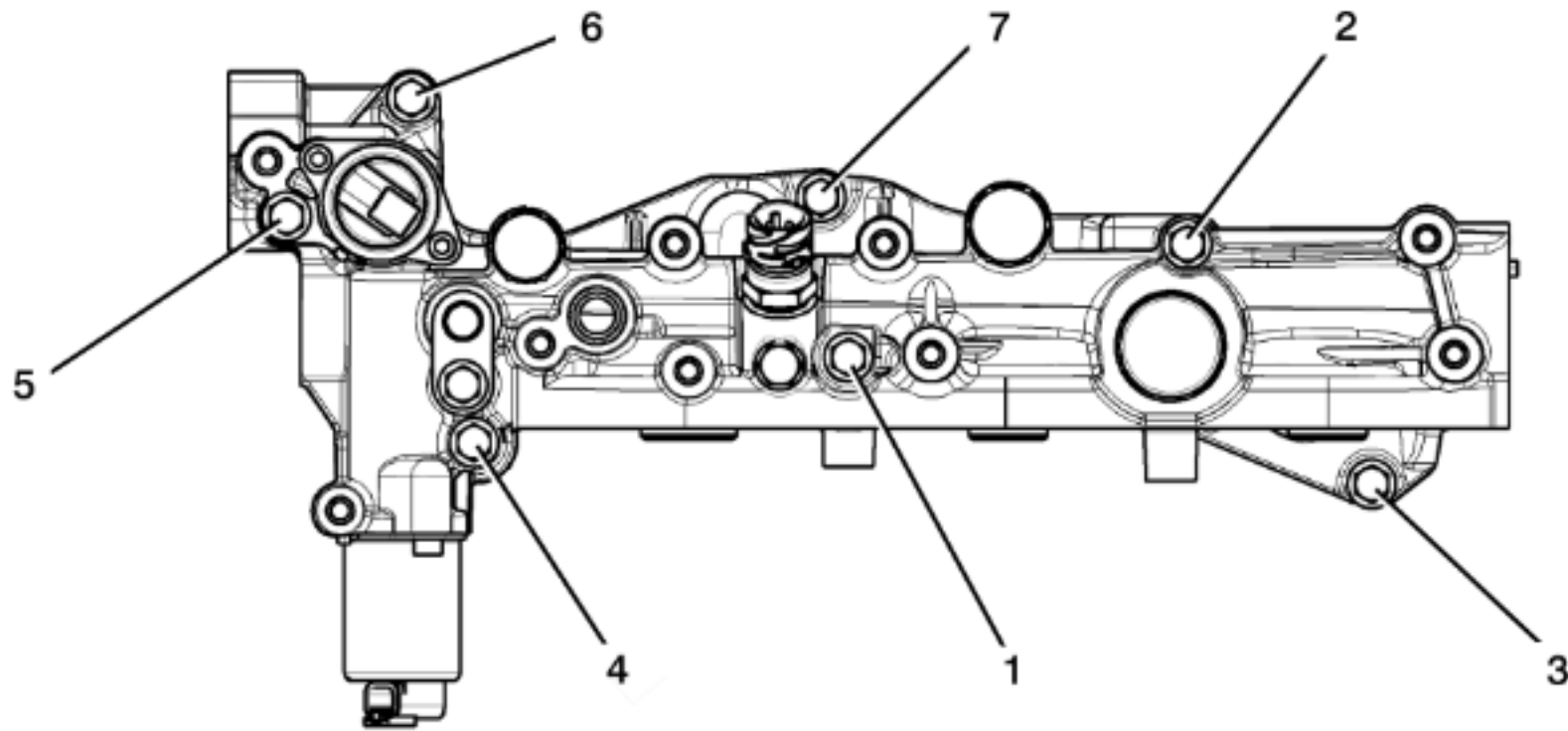
Oil filter bracket unit securing bolts	24±4 Nm
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21 3846A

Plug (1)	55±5 Nm
Plug (2)	12±2 Nm
Plug (3)	55±5 Nm
Bolt (4) dia. M6	10±2 Nm

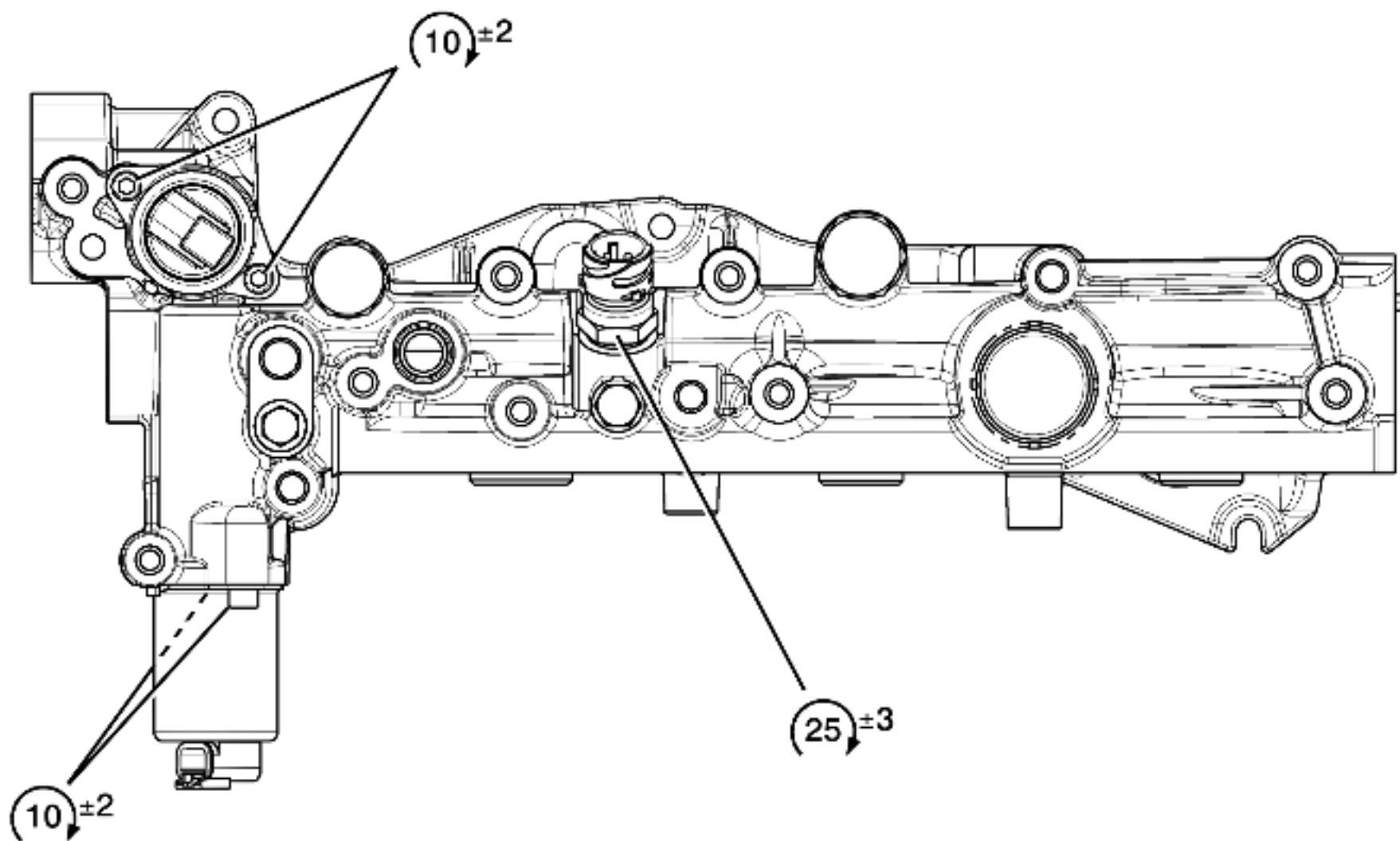
Euro 5



224373

The item numbers indicate the tightening sequence.

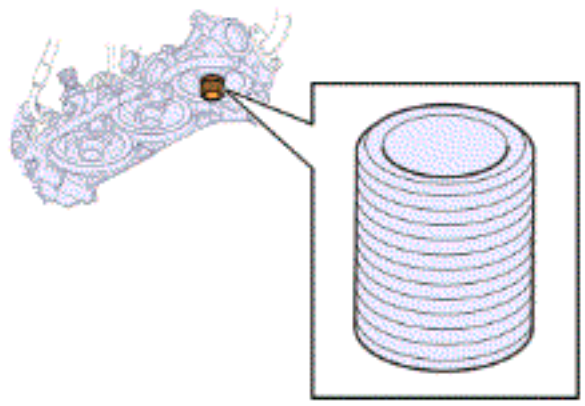
Oil filter bracket unit securing bolts	24±4 Nm
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185865

Oil filter nipple, tightening torque

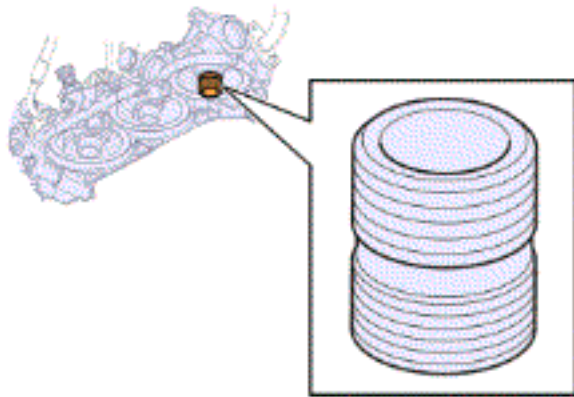
Assembly A.



289752

Union	48 Nm
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Assembly B.



