



Volvo Chassis - Timing Gear Plate Repair

Internal Content

2018 vgt and newer

Information

This solution provides supplementary information to be used when installing a Timing Gear Plate with Integrated Seal.

Repair Criteria

For inspection procedures and repair criteria, refer to TSB [V-212-001 Timing Gear Plate, Inspection](#) in Impact.

Tools

- **For Turbo Compound:** A new Turbo Component Support Tool has been developed. This tool is designed to support the TC unit in place while performing TGP Repair.
 - Tool Part Number 88800826.
 - For additional information, see Tool Bulletin [STB23-005V](#) and the [Trucks Academy Video](#).
- A list of other tools required can be found on the Job Aid included at the end of this solution.

Parts

- **PART KITS** have been developed to include all necessary parts for a complete repair. New Seal Conditioner will be included in all kits (instructions for seal condition application below):
 - **VGT Engines:** Spare Parts Kit 24459407
 - **Turbo Compound Engines:** Spare Parts Kit 24459389

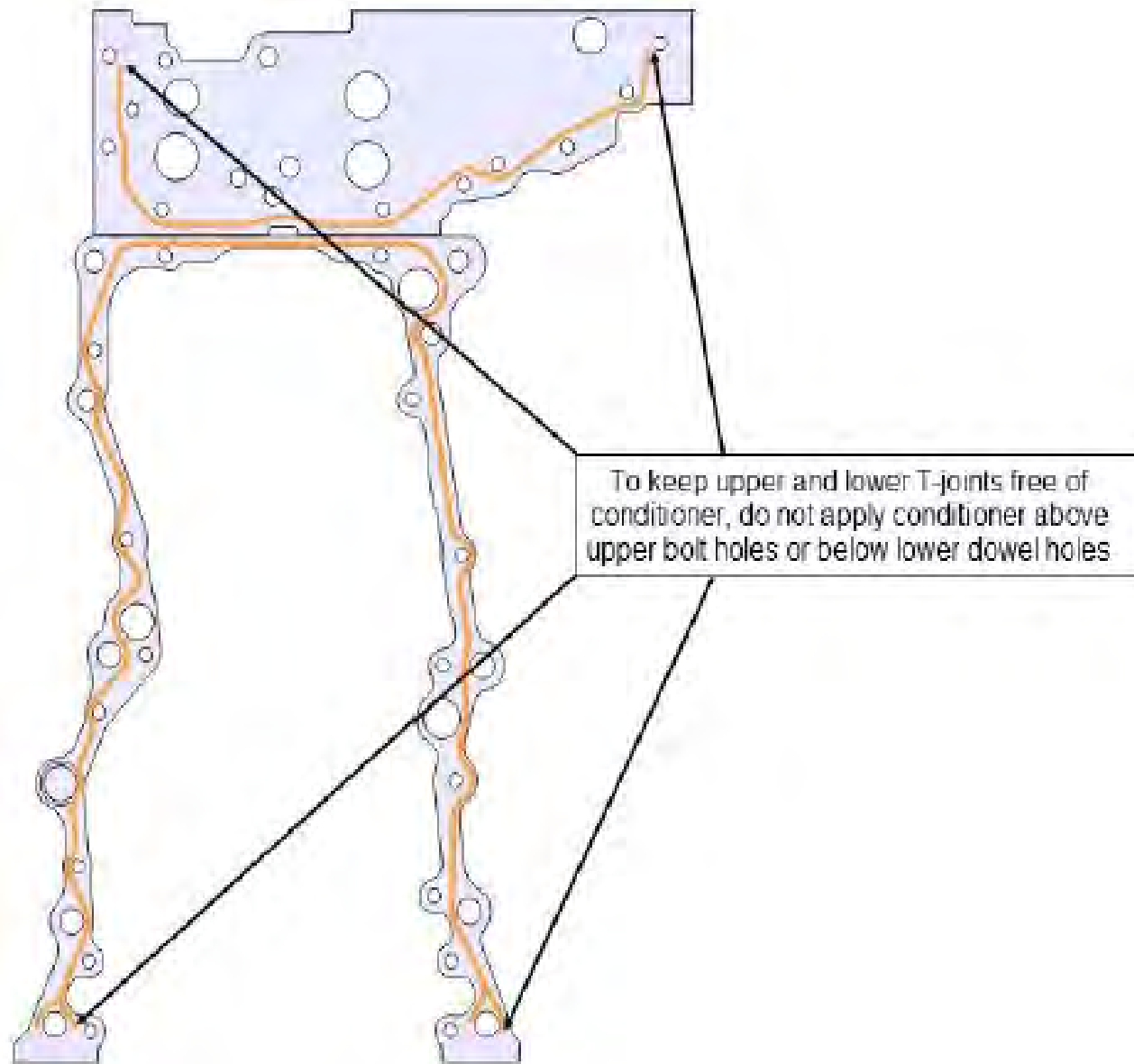
Repair

The timing gear plate replacement procedure in Impact should be utilized for this repair **in addition to the supplementary installation steps for application of the seal conditioner below.**

- The Impact procedure is Operation [2152-03-03-05 Timing Gear Plate, Replacement - Transmission and Clutch Removed](#).
- **IMPORTANT:** Loosening of the rocker shaft and overhead adjustment **IS NOT REQUIRED** when following the Impact instructions. There are new steps included in the Impact procedure for setting gear backlash.

Seal Conditioner Application

1. Clean engine block TGP seal mating surface of any oil, grease, dirt. Inspect and clean the TGP bolt holes in rear of the engine block.
2. Apply a **LIGHT FILM** of the seal conditioner (included in the part kit) with a gloved finger to the TGP mating seal surface of the block.
 - Avoid getting conditioner in bolt holes.
 - Remove any excess seal conditioner from bolt holes.
 - **IMPORTANT:** To keep conditioner from contaminating the T-joints, conditioner should not be applied beyond the corresponding dowel or bolt holes in the block. The correct application pattern is shown below:



2a. IMPORTANT: For a turbo compound engine, seal conditioner should be applied **to the surface of the TC unit.**



3. Install the TGP on the engine block per the Impact procedure. **Remove any excess seal conditioner from T-joints.**
4. Refer to the Impact operation for installation of timing gears and set-up procedures.
5. Prior to the installation of the flywheel housing (FWH) onto the TGP, clean the FWH mating surface of any oil, grease, dirt. Inspect and clean the TGP bolt holes in the FWH.
6. Complete the installation of the flywheel housing onto the engine following the procedure in Impact.

 Live UI

1. After the flywheel housing has been reinstalled, wipe away any excess conditioner from the joints.

Video

A video of the procedure can be found below. Click the YouTube button in the lower right-hand corner of the video to view the video full-size.

Timing Gear Plate Repair



Job Aid

A Job Aid outlining repair times, document information, and a tool list can be found below (click on the pictures to expand to a larger size).

Timing Gear Plate, Integrated Plate

Job Aid

- Coolant Extractor 85112740
- Drain Hose 9996049
- Disassembly Tool J-44773
- Cranking Tool 88840317
- Fixture 88800570
- Impact Wrench 9996400
- Puller 9990192
- Disassembly Tool 88900502
- Guide 9998267
- Rocker Indicator 9999683

Special Tools

- Magnetic Stand 9999696
- Timing Kit J-44514B
- Assembly Tool 88800619
- Assembly Tool 9990166
- Align Tool 8511422
- Setting Tool 8880031
- Align tool 9990024
- Fixture 9996857
- Transmission jack and plate
- TC Support Plate 88800826

<ol style="list-style-type: none"> 1) Secure the truck for service, disconnect negative cable 2) Drain air and coolant 3) Remove interior components 4) Remove transmission 5) Remove air cleaner box, CAC pipe and Offshore pipe 6) Remove EGR valve, EGR crossover pipe, valve cover, spacer frame, and upper timing cover 7) Remove all electrical, coolant lines, air lines, and brackets from the rear of the engine 8) Remove air compressor, starter, and tandem pump. 	<div style="border: 1px solid gray; padding: 5px; background-color: #f0f0f0;"> Teardown 0-4 Hrs. </div>	<ol style="list-style-type: none"> 9) Remove oil pan and Remove of filters 10) Place the engine on TDC 11) Raise and support the engine and Remove engine mounting brackets from flywheel housing 12) Remove engine mounts from the frame 13) Remove clutch, pressure plate, and flywheel 14) Install TC support tool (TC engine Only) 15) Remove all hardware securing the flywheel housing and remove the flywheel housing 16) Remove timing gears <ul style="list-style-type: none"> - Tandem idler rear (a puller may be required to remove the gear) - TC Idler Gear (TC Engine Only) - Cam gear, Double idler gear and Adjustable idler gear 17) Install alignment dowels, removed TGP hardware, and remove TGP.
<ol style="list-style-type: none"> 18) Apply seal conditioner to the block and head 19) install TGP and new mounting bolts 20) install all timing gears verifying timing and gear lash are correct 21) Make sure to remove alignment dowels 22) Apply seal conditioner to the TGP. 23) Install flywheel housing and torque all securing hardware to spec 24) Remove TC support tool (TC Engine Only) 25) install engine mounting bracket to flywheel housing and engine mounts in frame 26) Lower engine onto the engine mounts, install and torque engine mounting bolts 27) Clean and install oil pan, hook up level sensor, dipstick, and fill tube 28) Replace oil filters and fill engine with new oil 29) install rear main seal, flywheel, and starter 30) install upper timing cover, valve cover, and EGR cross over pipe 31) install tandem pump, air compressor, air compressor line and connector. 32) Connect EI (engine interface) connector. 	<div style="border: 1px solid gray; padding: 5px; background-color: #f0f0f0;"> Install 9-13 Hrs. </div>	<ol style="list-style-type: none"> 33) Install all electrical, coolant lines, air lines, and brackets from the rear of the engine. 34) install EGR valve, EGR hot pipe, offshore pipe, flex pipe, and install hot side CAC pipe 35) install air cleaner housing and turbo inlet pipe. 36) install clutch and pressure plate 37) Realign transmissions for installation and install trans. 38) Route and secure battery cables, trans cooler coolant lines, air lines, and electrical harness. 39) install drive line 40) Fill engine with coolant. 41) Connect hoses, start engine and check for leaks.
<div style="border: 1px solid gray; padding: 5px; background-color: #f0f0f0;"> Training Video available at VolvoTrainingsupport.com </div>		<div style="border: 1px solid gray; padding: 5px; background-color: #f0f0f0;"> Additional Communications </div>
<div style="border: 1px solid gray; padding: 5px; background-color: #f0f0f0;"> Turbo Compound Support Bracket </div>		<div style="border: 1px solid gray; padding: 5px; background-color: #f0f0f0;"> TSB M212-001 Timing gear plate, Inspection/Repair </div>
<div style="border: 1px solid gray; padding: 5px; background-color: #f0f0f0;"> Timing Gear Plate Install </div>		<div style="border: 1px solid gray; padding: 5px; background-color: #f0f0f0;"> Repair operation 2152-03-03-05 (Timing Gear Plate, Replacement) in Impact </div>



Warranty Information

Warranty Information can be found in the Warranty Operations Manual, [6.2.1.1 - TIMING GEAR PLATE - Clean Claim Template](#).

- Log in to TDP prior to clicking the link.

Additional Information

- Use of recommended oils is advised. The Recommended Oil List can be found in Impact or by clicking [here](#).



Tags

[volvo](#)

[unlocking uptime](#)

[tgp](#)

[oil leak](#)

[timing gear plate](#)

Categories

[Make and Model > Volvo > VNL](#)

[Make and Model > Volvo > VNR](#)

[Make and Model > Volvo > VNX](#)

[Make and Model > Volvo > VAH](#)

[Make and Model > Volvo > VHD](#)

[Powerplant > Volvo > D11](#)

[Powerplant > Volvo > D13](#)

[Vehicle System > Engine](#)

Related links and attachments

[Volvo TGP Job Aid V3](#)



Feedback

[Give feedback](#) to help improve the content of this article

Timing Gear Plate, Inspection and Repair

V-212-003

(December 2022)

Valid for

All Volvo Powered Trucks 2017 to current

Case description

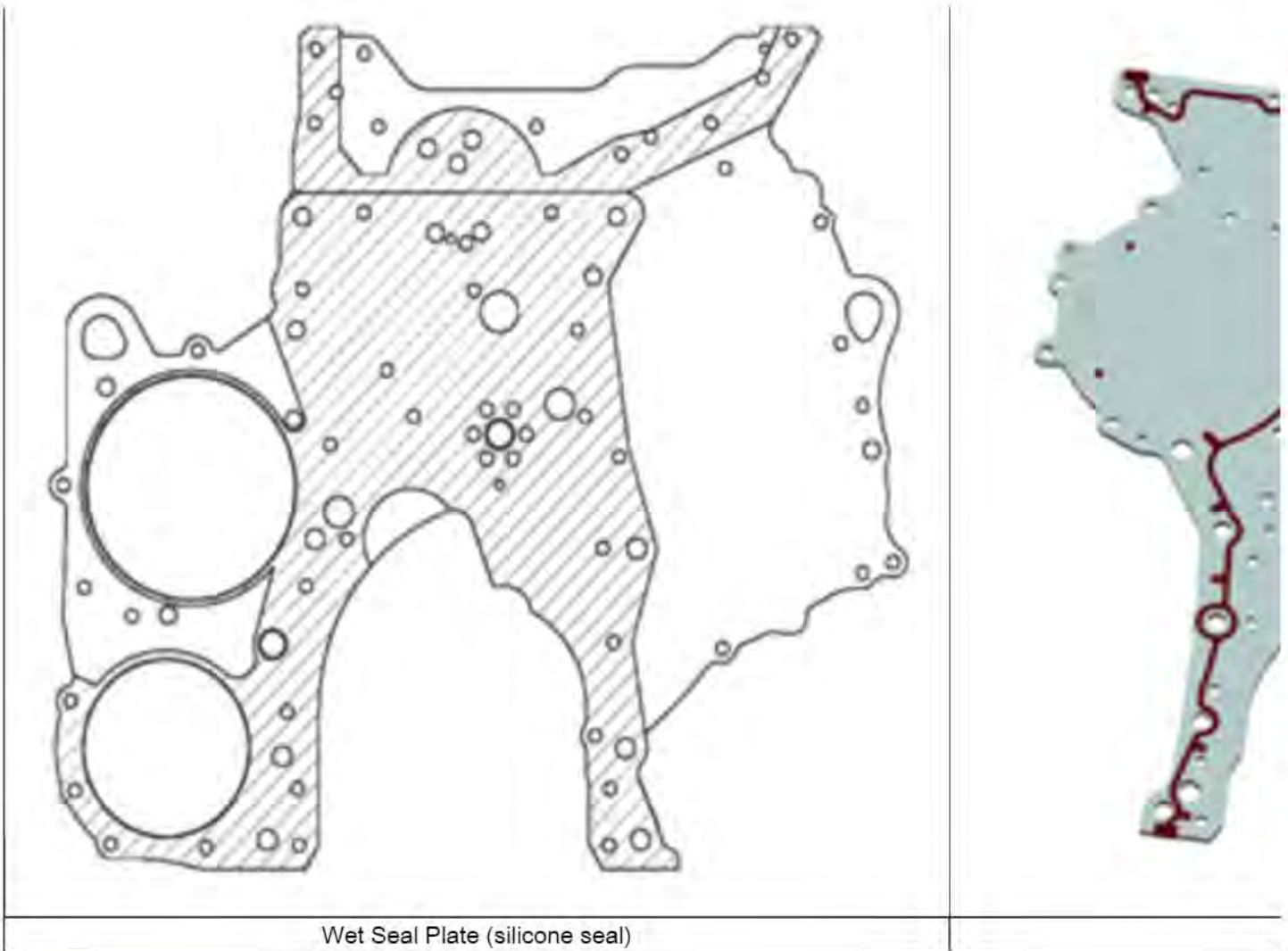
Volvo Trucks with an 11L and 13L engine utilize two types of timing gear plates. In some instances, the timing gear plates may show evidence of an oil leak or oil weep. The information in this publication describes the differences between the two types of timing gear plates used, the inspection criteria for determining an oil weep vs an oil leak, and the recommended best practices for how to properly diagnose a leak, and what is considered a valid repair and updated repair instructions.

Types of timing gear plates

Wet seal plates are multiple time use and can be removed, cleaned and reinstalled with new sealant. Wet seal plates are used on 11L-13L engines from the start of production to current on the 11L and through April 2018 on the 13L VGT engines. The 13L turbocompound engine has never been built using the wet seal plate.

Important Note
13L Engine with a wet seal plate can be upgraded to the new integrated seal plate but will require additional components to be replaced. Refer to TPI 212-031, Timing Gear Plate for required parts list.

Integrated seal plates were introduced into production in 2017 models built with the 13L turbocompound engine and 13L VGT engines built after April 2019. If a leak is found on an integrated seal plate or any damage is found to the integrated seal the plate must be replaced. The integrated plate is not repairable and must be replaced if any damage is found.



Repair criteria

Oil leak can be classified into two different categories, a weep, or an active leak.

Oil Weep is determined by the appearance of a thin accumulation of oil on the exterior of a part. The area will look like a dark stain or look damp in appearance (but not wet or dripping) and will likely collect dust and dirt.

Note: An oil weep is a normal condition seen around mechanical joints and does not require a repair.

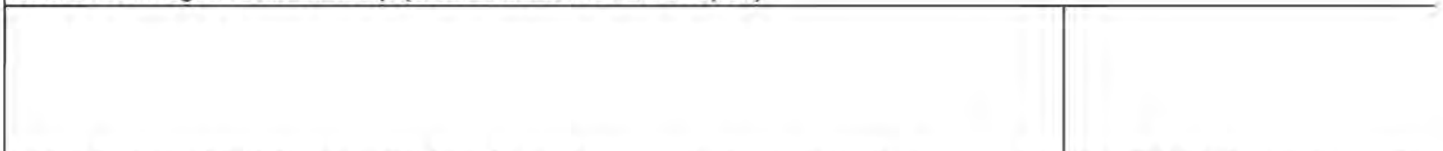
Oil Leak is determined by the identification of oil actively accumulating on the exterior of a part. The area will be visibly saturated, can be seen actively accumulating and running from the area.

Note: An active leak is the only leak that is considered a valid warrantable repair.

Use the images below for a visual reference of the leak categories. If farther assist in needed determining the leak category, please follow normal support procedures.

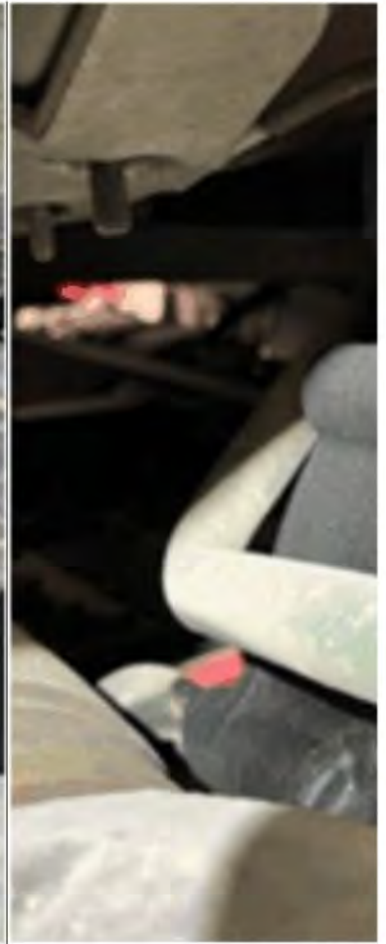
Note: If an integrated seal plate is leaking or if damage is found to the seal, it must be replaced with a new one. It cannot be repaired using silicone.

Reference images of an oil weep (not a valid warrantable repair)



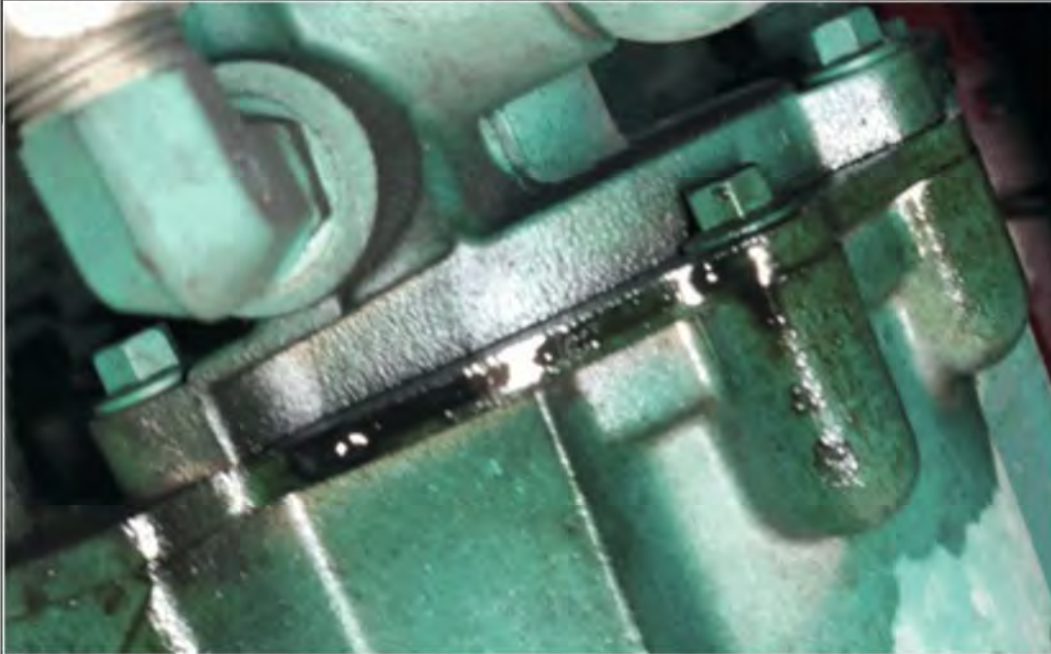


Dark spot or stain



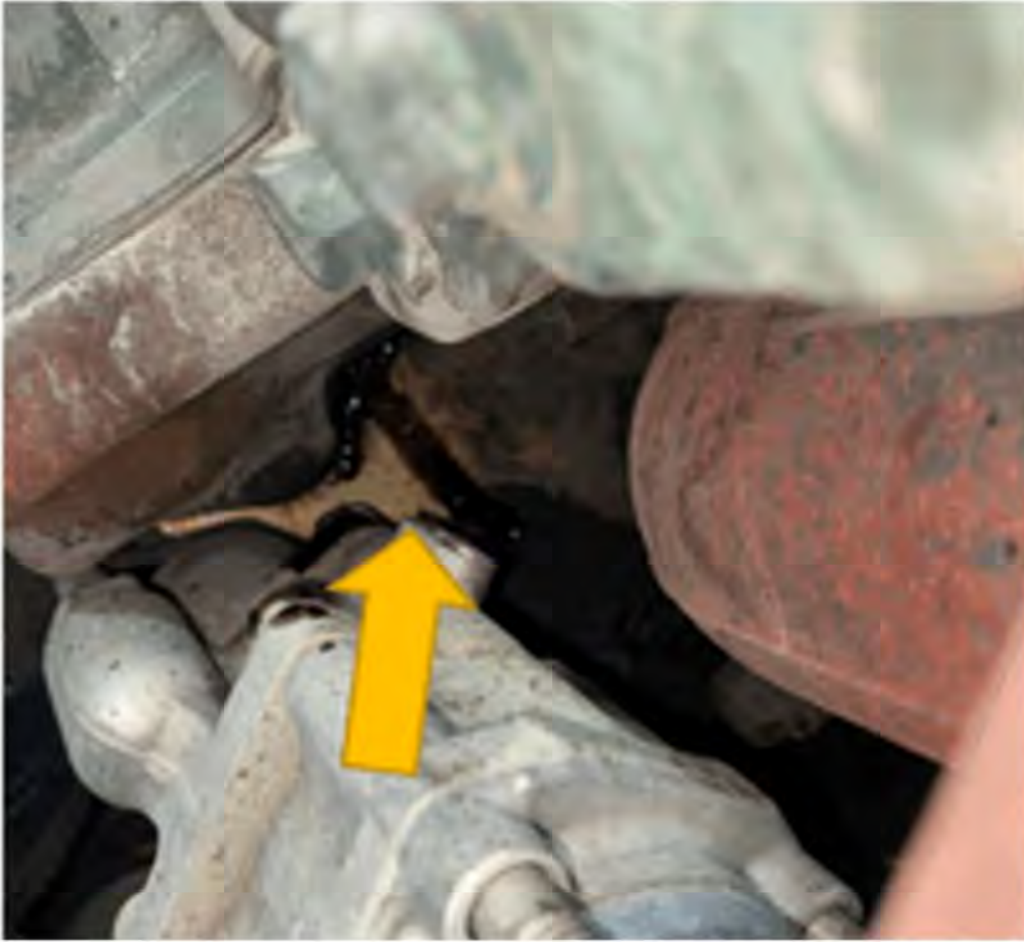
Colle

Reference images for an oil leak (valid warrantable repair)





Oil actively leaking

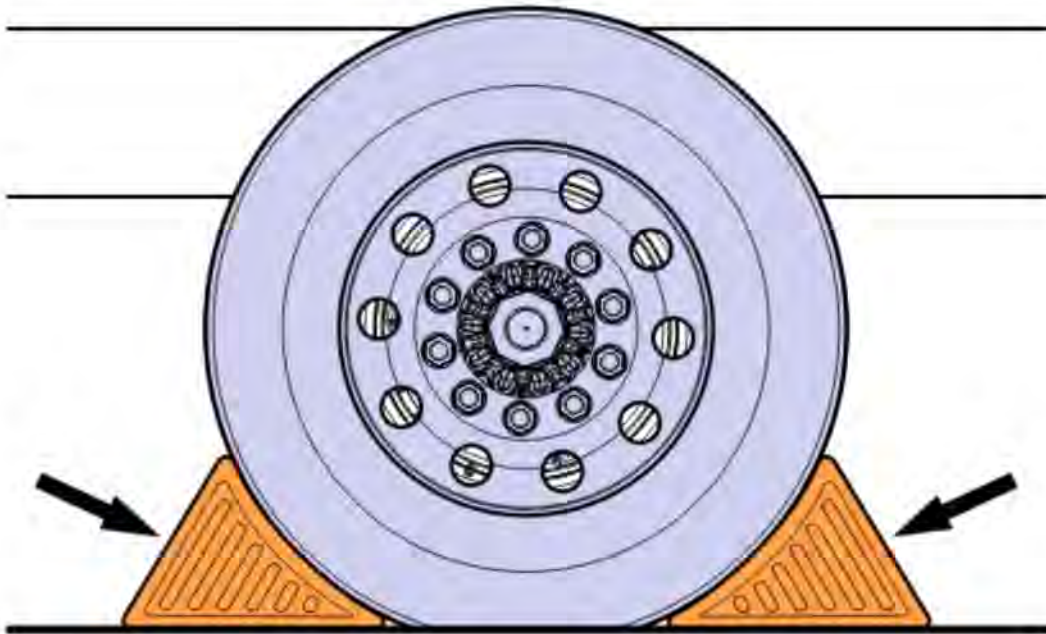


Oil actively running down joint

11L-13L Engine Oil Leak Diagnose

Note: When diagnosing a suspected timing gear plate leak, it is important to understand the difference between a weep and a leak.

- . Park the vehicle on a level surface.
- . Apply the parking brake.
- . Place the gear lever in neutral.
- . Install the wheel chocks.



- Unlatch and raise the hood.
- Visually inspect the Timing Gear Plate (TGP) for an active leak.
- If a **weep** is found (dark stain/dust and dirt) no further diagnostics is needed. Release truck back into service.
- If a **leak** is suspected, follow the steps below to properly diagnose and repair the leak.

When diagnosing a TGP leak

- A. Prior to cleaning the engine, document the suspected leak with pictures that clearly shows the accumulation of the oil leak as well as pictures of the suspected area.
- B. Thoroughly clean the suspected area.
- C. Load the engine (road test/regen) to get coolant and oil up to operating temperature.
- D. Verify oil is actively leaking.
- E. Document the oil leak with clear pictures of the active leak and the origin point.

Important Note

If further assistance is needed determining a leak request support using the normal process.
--

- Once a leak is determined and documented with pictures, follow Impact repair instruction in function group 2152 for replacement of the TGP.

Important Note

If an integrated seal plate is leaking or if damage is found to the seal, it must be replaced with a new one.

- Verify the leak is repaired and release truck back into service.

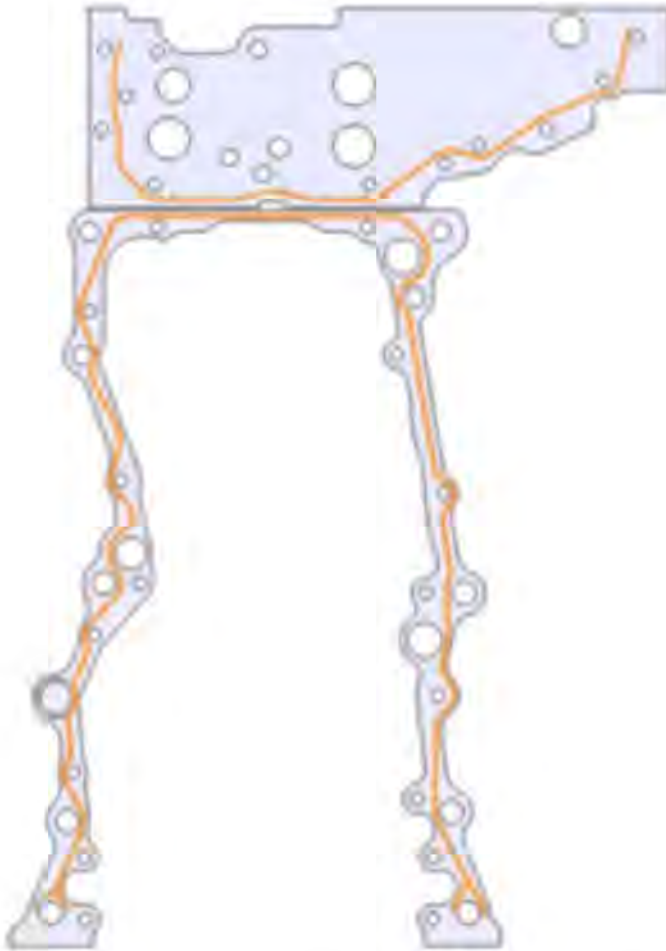
Repair Information

Timing gear plate kits are now available for the 13L VGT **24459407** and 13L TC engines **24459389** and includes a new seal conditioner **24533210**. This seal conditioner is used on the integrated TGP seal and is designed to extend the life of the TGP seal. Seal conditioner should be applied to the TGP seal anytime the seal is exposed (TGP replacement, flywheel housing removal, cylinder head removal and TC unit removal).

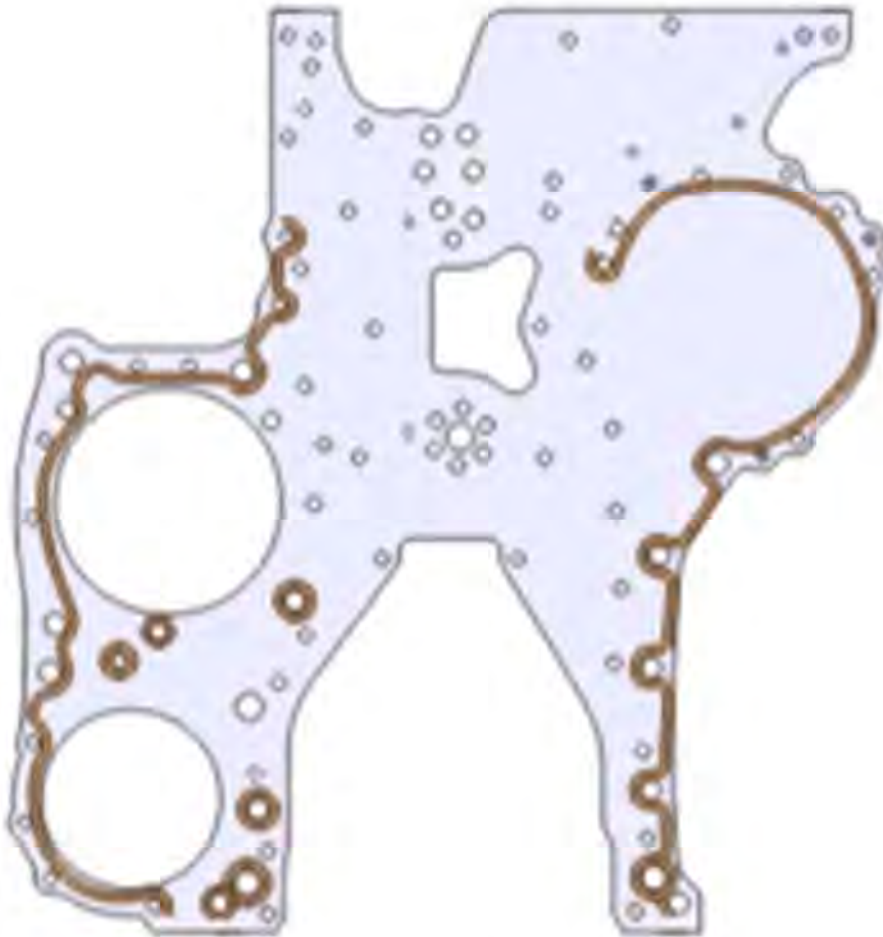
- When installing a TGP, the seal conditioner should be applied to the back of the block and cylinder head. Make sure not to apply seal conditioner above the top holes of the cylinder head and below the dowel holes at the bottom of the block. (Shown below). Any excess seal conditioner must be cleaned from the bolt holes and T-joints. This is to prevent seal conditioner from interfering with the securing hardware torque and the silicone sealant at the T-joints.

Copyright to this documentation belongs to the Volvo Group. No reproduction, copying, change, amendment or other similar disposal is entitled without prior written consent by the Volvo Group

The information contained herein is current at the time of its original distribution, but is subject to change. The reader is advised that printed copies are uncontrolled.



- When installing the flywheel housing, the seal conditioner should be applied to TGP seal not the flywheel housing. Make sure not to apply seal conditioner above the top holes of the sealing surface and below the dowel holes at the bottom of the TGP. (Shown below). Any excess seal conditioner must be cleaned from the bolt holes and T-joints. This is to prevent seal conditioner from interfering with the securing hardware torque and the silicone sealant at the T-joints.



When installing the TC unit, the seal conditioner should be applied to the TC unit not the TGP. (Shown below). Any excess seal conditioner must be cleaned from the bolt holes. This is to prevent seal conditioner from interfering with the securing hardware torque.





Issued by


Technical Service

21527-3 Timing Gear Plate, Replacement

Transmission and Clutch Removed

 Illustrations may differ slightly from the actual vehicle being serviced. However, key components addressed in this information are represented as accurately as possible.

 Colors used in illustrations are for highlighting purposes only and do not correspond to the actual colors of the vehicle.

 All threaded fasteners that do not have a tightening torque specification in the information are tightened to a standard torque. Standard torques are available in the following specification. [▶ Standard Tightening Torques](#)

 **CAUTION**

Risk of material damage.
Any damage or deformation to the EGR (Exhaust Gas Recirculation) pipes can affect their function and lifetime. The corrugated steel bellows are sensitive to dents.

- ▶ Use caution when working on or near the EGR pipes.
- ▶ Do not try to force the pipe into place by bending, twisting, or stretching the bellows.

 **WARNING**

Risk of burn injuries.
Heated components and mechanical parts can cause burns.

- ▶ Exercise caution when working with heated components. Always use the appropriate protective equipment.

 **WARNING**

Risk of burn injuries.
The coolant may be hot.

- ▶ The cooling system is under pressure and can reach the temperature sufficient to cause burns. Allow the coolant temperature to reach the safe level before starting the work.
- ▶ Remove the coolant tank cap carefully. Use appropriate protective equipment.

 **CAUTION**

Risk of material damage.
Using the wrong type of oil filter could result in damage to bearings, crankshaft, and connected parts as a result of unfiltered oil entering the lubrication system.

- ▶ Only use oil filters approved by the manufacturer.

 **CAUTION**

Service Information Advisory.

If you are not properly trained and certified in this procedure, ask your supervisor for training before you perform it.

▶ You must read and understand the precautions and guidelines in Service Information, Function Group 2, "General Safety Practices, Engine" before performing this procedure.

Special tools

85112740	88800031	88800502	88800570	88800619
88840317	88870002	88870012	88870039	9990166
9990192	9996049	9996400	9998267	9999683
9999696				

1 Unlatch and raise the hood.

2 Remove the lower right splash shield.


3 Remove the lower left splash shield.

4 Perform this procedure when the condition below is met.

Conditions

- Certain vehicle applications may require the engine cover to be removed

▶ Remove the engine cover if needed.



Service hint
To gain better access to the engine.

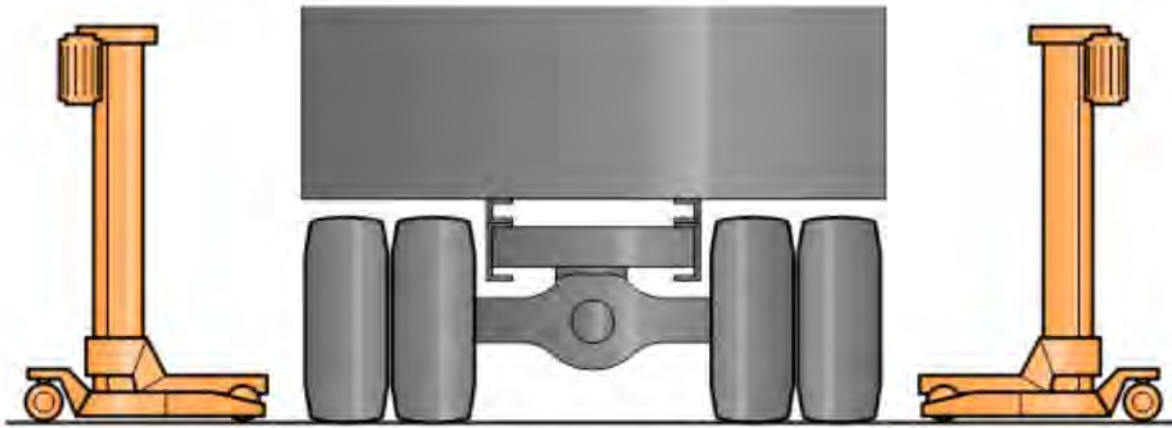
5 Perform this procedure when the condition below is met.

Conditions

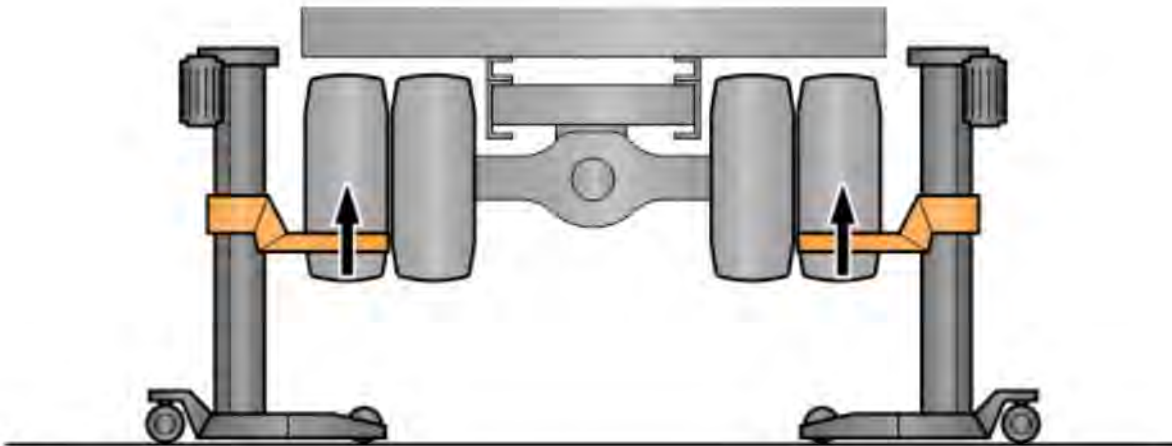
- If the vehicle is equipped with a removable bumper end cap

▶ Remove the end cap.

6 Position the column lifts.



7 Raise the vehicle.



8 Perform this procedure when the condition below is met.

Conditions

- If the coolant is not drained, then drain the coolant
- ▶ Drain the cooling system using either a coolant extractor or a drain hose and pan.

Required material

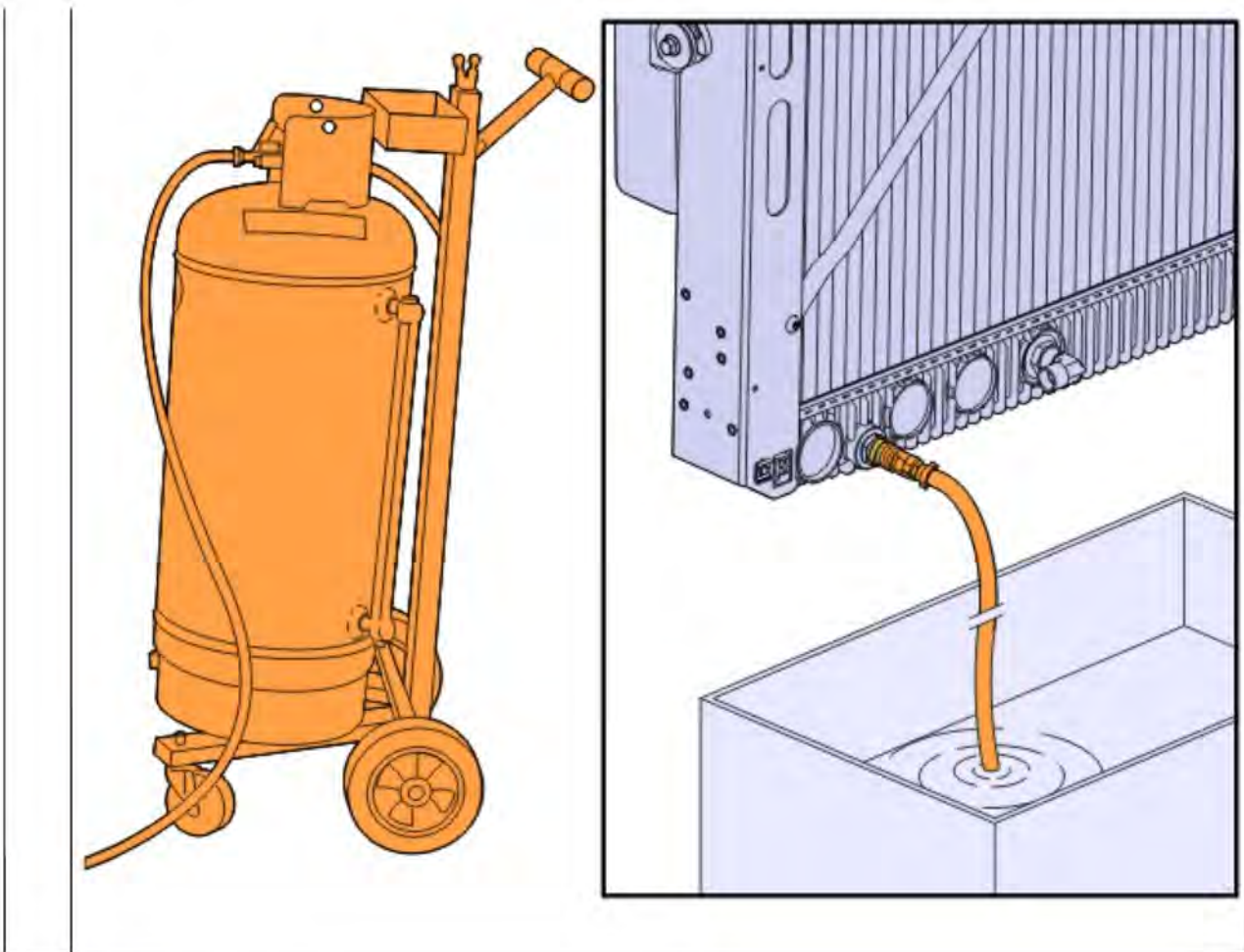
COOLANT EXTRACTOR/INJECTOR [85112740](#)

DRAIN_HOSE [9996049](#)



Note

Take the collected coolant to a recycling facility as per local safety regulations.