289753

Union

60 Nm

Lubrication components, tightening torques

Oil pump

Oil pump securing bolts	24±4 Nm
Oil strainer securing bolts	27±4 Nm

Oil jets

Oil jet securing bolts	24±4 Nm
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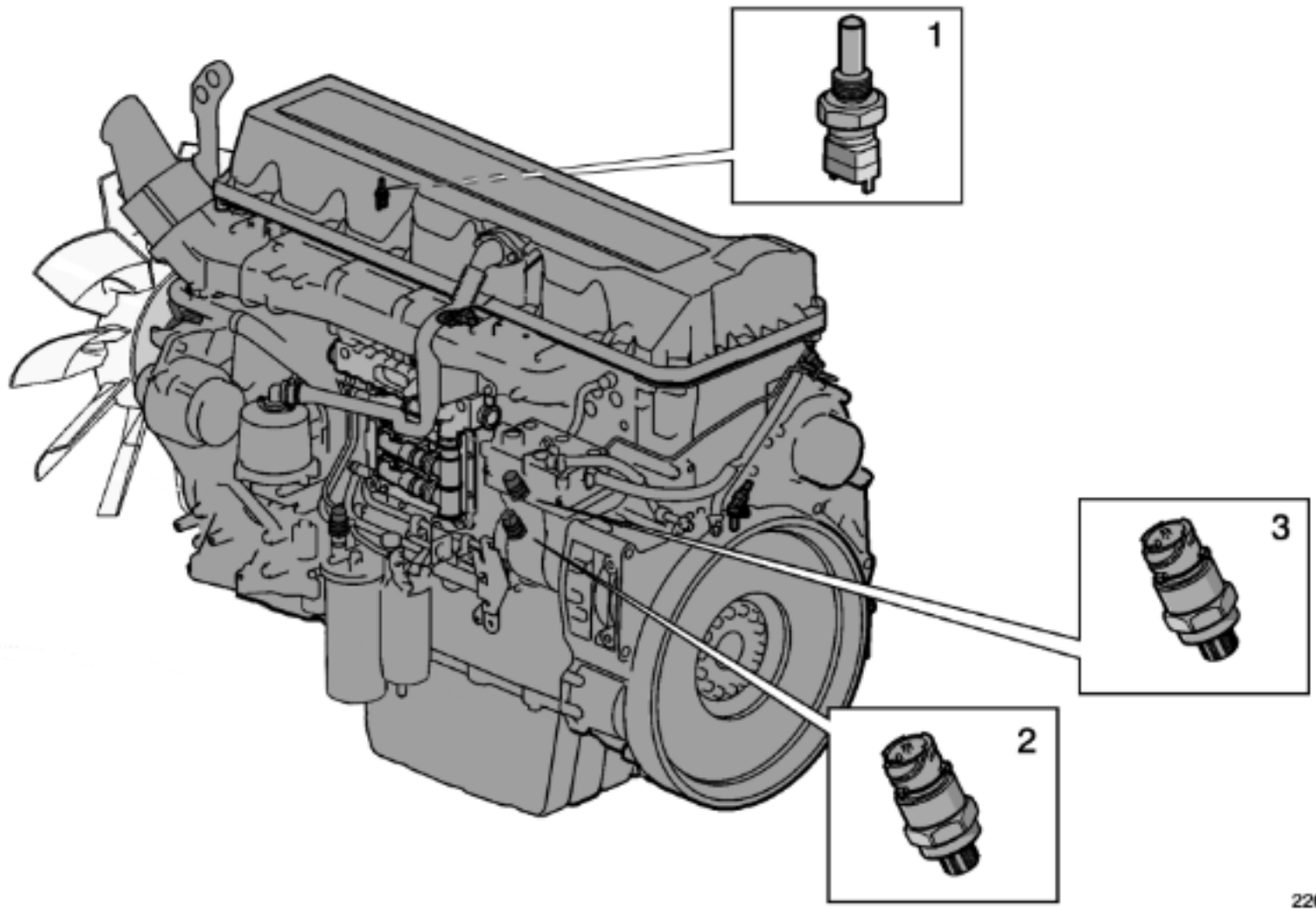


The bolts must not be re-used. Use new bolts.



Safety valve (pressure limiter)

Sensors, tightening torques

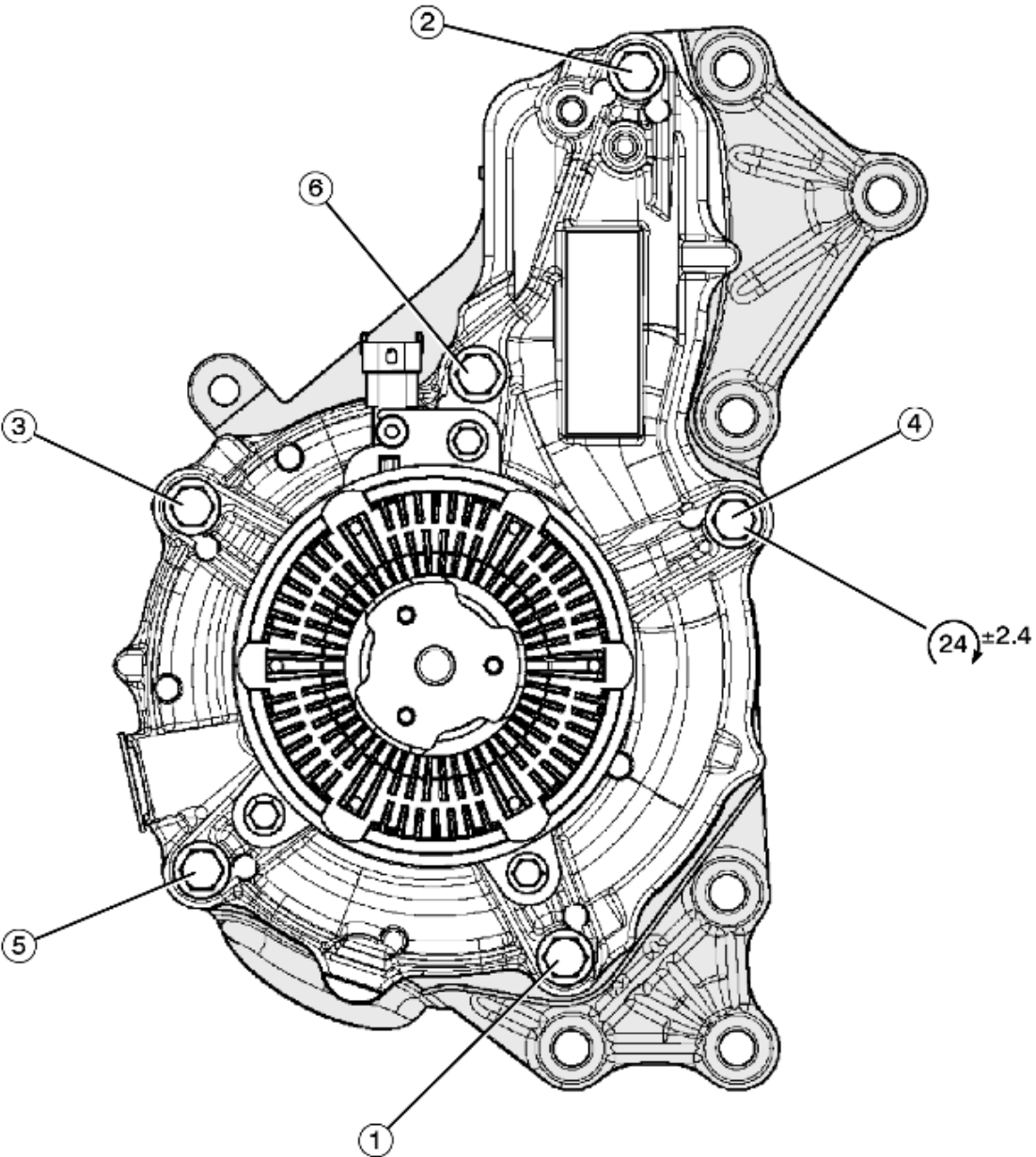


226486

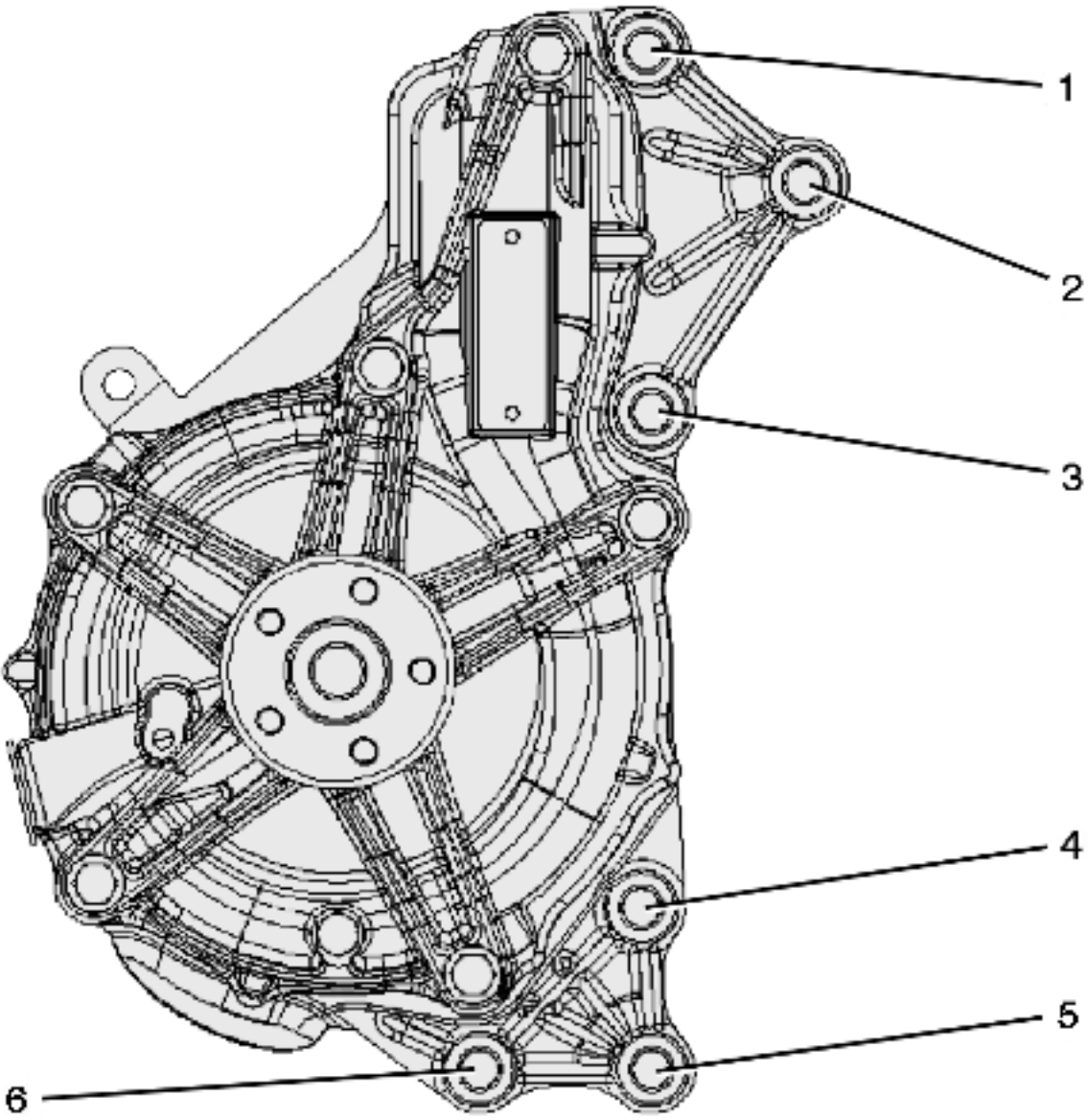
Coolant temperature sensor (1)	22.5± 2.5 Nm
Crankcase pressure sensor (2)	25±5 Nm
Oil pressure and temperature sensor (3)	25±5 Nm