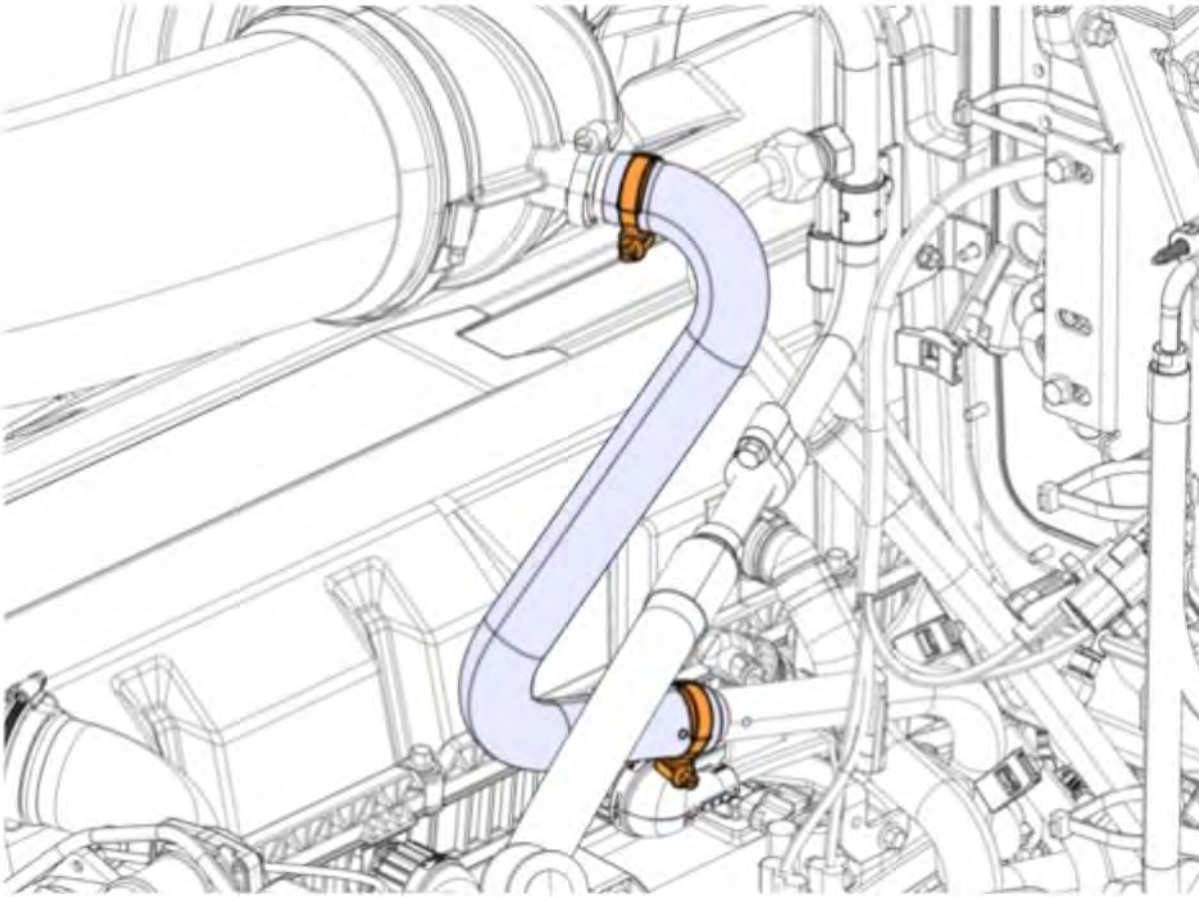


9 Loosen the clamps.

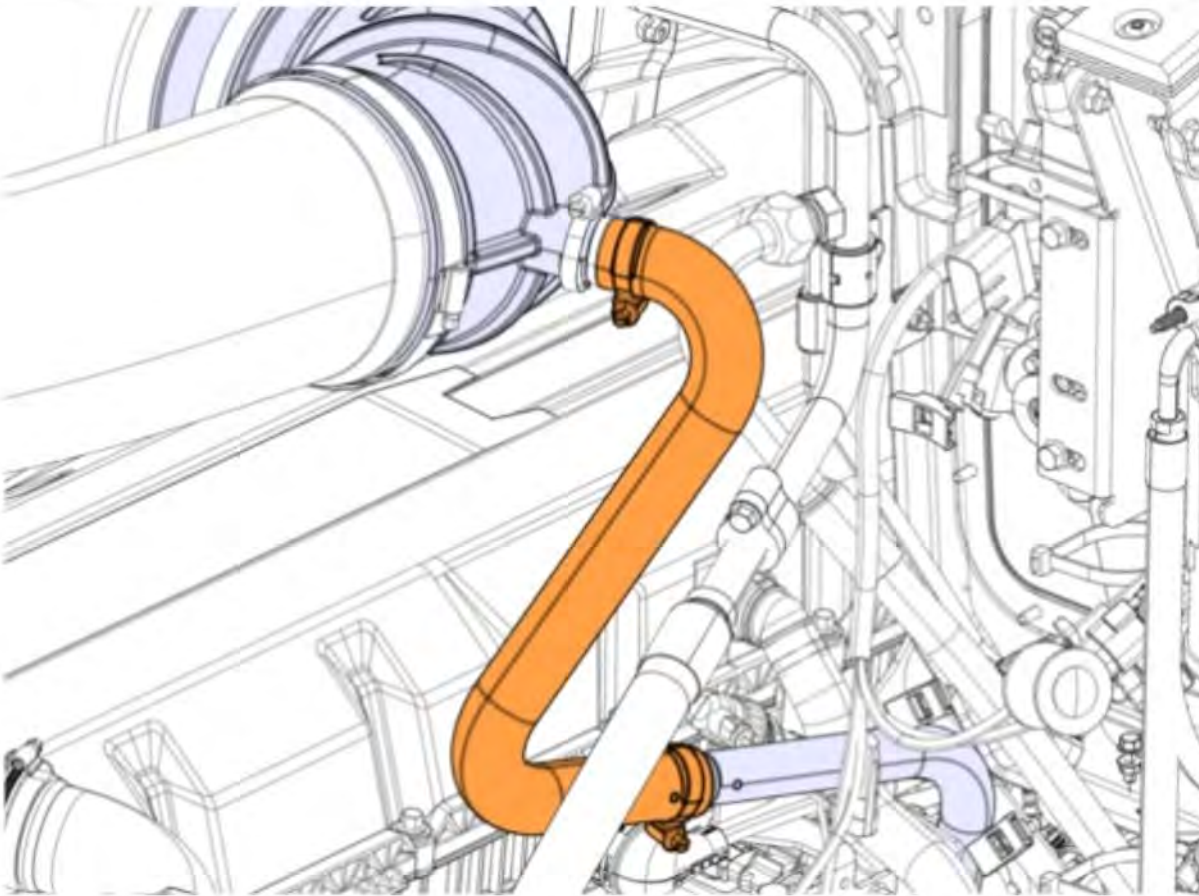


Note

Note the orientations and the positions.



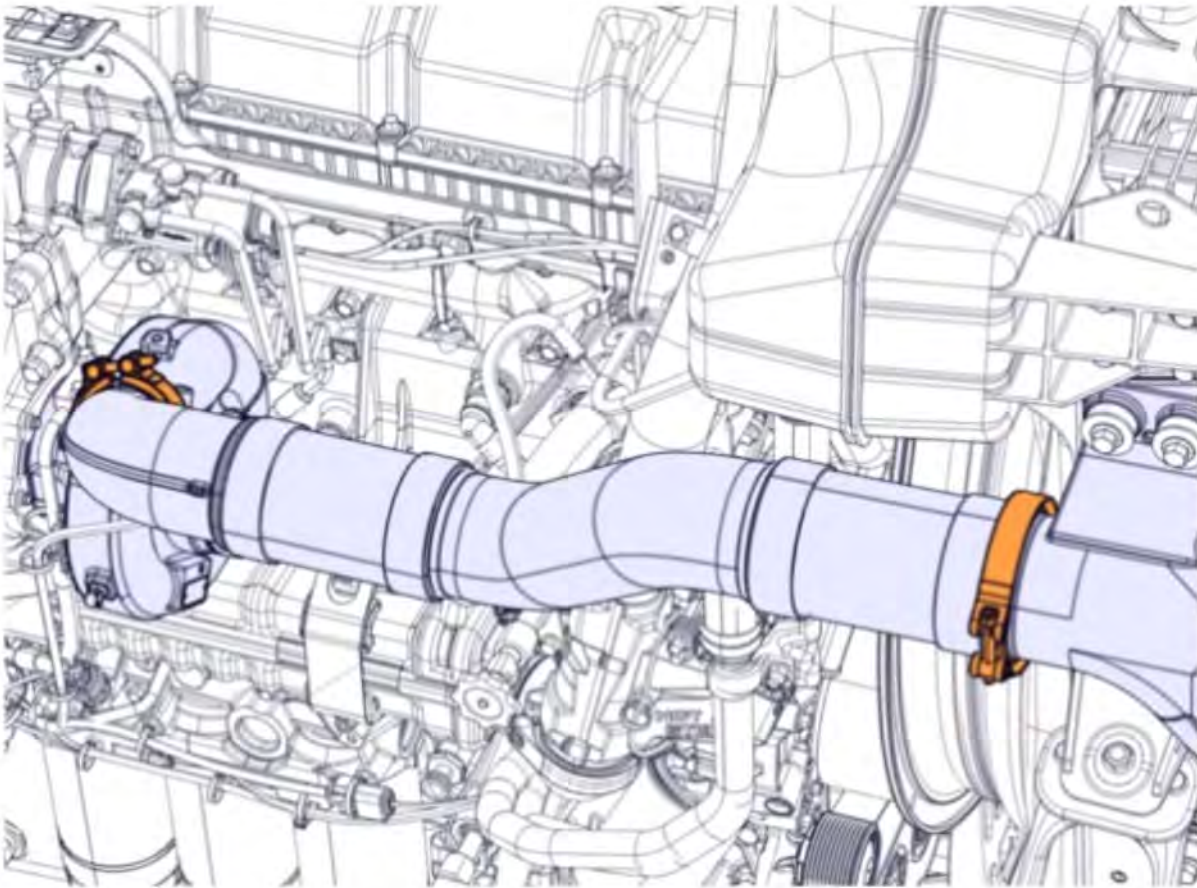
10 Remove the hose.



11 Remove the V-clamps.

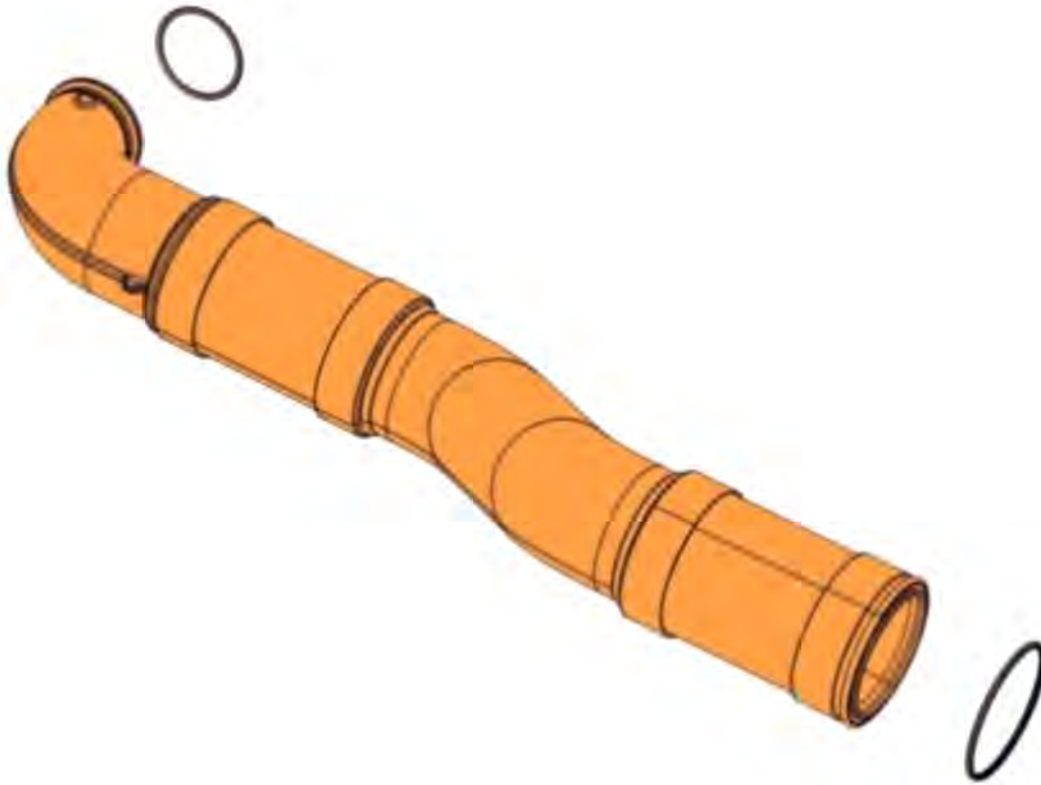
**Note**

Note the position.



12	Remove the charge air pipe.
----	-----------------------------

13	Remove the seals.
----	-------------------

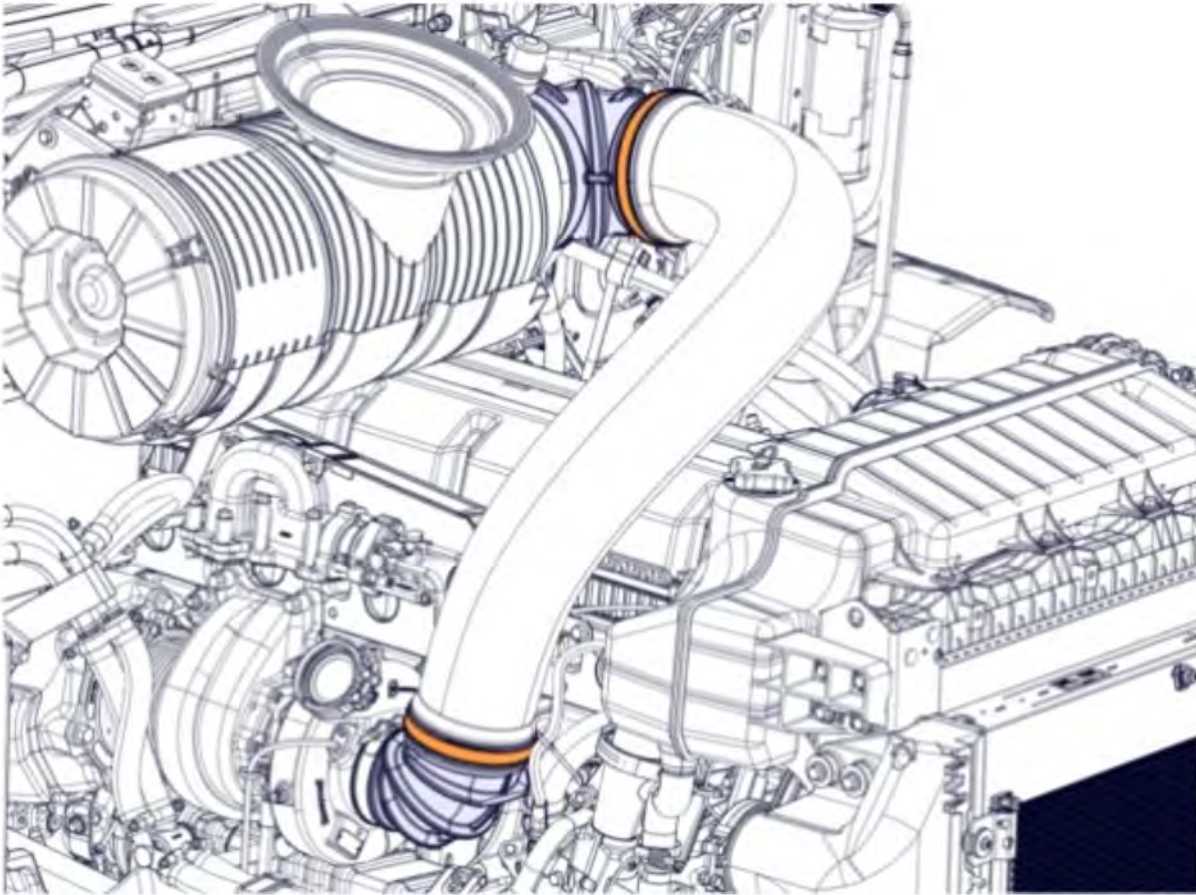


14 Loosen the clamps.

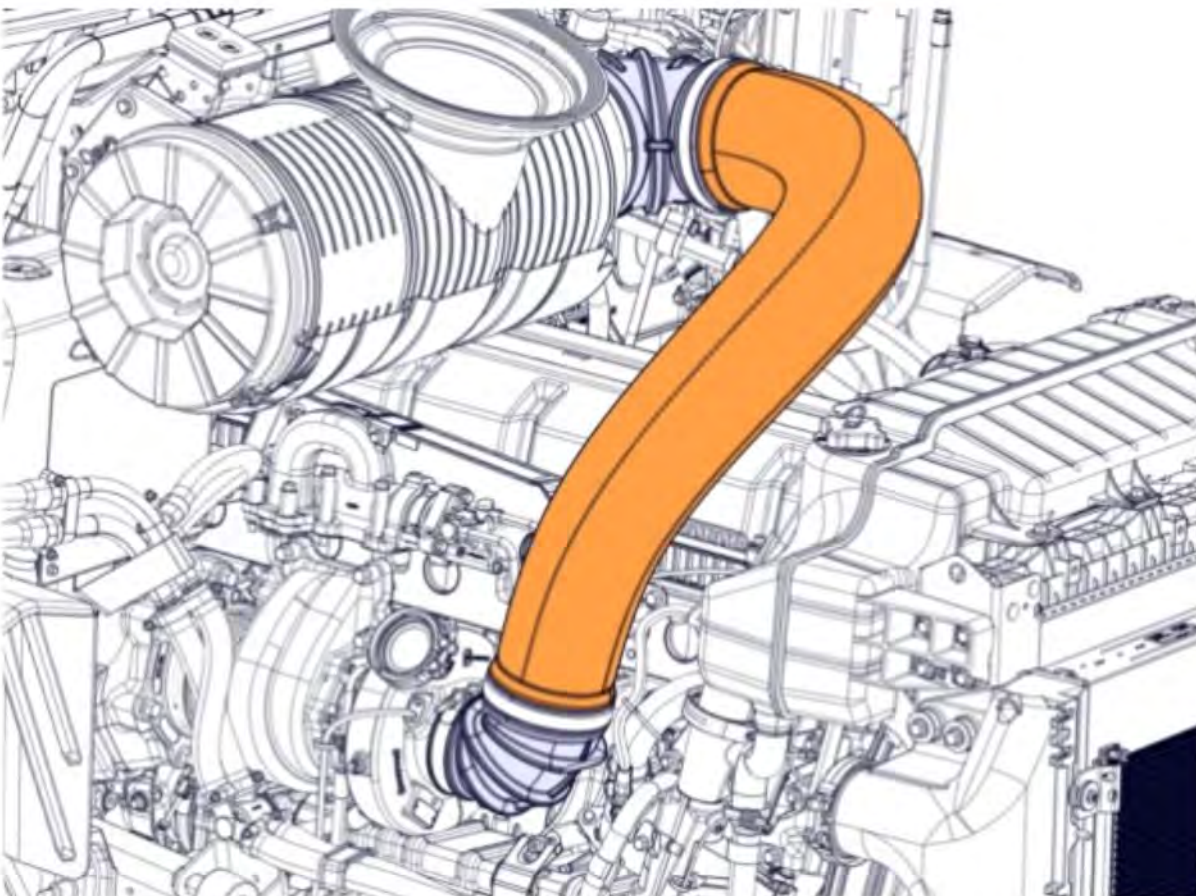


Note

Note the orientations and the positions.



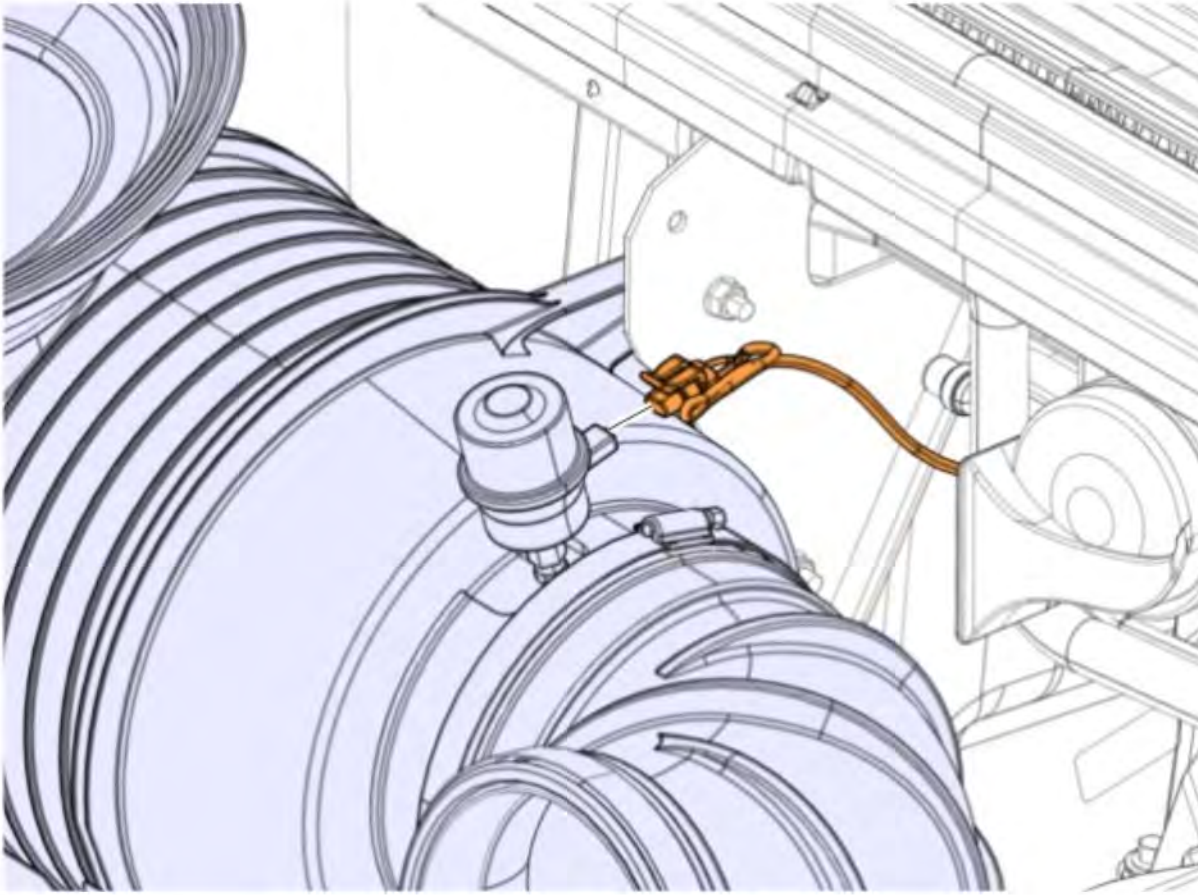
15 Remove the duct.



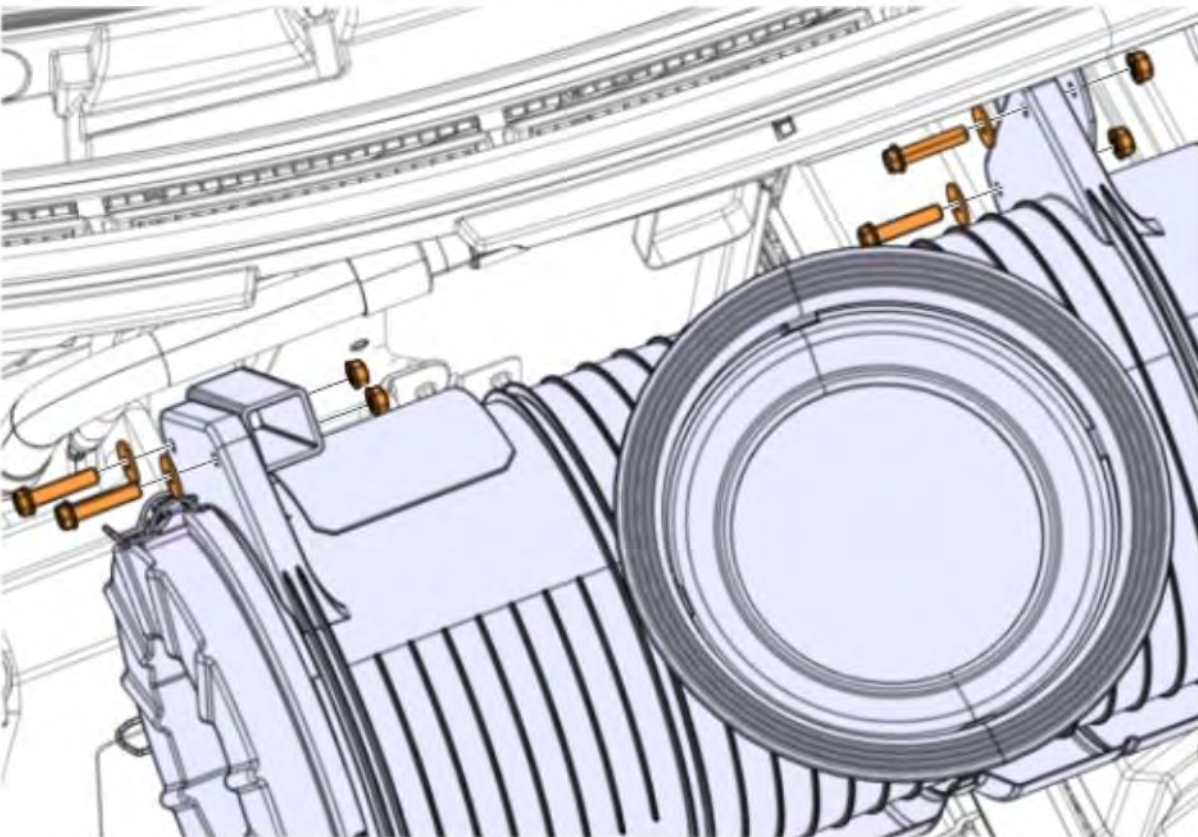
16 Disconnect the connector.

Copyright to this documentation belongs to the Volvo Group. No reproduction, copying, change, amendment or other similar disposal is entitled without prior written consent by the Volvo Group

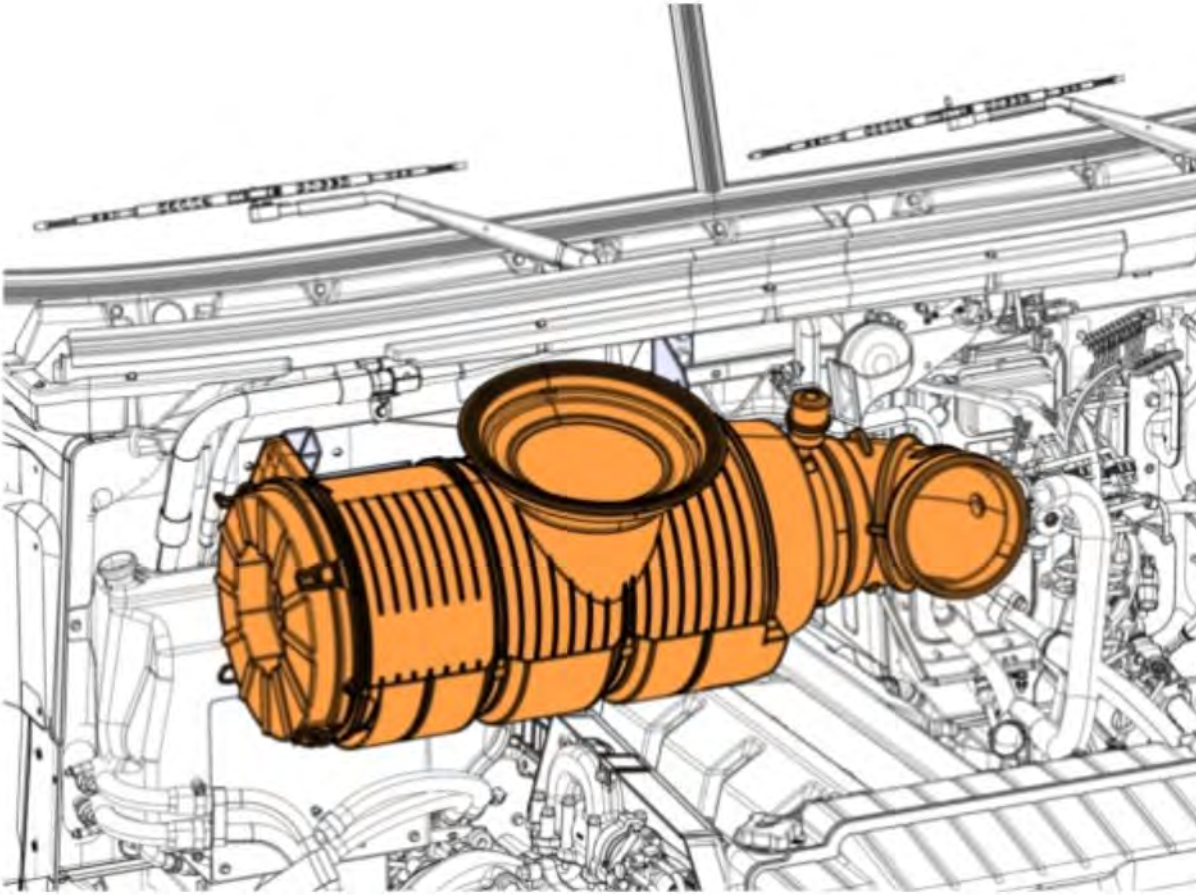
The information contained herein is current at the time of its original distribution, but is subject to change. The reader is advised that printed copies are uncontrolled.



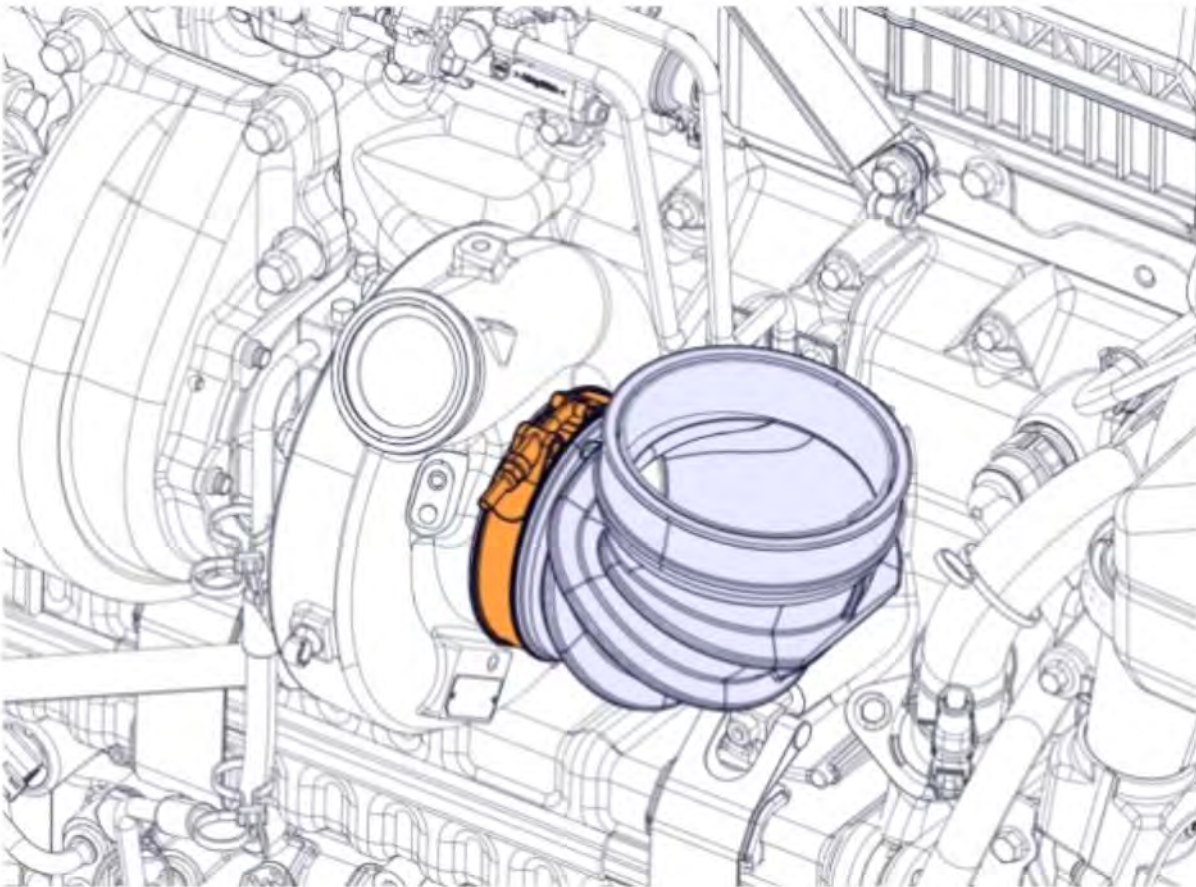
17 Remove the screws, nuts and the washers.



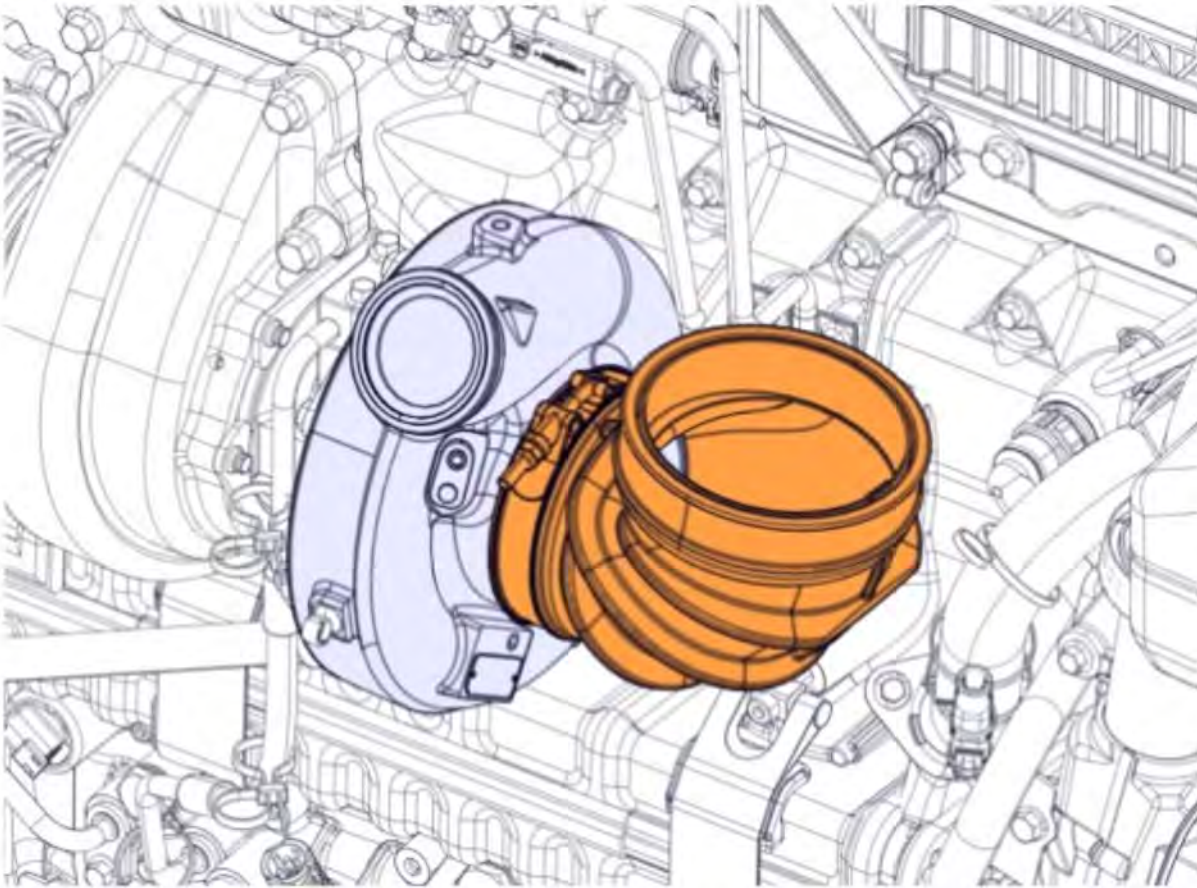
18 Remove the housing.



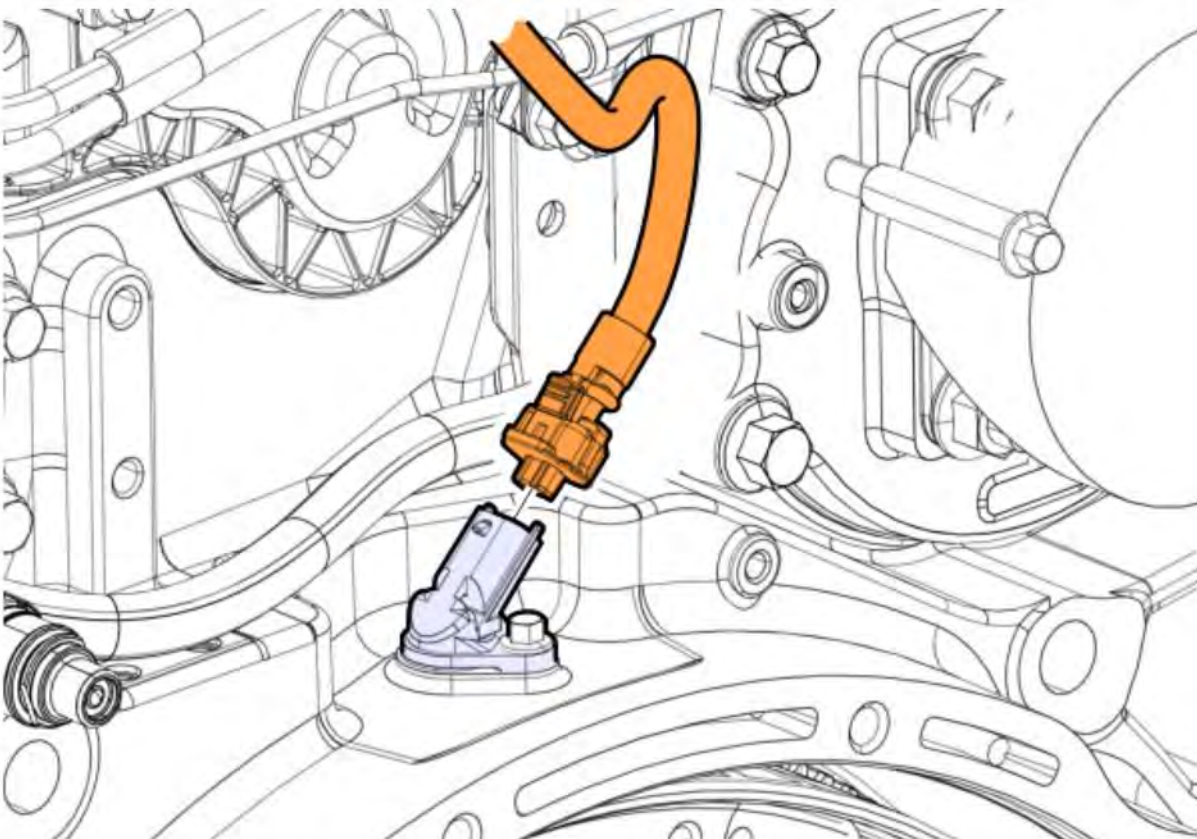
19 Loosen the clamp.



20 Remove the duct.



21	Disconnect the connector.
----	---------------------------



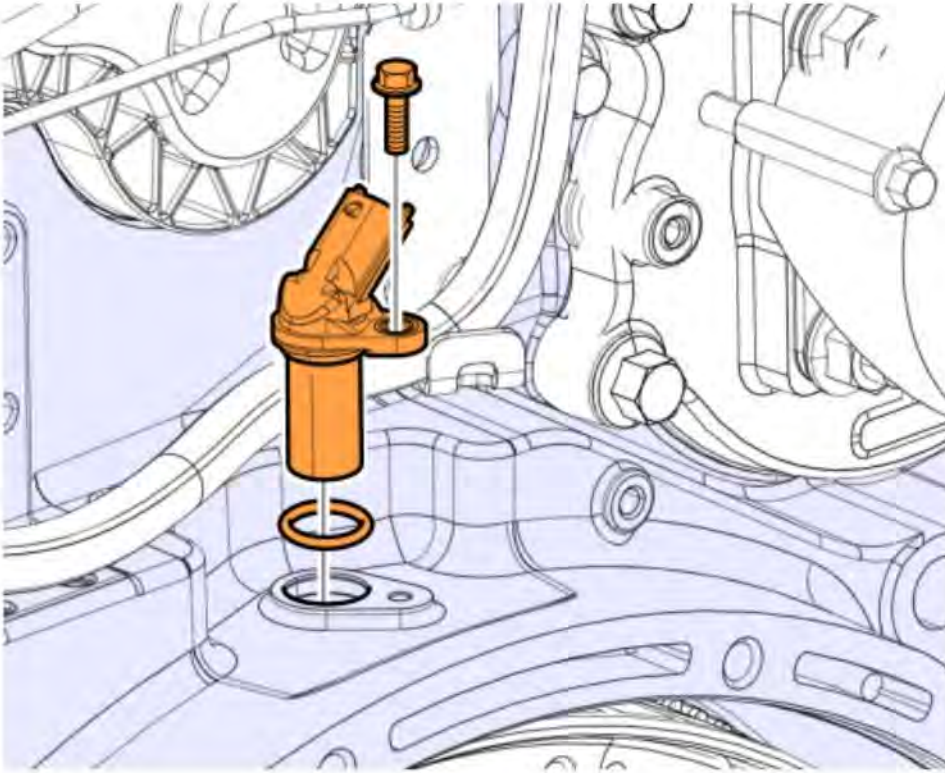
22	Remove the screw.
----	-------------------

23	Remove the sensor.
----	--------------------

Copyright to this documentation belongs to the Volvo Group. No reproduction, copying, change, amendment or other similar disposal is entitled without prior written consent by the Volvo Group

The information contained herein is current at the time of its original distribution, but is subject to change. The reader is advised that printed copies are uncontrolled.