Cooling system, tightening torques

Water pump



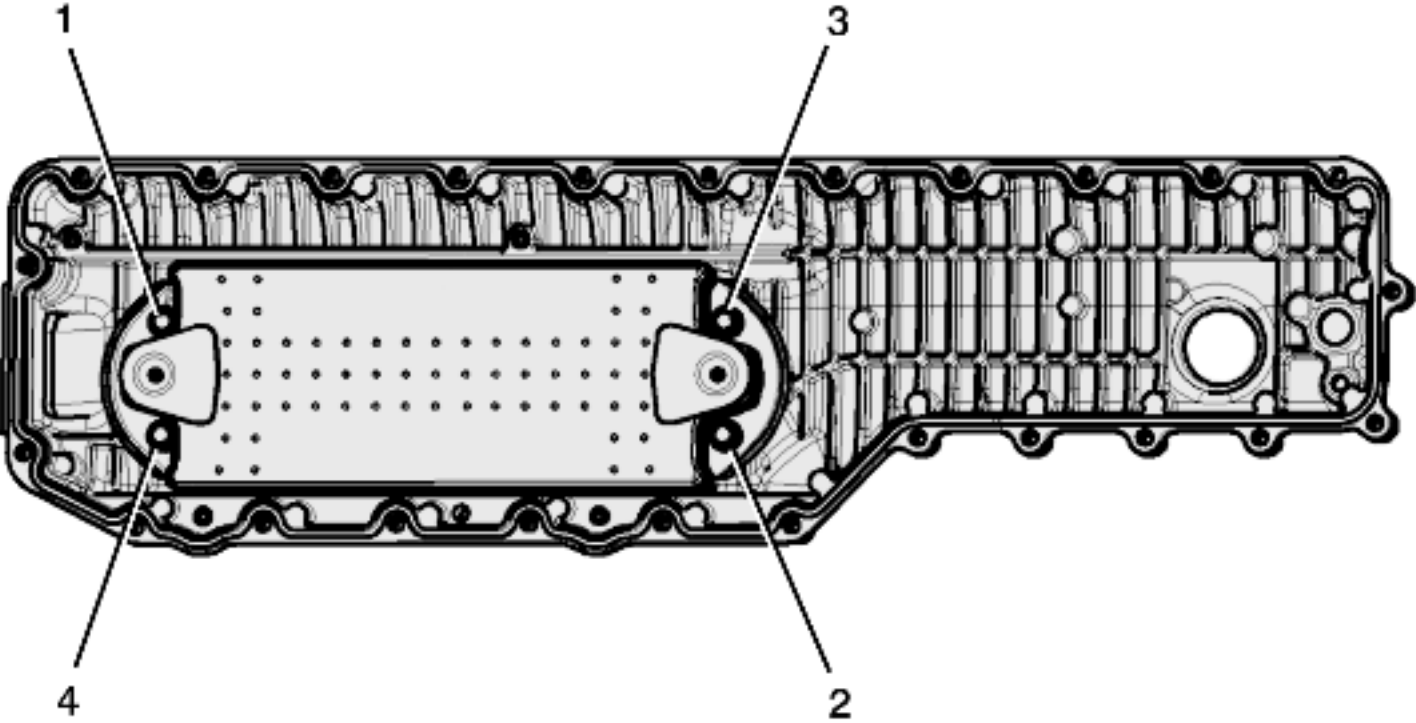
The item numbers indicate the tightening sequence.



21 3808A

Stage 1: tighten bolts (2 - 5 - 6 - 4 - 3 - 1)	48±8 Nm
Stage2 (check tightening)	48±8 Nm

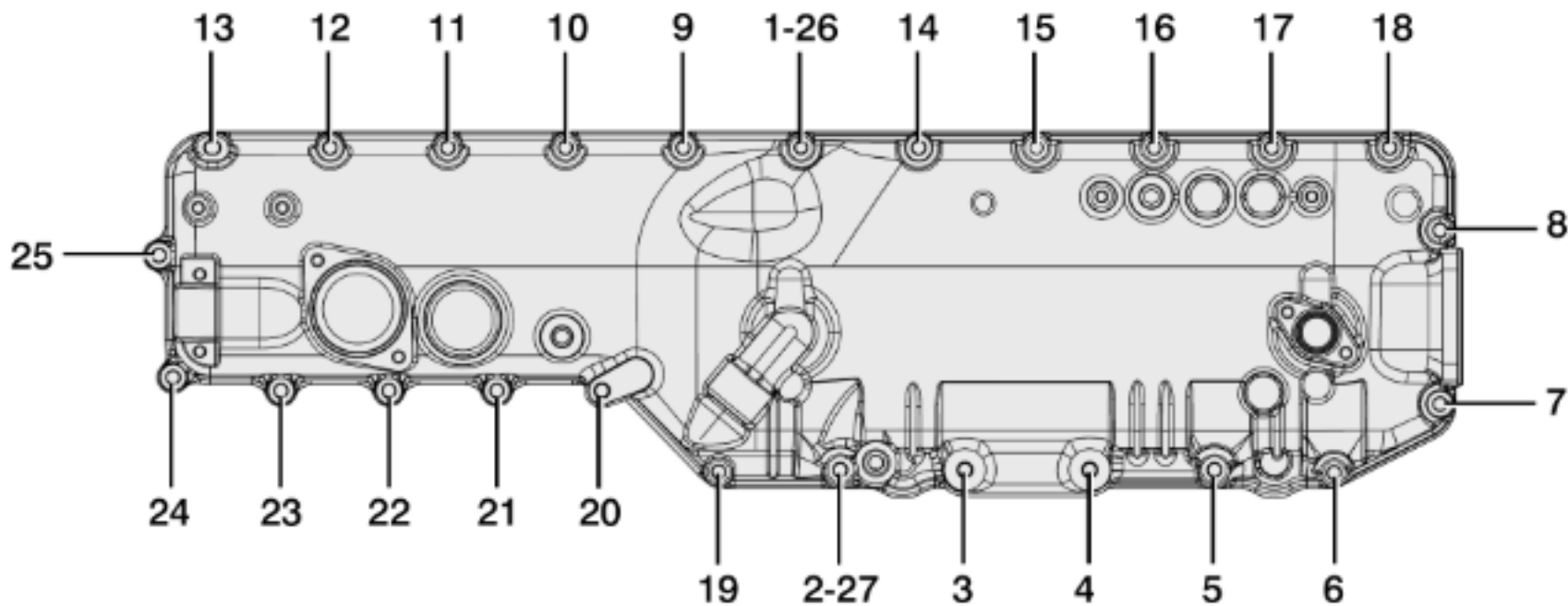
Oil cooler



21 3672A

The item numbers indicate the tightening sequence.