24	Remove the O-ring.
----	--------------------

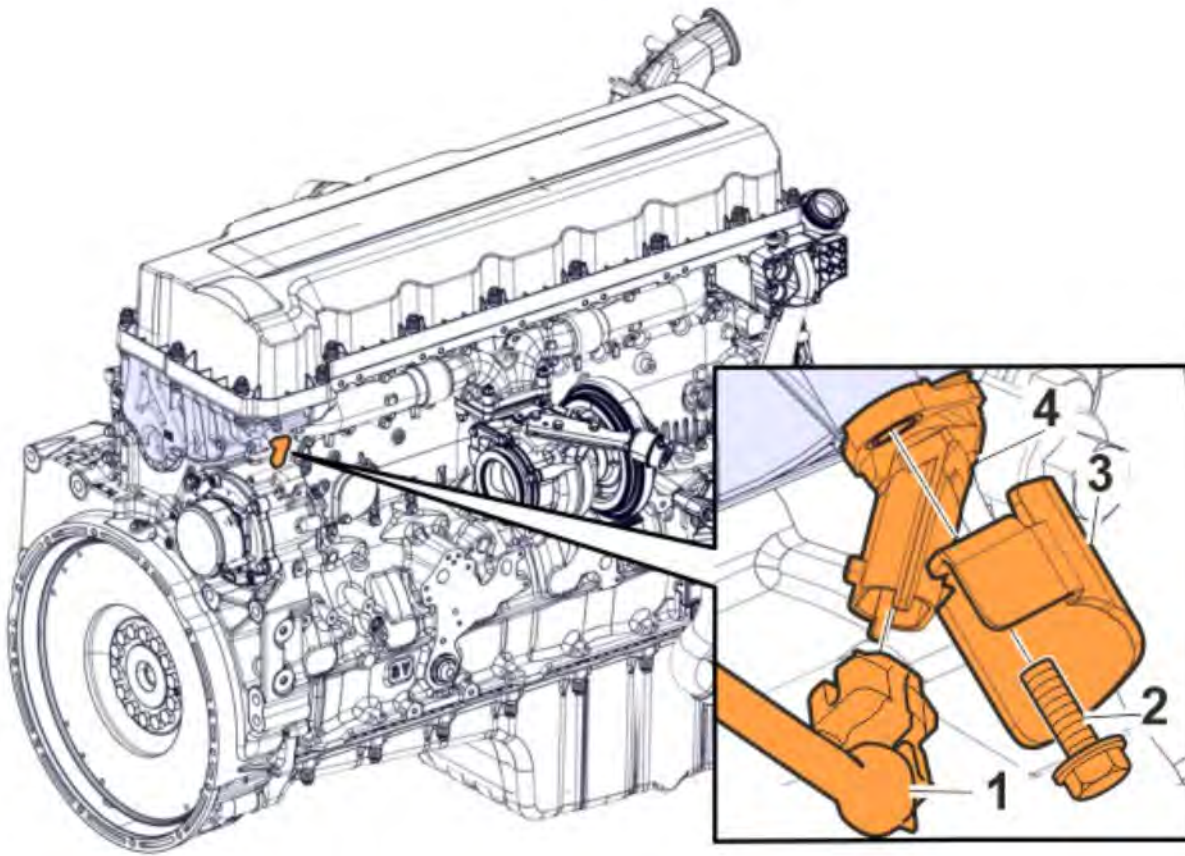


25	Disconnect the connector (1).
----	-------------------------------

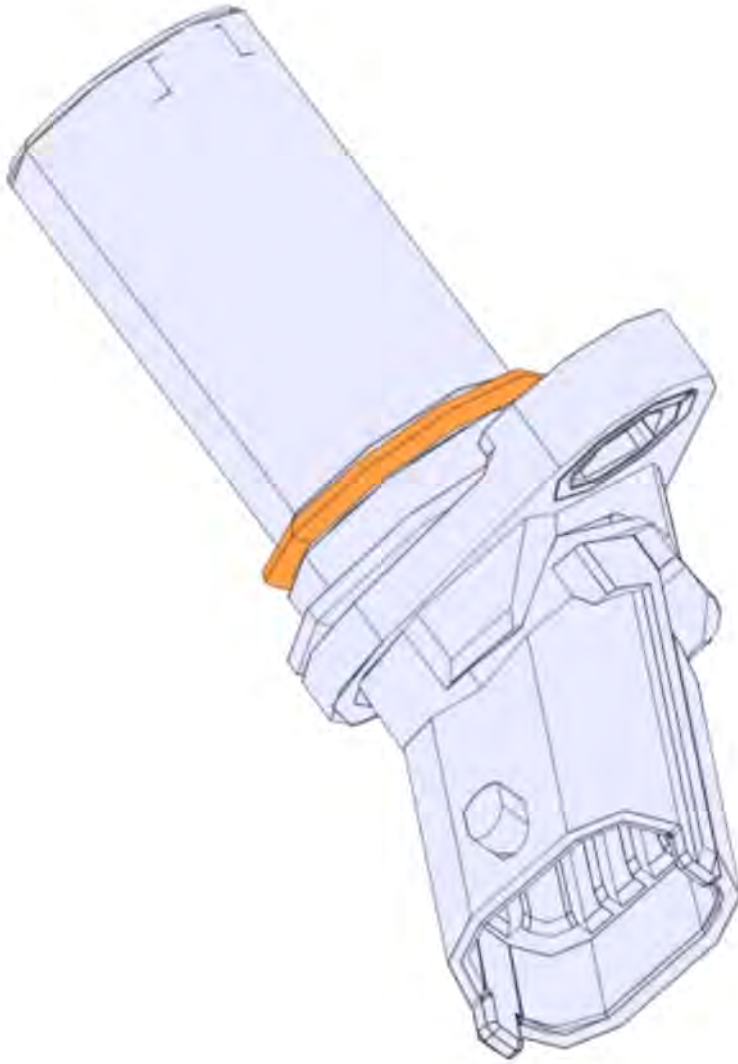
26	Remove the screw (2).
----	-----------------------

27	Remove the heat shield (3).
----	-----------------------------

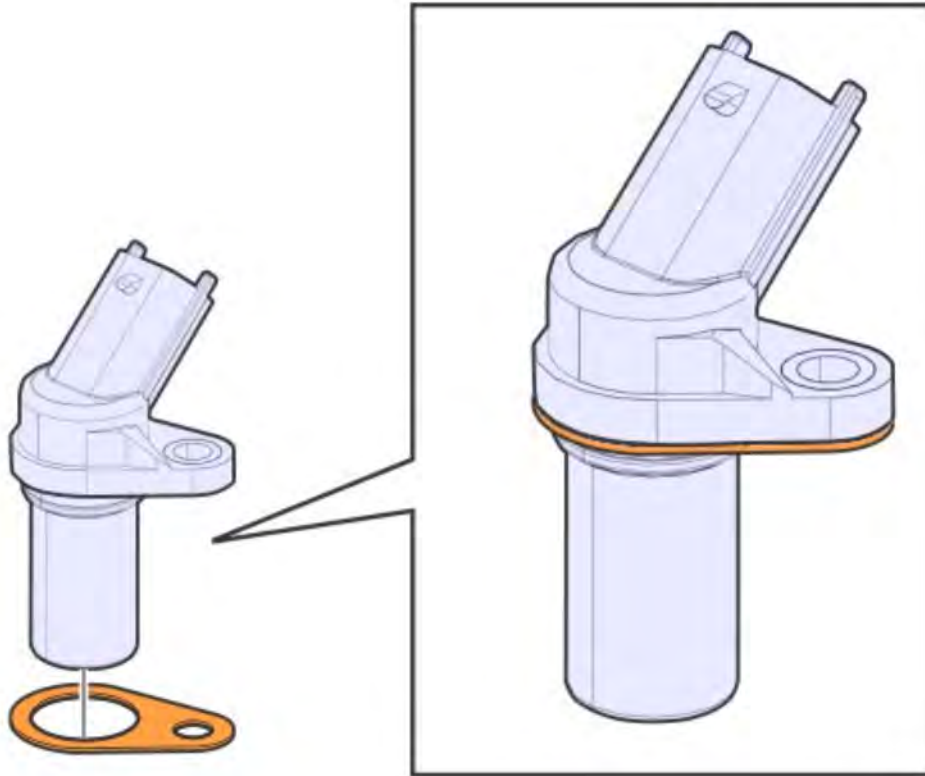
28	Remove the sensor (4).
----	------------------------



29	Remove the O-ring.
----	--------------------



30	Remove the shims as needed.
----	-----------------------------

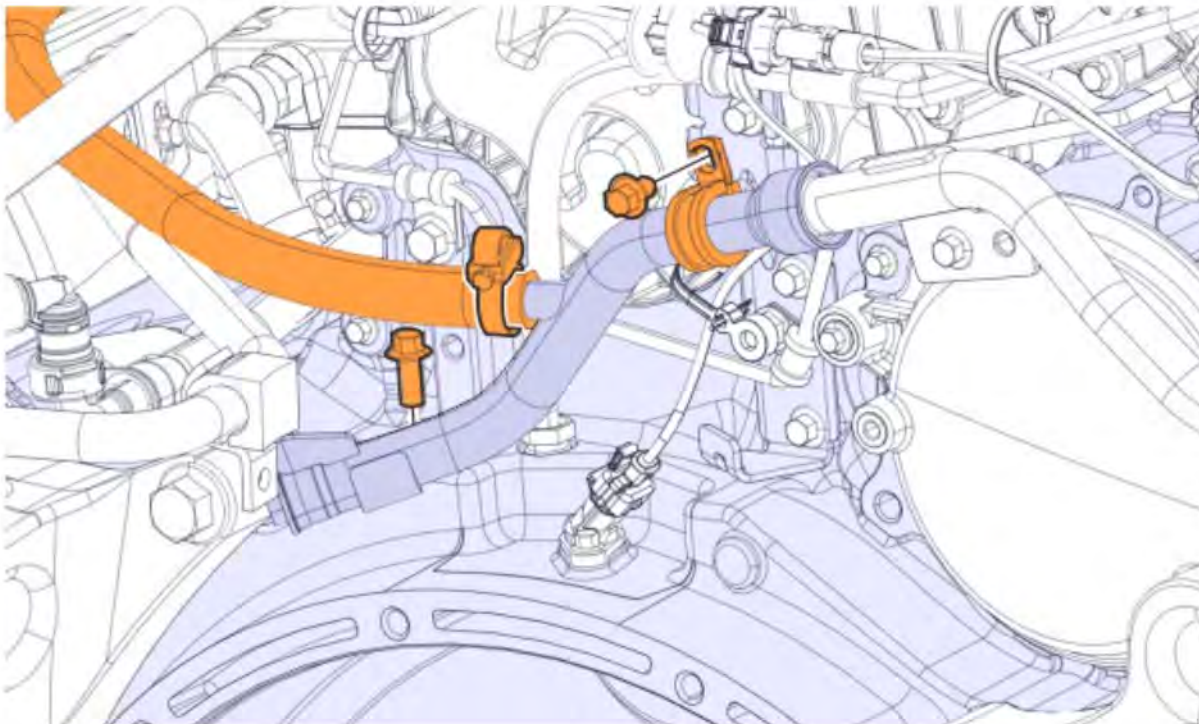


31	Loosen the clamp.
-----------	-------------------

32	Remove the hose.
-----------	------------------

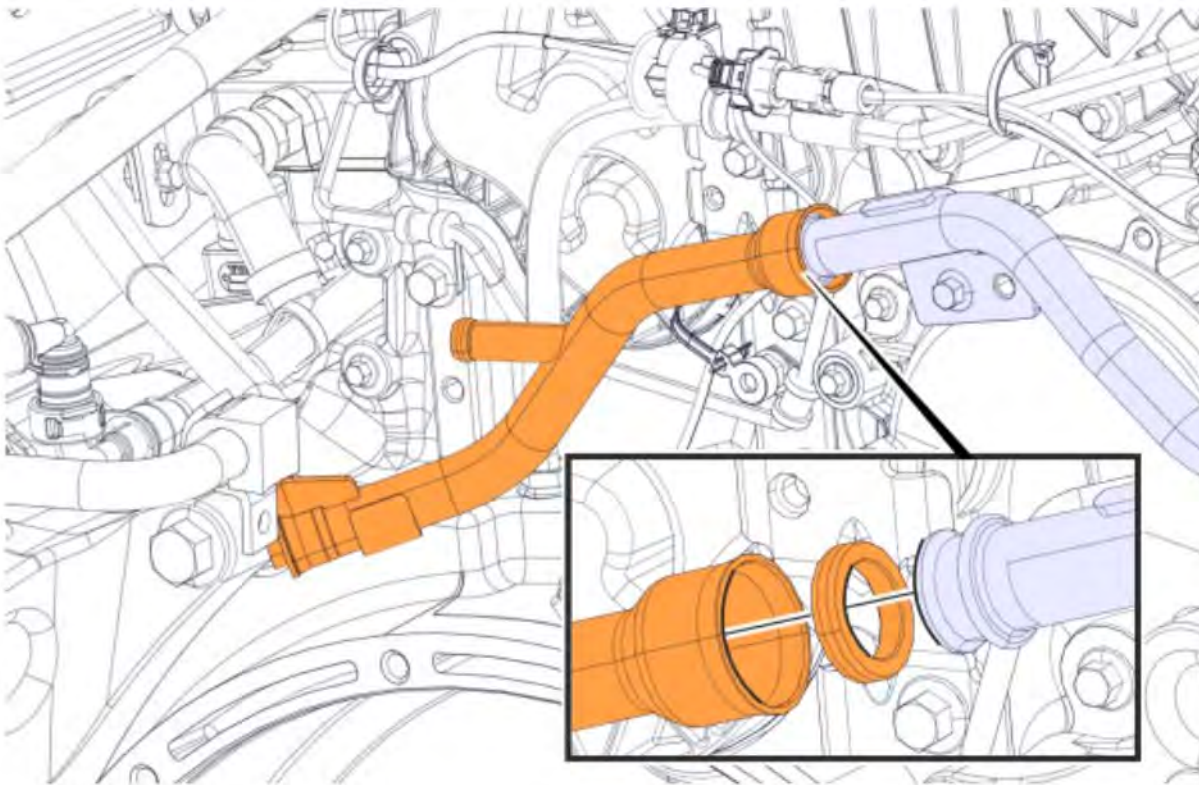
33	Remove the screws.
-----------	--------------------

34	Remove the clamp.
-----------	-------------------

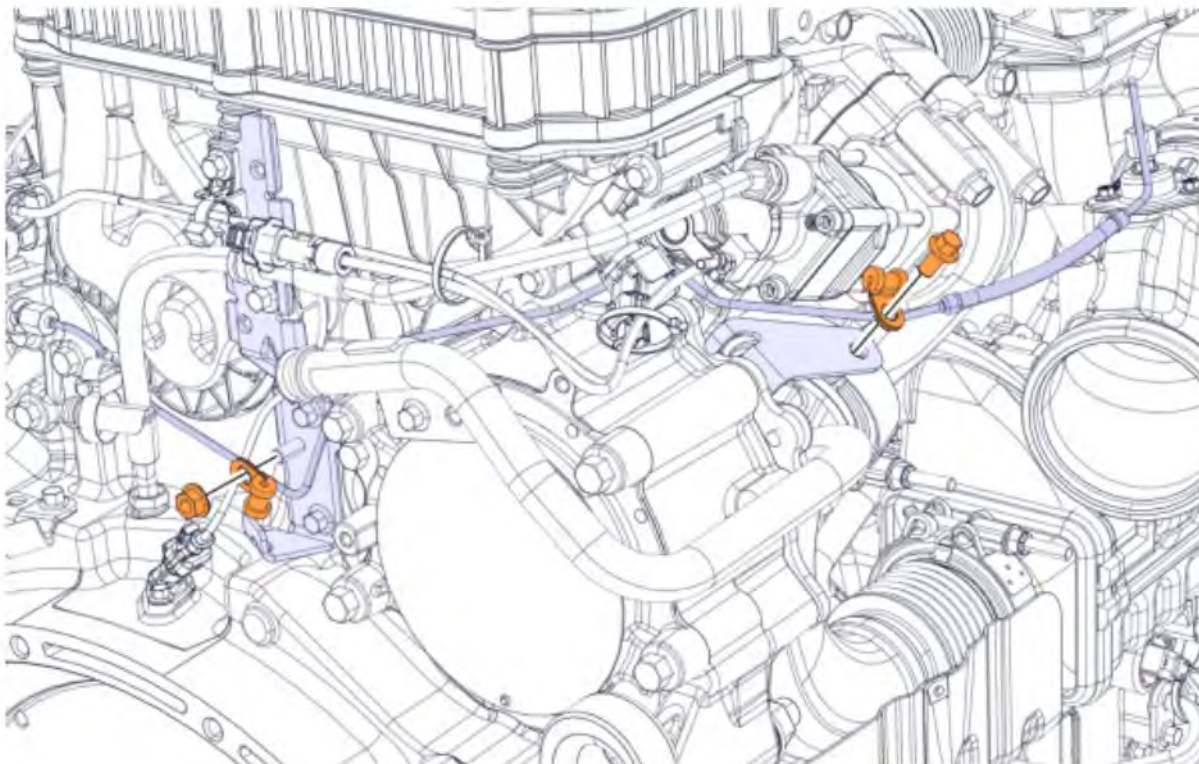


35	Remove the pipe.
-----------	------------------

36 Remove the seal.

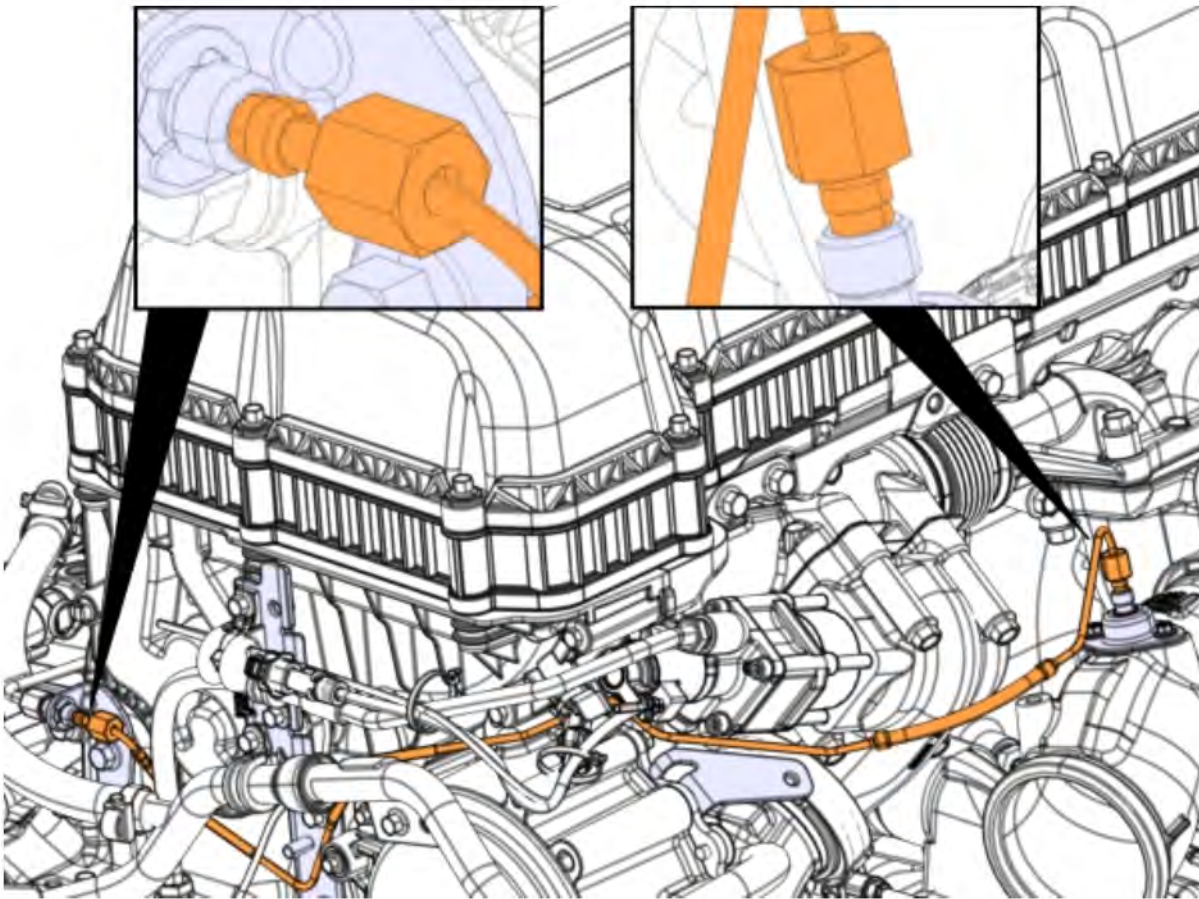


37 Remove the screws and clamps.



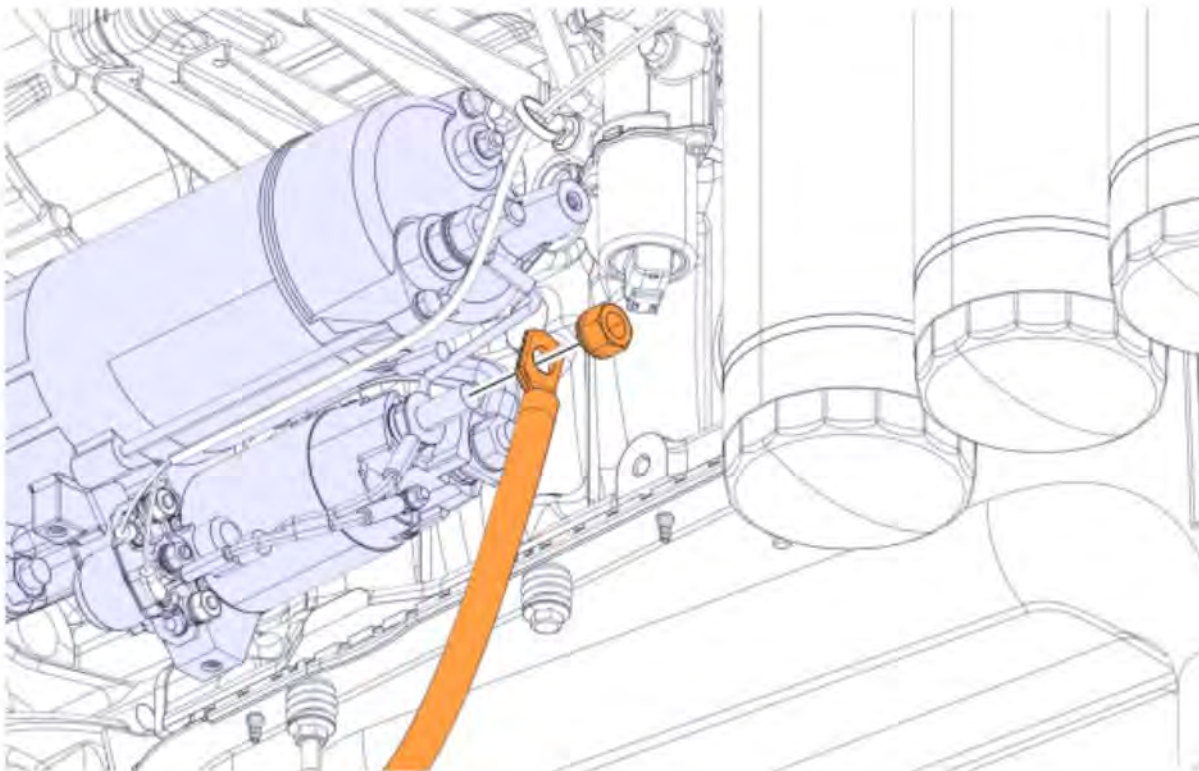
38 Loosen the nuts.

39 Remove the pipe.



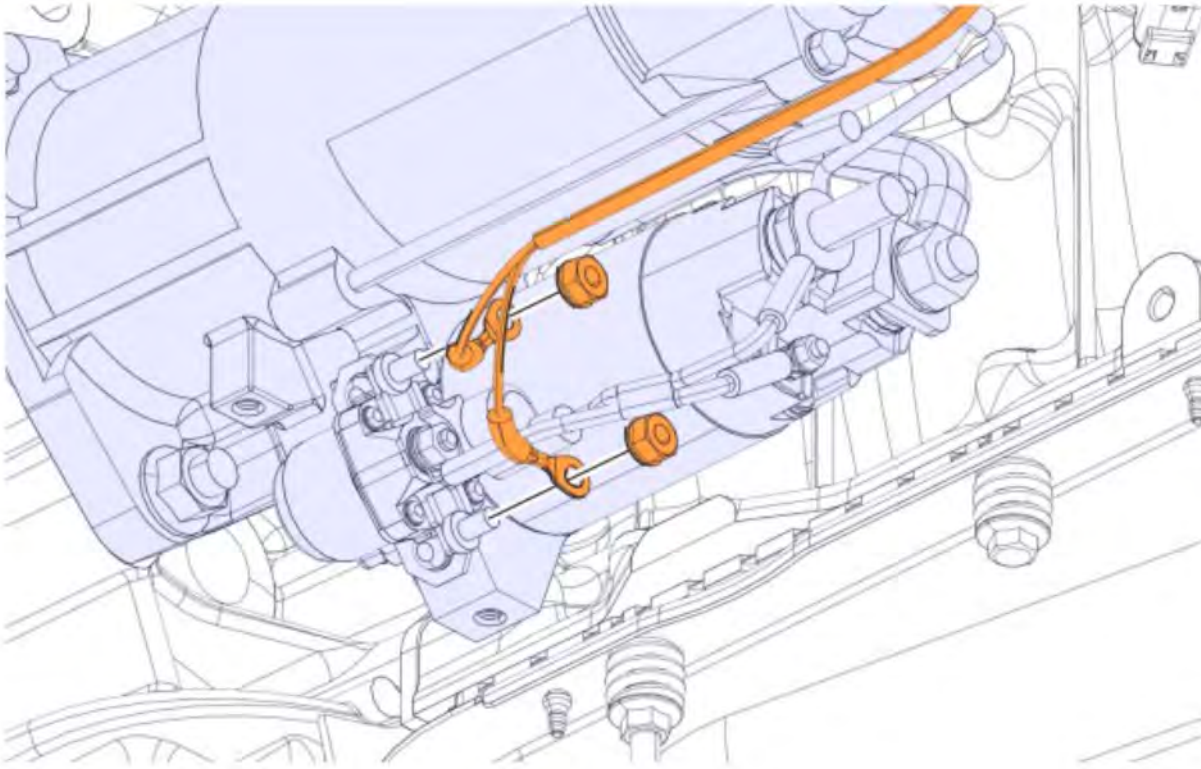
40	Remove the nut.
----	-----------------

41	Remove the cable terminal.
----	----------------------------



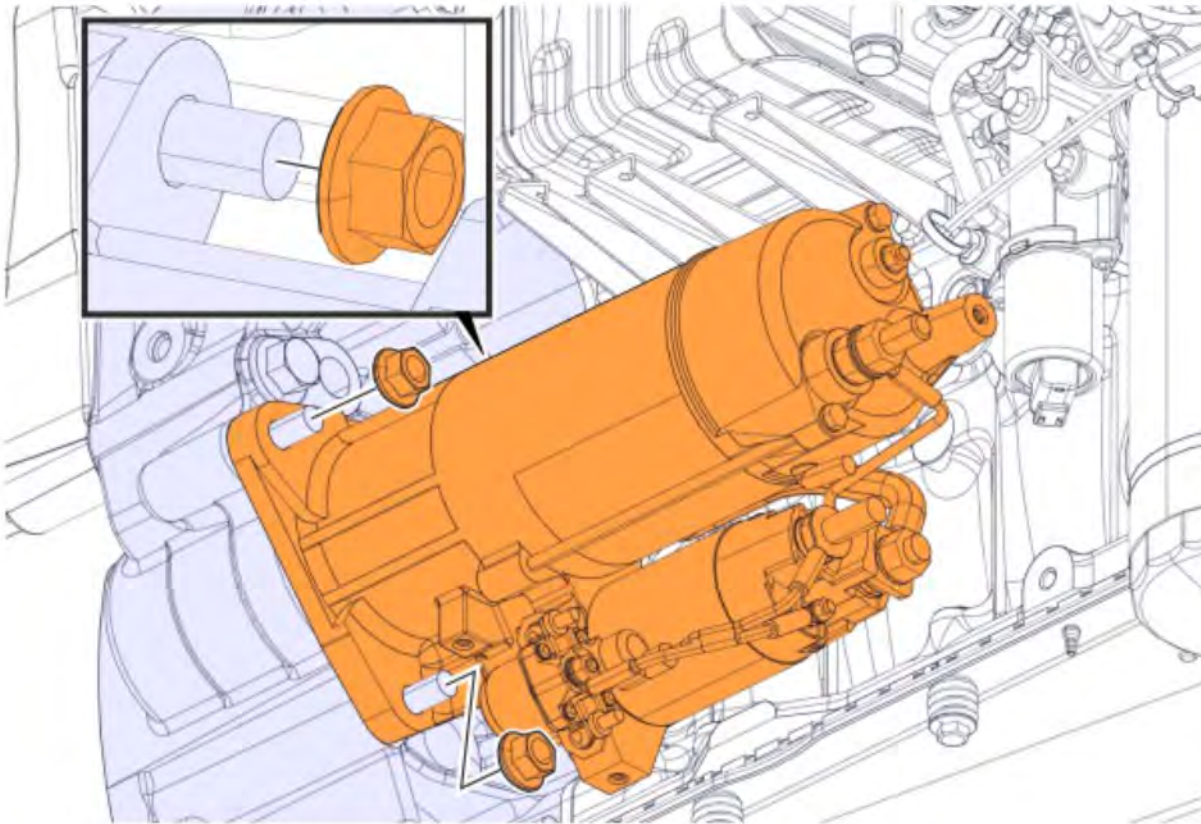
42	Remove the nuts.
----	------------------

43	Remove the cable terminals.
----	-----------------------------



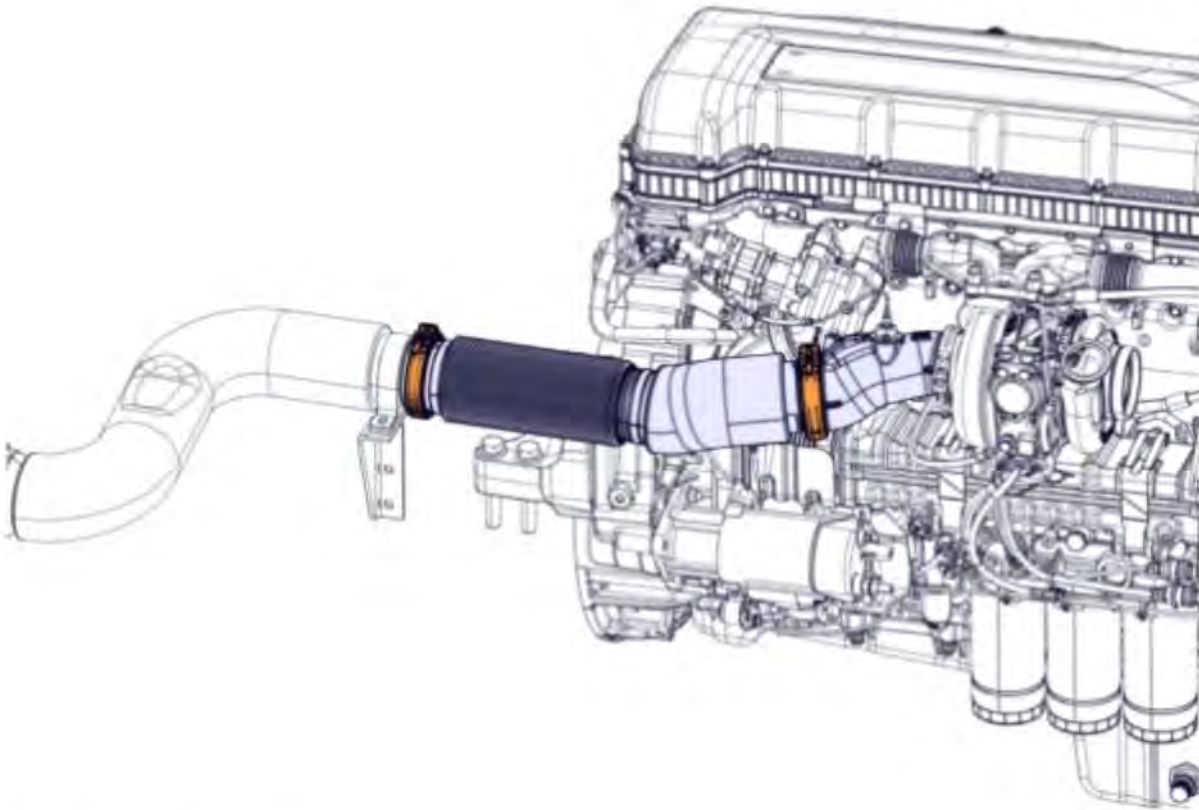
44 Remove the nuts.

45 Remove the starter motor.



46 Remove the clamps.

i **Note**
 Note the orientations and the positions.

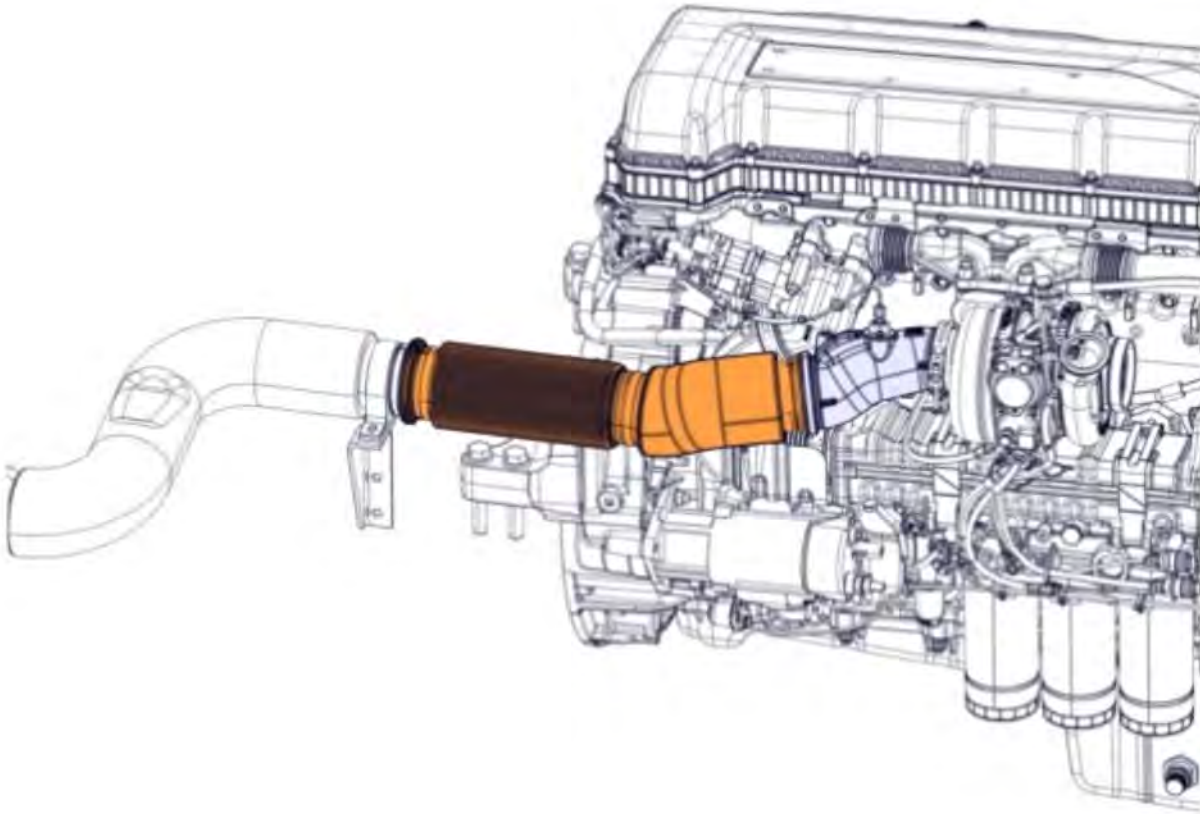


47 Remove the pipe.



Note

Note the orientation and the position.



48	Remove the gaskets.
----	---------------------



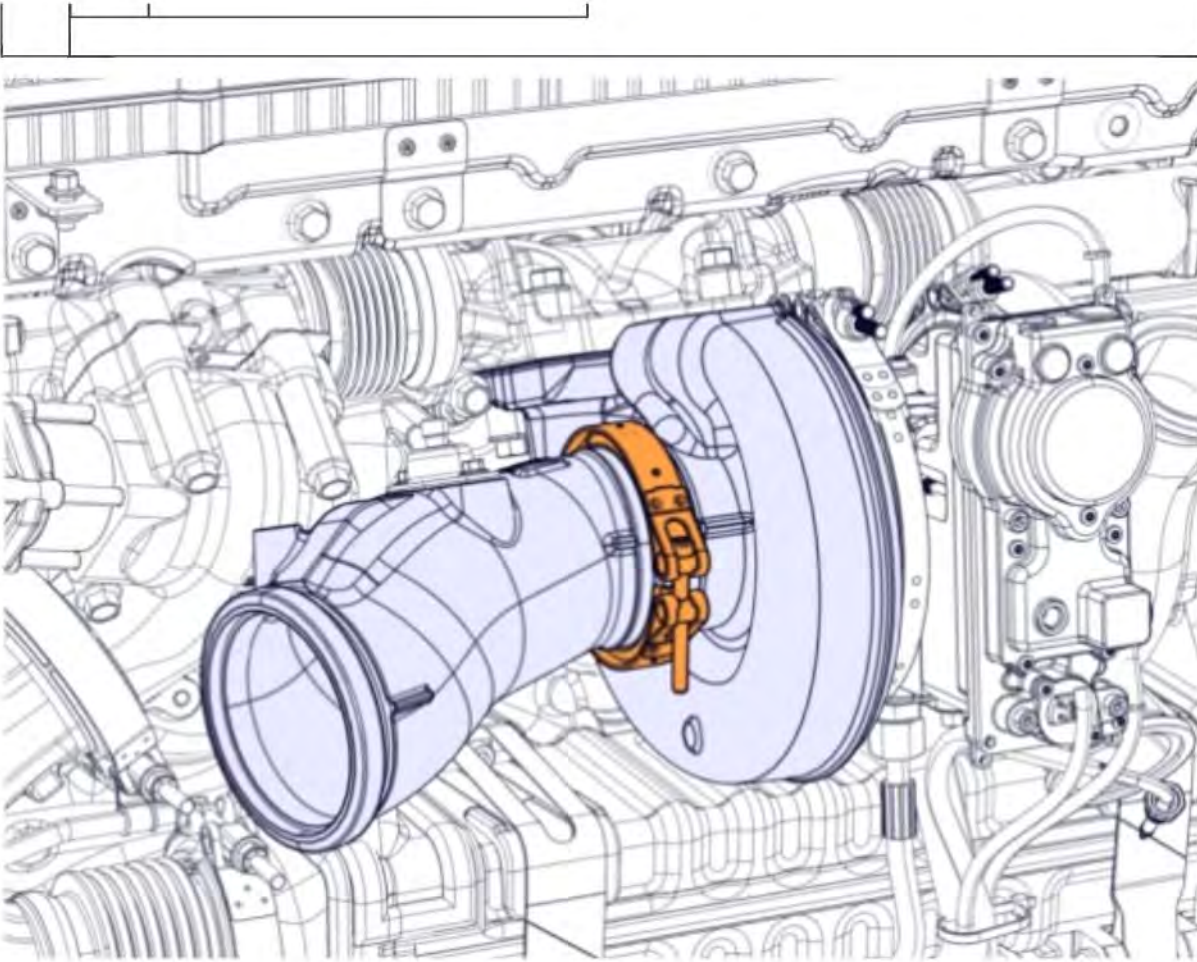
49	Remove the clamp.
----	-------------------

**Note**

Note the orientation and the position.

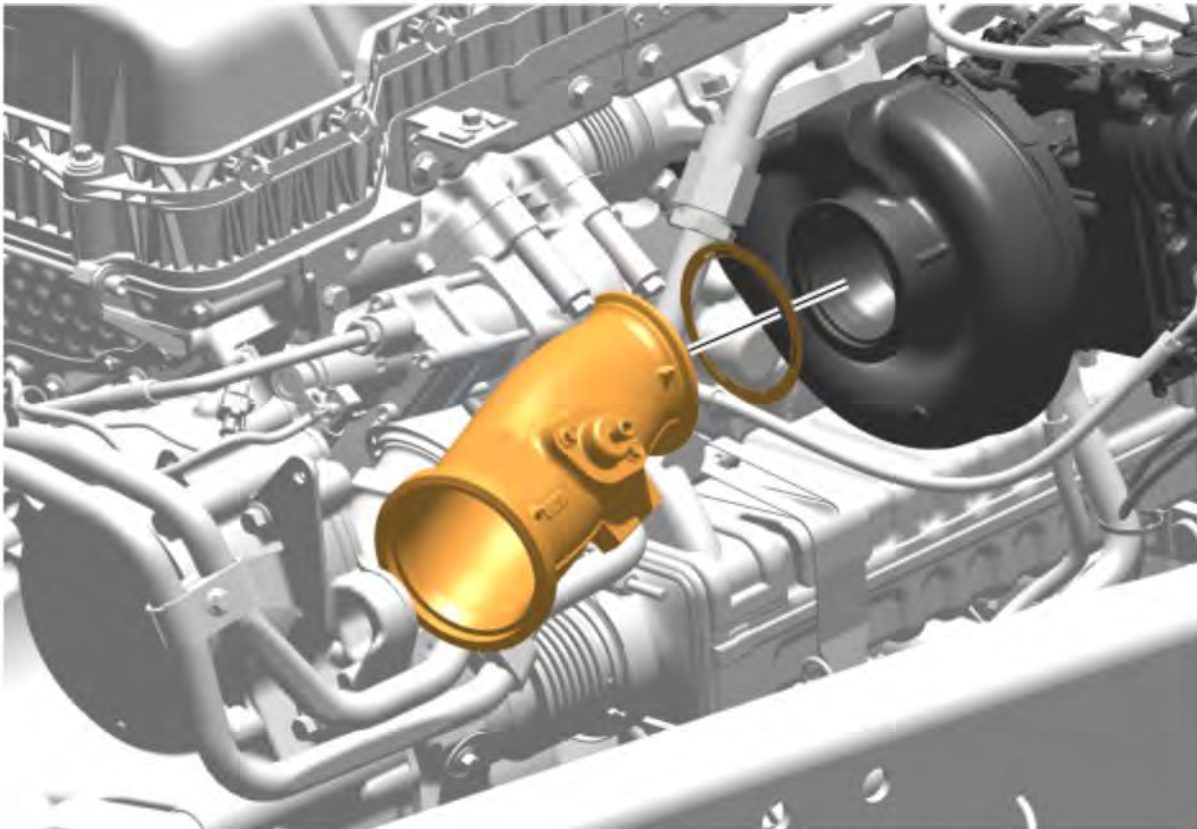
Copyright to this documentation belongs to the Volvo Group. No reproduction, copying, change, amendment or other similar disposal is entitled without prior written consent by the Volvo Group

The information contained herein is current at the time of its original distribution, but is subject to change. The reader is advised that printed copies are uncontrolled.