Stage 1: tighten bolts (1 - 2 - 3 - 4)	5±1 Nm
Stage 2: tighten bolts (1 - 2 - 3 - 4 - 1)	27±4 Nm



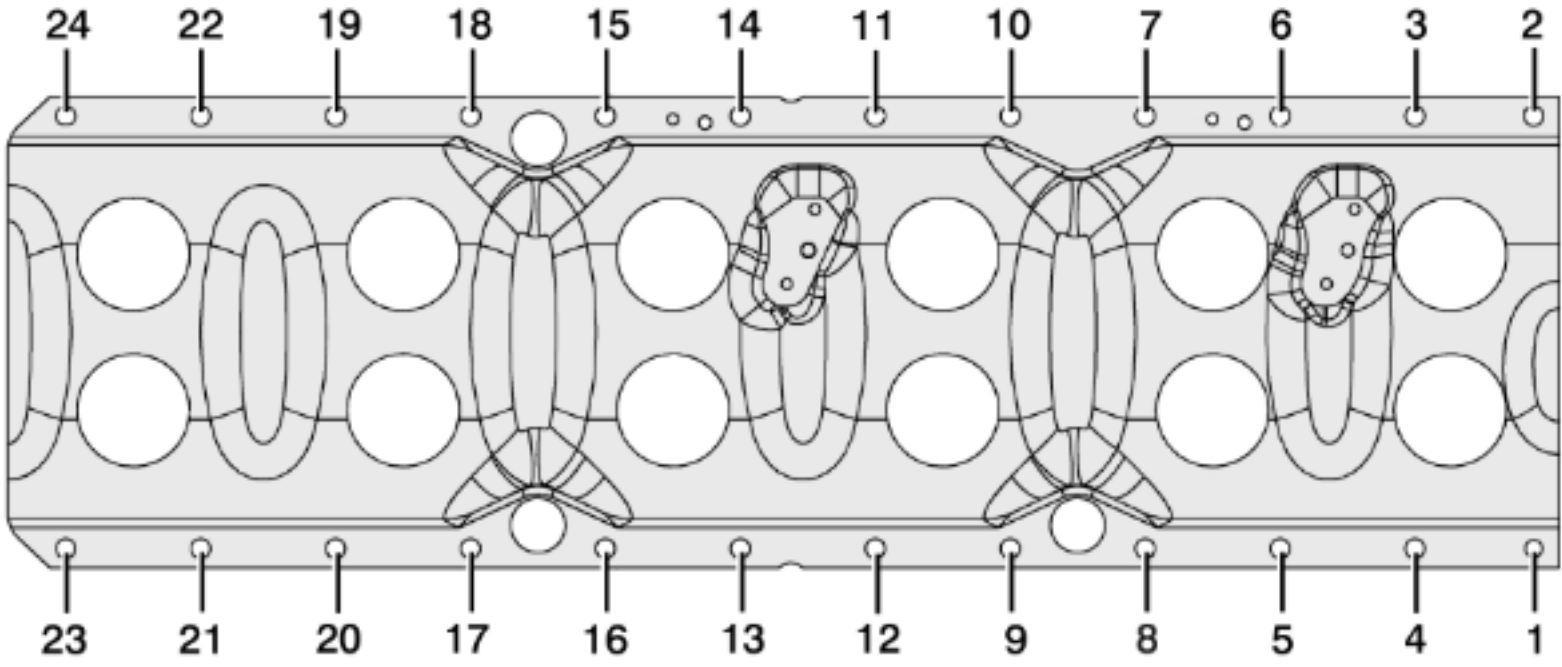
224378



Begin by tightening bolts (13 - 14 - 3) to a torque of 24 ± 4 Nm, then tighten all the bolts in the specified sequence.

Oil cooler casing securing bolts	24 ± 4 Nm
Oil cooler casing plug	55 ± 8 Nm
Oil cooler casing water circuit drainage union	40 ± 4 Nm

Cylinder block reinforcement, tightening torques



224379

The item numbers indicate the tightening sequence.



The bolts must not be re-used. Use new bolts.

Stage1	45±5 Nm
Stage2	60±5 °

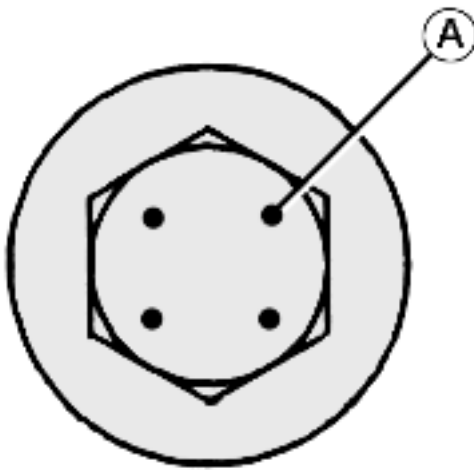
Big end caps, tightening torques



Tighten in diagonally opposed sequence.

Stage1	20±3 Nm
Stage2	60±3 Nm
Stage3	90±5 °
Control torque	115 > 195 Nm

Crankshaft bearing caps, tightening torques



21 2927A

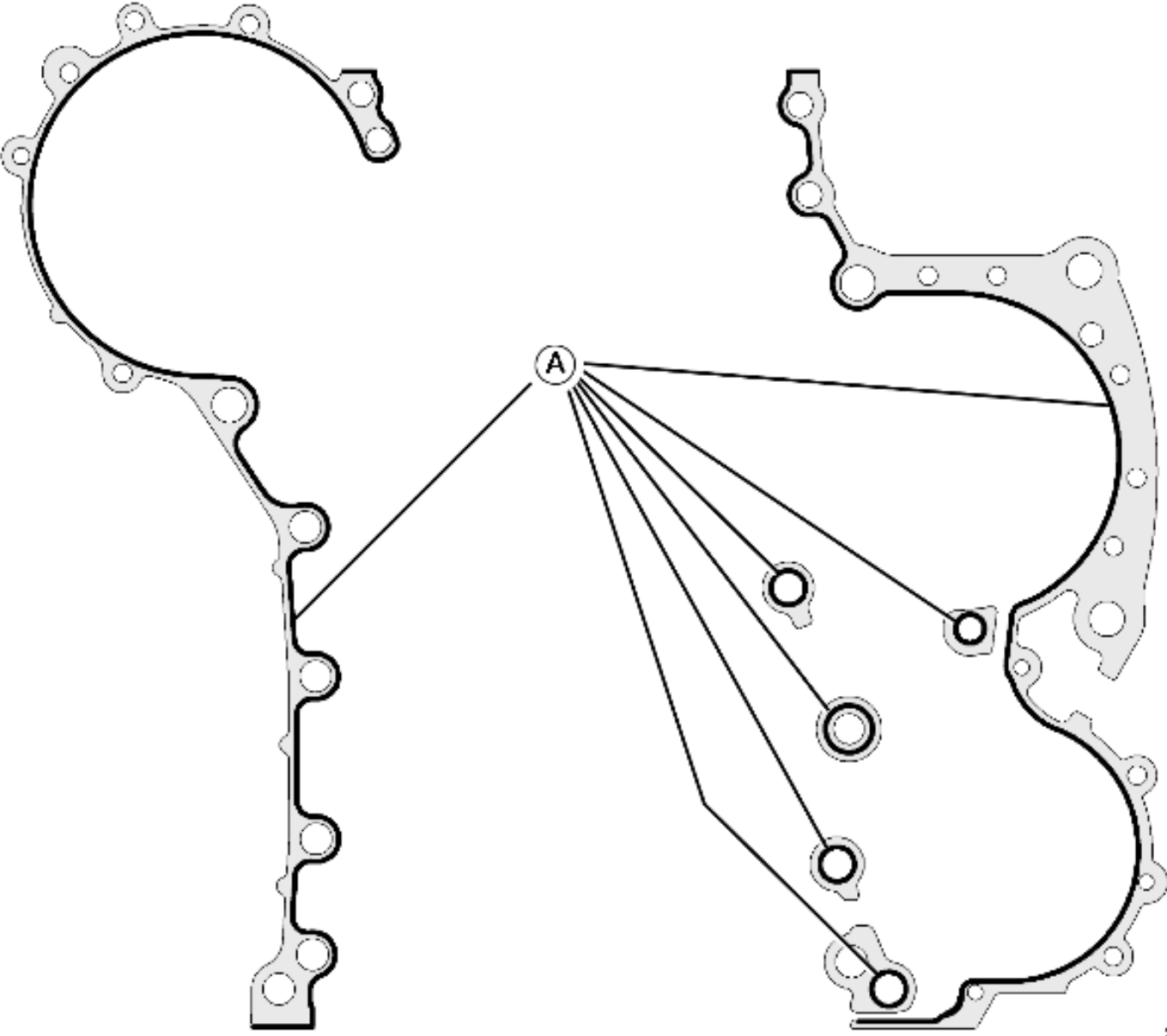


The bolts can be re-used no more than 4 times maximum. Mark the bolt head with an indentation (A) after tightening each time using a centre punch. In this case, apply engine oil to the screw-threads and under the bolt heads. Do not apply engine oil to new bolts, which are already pre-lubricated.