50	Remove the diffuser.
-----------	----------------------

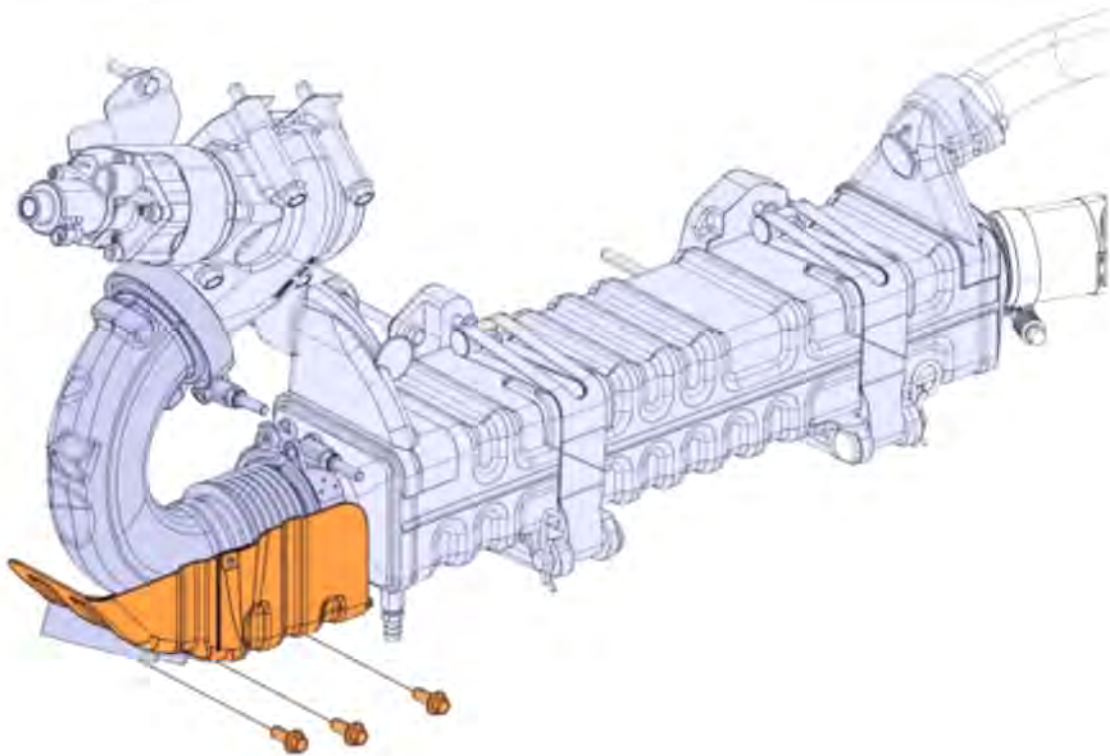
51	Remove the gasket.
-----------	--------------------



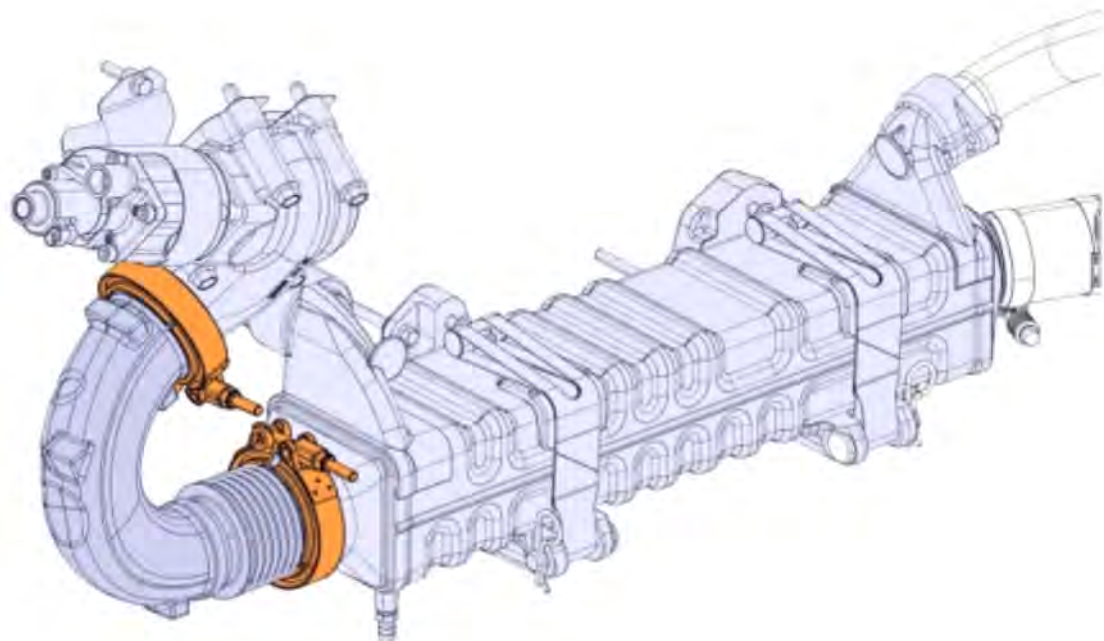
Copyright to this documentation belongs to the Volvo Group. No reproduction, copying, change, amendment or other similar disposal is entitled without prior written consent by the Volvo Group

The information contained herein is current at the time of its original distribution, but is subject to change. The reader is advised that printed copies are uncontrolled.

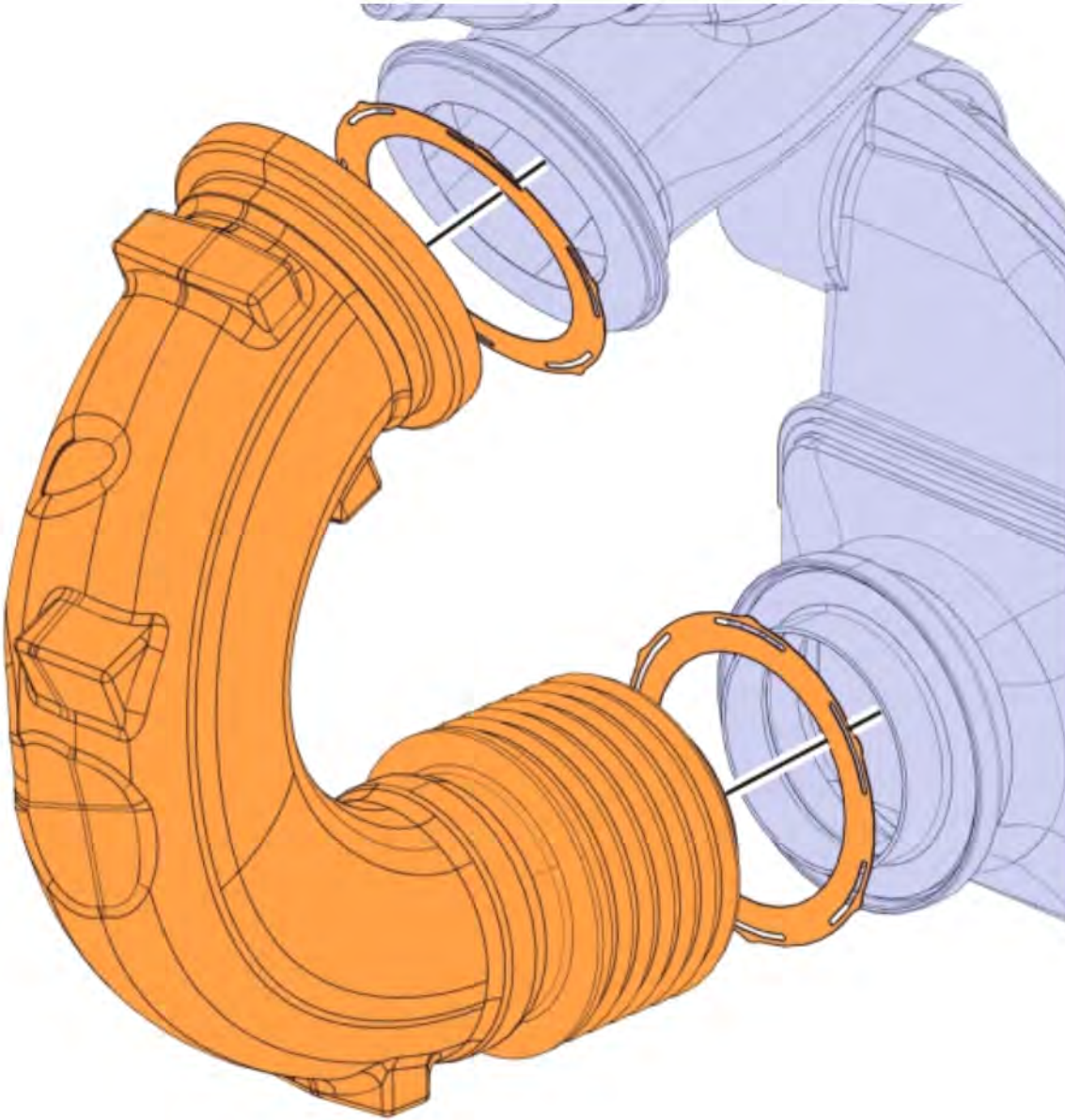
 WARNING	
<p>Risk of burn injuries. Heated components and mechanical parts can cause burns.</p>	
<p>▶ Exercise caution when working with heated components. Always use the appropriate protective equipment.</p>	
52	Remove the screws.
53	Remove the heat shield.



54	Remove the V-clamps.		
	<table border="1" style="width: 100%;"> <tr> <td style="width: 30px; text-align: center;">i</td> <td>Note Note the V-clamp positions.</td> </tr> </table>	i	Note Note the V-clamp positions.
i	Note Note the V-clamp positions.		



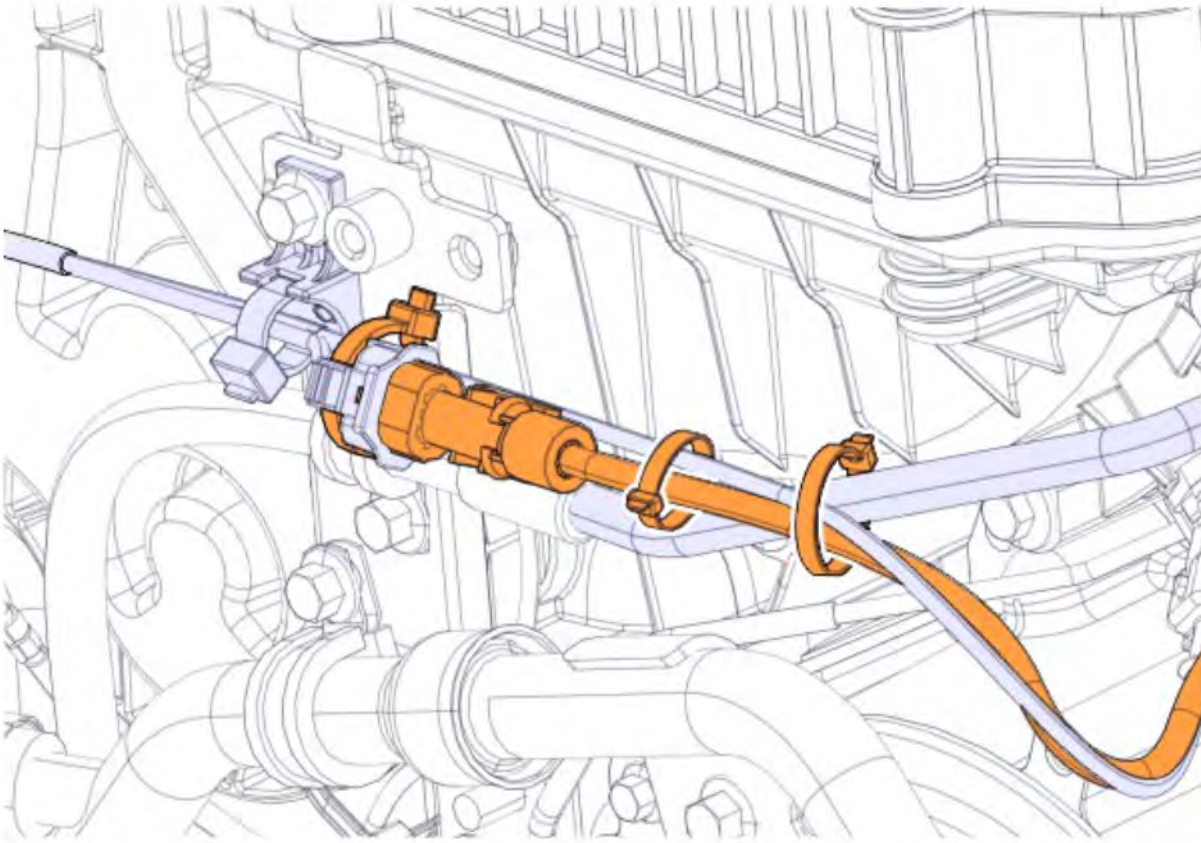
55	Remove the pipe.
56	Remove the gaskets.



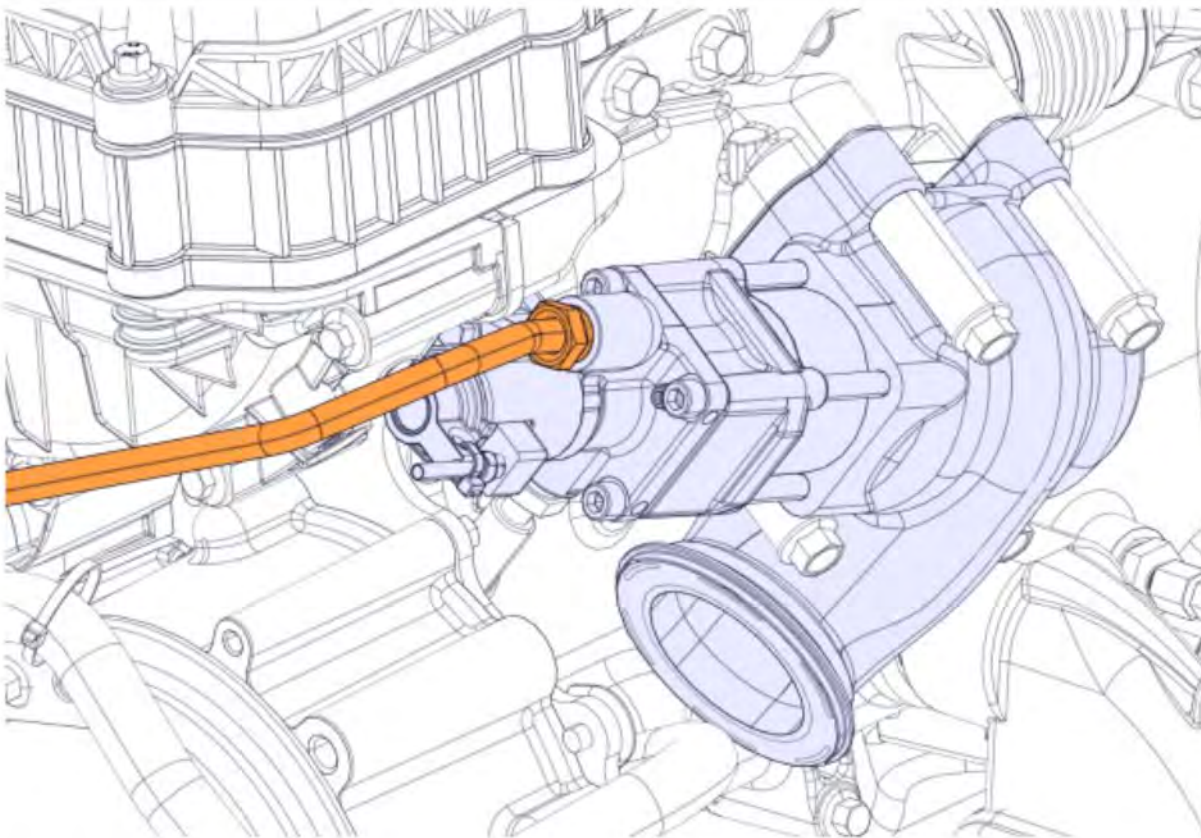
57	Remove the cable ties.
----	------------------------

58	Disconnect the connector.
----	---------------------------

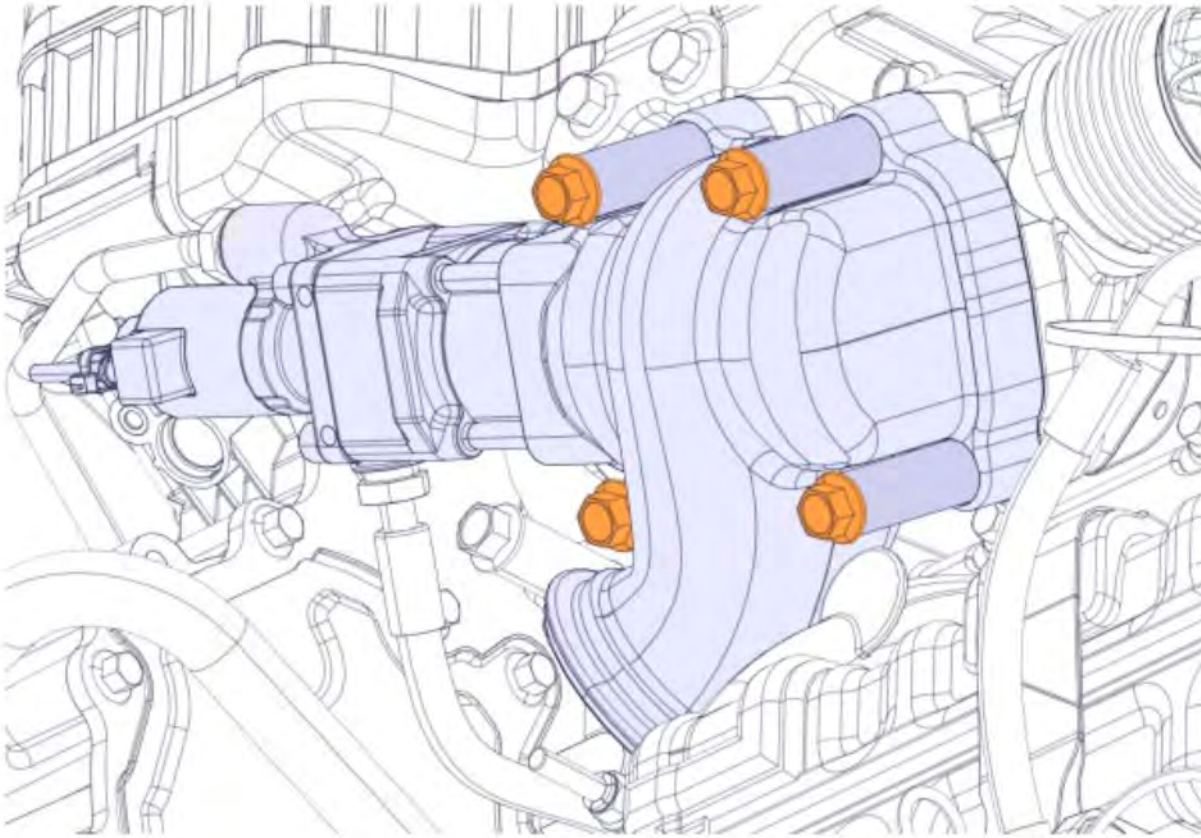
59	Move the cable aside.
----	-----------------------



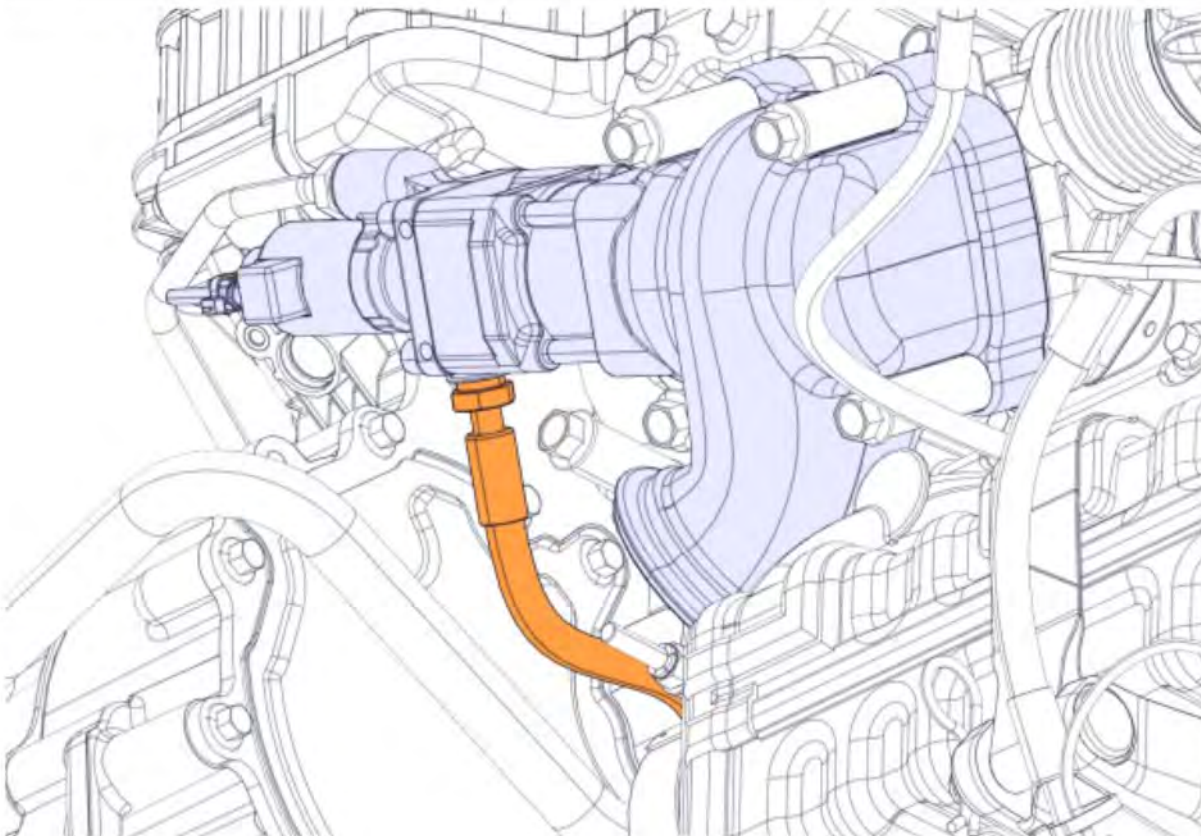
60 Loosen the pipe.