Stage1	150± 20 Nm
Stage2	120± 5 °

Engine flywheel housing, tightening torques

Assembly type A

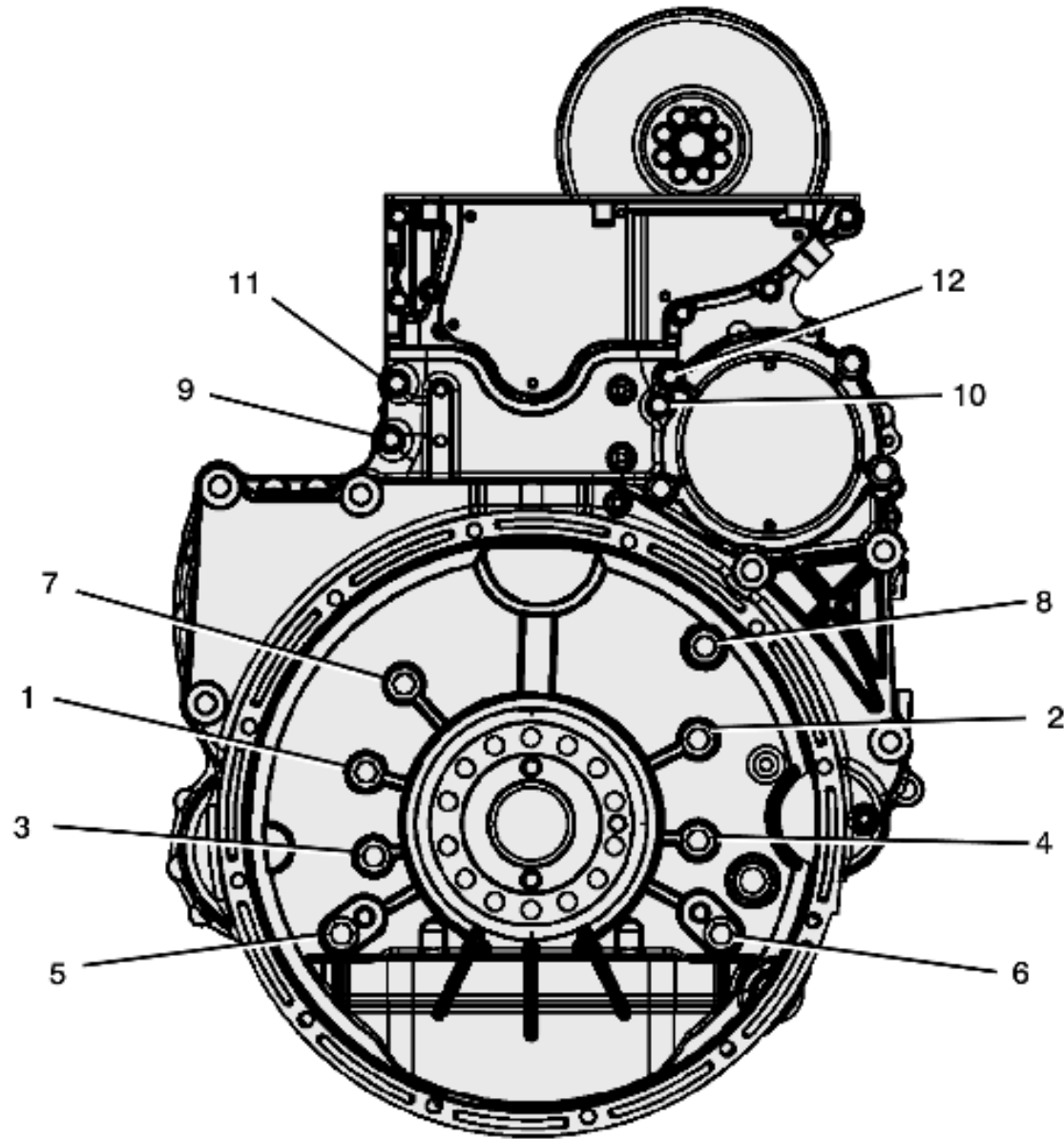


21 3617A

Apply a bead of silicone **dia. 2 mm (A)** as shown in the drawing. Perform assembly within 20 minutes of application of the silicone.
Apply "

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".



21 3618A

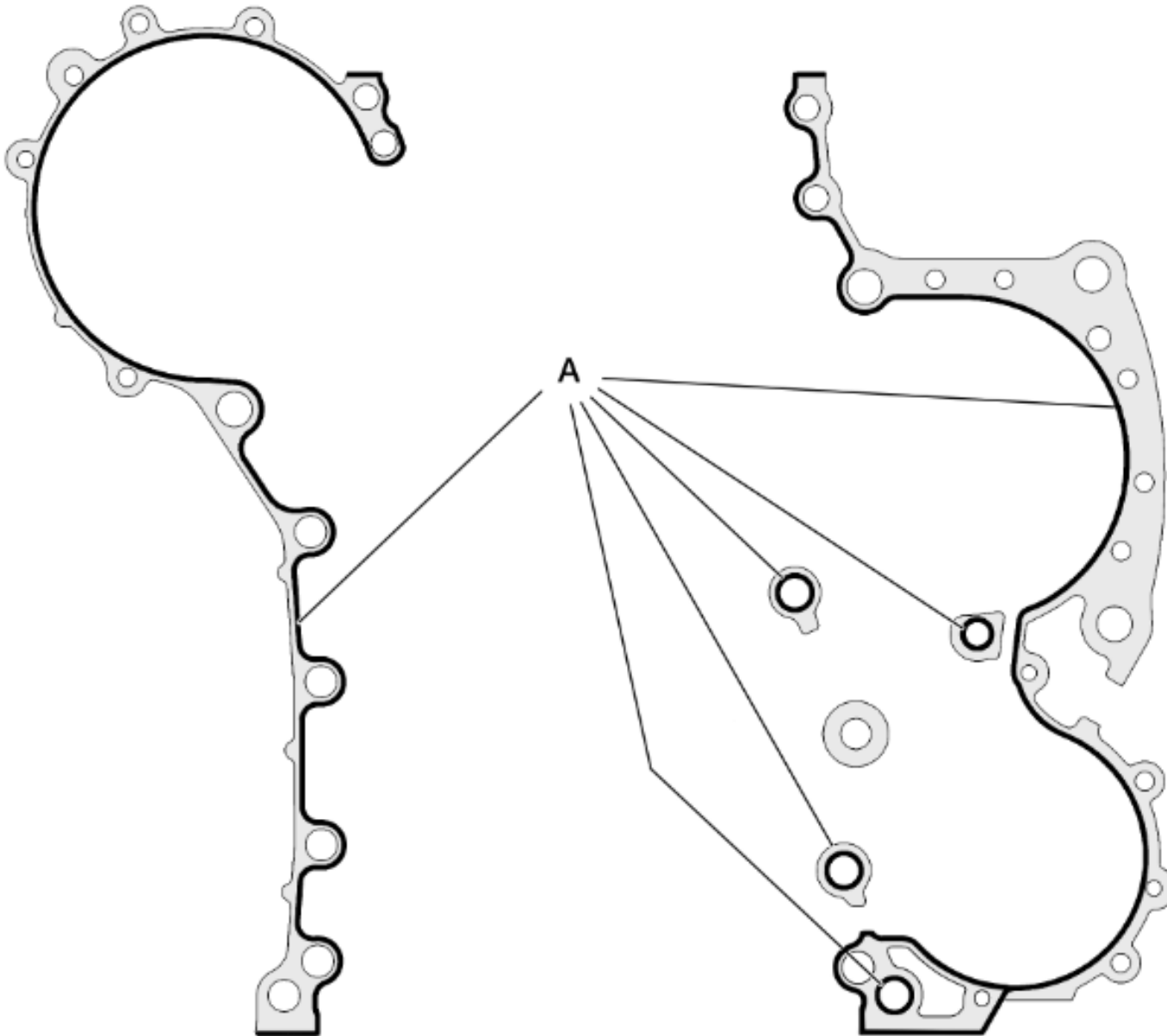
The item numbers indicate the tightening sequence.

Bolt M14	140±20 Nm
Bolt M10	48±8 Nm

Bolt M8

24±4 Nm

Assembly type B

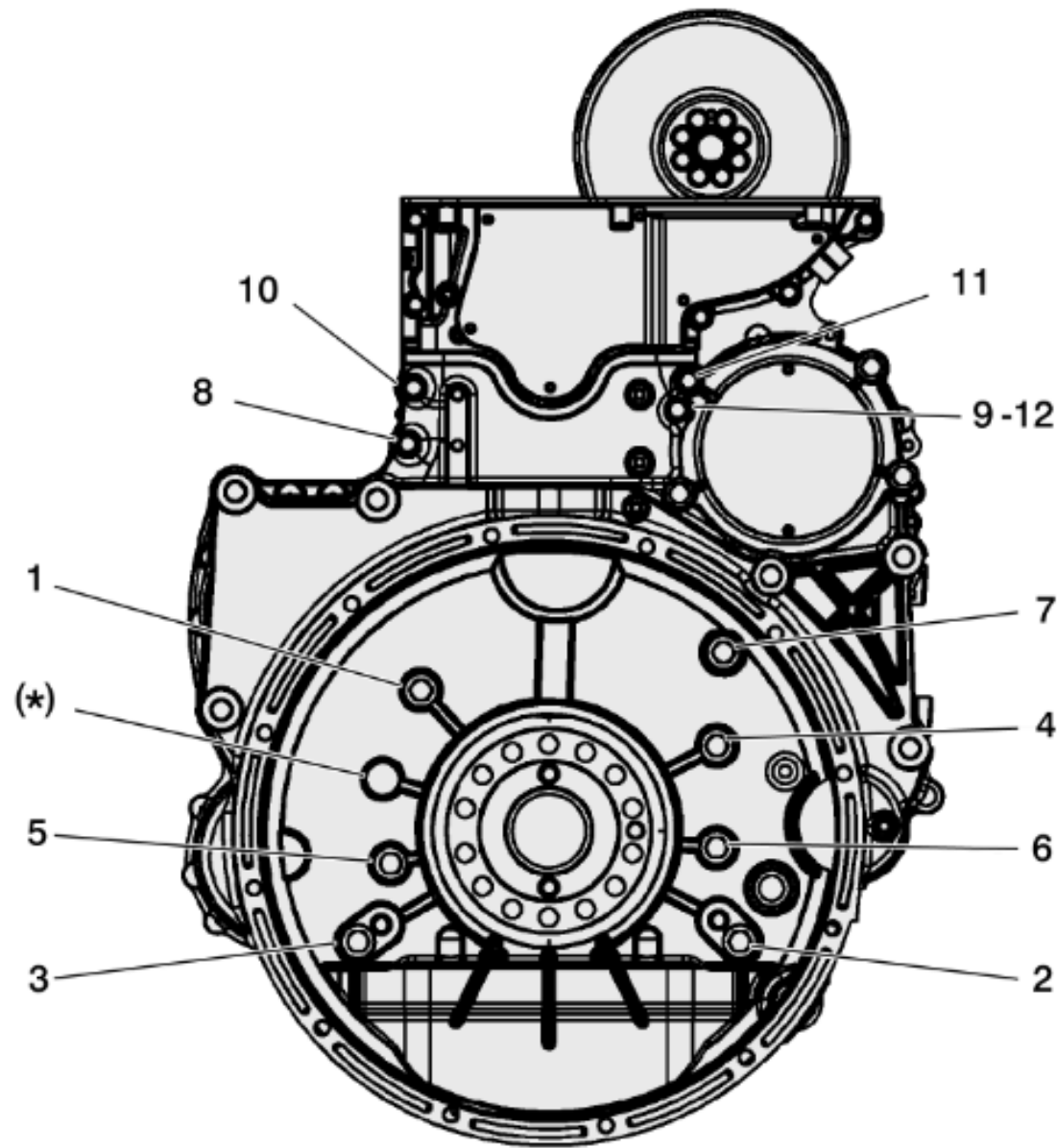


224704

Apply a bead of silicone **dia. 2 mm (A)** as shown in the drawing. Perform assembly within 20 minutes of application of the silicone.
Apply "

ADHESIF SILICONE 7091

".