61 Loosen the screws.

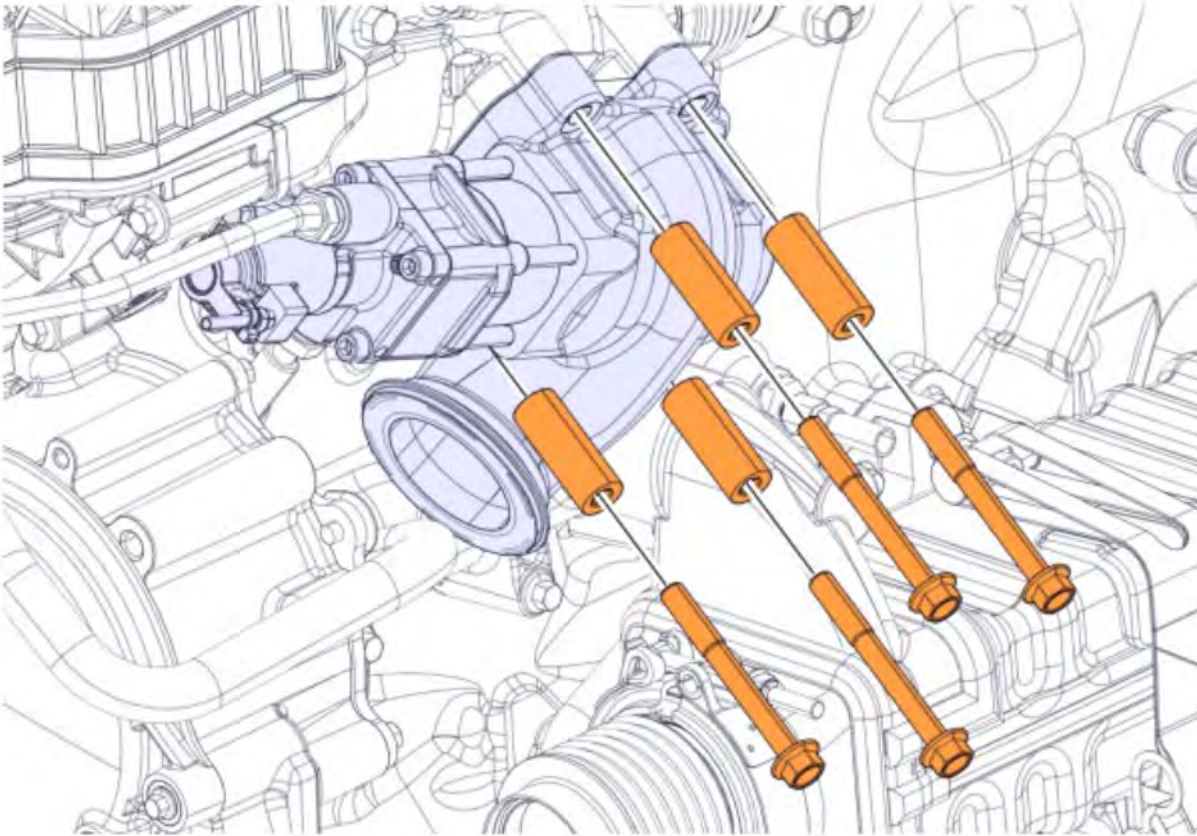


62	Loosen the pipe.
----	------------------

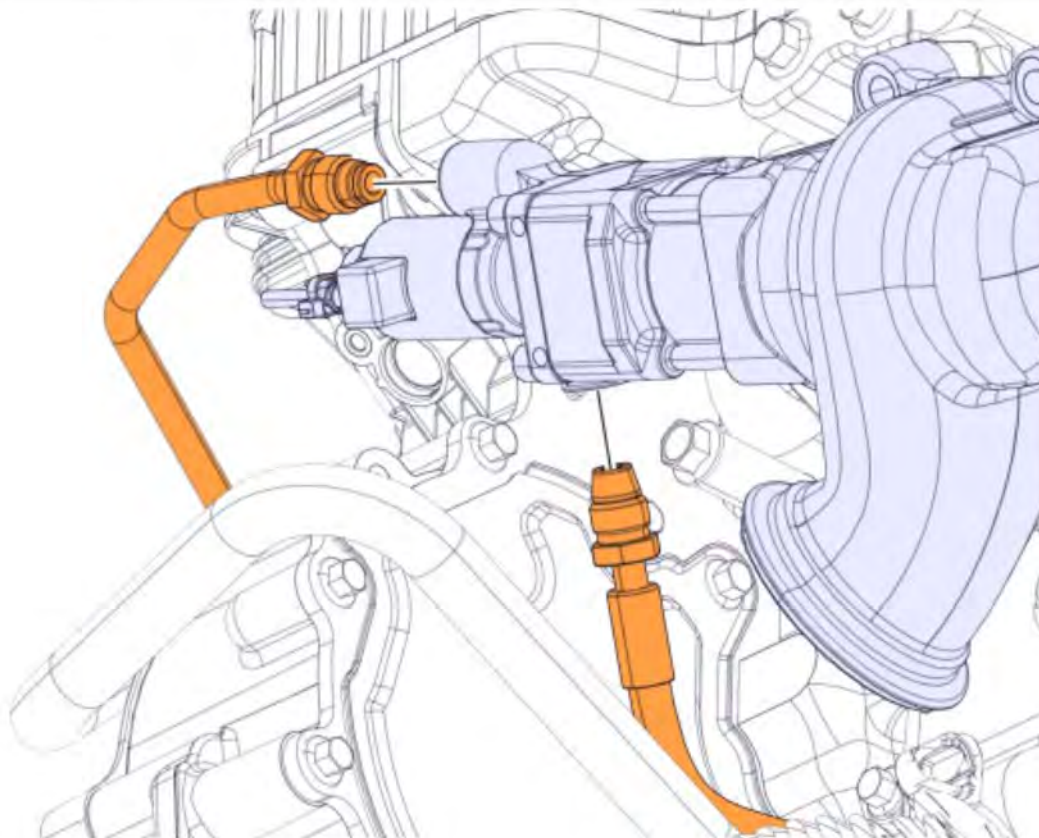


63	Remove the screws.
----	--------------------

64	Remove the spacers.
----	---------------------

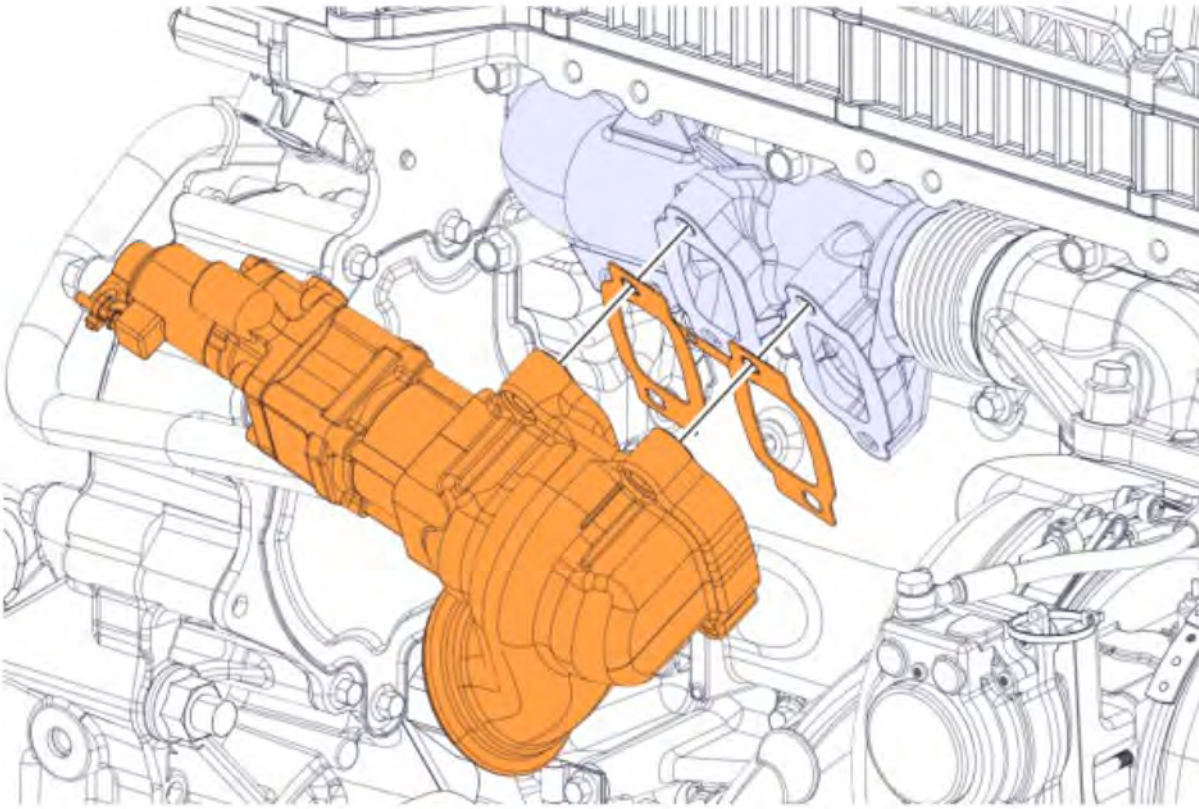


65	Remove the pipes.
----	-------------------

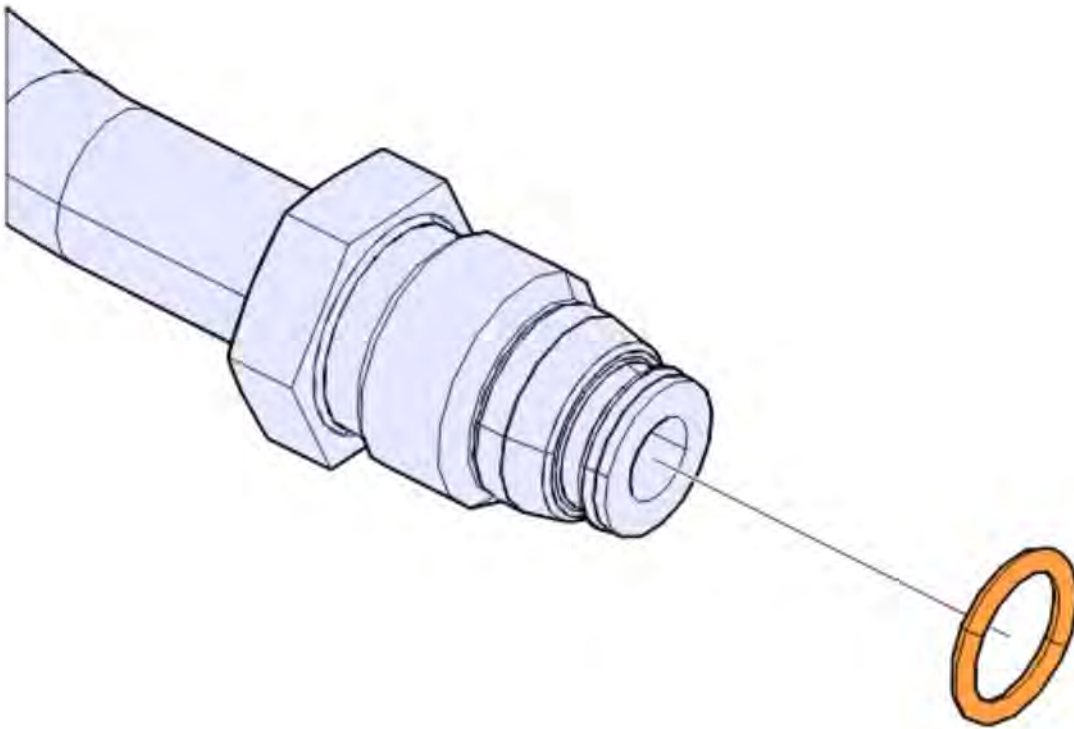


66	Remove the valve.
----	-------------------

67	Remove the gasket.
----	--------------------

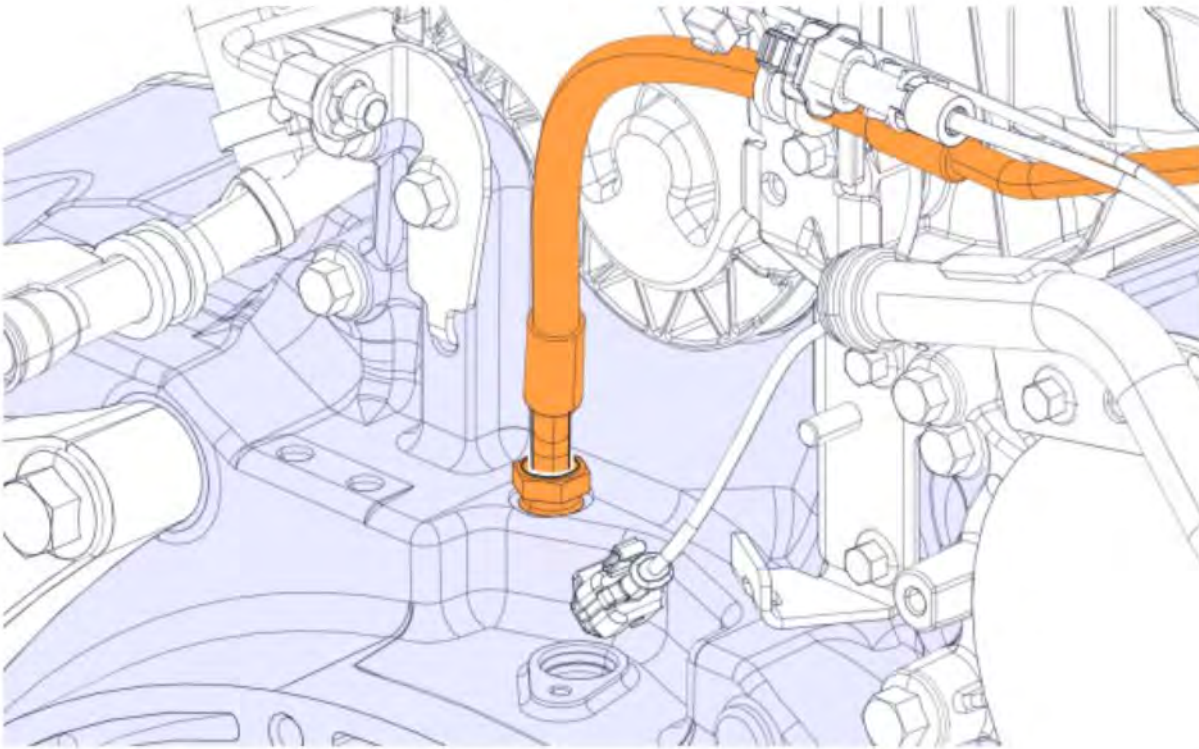


68	Remove the seal.
----	------------------

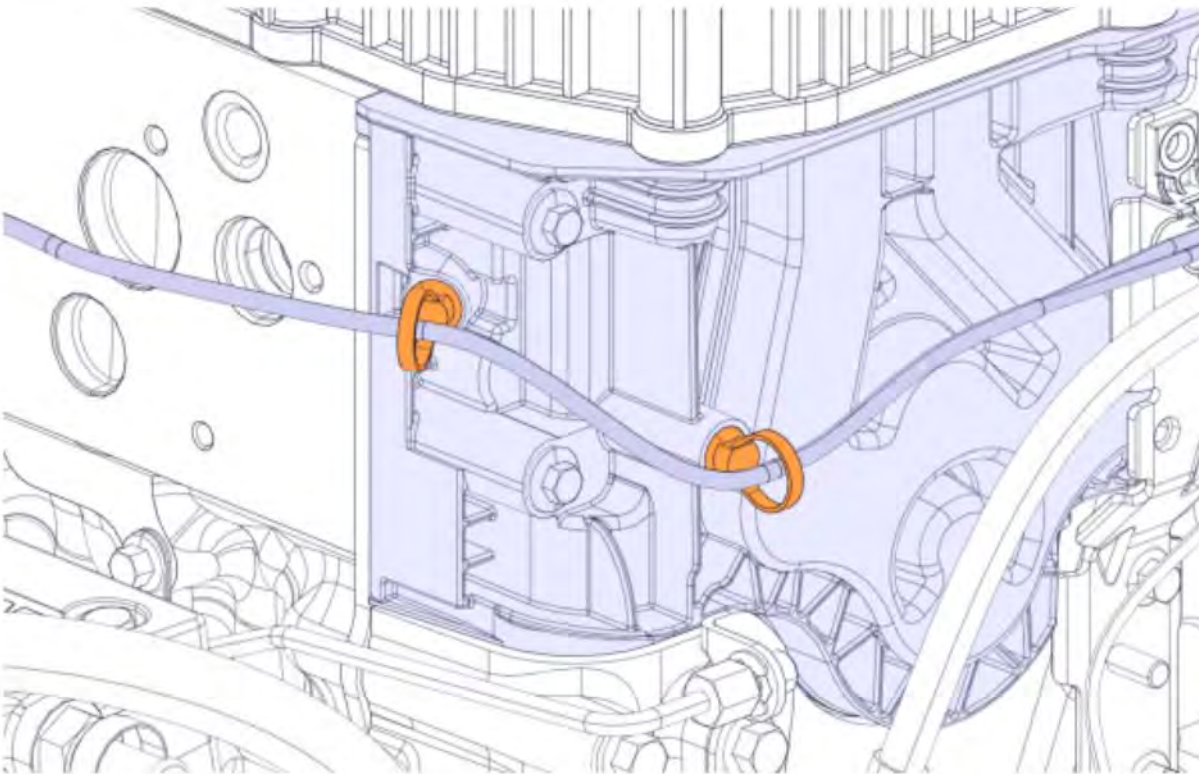


69	Loosen the nut.
----	-----------------

70	Remove the hose.
----	------------------

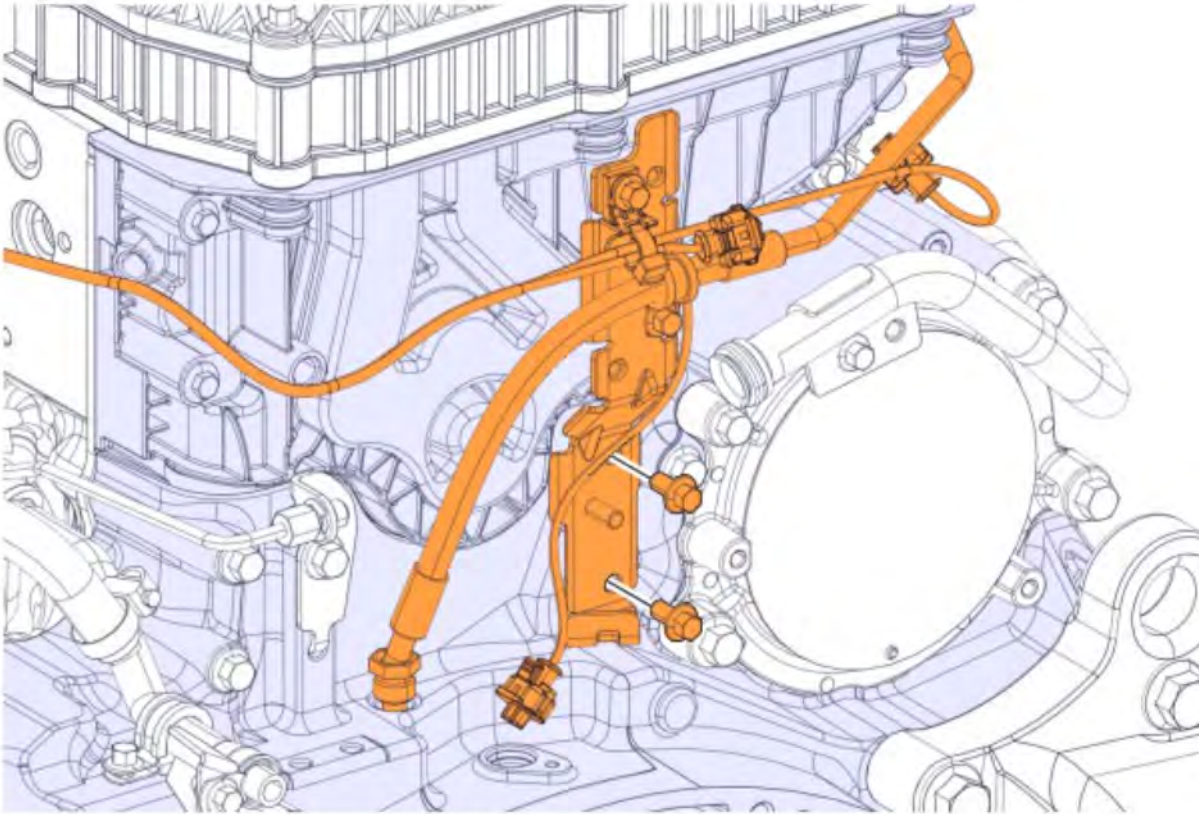


71	Remove the cable ties.
----	------------------------

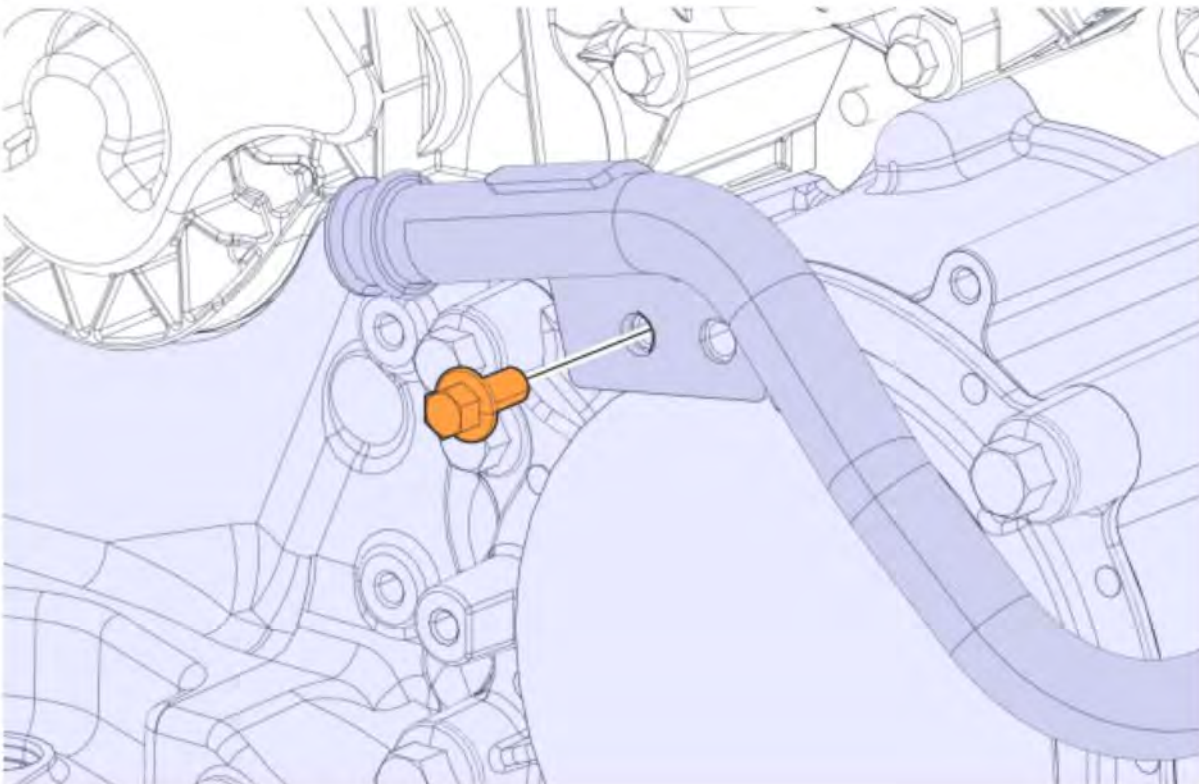


72	Remove the screws.
----	--------------------

73	Move the assembly aside.
----	--------------------------

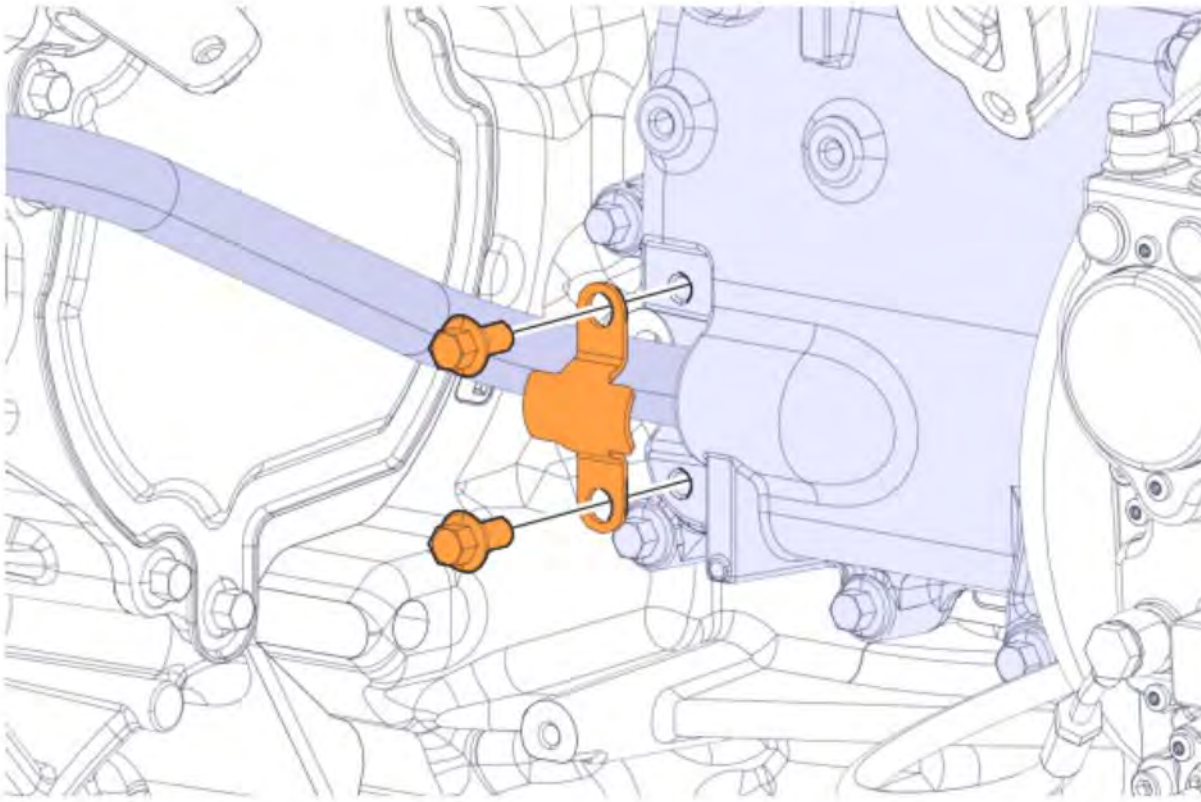


74	Remove the screw.
----	-------------------



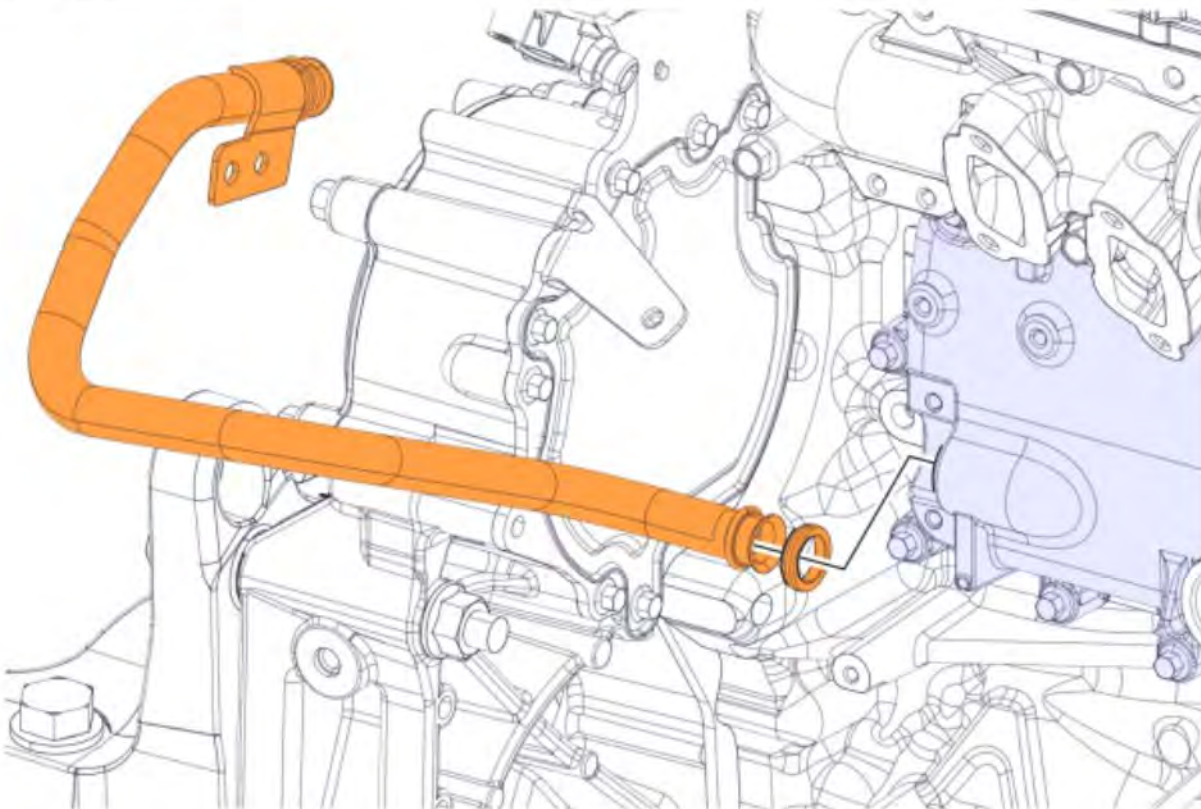
75	Remove the screws.
----	--------------------

76	Remove the clamp.
----	-------------------



77	Remove the pipe.
-----------	------------------

78	Remove the seal.
-----------	------------------



79	Remove the screws.
-----------	--------------------

80	Remove the pump.
-----------	------------------

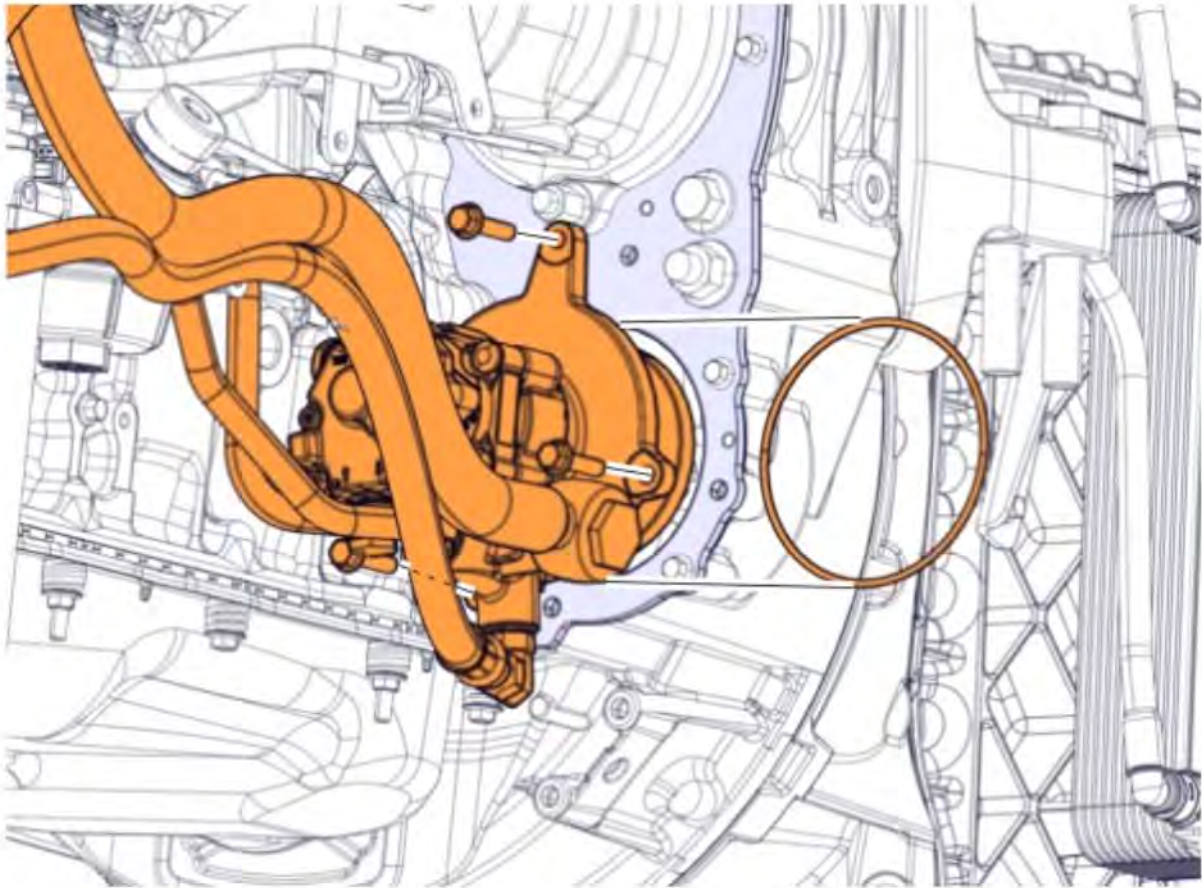
Note

Copyright to this documentation belongs to the Volvo Group. No reproduction, copying, change, amendment or other similar disposal is entitled without prior written consent by the Volvo Group

The information contained herein is current at the time of its original distribution, but is subject to change. The reader is advised that printed copies are uncontrolled.

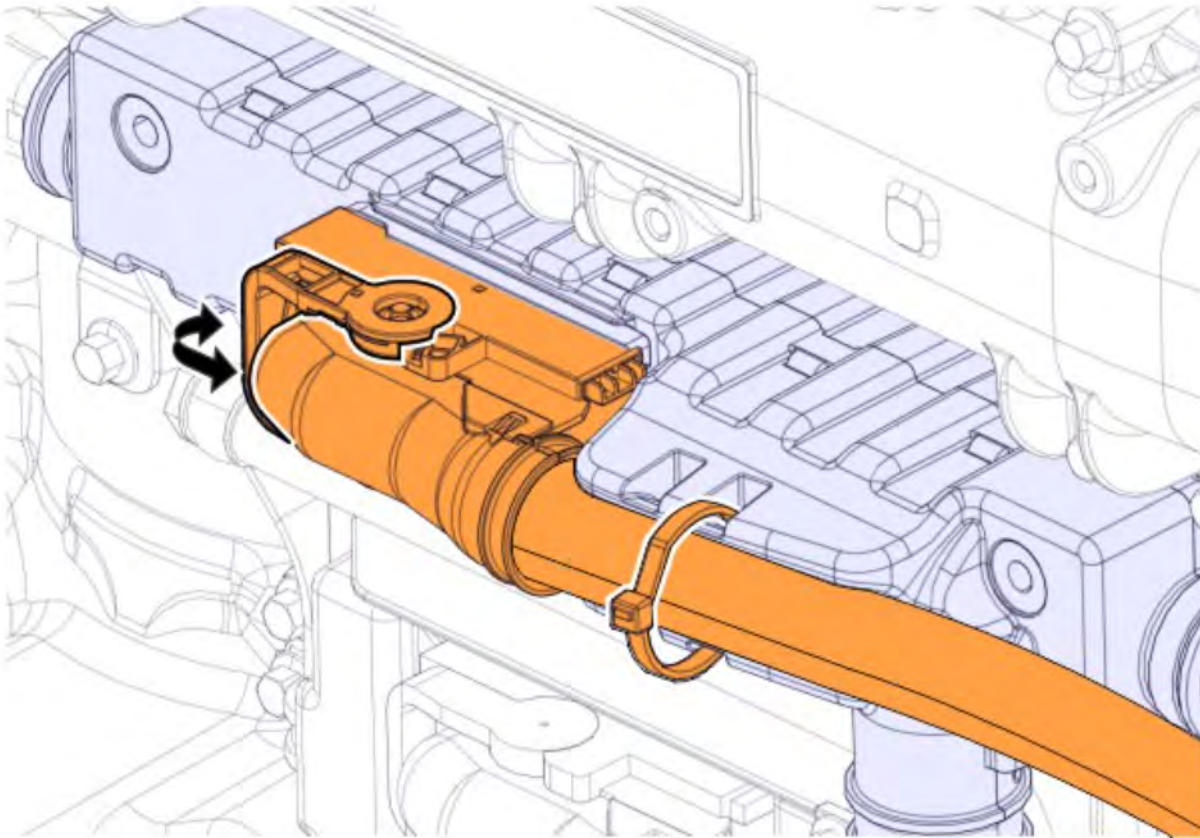
i	Leave the pipes connected to the pump.
i	Note Support the pump.

81 Remove the seal.

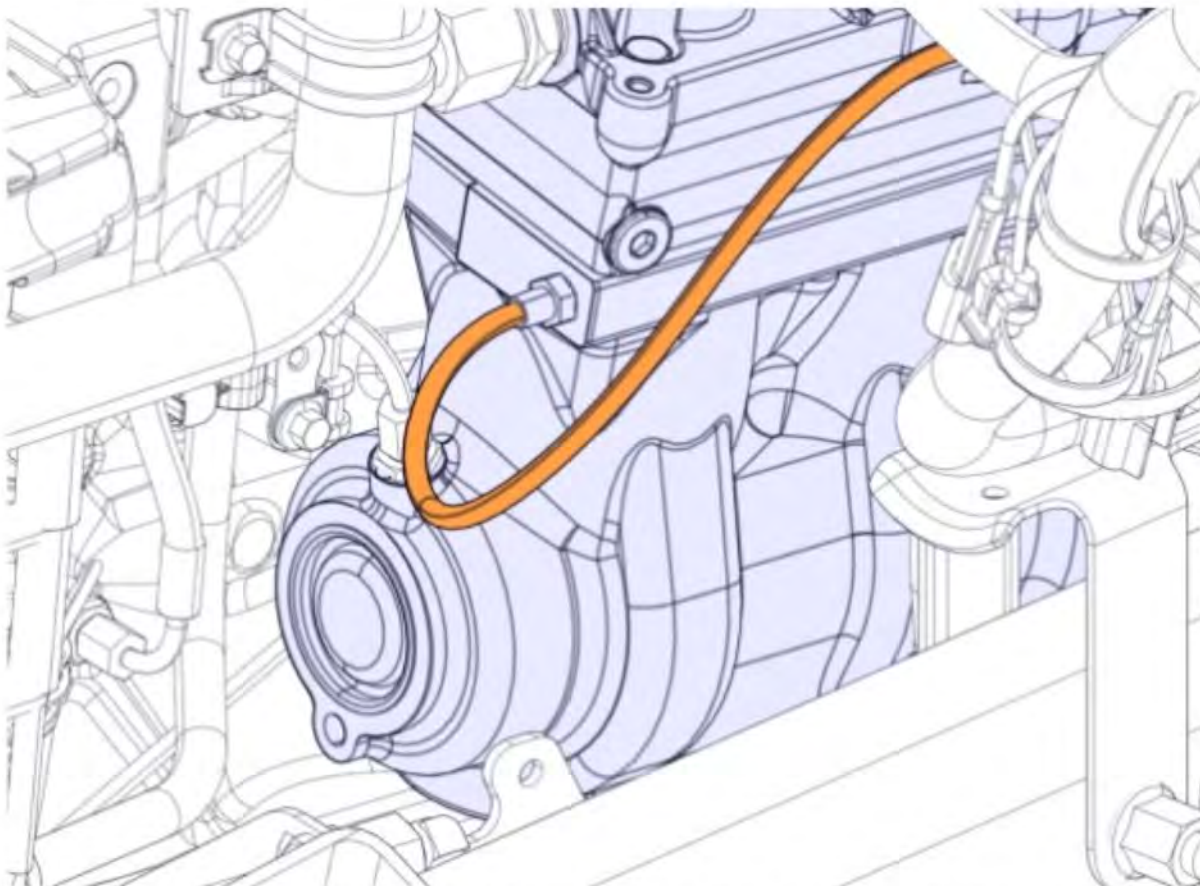


82	Remove the cable ties.
i	Note Note the positions.

83 Disconnect the connector.



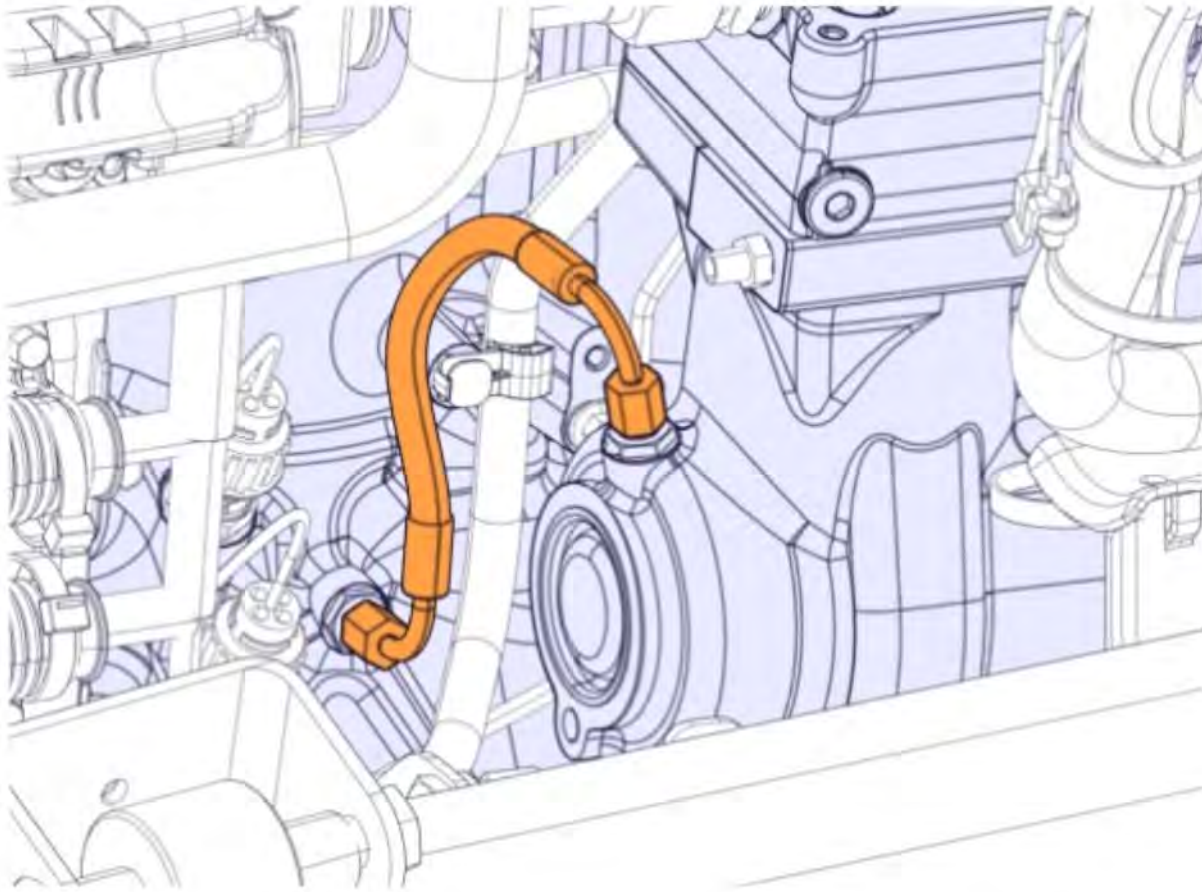
84	Disconnect the air line.	
	Required material	
	DISASSEMBLY TOOL	88870002



Copyright to this documentation belongs to the Volvo Group. No reproduction, copying, change, amendment or other similar disposal is entitled without prior written consent by the Volvo Group

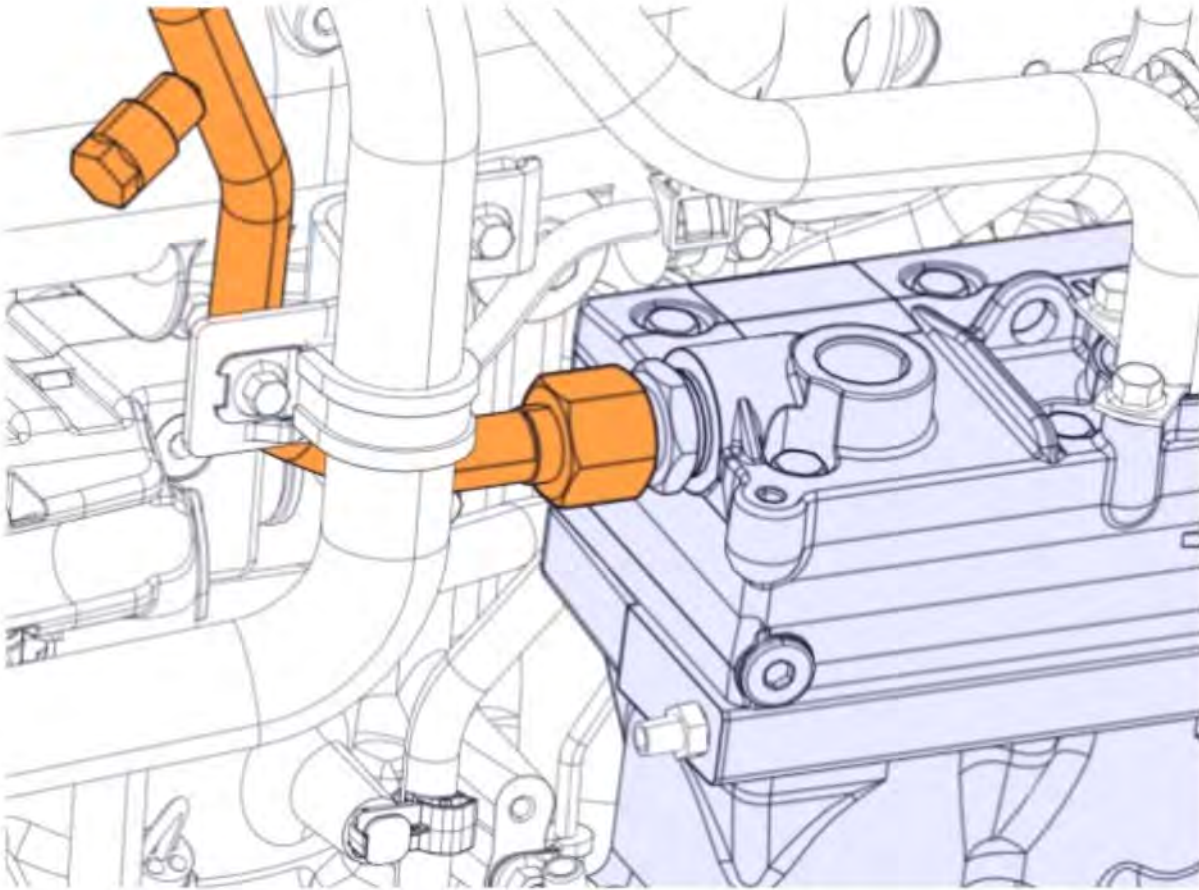
The information contained herein is current at the time of its original distribution, but is subject to change. The reader is advised that printed copies are uncontrolled.

85	Remove the oil hose.
----	----------------------

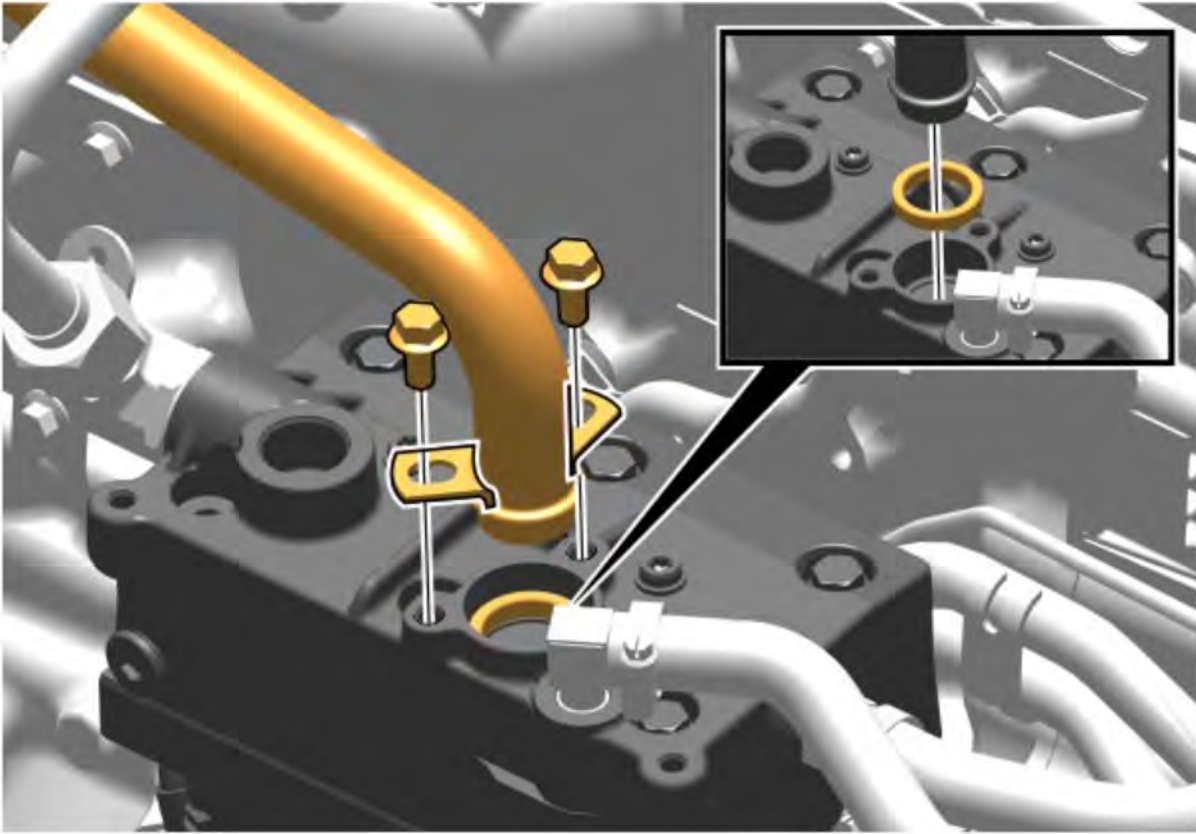


86	Loosen the nut.
----	-----------------

87	Remove the pipe.
----	------------------

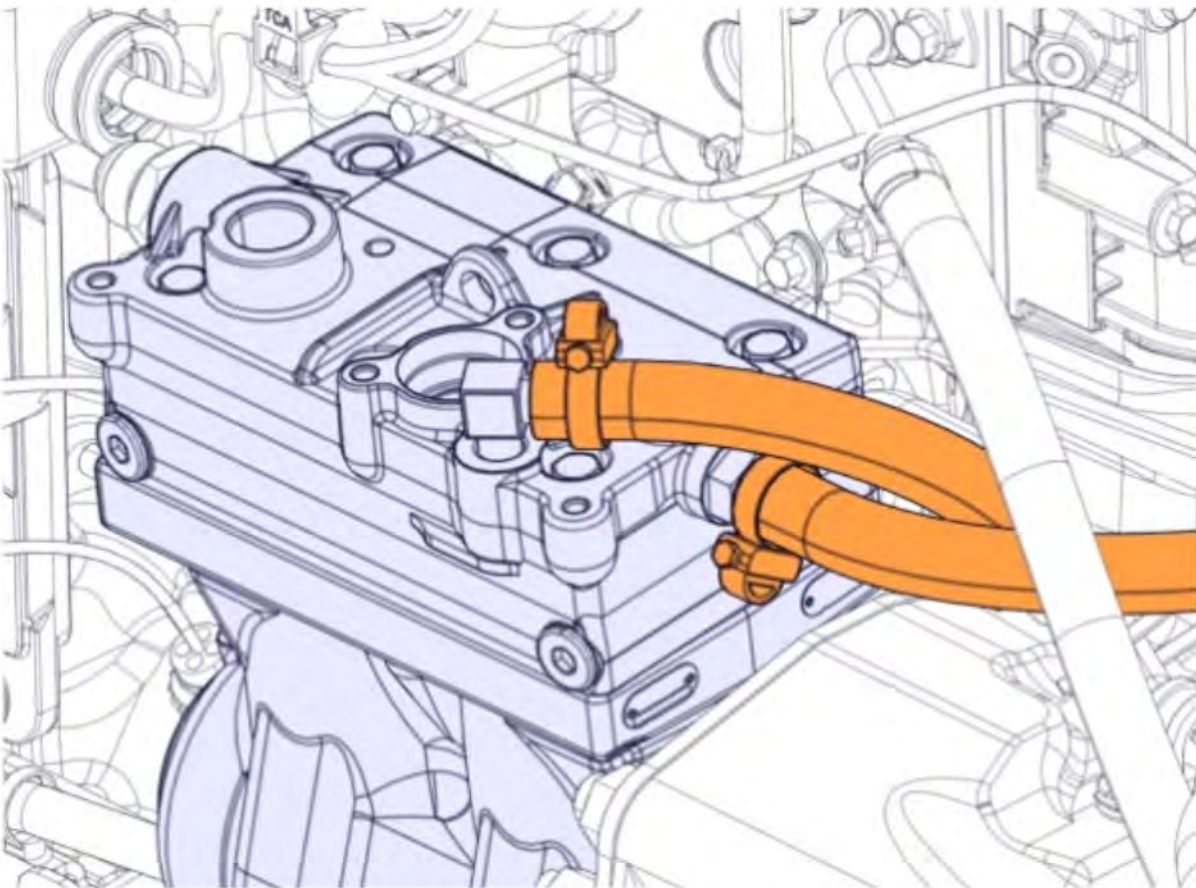


88	Remove the screws.
89	Remove the lock braces.
90	Move aside the pipe.
91	Remove the sealing ring.



92	Loosen the clamps.
-----------	--------------------

93	Remove the hoses.
-----------	-------------------



94	Remove the nuts.
-----------	------------------

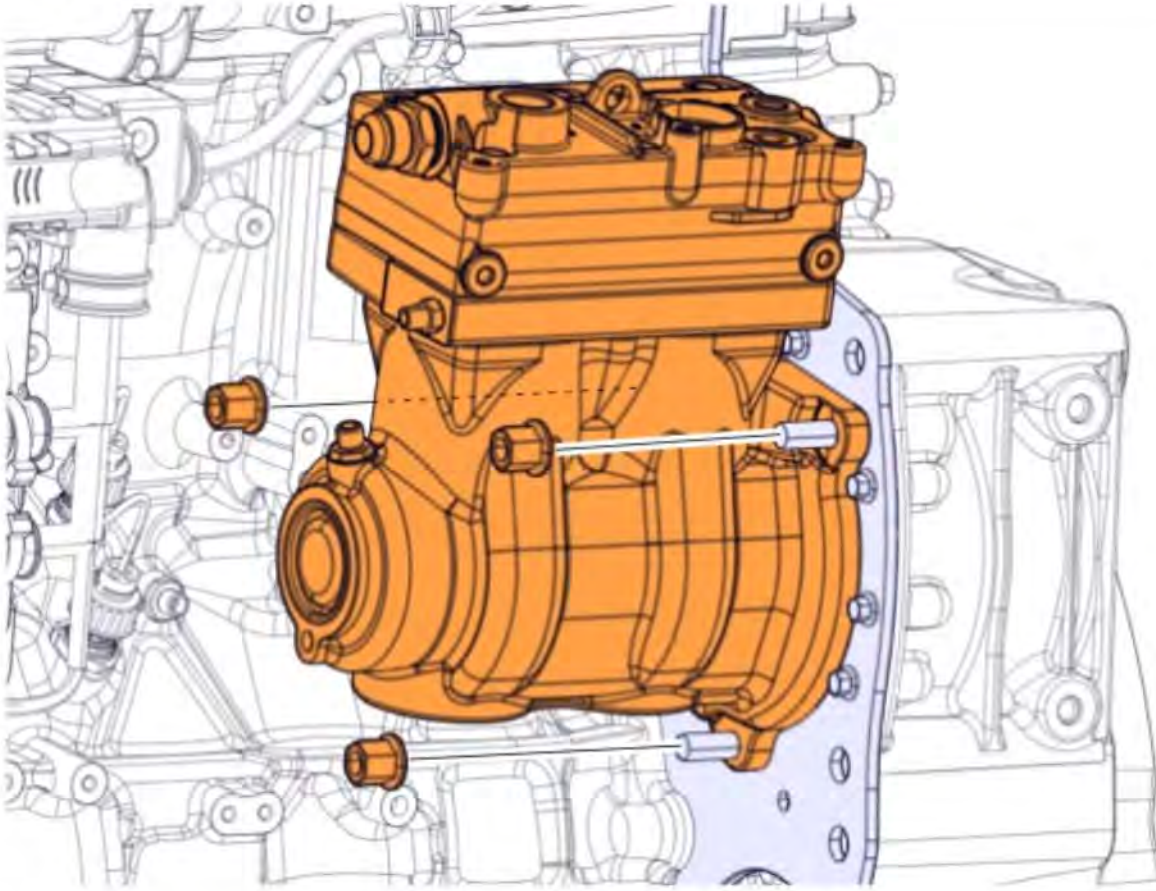
Copyright to this documentation belongs to the Volvo Group. No reproduction, copying, change, amendment or other similar disposal is entitled without prior written consent by the Volvo Group

The information contained herein is current at the time of its original distribution, but is subject to change. The reader is advised that printed copies are uncontrolled.

**CAUTION****Risk of serious injury.**

Heavy component.

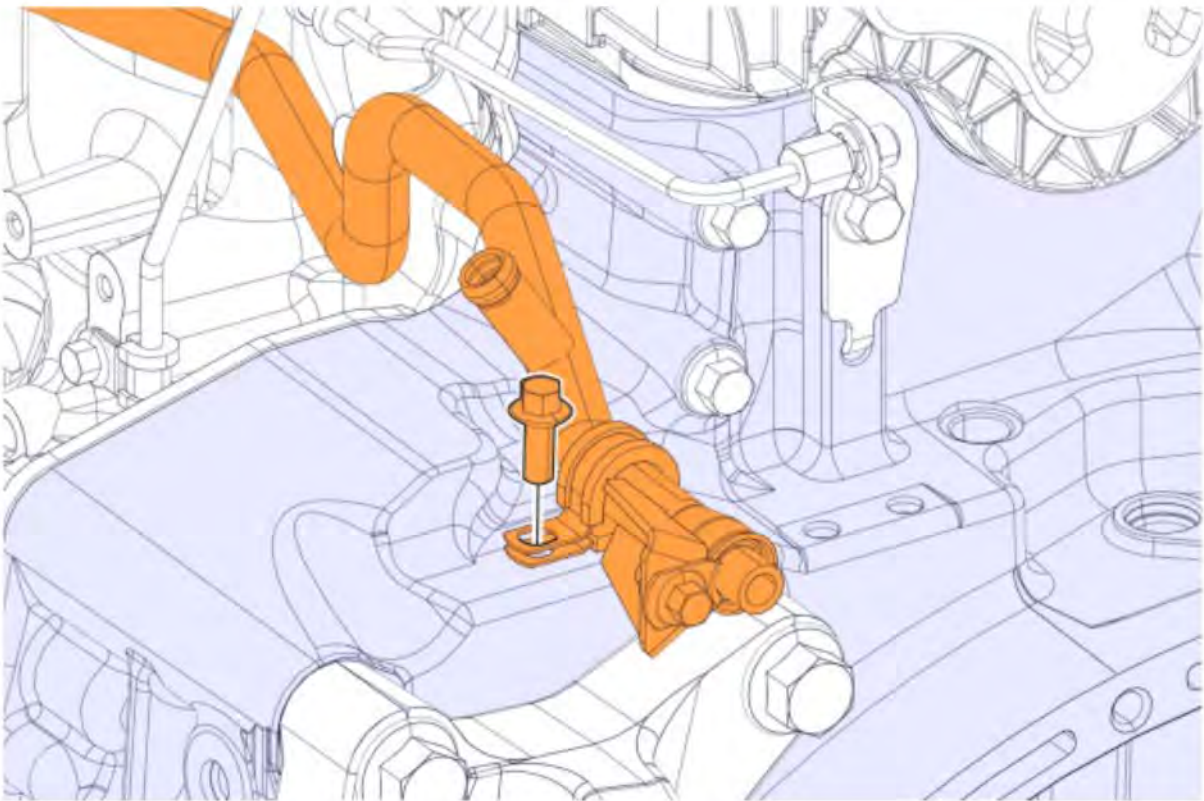
► Exercise caution when moving the component. Use appropriate tools.