224705

The item numbers indicate the tightening sequence.

Bolt M14	140±20 Nm
Bolt M10	48±8 Nm

Bolt M8	24±4 Nm
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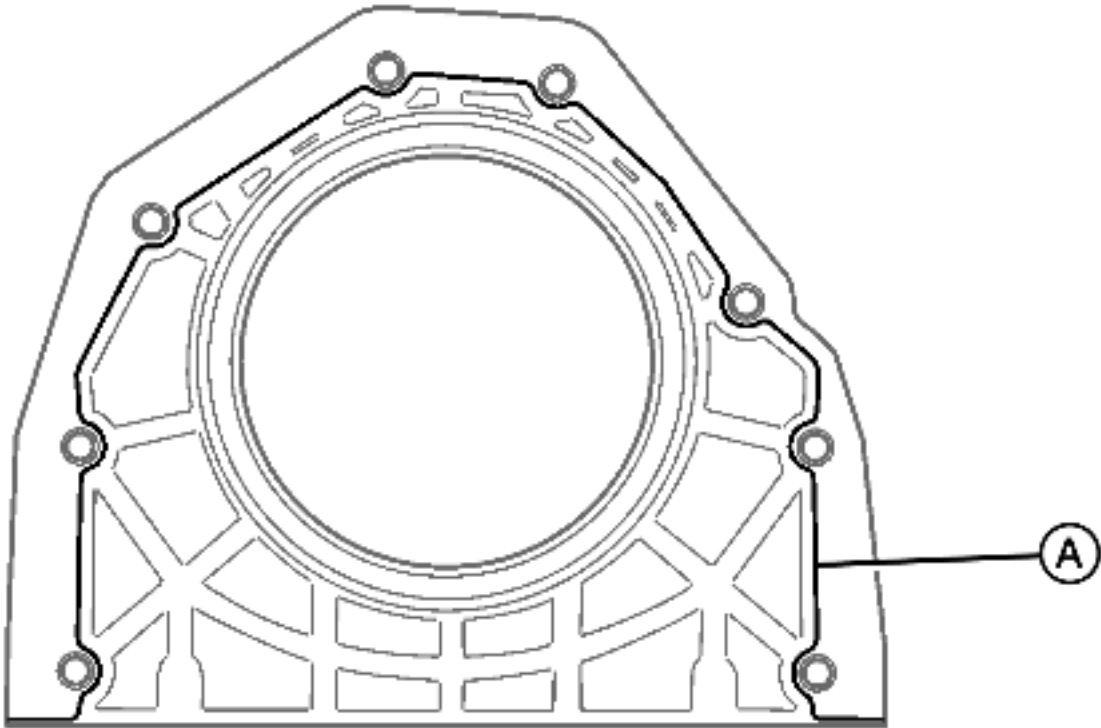
(*)Depending on the assembly.

Plug	40±4 Nm
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Consumables

Automotive part N°	Industrial reference N°
56 89 501 292	Silicon adhesive 7091

Crankshaft sealed casing, tightening torques



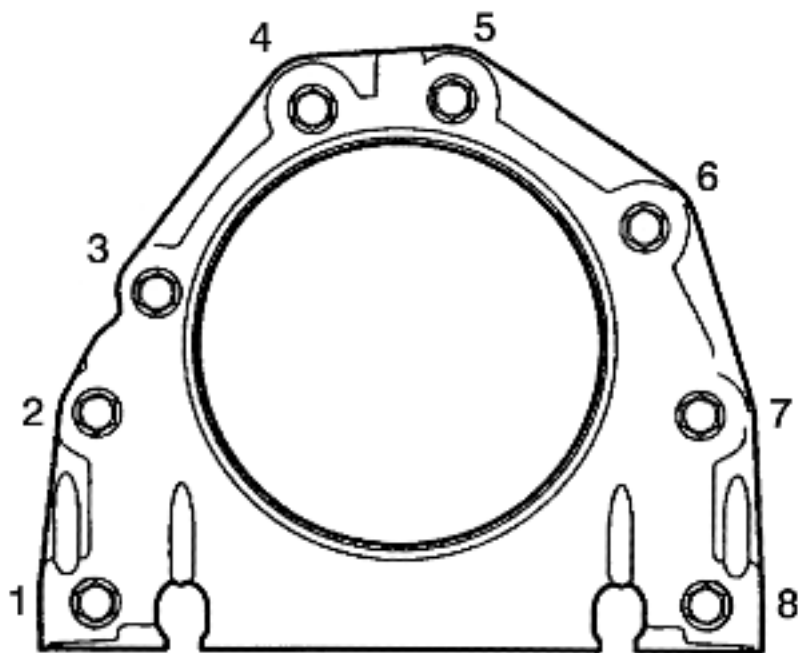
21 2721A

Apply a bead of silicone **dia. 2 mm (A)** as shown in the drawing. Perform assembly within 20 minutes of application of the silicone.

Apply "

ADHESIF SILICONE 7091

".



21 2722A

The item numbers indicate the tightening sequence.

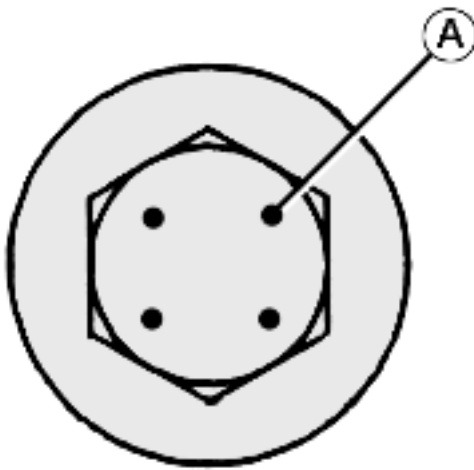
Stage 1: bolts (2 - 7)	24±4 Nm
Stage 2: bolts (1 > 8)	24±4 Nm

Follow the tightening sequence.

Consumables

Automotive part N°	Industrial reference N°
56 89 501 292	Silicon adhesive 7091

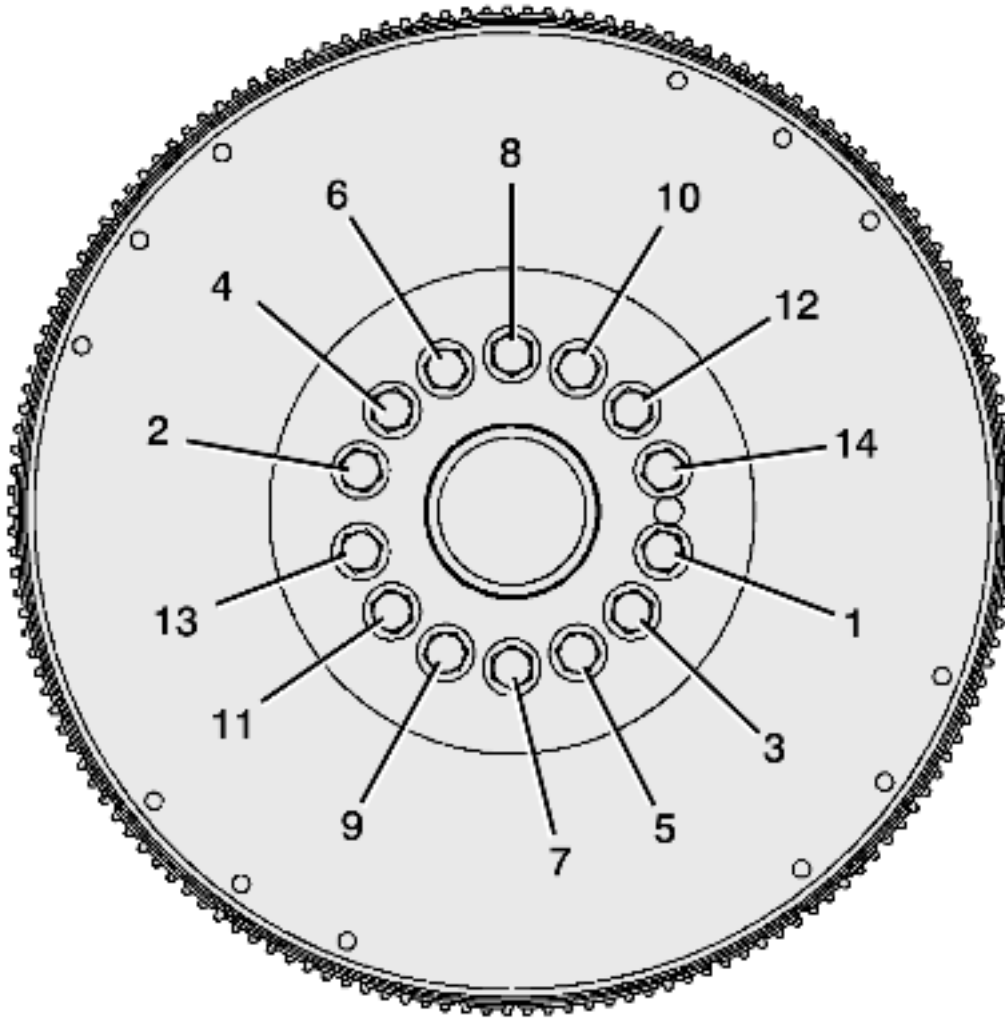
Engine flywheel, tightening torques



21 2927A



The bolts can be re-used no more than 4 times maximum. Mark the bolt head with an indentation (A) after tightening each time using a centre punch. In this case, apply engine oil to the screw-threads and under the bolt heads. Do not apply engine oil to new bolts, which are already pre-lubricated.