95 Remove the compressor.**96** Remove the O-ring.



97	Remove the screw.
-----------	-------------------

98	Move aside the pipe.
-----------	----------------------



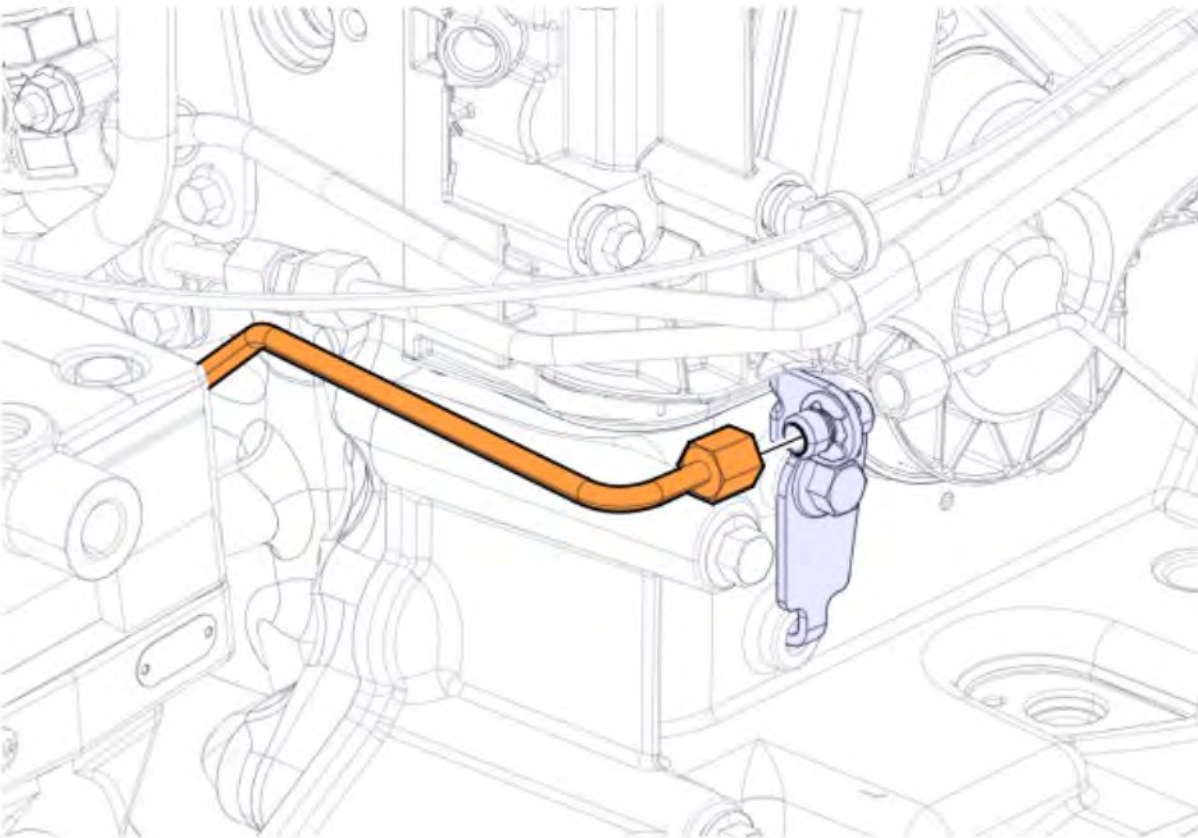
99	Remove the screws.
-----------	--------------------

100	Remove the clamps.
------------	--------------------



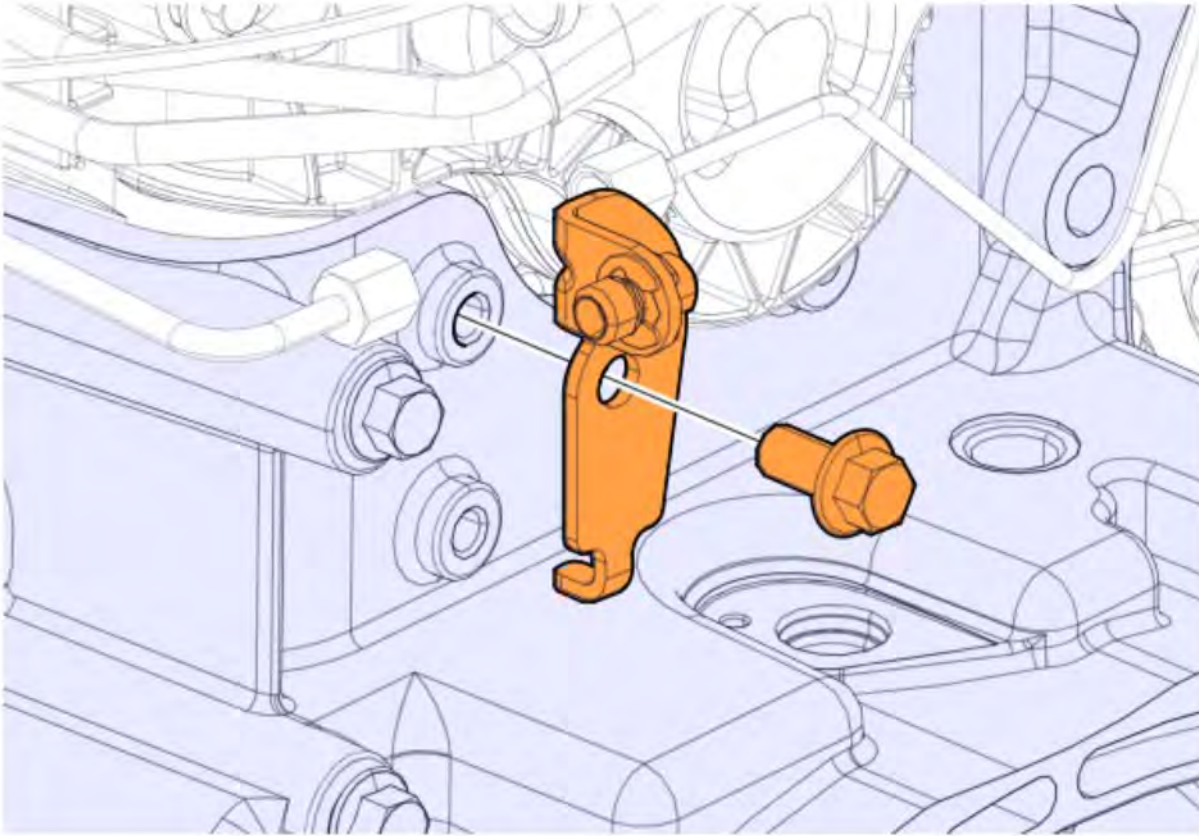
101	Loosen the nut.
-----	-----------------

102	Remove the pipe.
-----	------------------



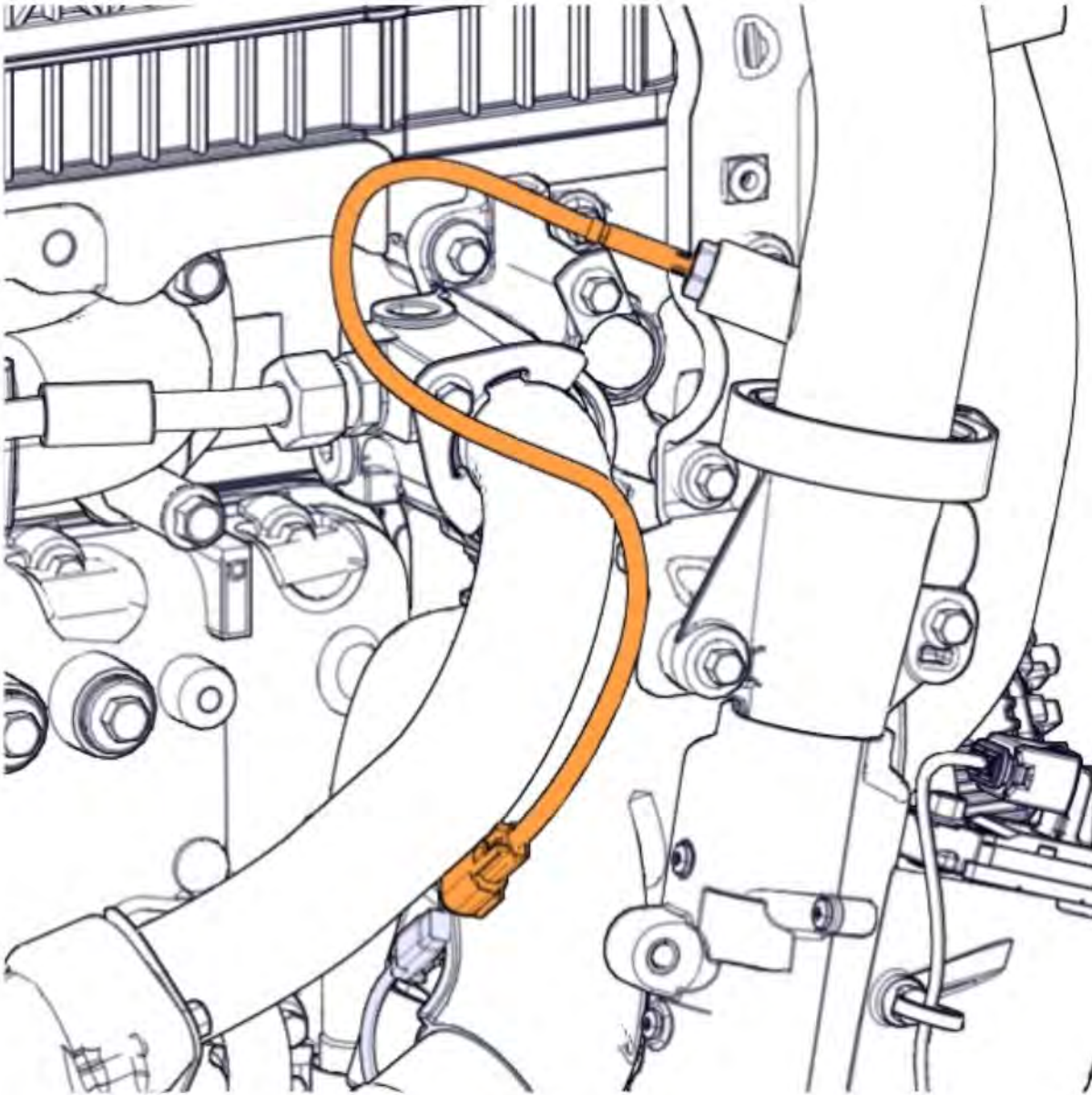
103	Remove the screw.
-----	-------------------

104	Remove the bracket.
-----	---------------------



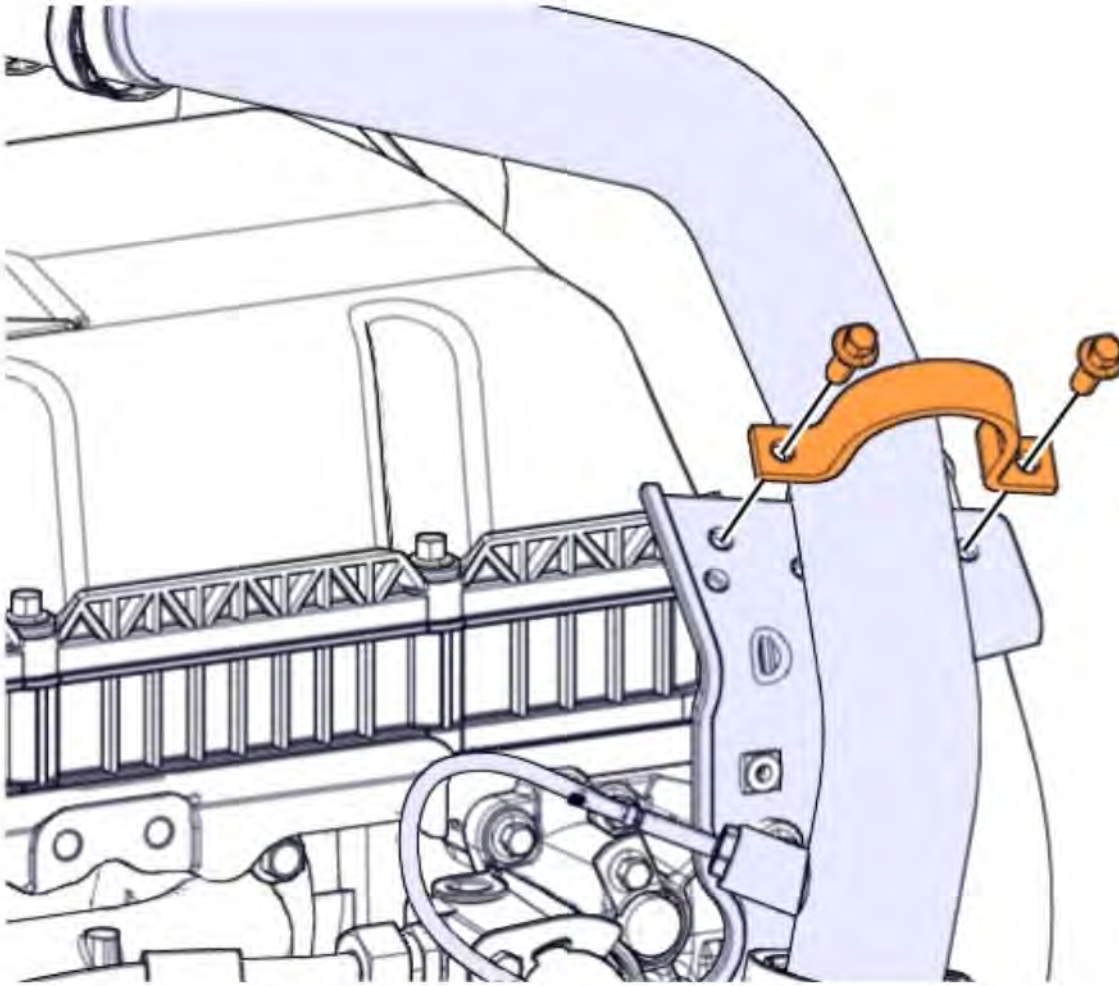
105	Disconnect the connector.
-----	---------------------------

106	Remove the cable tie.
-----	-----------------------



107	Remove the screws.
-----	--------------------

108	Remove the clamp.
-----	-------------------

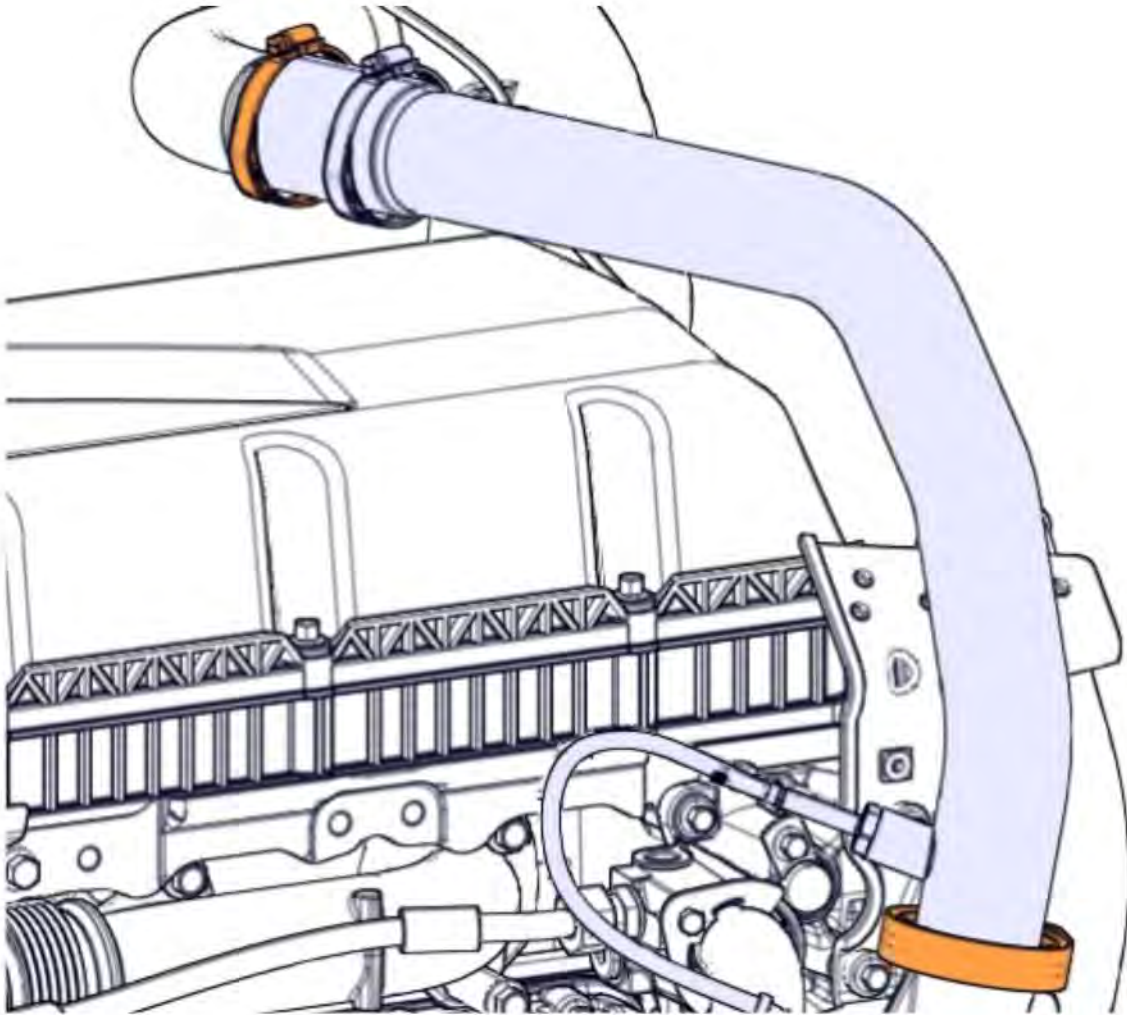


109 Loosen the clamps.

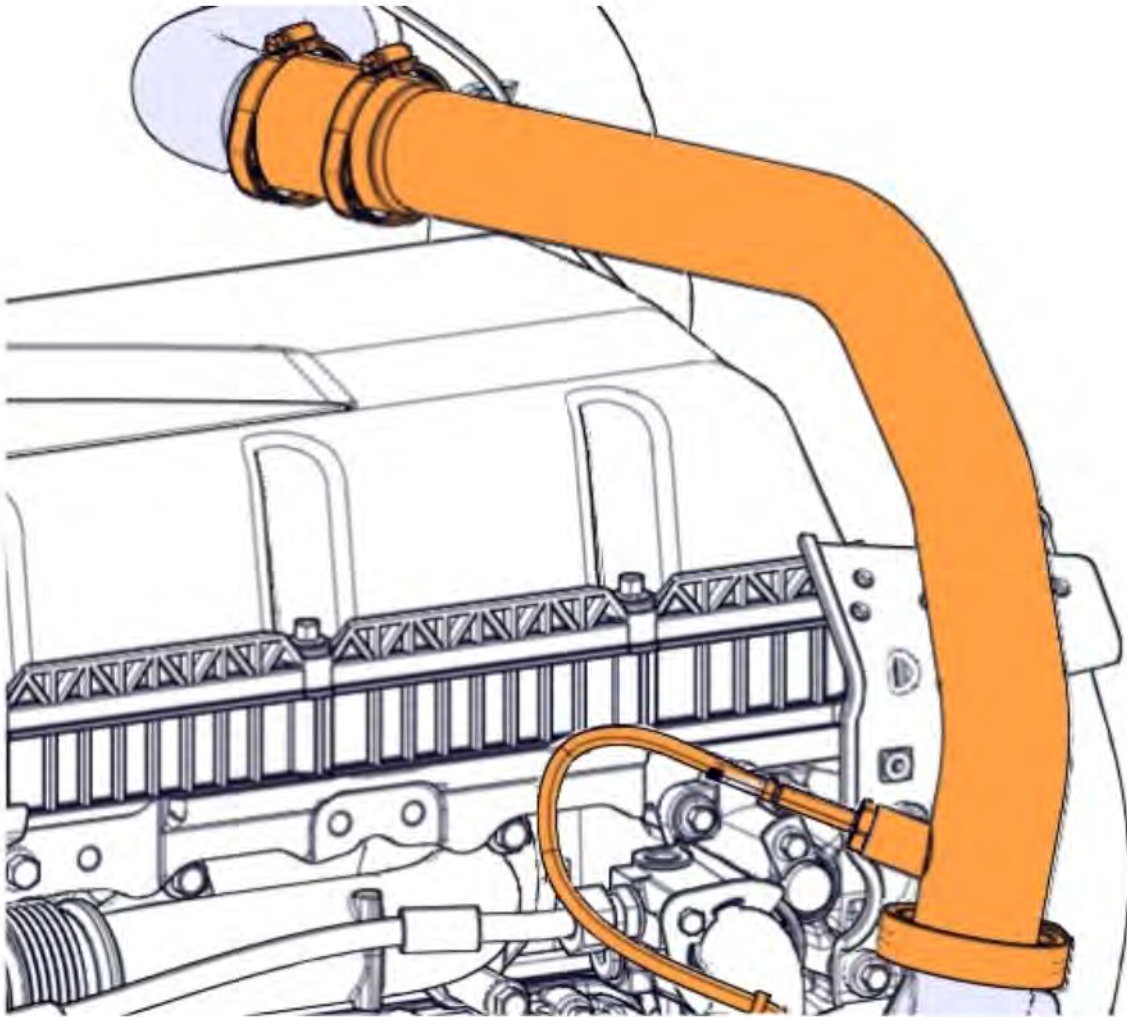


Note

Note the positions.

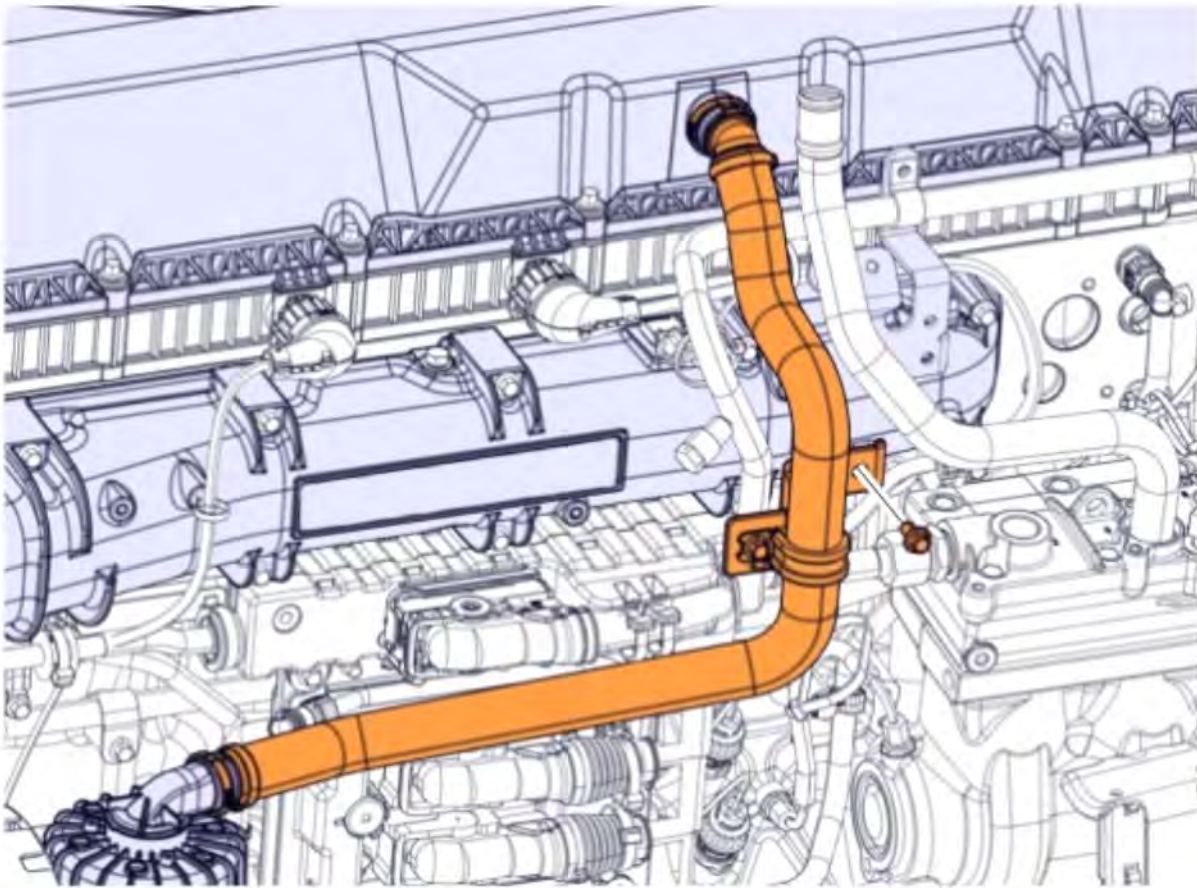


110	Remove the pipe.
-----	------------------



111	Remove the screw.
-----	-------------------

112	Remove the pipe.
-----	------------------

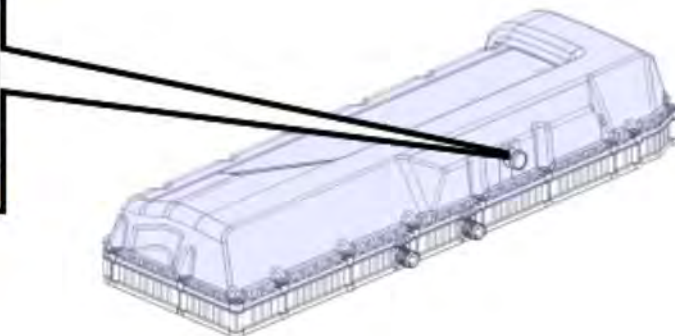
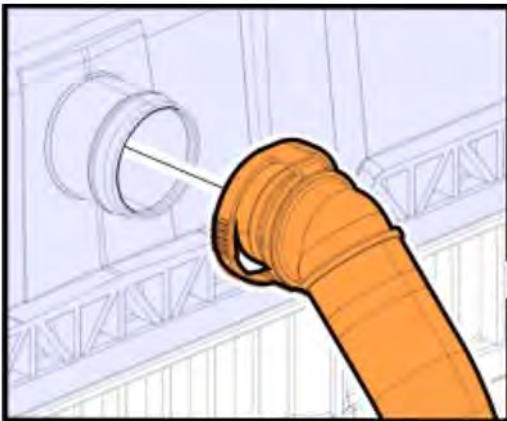


113 Remove the pipe.



Note

If not previously removed.



114 Loosen the screws.

115 Remove the valve cover.

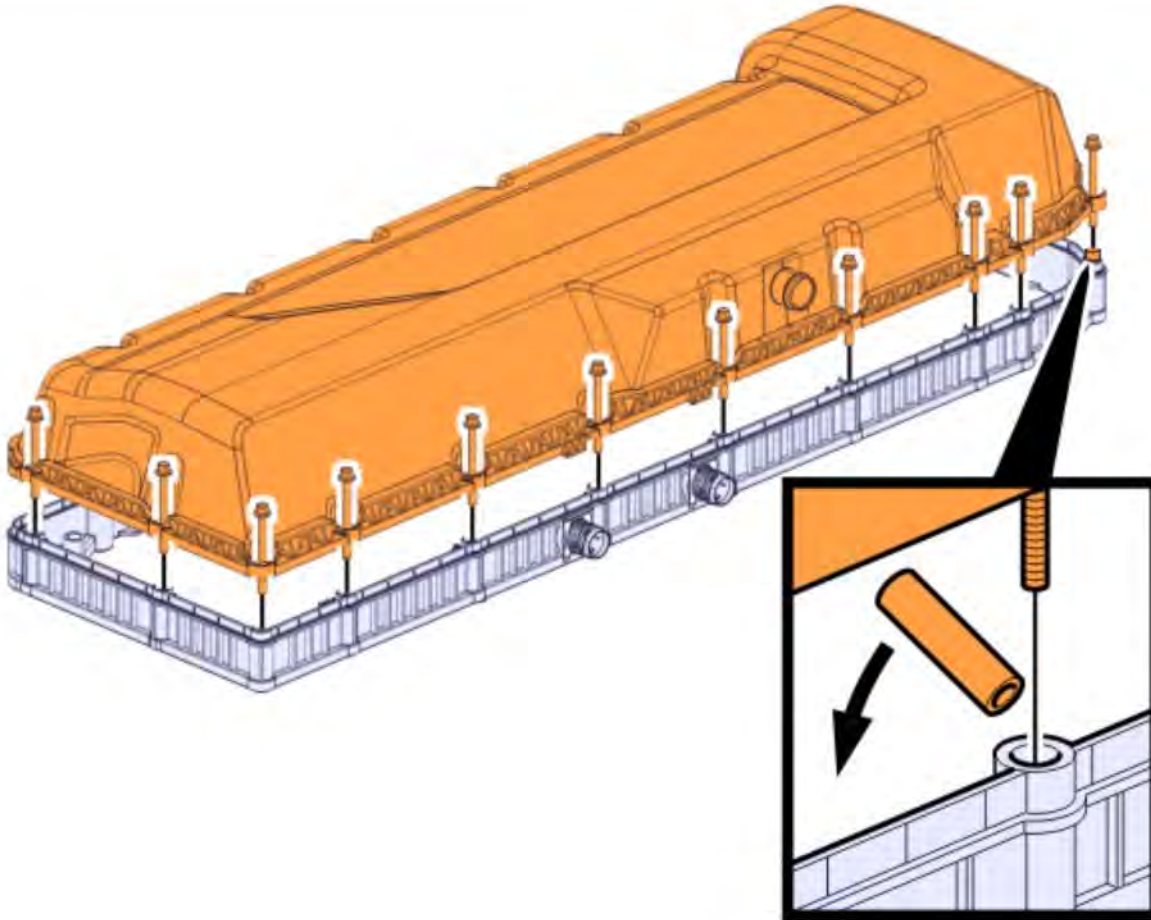


Service hint

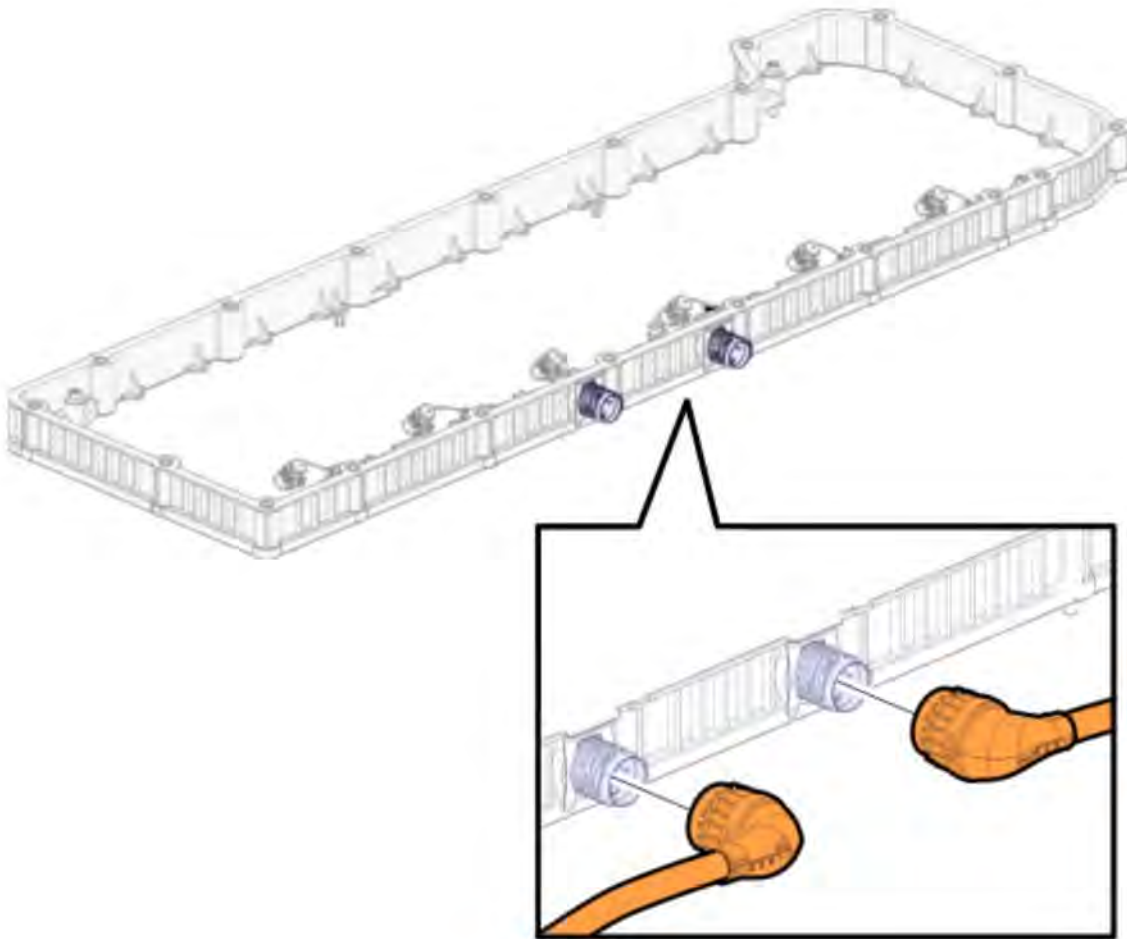
It is possible, when removing a valve cover screw, that the crush sleeve is drawn out with it. Take care to prevent the sleeve from falling into the gear train as this could result in engine damage.

**Service hint**

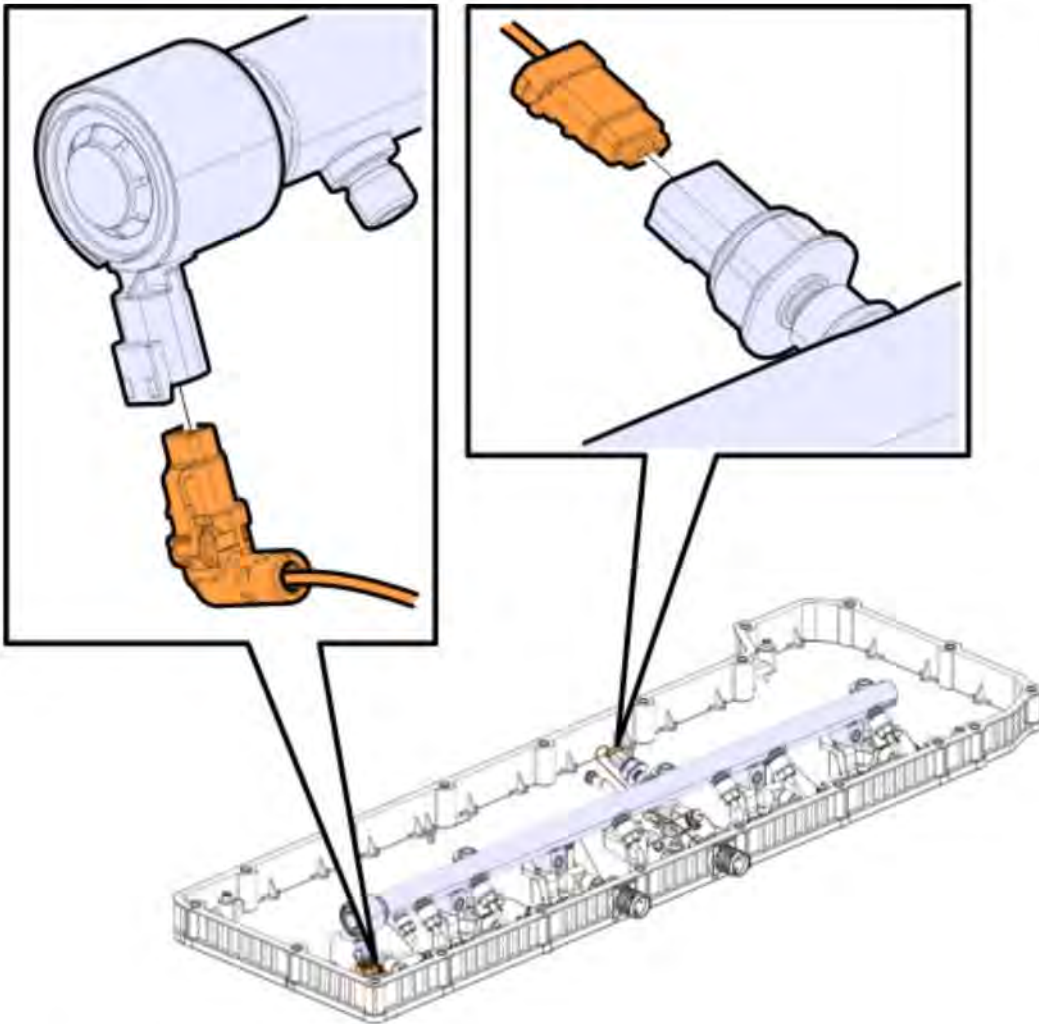
You do not need to loosen the valve or adjust the injector or the rocker arm shaft to replace the timing gear plate. A revised procedure for adjusting gear lash has been created.



116 Disconnect the connectors.



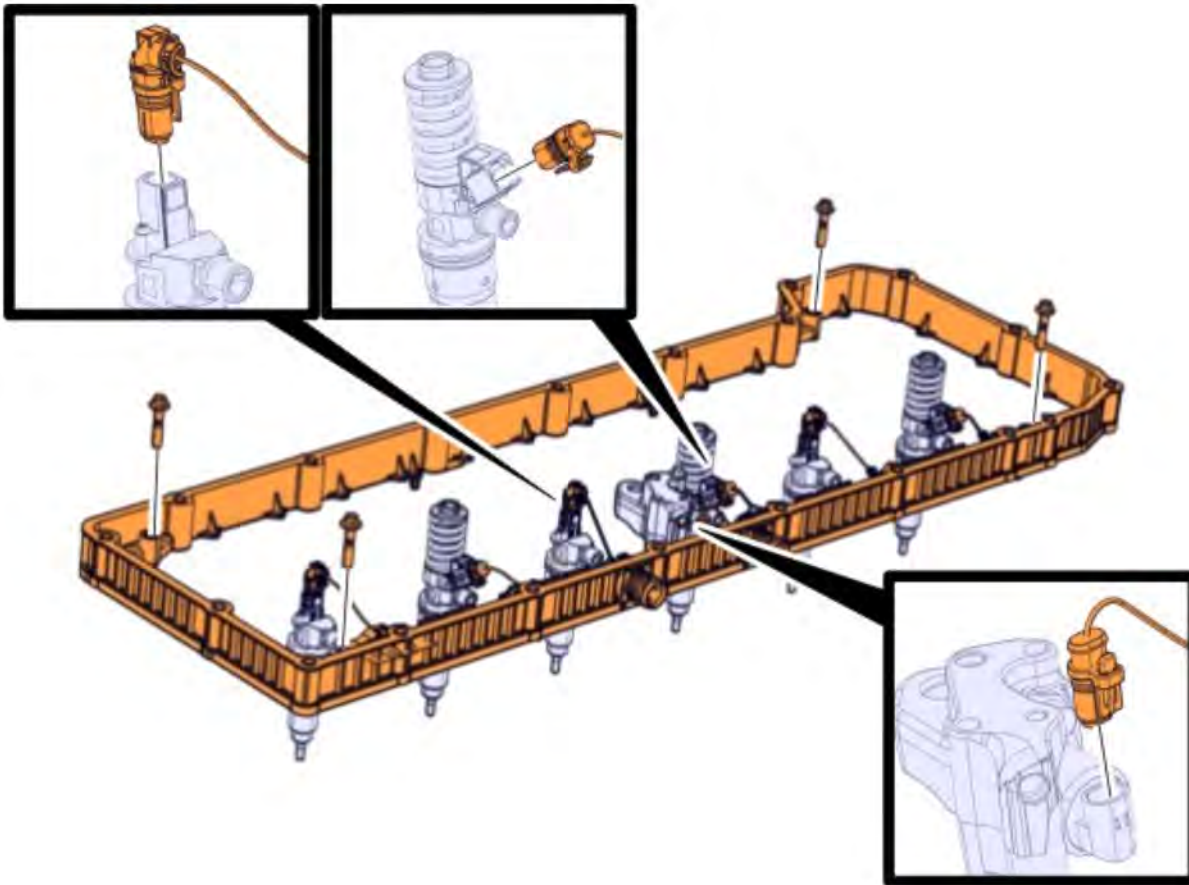
117	Disconnect the connectors.
-----	----------------------------



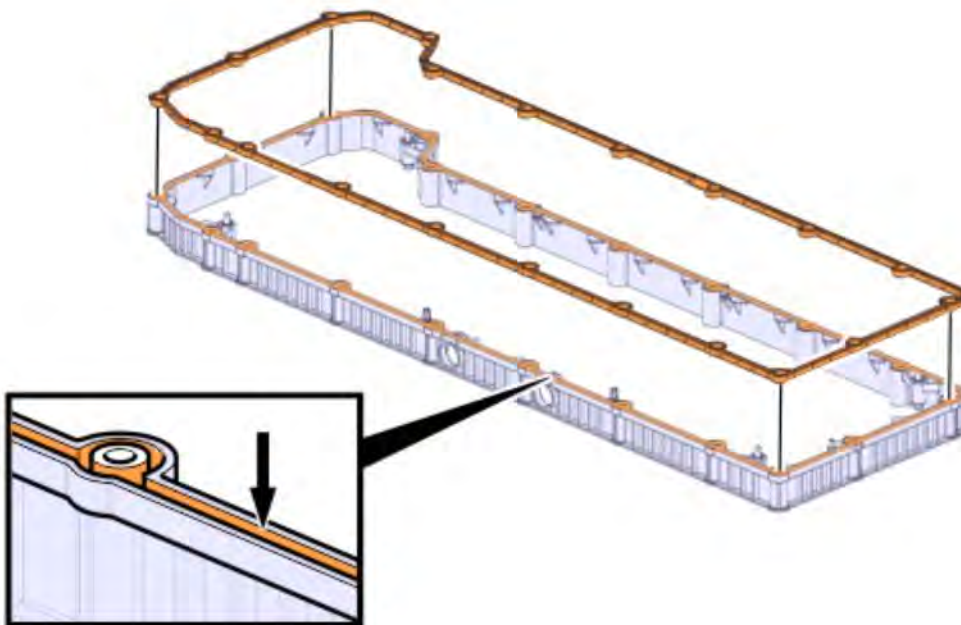
118	Loosen the screws.
-----	--------------------

119	Disconnect the connectors.
-----	----------------------------

120	Remove the frame.
-----	-------------------



121 Remove the gasket.



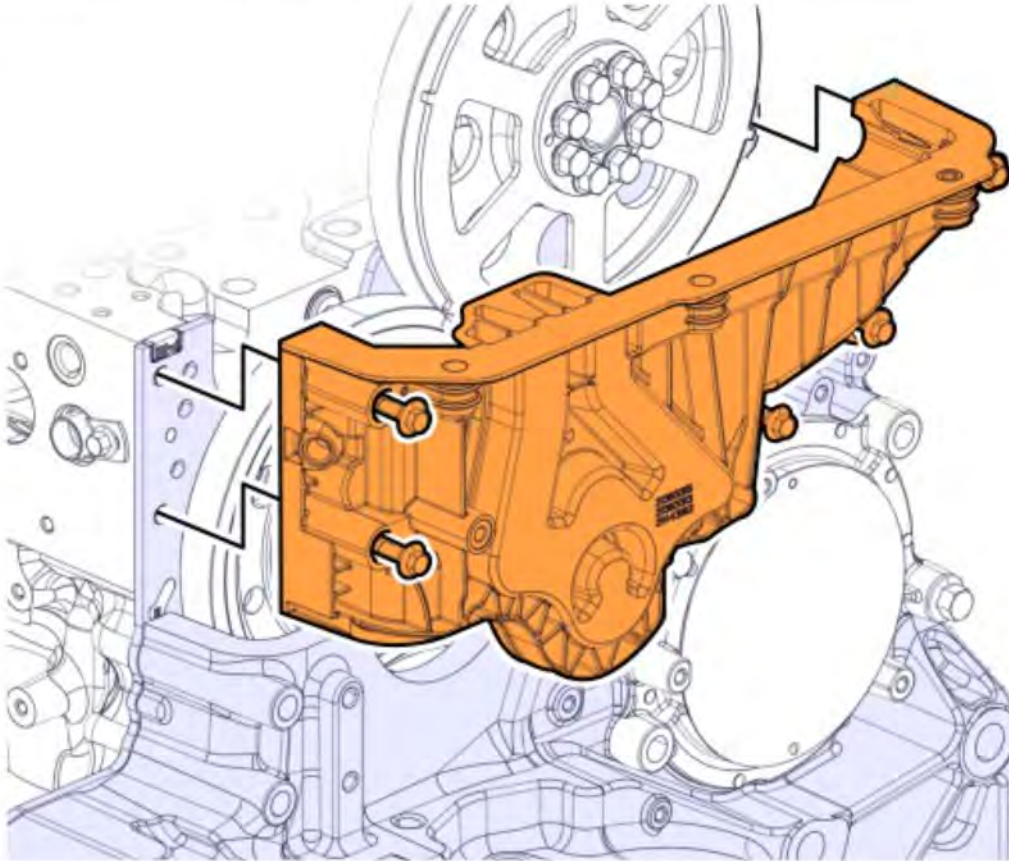
122 Remove the screws.



Service hint

The screws cannot be removed from the timing gear cover.

123 Remove the timing gear cover.

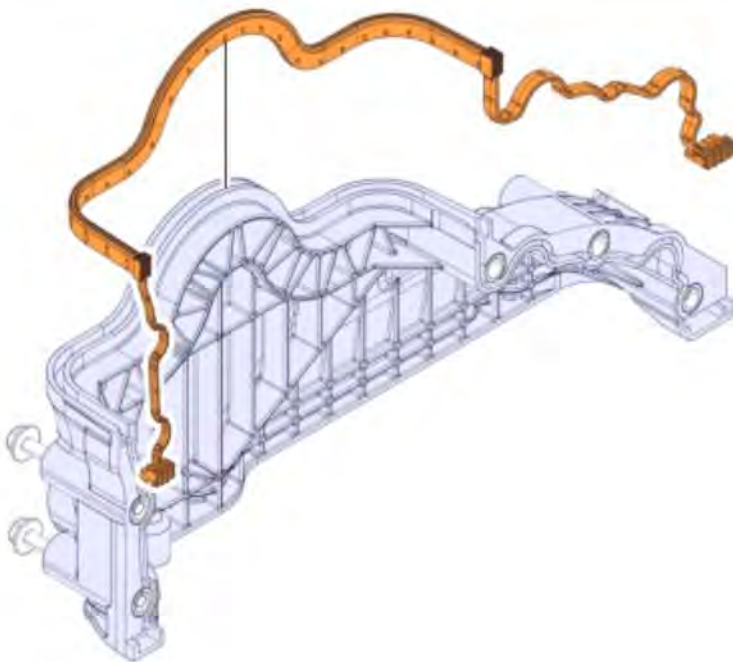


124 Remove the gasket.



Note

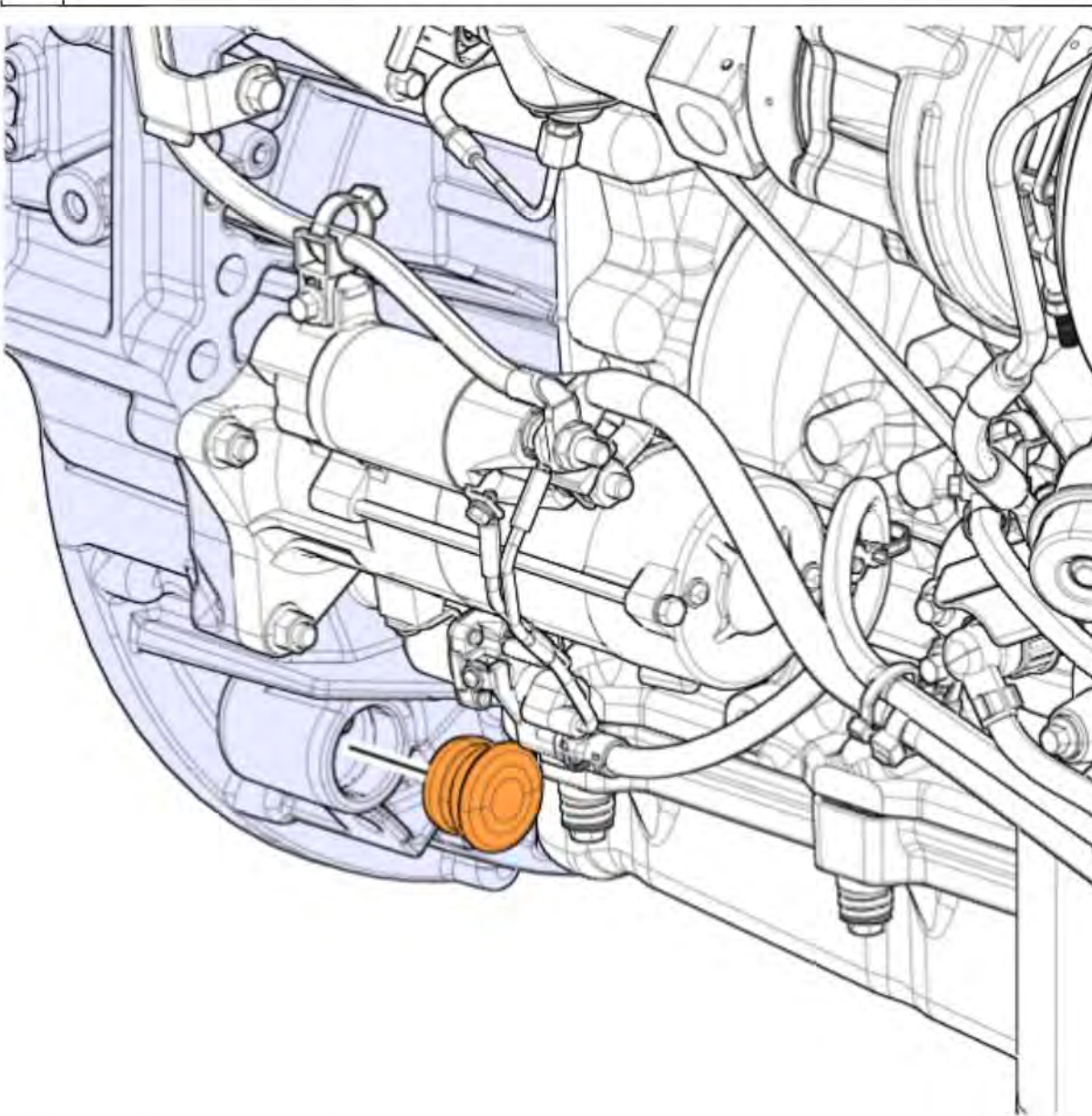
Discard the gasket.



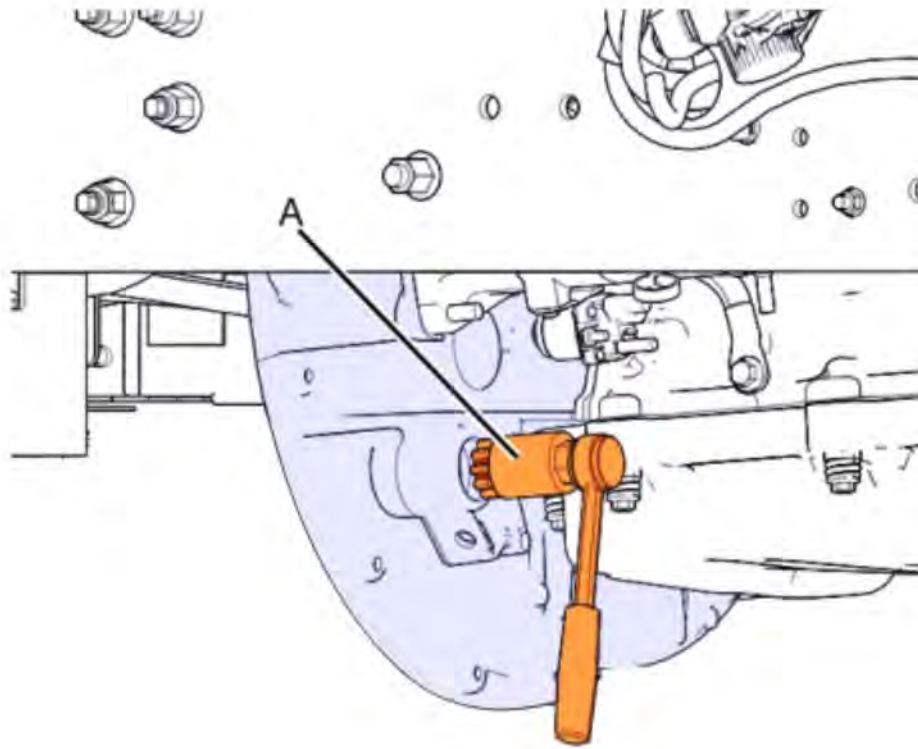
125 Remove the plug.

Copyright to this documentation belongs to the Volvo Group. No reproduction, copying, change, amendment or other similar disposal is entitled without prior written consent by the Volvo Group

The information contained herein is current at the time of its original distribution, but is subject to change. The reader is advised that printed copies are uncontrolled.

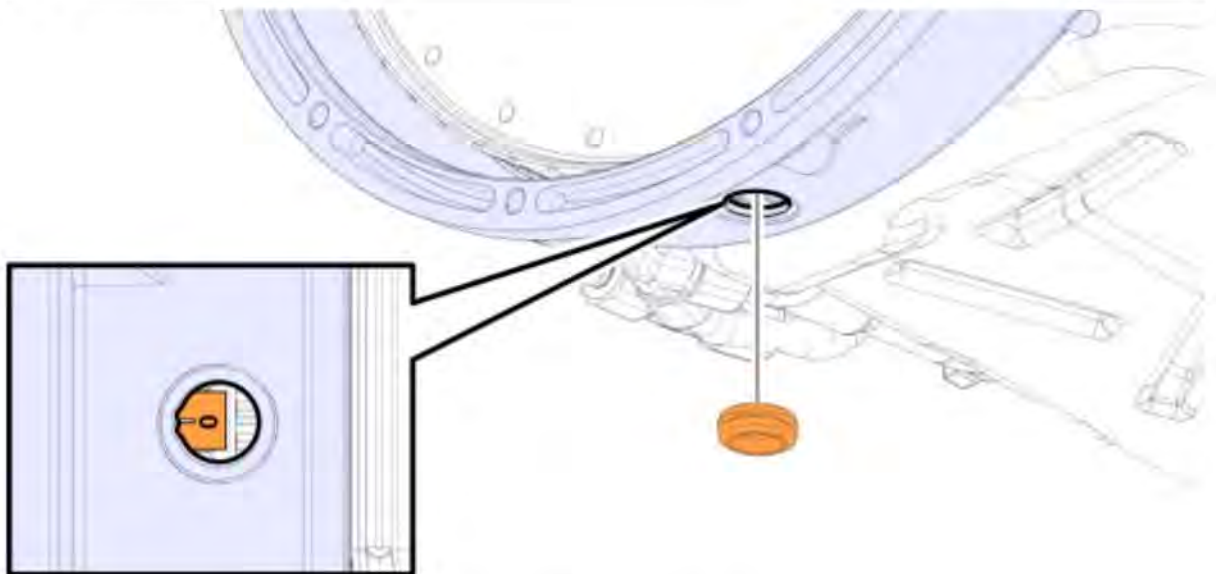


126	Install the cranking tool (A).	
Required material		
	CRANKING TOOL	88840317



127 Remove the plug.

128 Check the marking (0).



129 Perform this procedure when the condition below is met.

Conditions

- If the flywheel is not in the TDC (Top Dead Center) position.

- ▶ Rotate the flywheel to the TDC marking (0).



Note

Do not use power tools.

Copyright to this documentation belongs to the Volvo Group. No reproduction, copying, change, amendment or other similar disposal is entitled without prior written consent by the Volvo Group

The information contained herein is current at the time of its original distribution, but is subject to change. The reader is advised that printed copies are uncontrolled.



Note

Rotate the flywheel in the normal engine rotation direction.

130 This step contains 2 alternatives.

Select one of the valid alternatives below.

Alternative 1 / 2

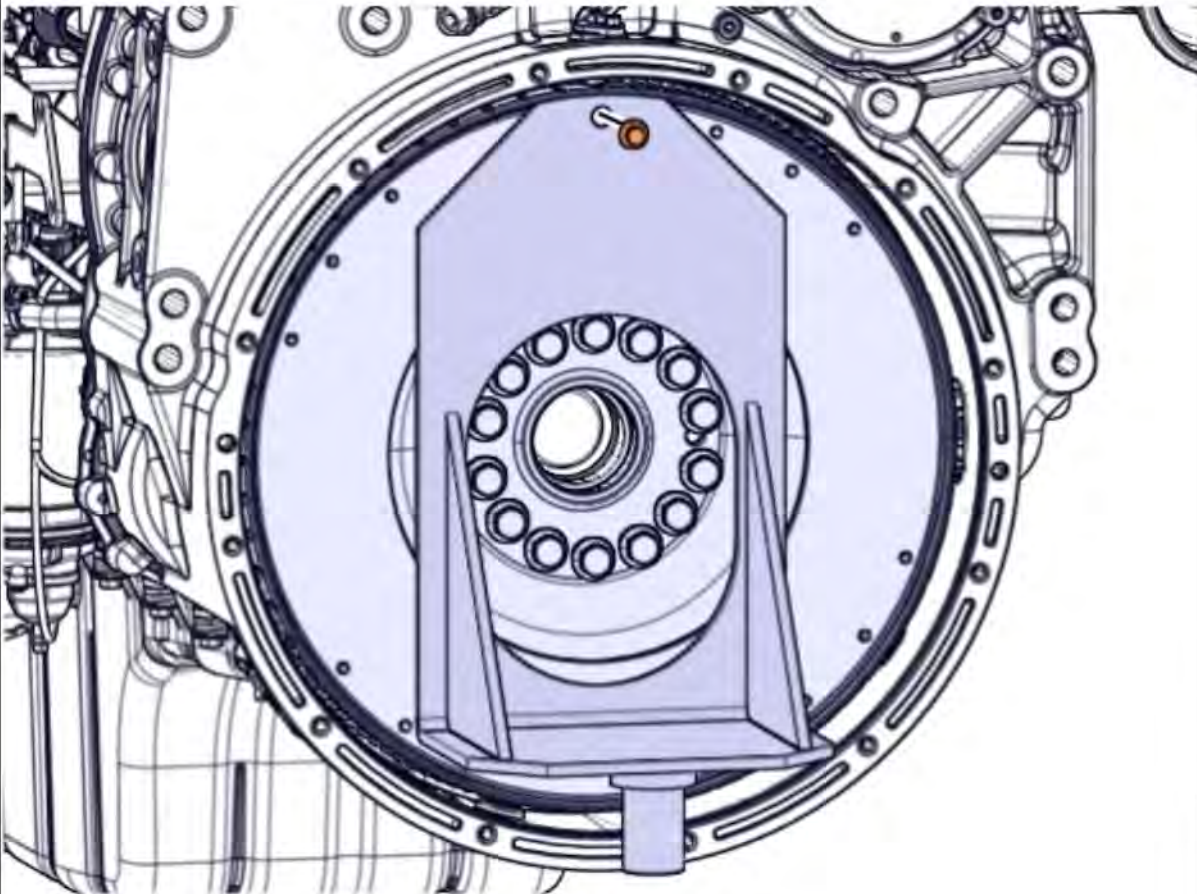
- ▶ Install the tool.

Required material

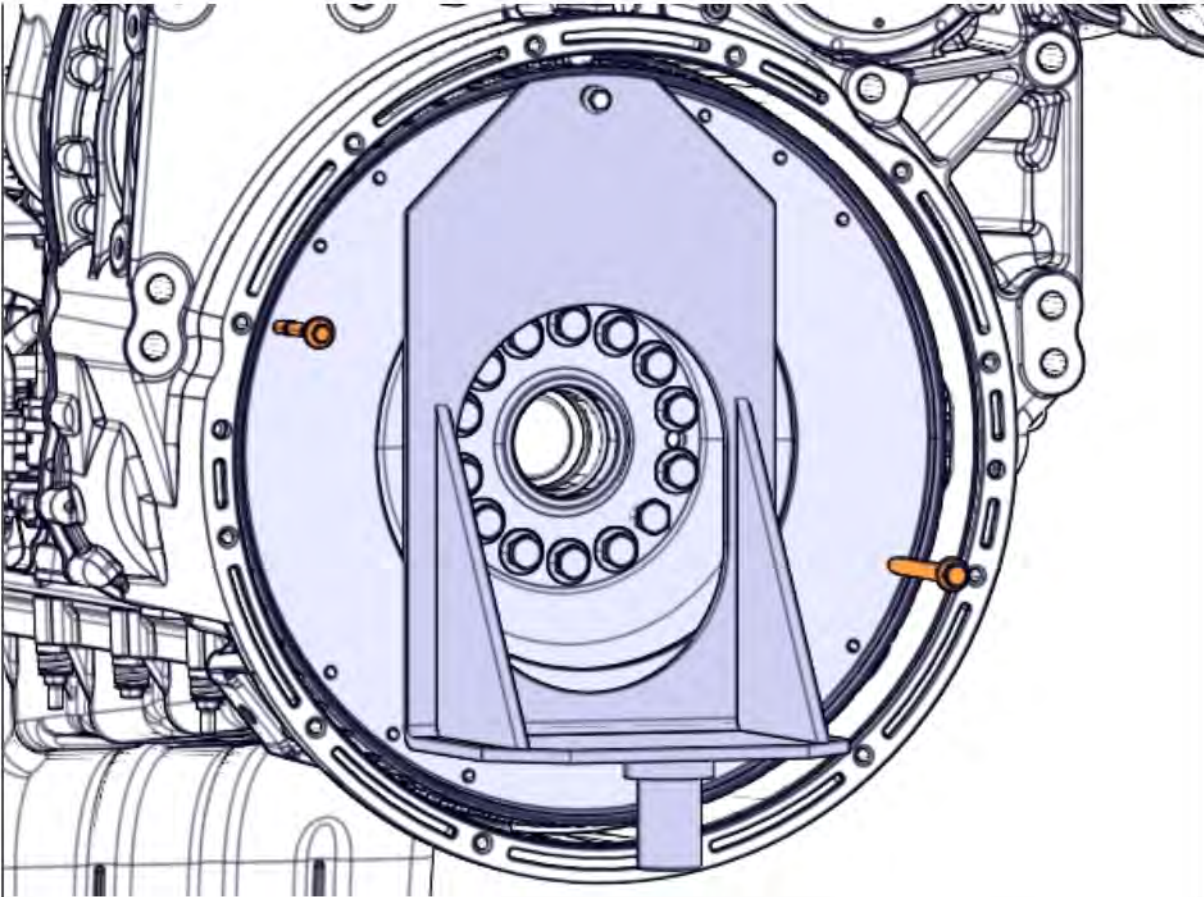
fixture

[88800570](#)

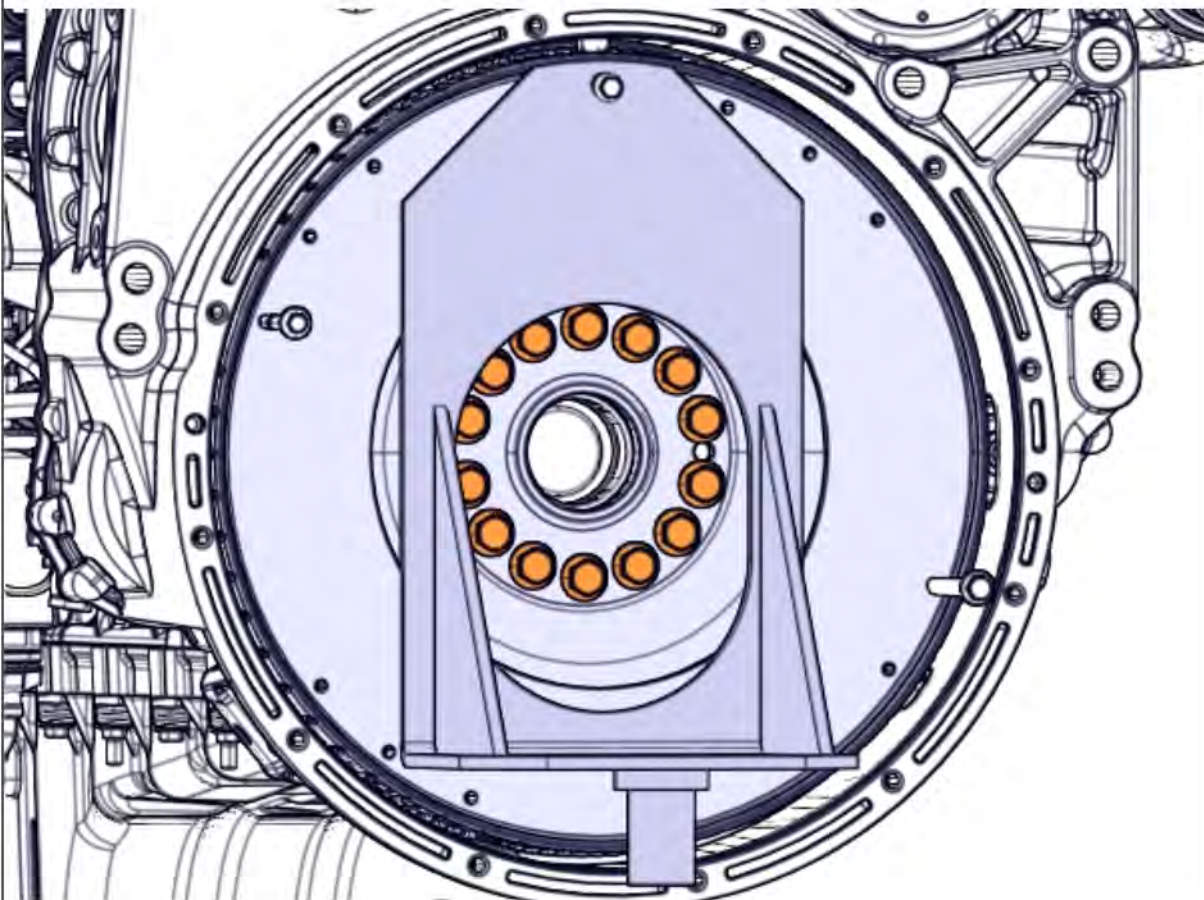
- ▶ Install the screw.



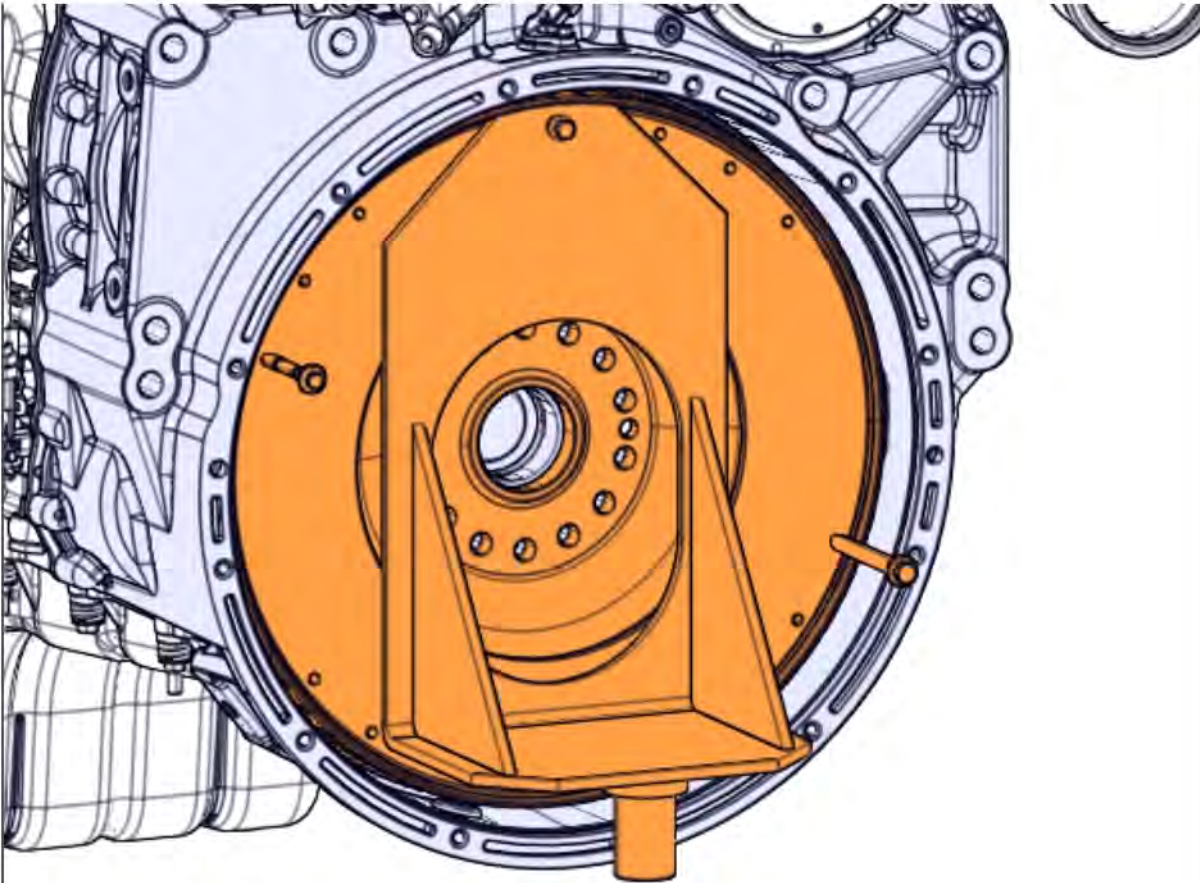
- ▶ Install the screws.



▶ Remove the screws.

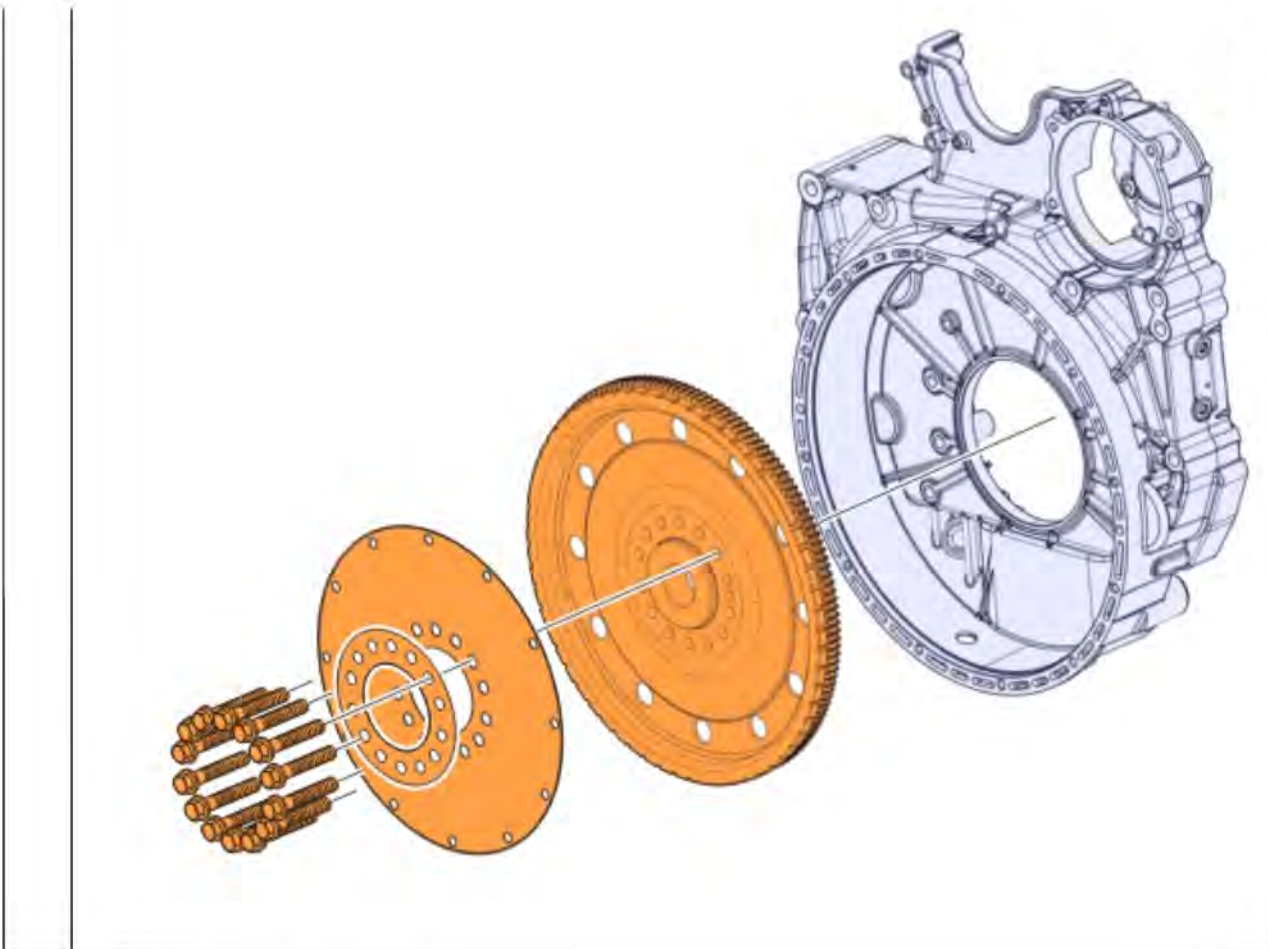


▶ Remove the flywheel.



Alternative 2 / 2

- ▶ Remove the screws.
- ▶ Remove the thrust plate.
- ▶ Remove the flexplate.
- ▶ Remove the flywheel.



131 Position a draining container.



WARNING

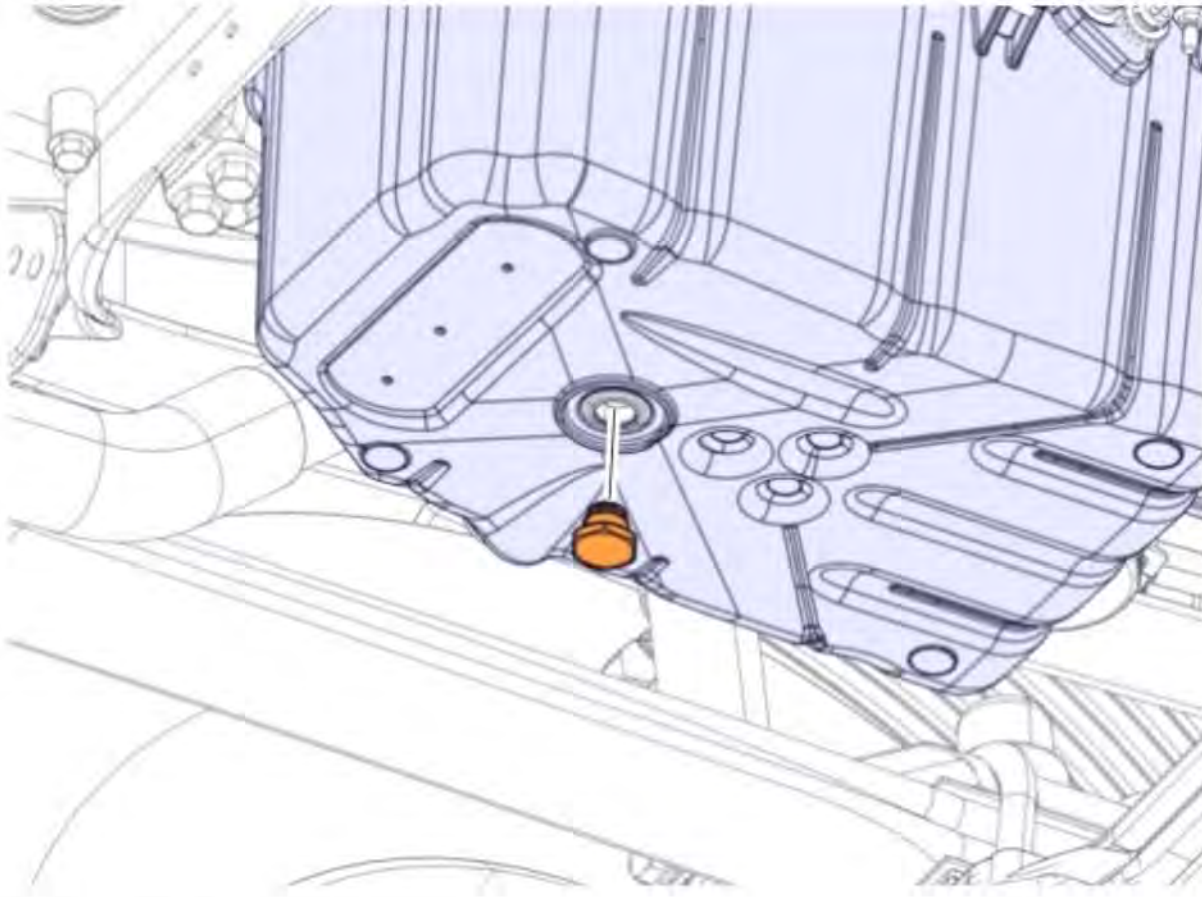
Risk of serious burns.

Contact with a hot engine or hot engine oil can cause serious burns.

- ▶ Take precautions when draining the oil. Wear gloves and let the engine cool down before draining.

132 Remove the drain plug.

133 Drain the oil.





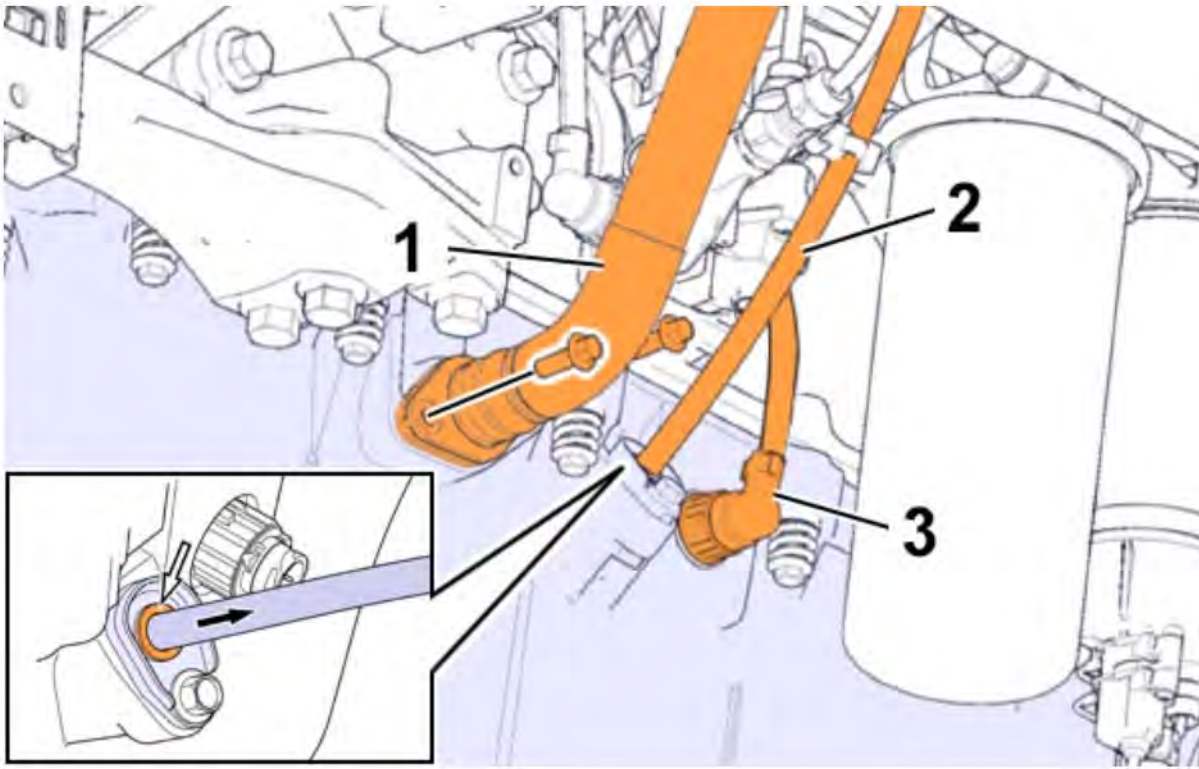
134	Install the drain plug.		
	<table border="1" style="width: 100%;"> <tr> <td style="width: 10%; text-align: center;">i</td> <td>Note Always use a new gasket.</td> </tr> </table>	i	Note Always use a new gasket.
i	Note Always use a new gasket.		

135	Torque tighten the plug.	
	Tightening torque	
	Oil pan, drain plug	60 ±10 Nm (44 ±7 lb _f ·ft)

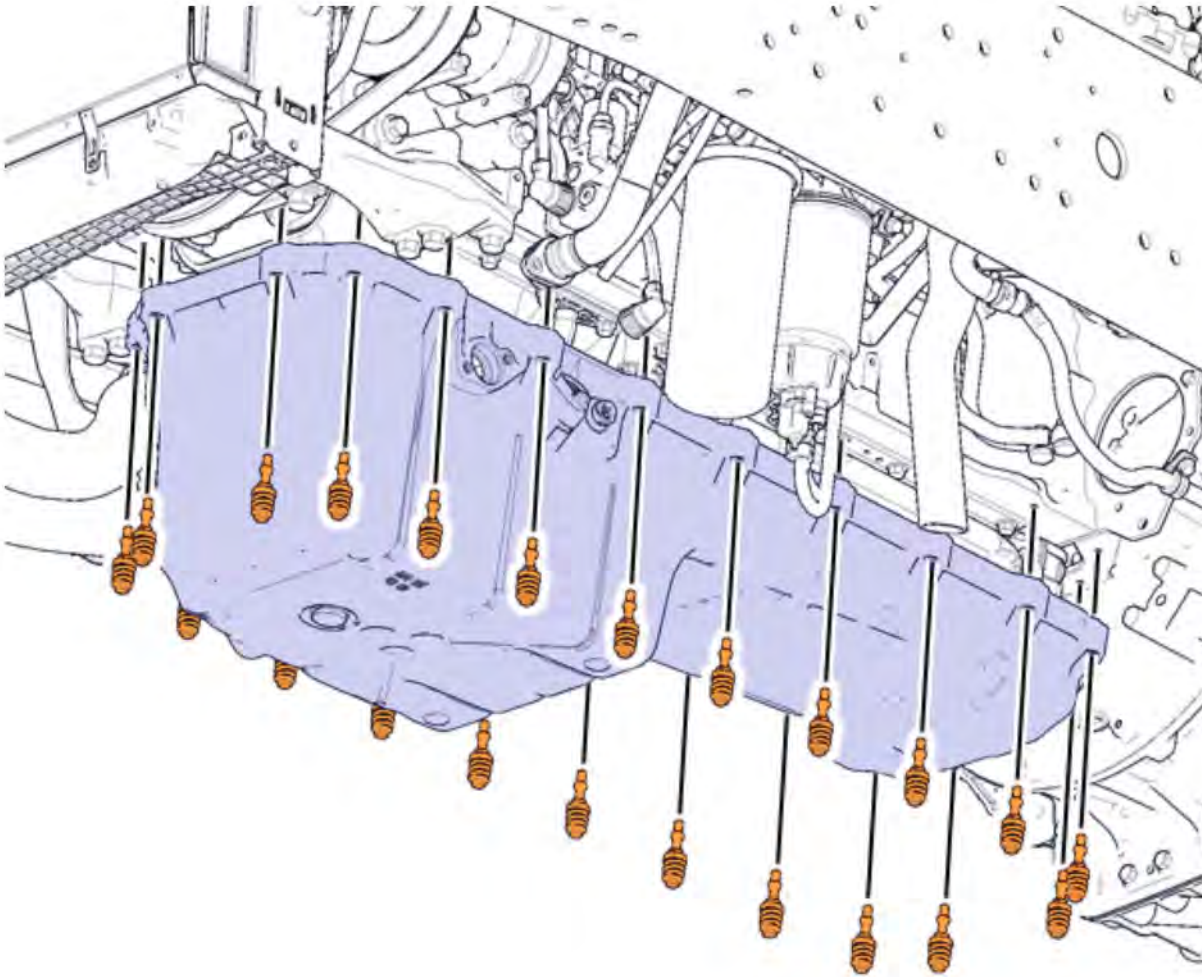
136	Remove the dipstick.	
	Tech data	
	The distance the dipstick is drawn out from the outer casing	≈ 0.5 m (1 ft – 7.7 in)



137	Disconnect the connector (3).
138	Depress the release ring (2) remove the dipstick pipe.
	Note Pull to remove.
	Note Use a suitable tool to depress.
139	Remove the screws.
140	Remove the pipe (1).



141	Remove the screws.
-----	--------------------

**142** Remove the oil pan.**Note**

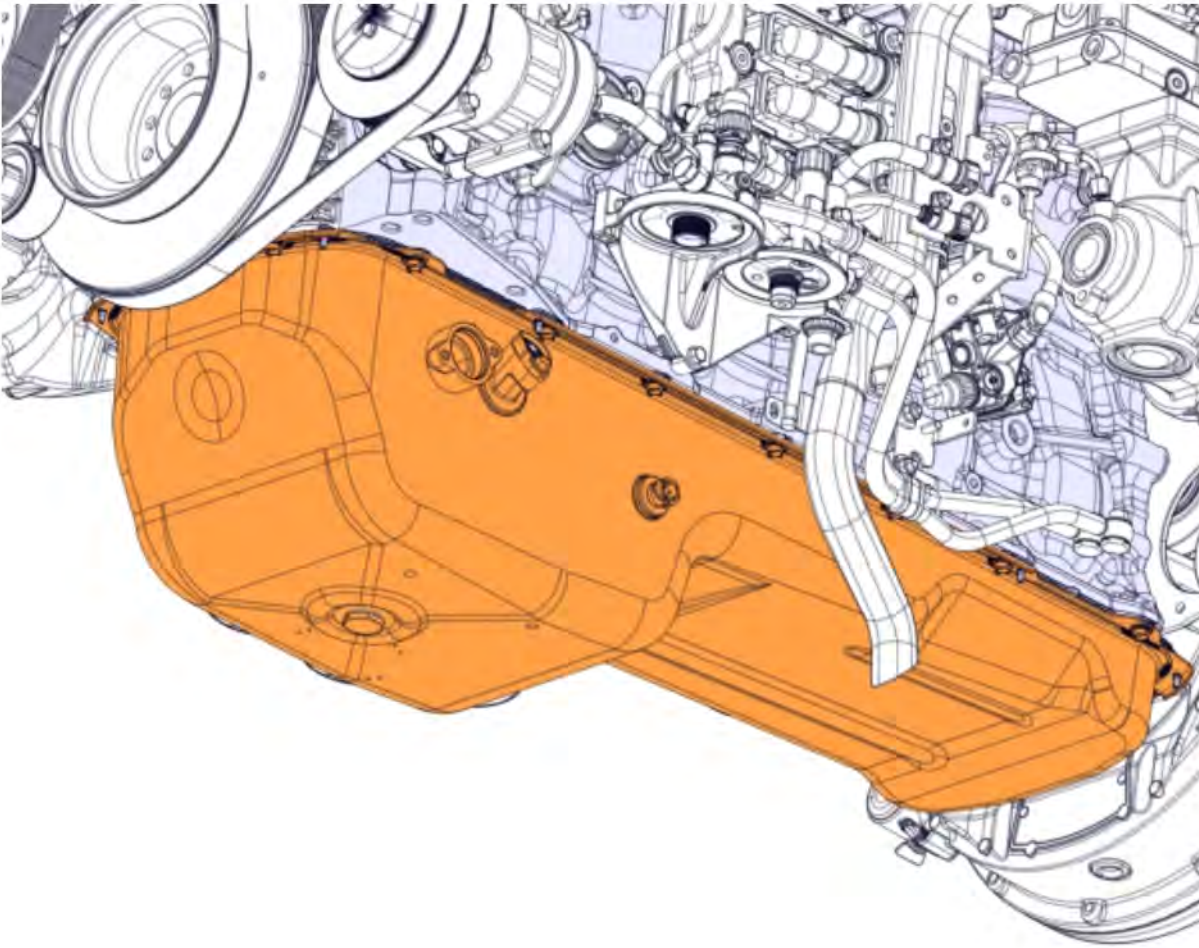
Get help if needed.

**Note**

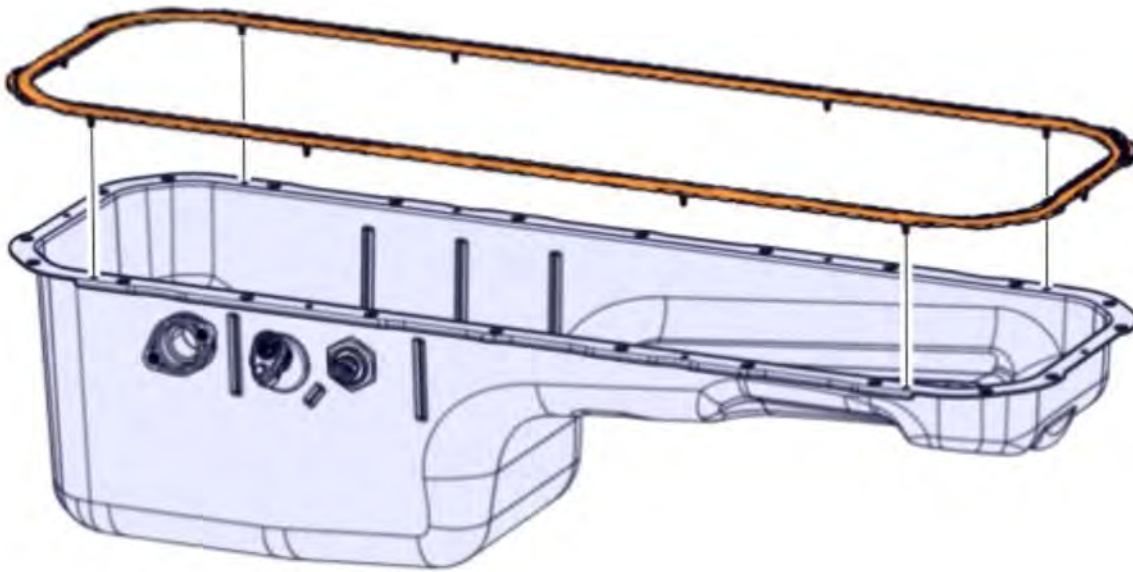
Lower the component carefully.

**Note**

Ensure that there is no damage to the oil pickup tube and oil pump gear.