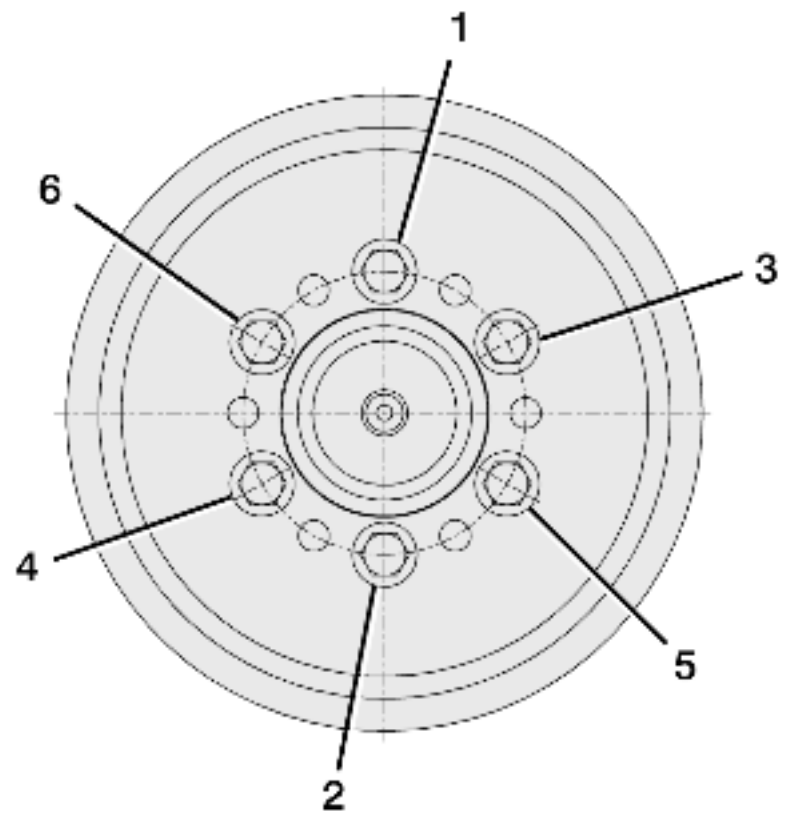


21 3514A

The item numbers indicate the tightening sequence.

Stage1	60±5 Nm
Stage2	120±10 °
Control torque	270 > 410 Nm

Damper, tightening torques



21 35B2A

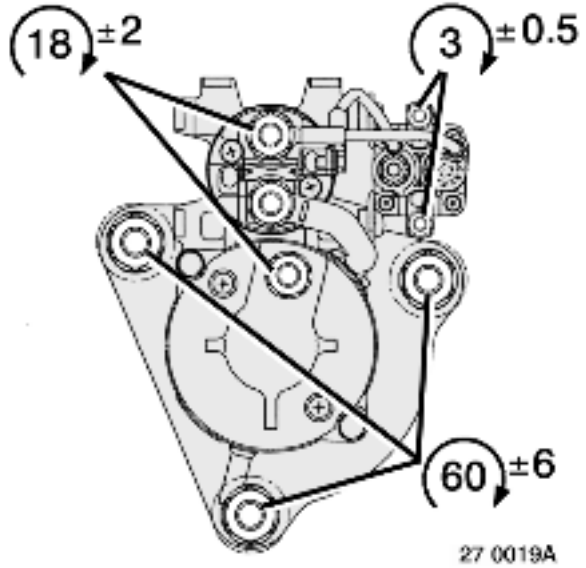
The item numbers indicate the tightening sequence.



The bolts must not be re-used. Use new bolts.

Stage1	35±5 Nm
Stage2	90±10 Nm

Starter, tightening torques

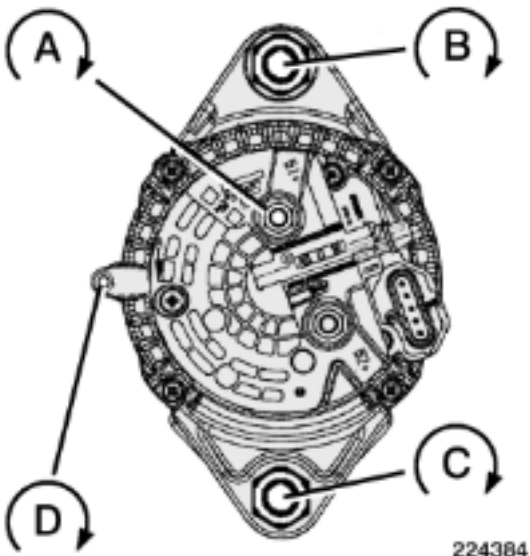


Mounting studs

24±4 Nm

Alternator, tensioners, tightening torques

Pulley to hub securing bolt	95±5 Nm
Tensioner roller securing bolts M10	48±8 Nm



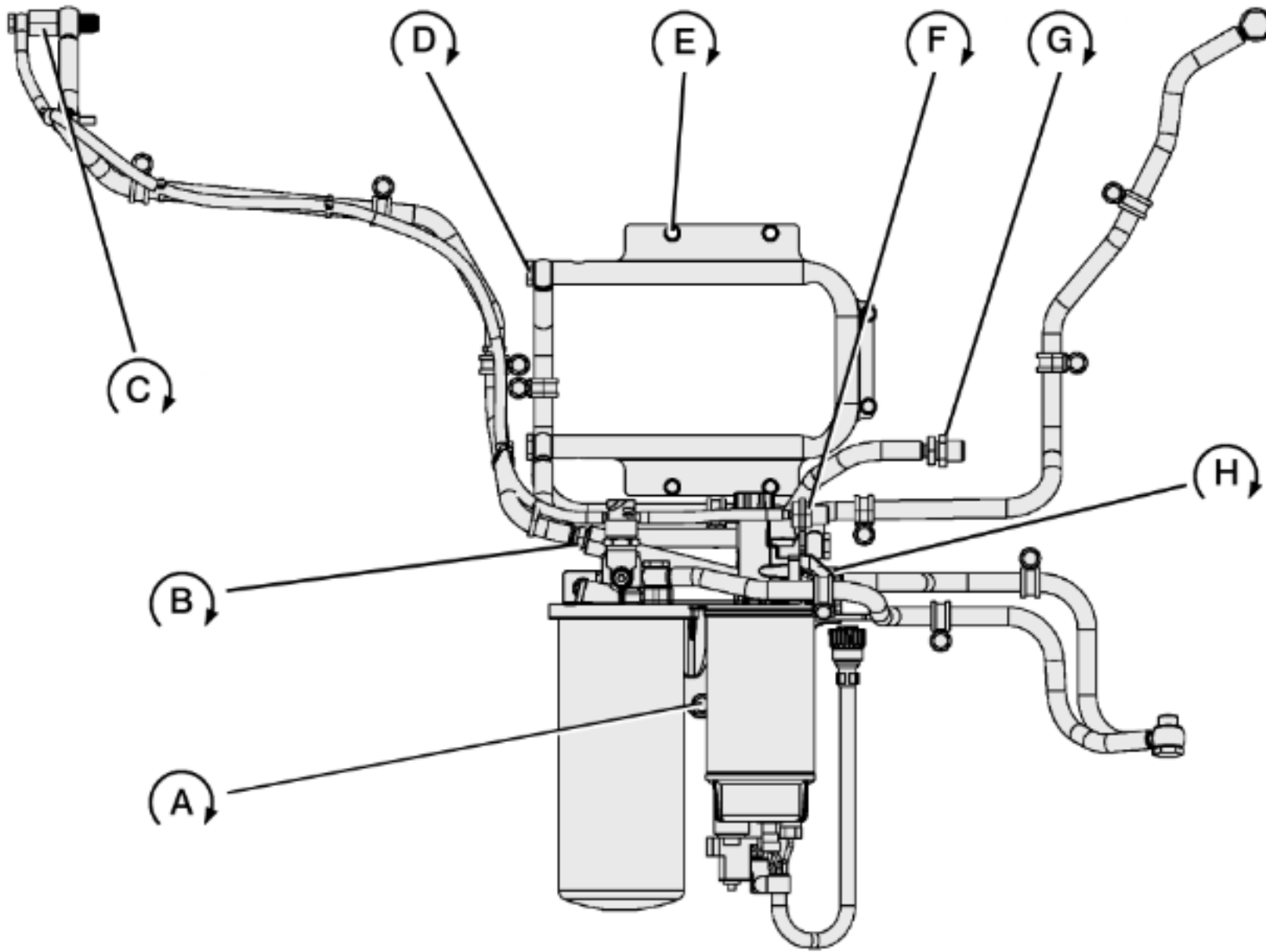
Item A	12±2 Nm
Item B	40±8 Nm
Item C	100±20 Nm
Item D	10±2 Nm

Viscous coupling, tightening torques

Viscous coupling fan / hub securing nuts	20±4 Nm
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Low-pressure fuel circuit, tightening torques

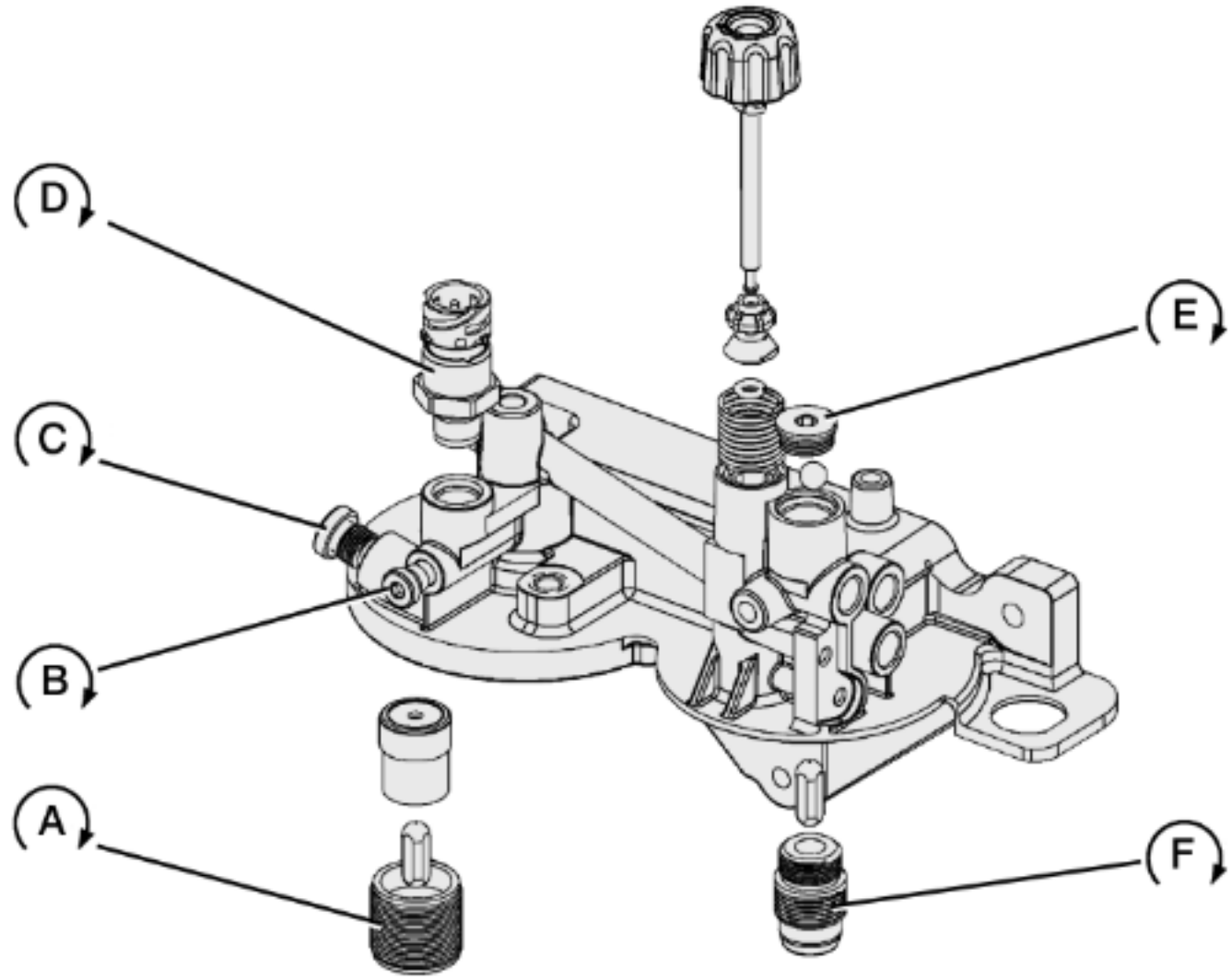
Banjo union(s) M10	25±3 Nm
Banjo union(s) M14	35±5 Nm
Banjo union(s) M16	48±5 Nm
Bolt dia. M8x1.25	24±4 Nm



224382

Item A	24 ± 4 Nm
Item B	30 ± 5 Nm
Item C	48 ± 5 Nm

Item D	35±5 Nm
Item E	10±1 Nm
Item F	35±5 Nm
Item G	48±4 Nm
Item H	35±5 Nm



Item A	55±5 Nm
Item B	10±1.5 Nm
Item C	25±1.5 Nm

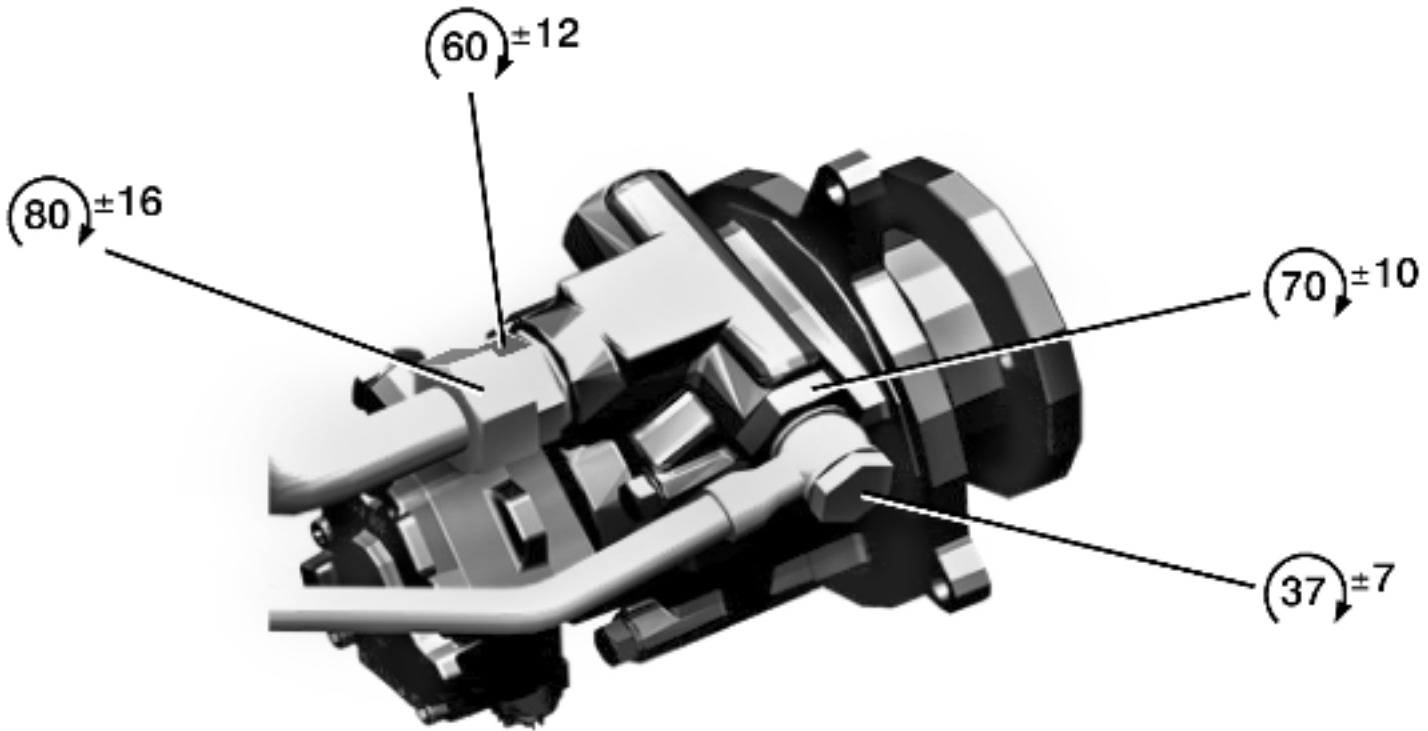
224383

Item D	25±3 Nm
Item E	1.5±0.5 Nm
Item F	55±5 Nm

Steering pump, tightening torques

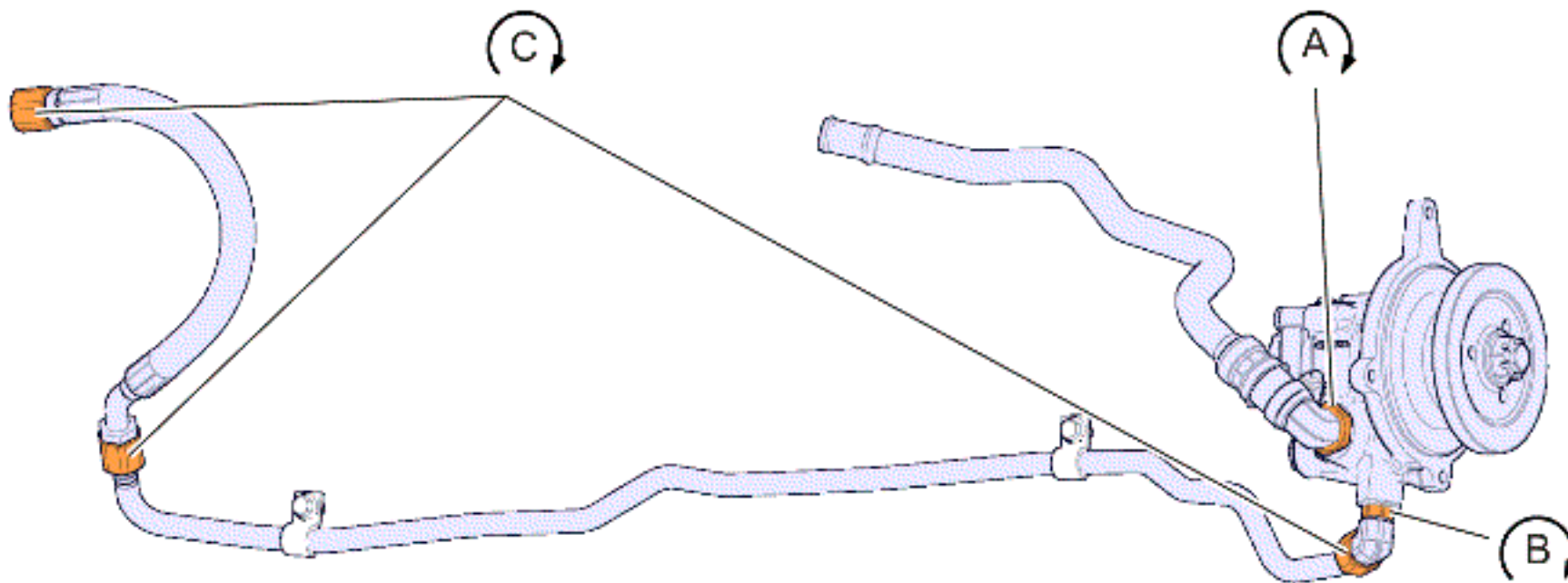
Steering pump drive pinion securing nut	100±10 Nm
Steering pump securing bolts	24±2 Nm

Assembly type A



26 0005A

Assembly type B



222753

Item A	90 Nm
Item B	55±5.5 Nm
Item C	80±10 Nm