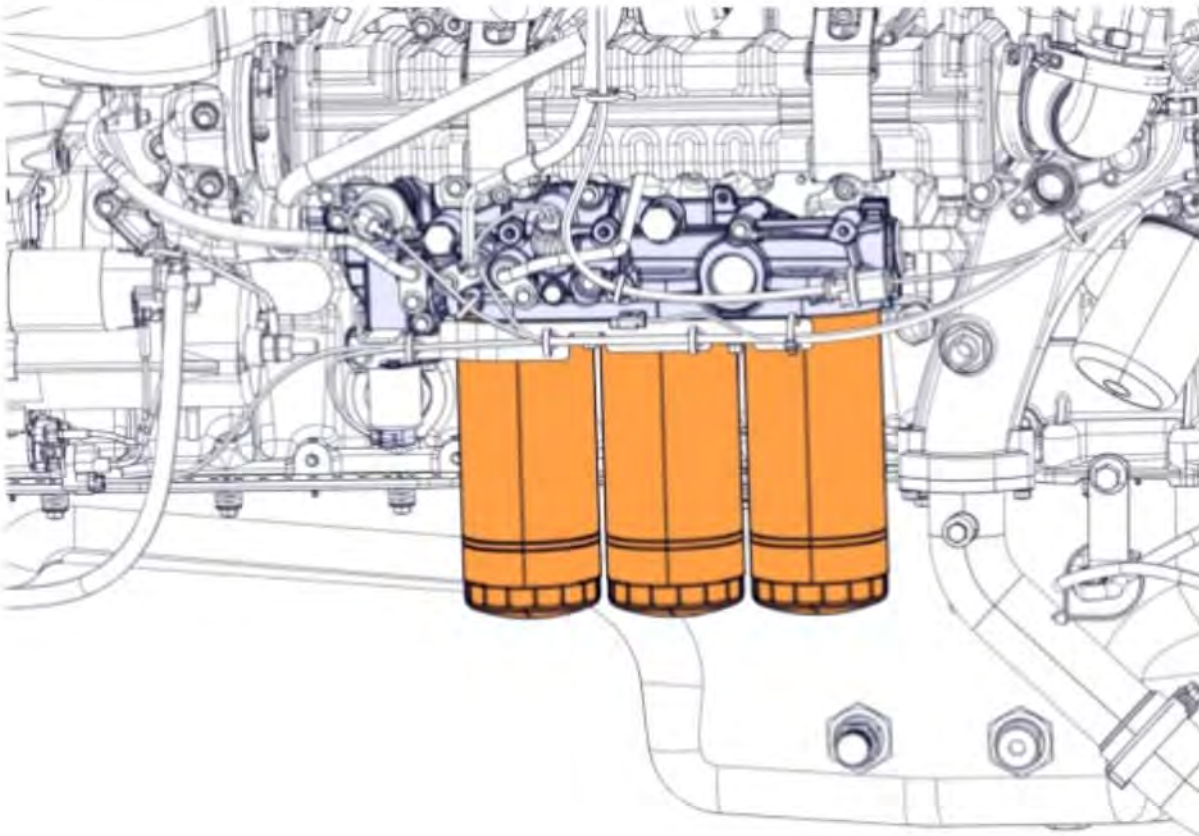


143	Remove the gasket.
-----	--------------------



144	Clean the oil filter housing.
-----	-------------------------------

145	Remove the oil filters.
-----	-------------------------



146 This step contains 2 alternatives.
 Select one of the valid alternatives below.

Alternative 1 / 2

Conditions

- Old variant of seal

▶ Install tool (B) on tool (A).

Required material

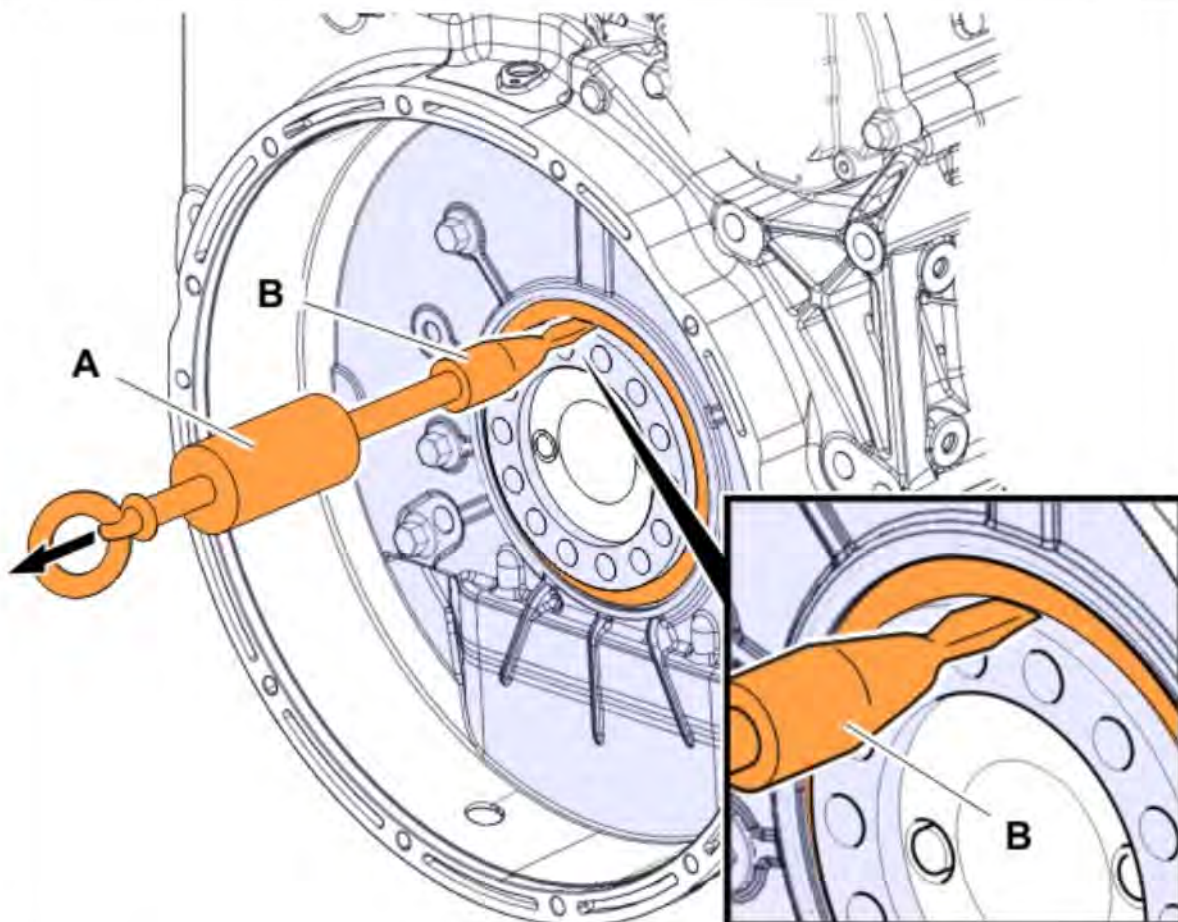
IMPACT WRENCH	9996400
puller	9990192

i Note
 Ensure that the tools are clean and intact.

▶ Insert the puller (B) between the seal and the crankshaft using an impact wrench (A).

i Note
 Take care not to damage the crankshaft surface.

▶ Remove the seal.



Alternative 2 / 2

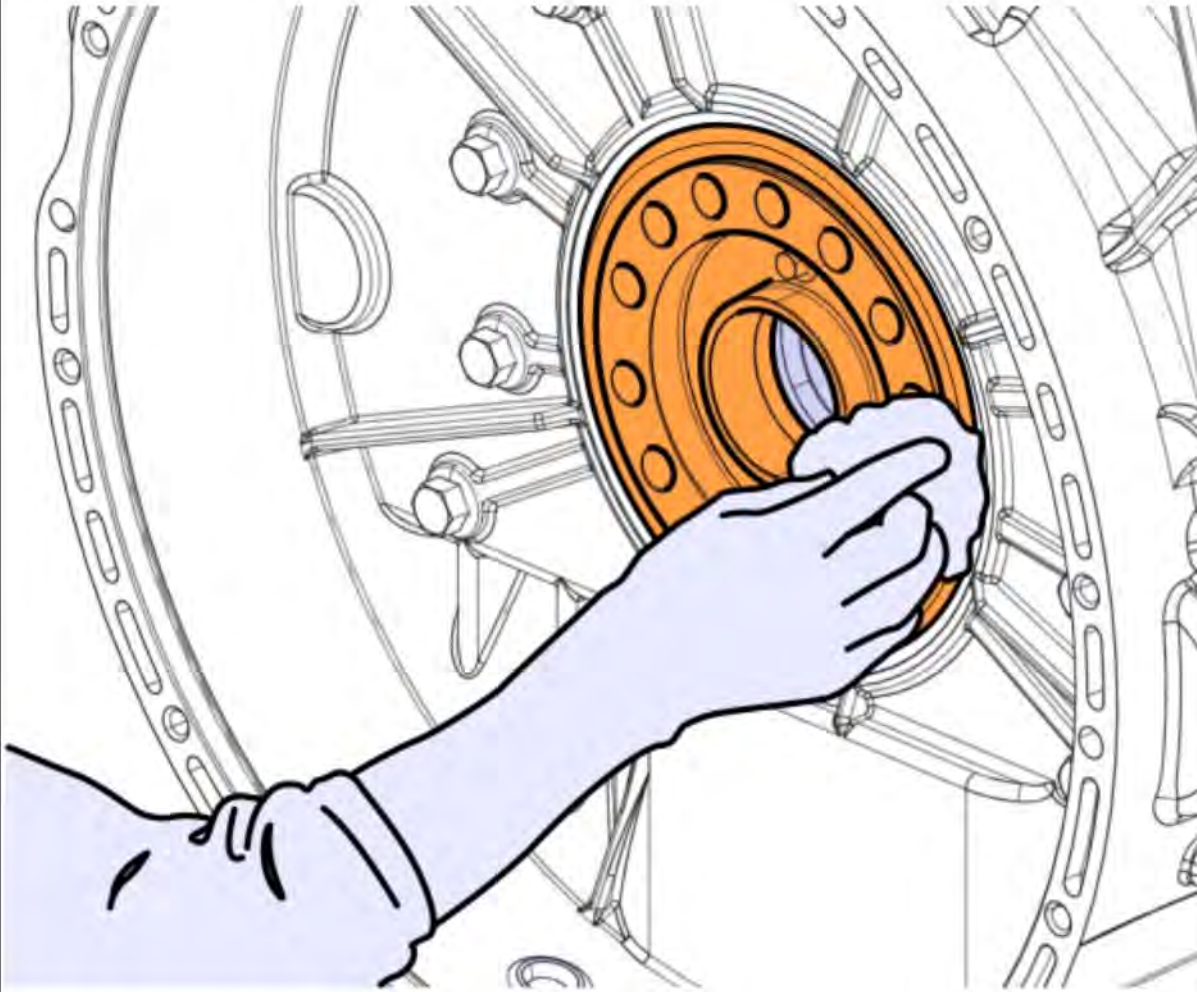
Copyright to this documentation belongs to the Volvo Group. No reproduction, copying, change, amendment or other similar disposal is entitled without prior written consent by the Volvo Group

The information contained herein is current at the time of its original distribution, but is subject to change. The reader is advised that printed copies are uncontrolled.

Conditions

- New variant of seal

- ▶ Clean the area around the seal.



- ▶ Release the seal.



Service hint

Tap the seal to loosen it from the contact surfaces.



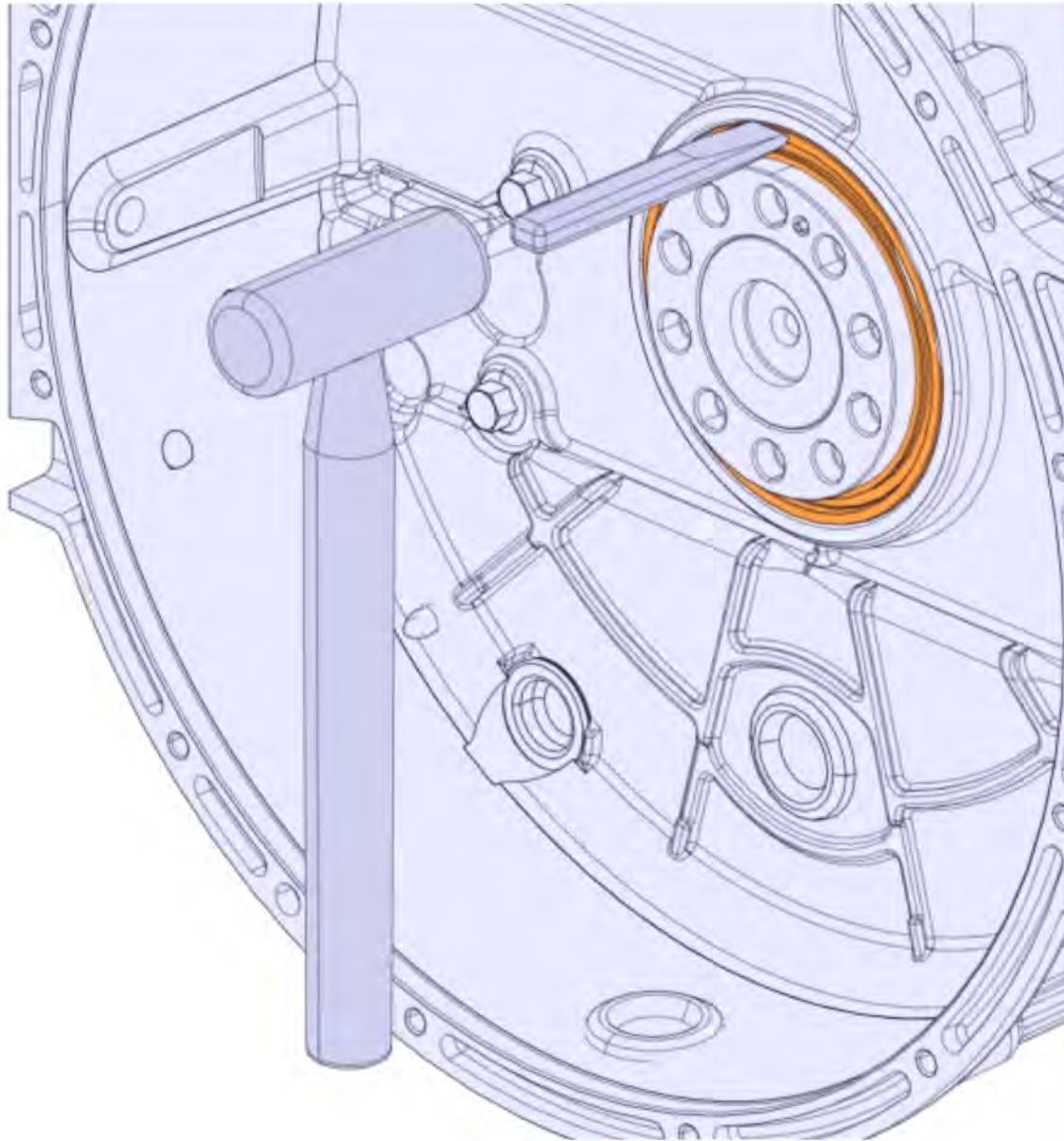
Service hint

Use a plastic chisel and a hammer.



Service hint

Lubricate the contact surfaces to facilitate removal of the seal.



► Install the tool.

Required material

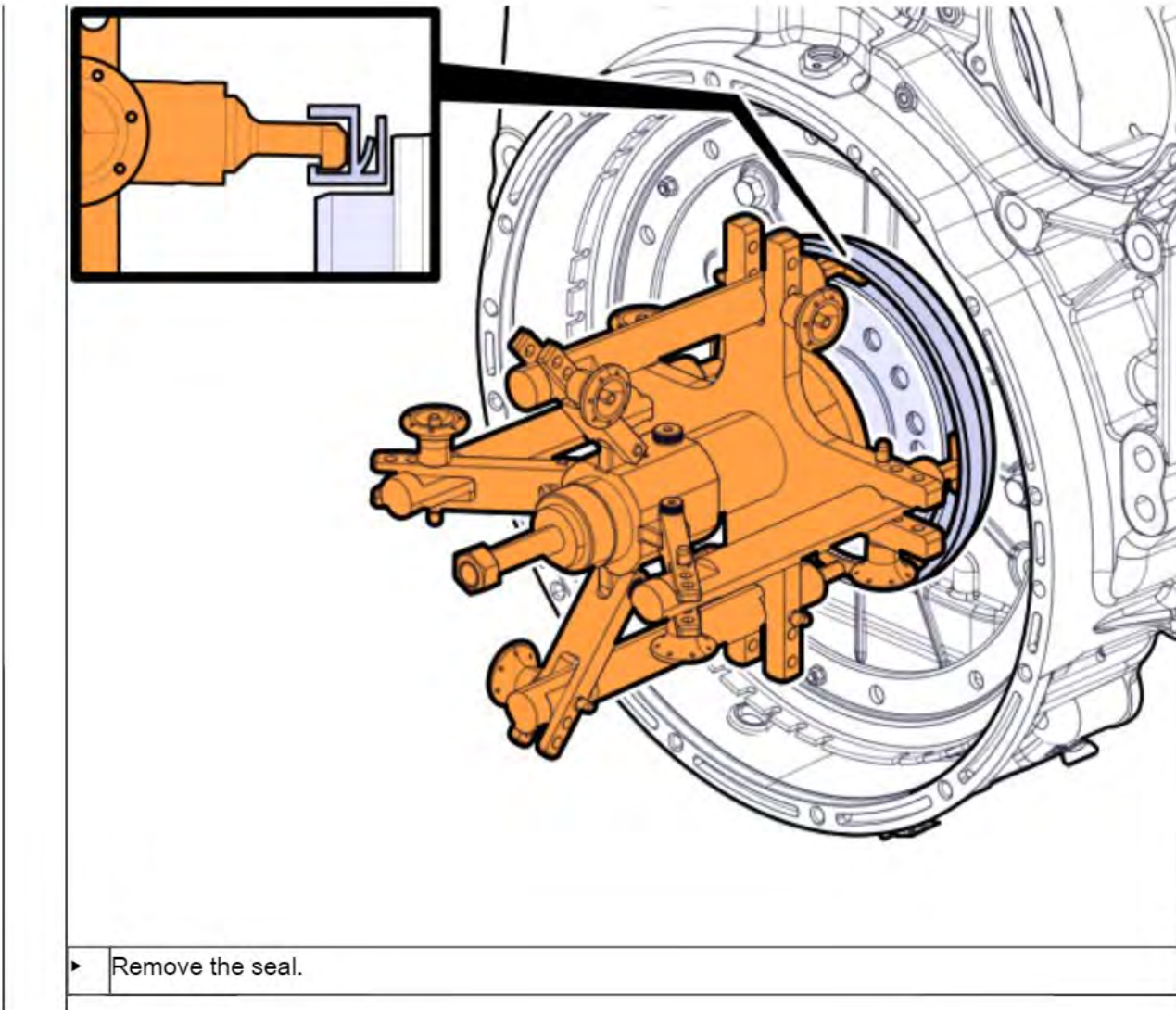
DISASSEMBLY TOOL

[88800502](#)



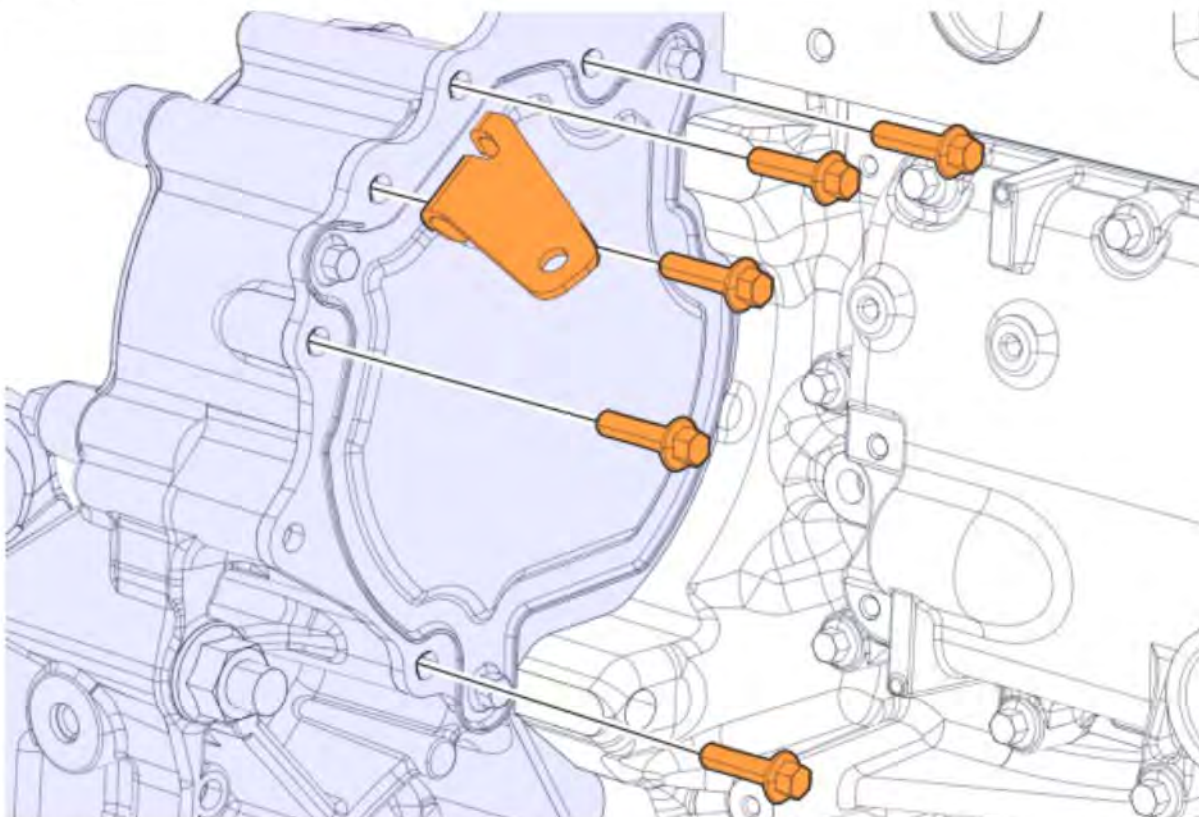
Note

The arms of the tool can be adjusted to different diameters.



▶ Remove the seal.

147 Remove the screws and bracket.



Copyright to this documentation belongs to the Volvo Group. No reproduction, copying, change, amendment or other similar disposal is entitled without prior written consent by the Volvo Group

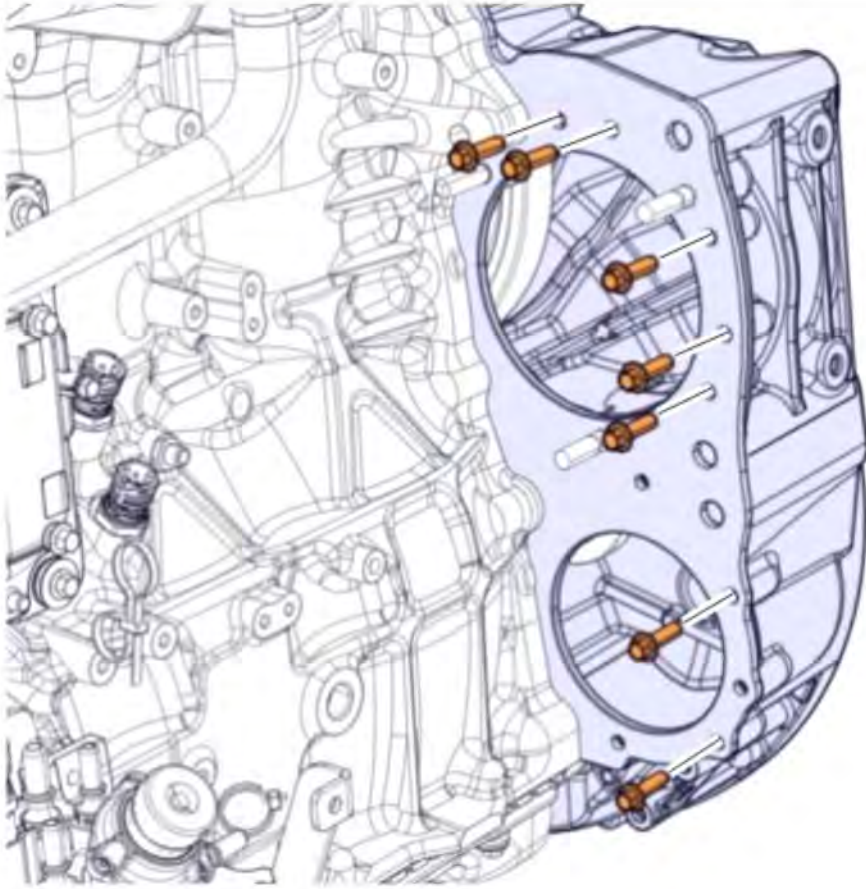
The information contained herein is current at the time of its original distribution, but is subject to change. The reader is advised that printed copies are uncontrolled.

148 Remove the screws.

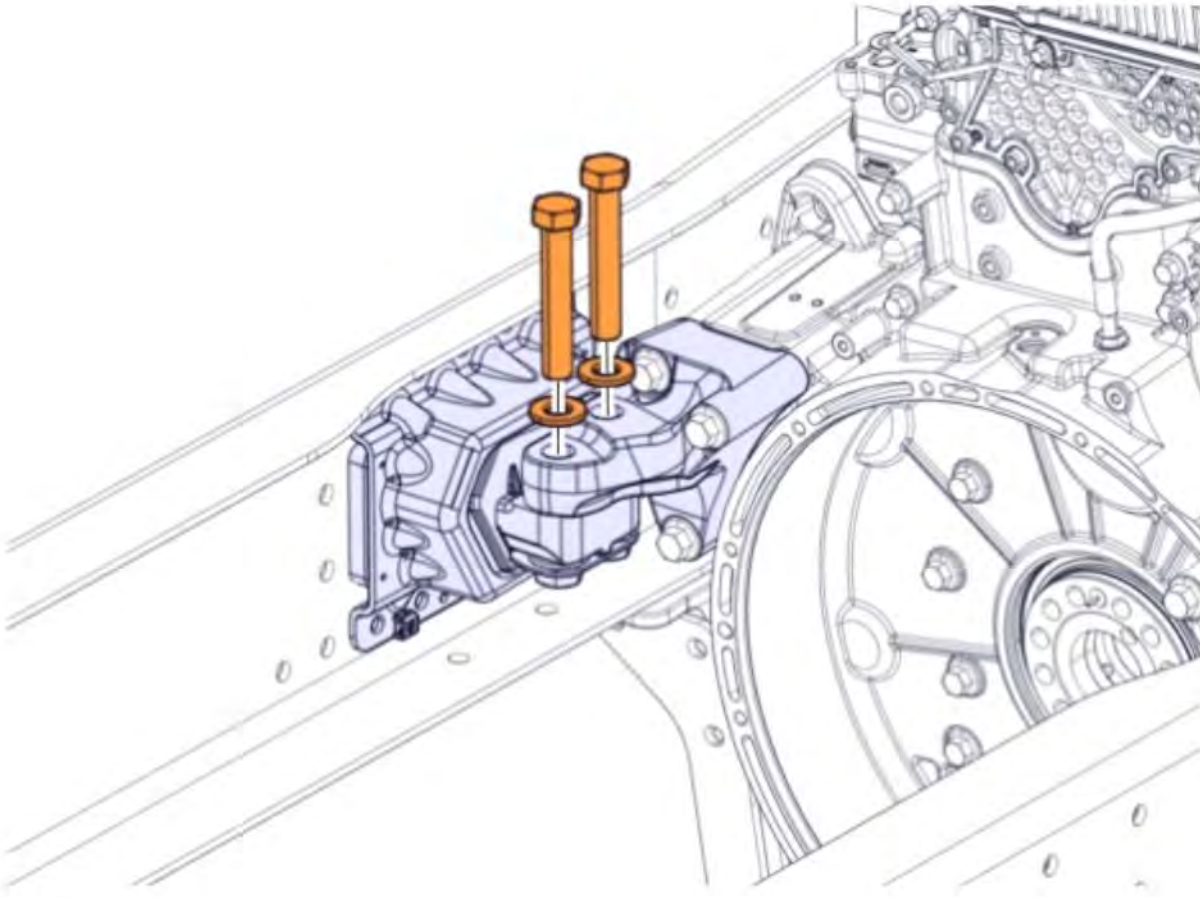


Note

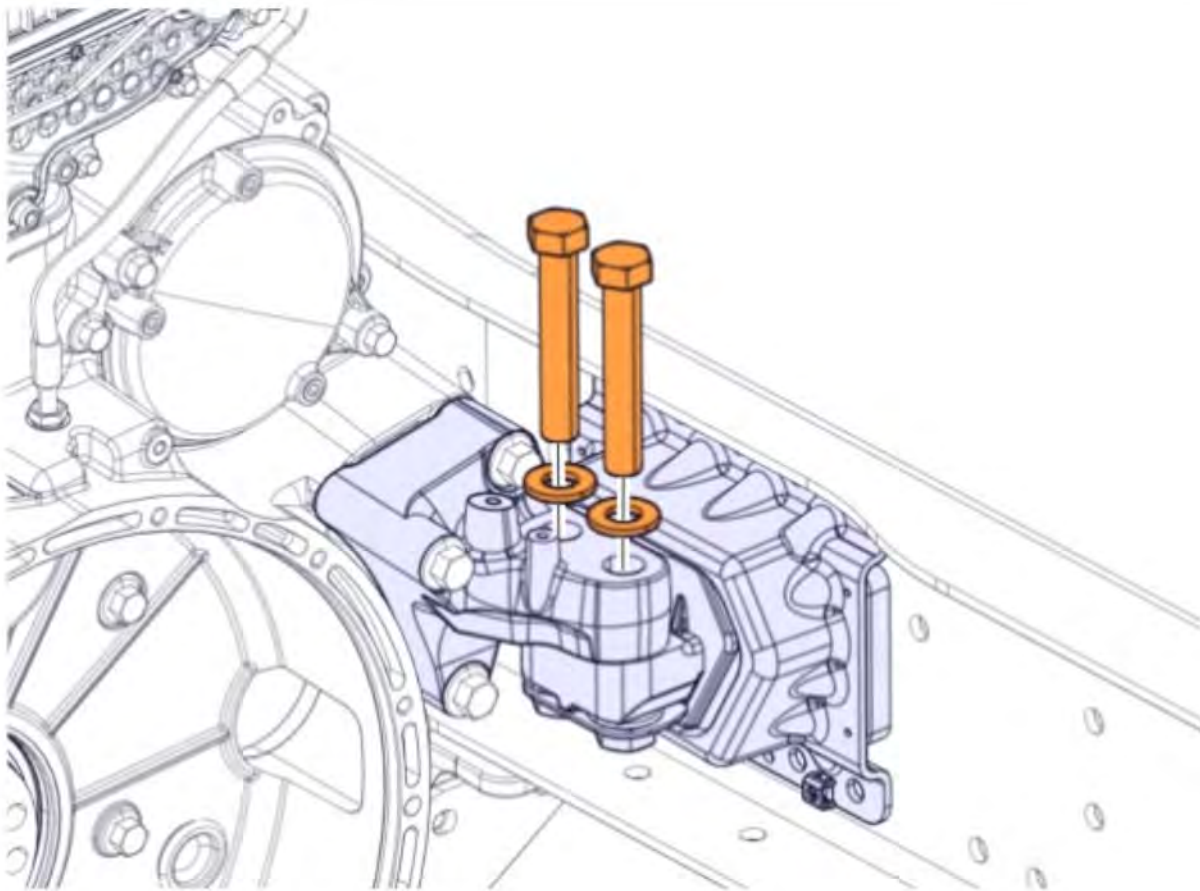
Some housings may not include all the screws shown.



149 Remove the screws.



150 Remove the screws.



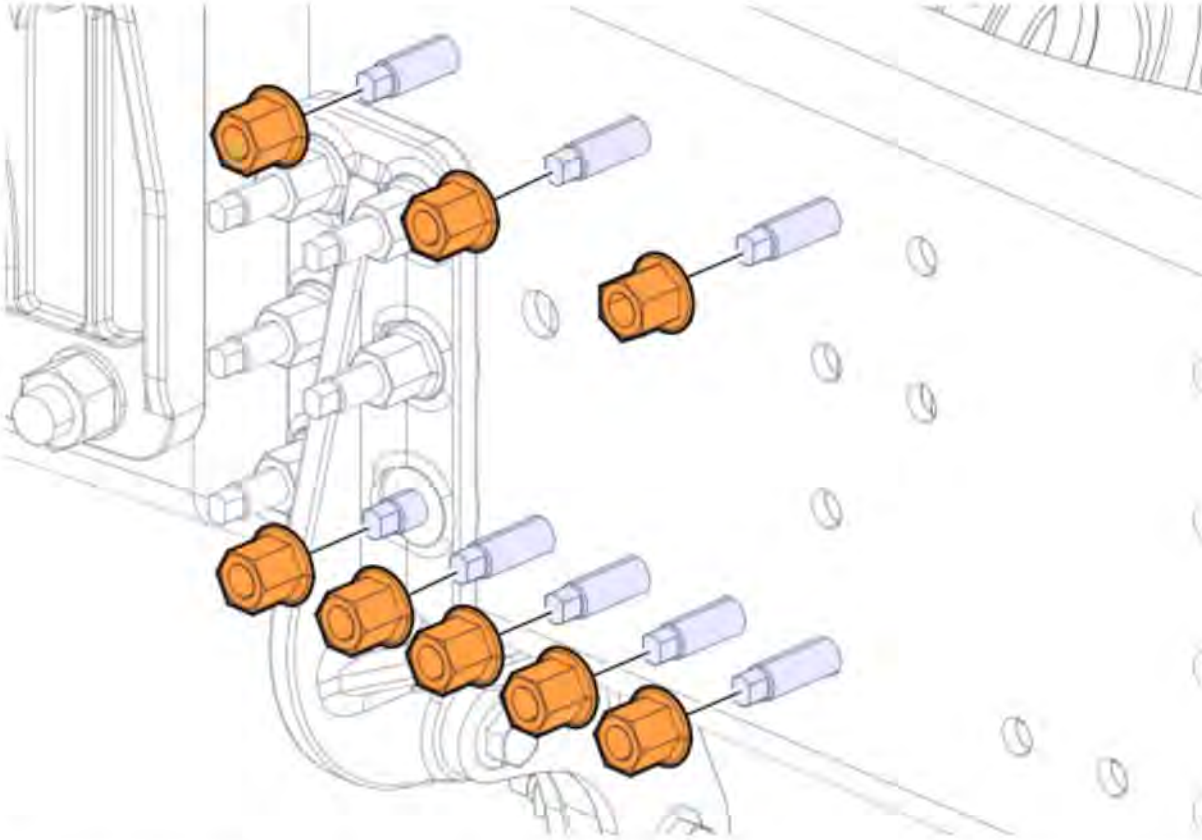
	CAUTION
---	----------------

Risk of serious injury.
Heavy component.

▶ Exercise caution when moving the component. Use appropriate tools.

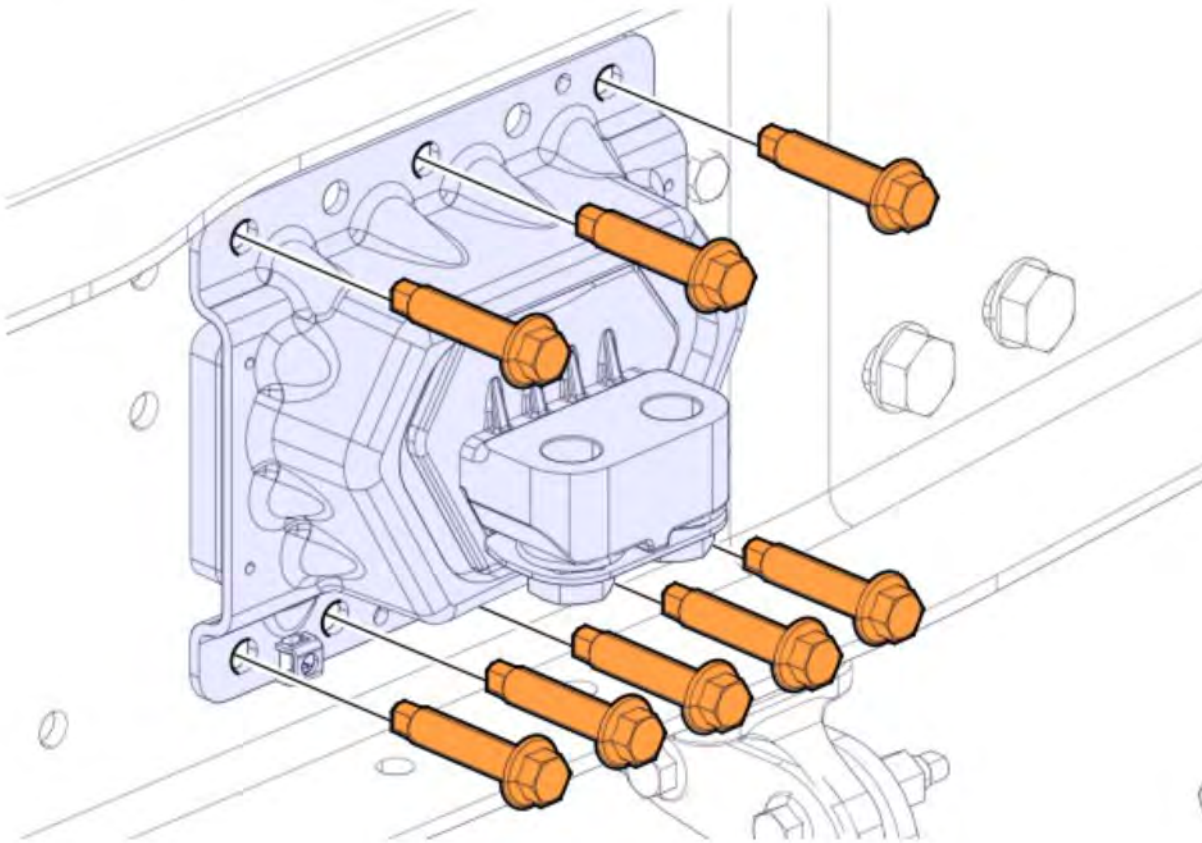
151	Safely lift and support the engine.
------------	-------------------------------------

152	Remove the nuts.
------------	------------------

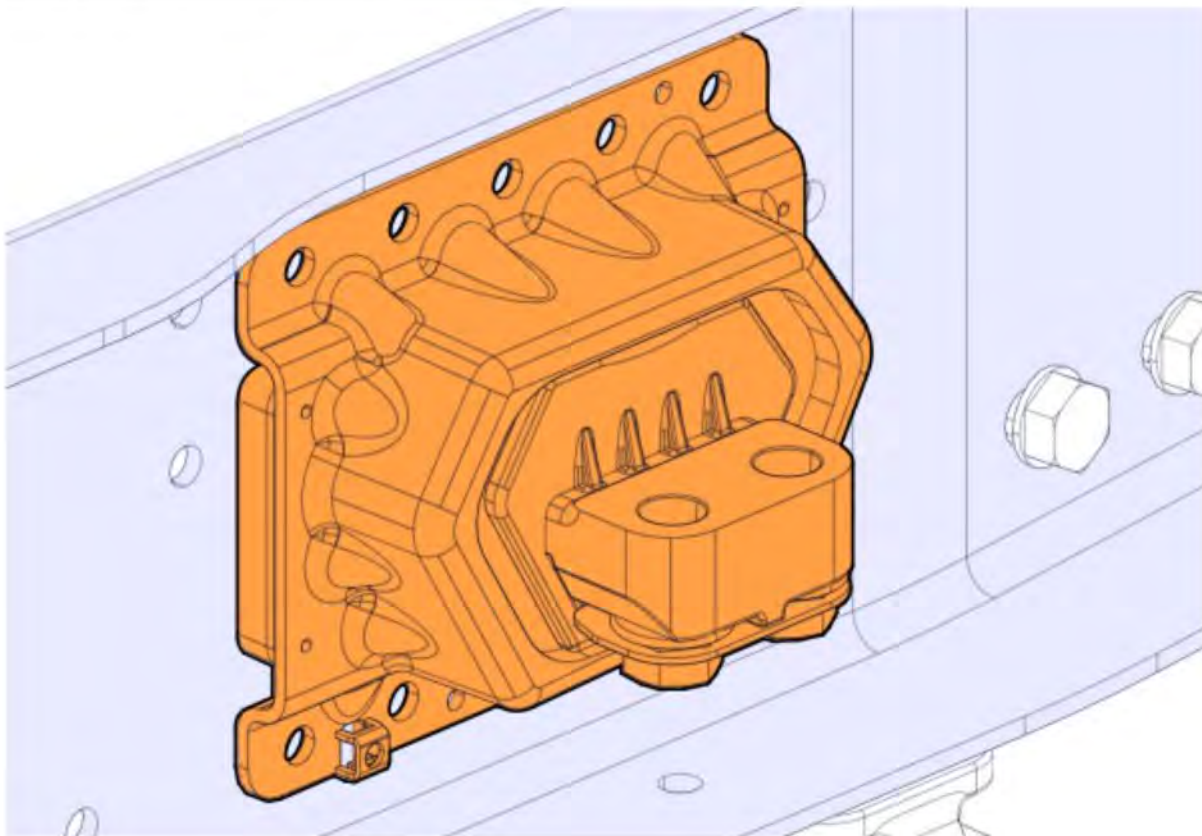


153	Perform this procedure when the condition below is met.
	Conditions
	<ul style="list-style-type: none"> • If the screw has a non-removable nut
	▶ Cut the nut to remove it.

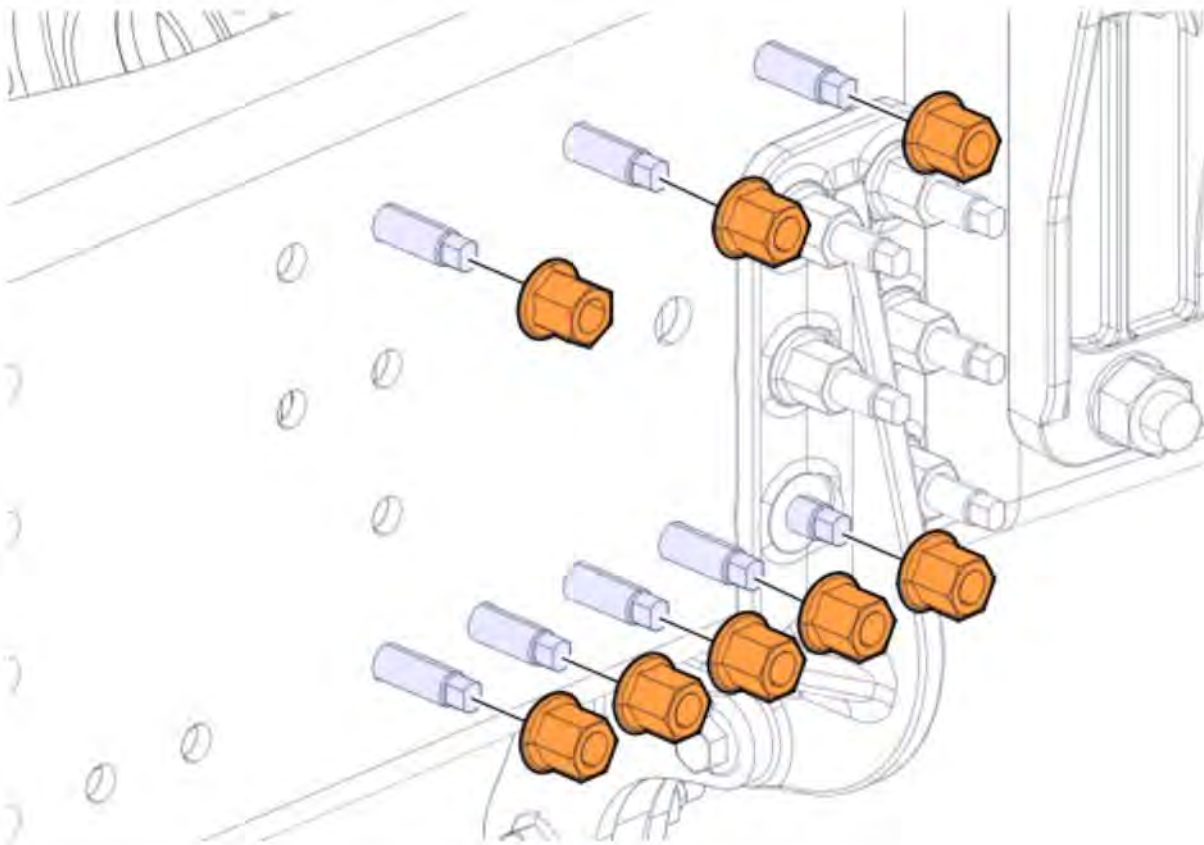
154	Remove the screws.
------------	--------------------



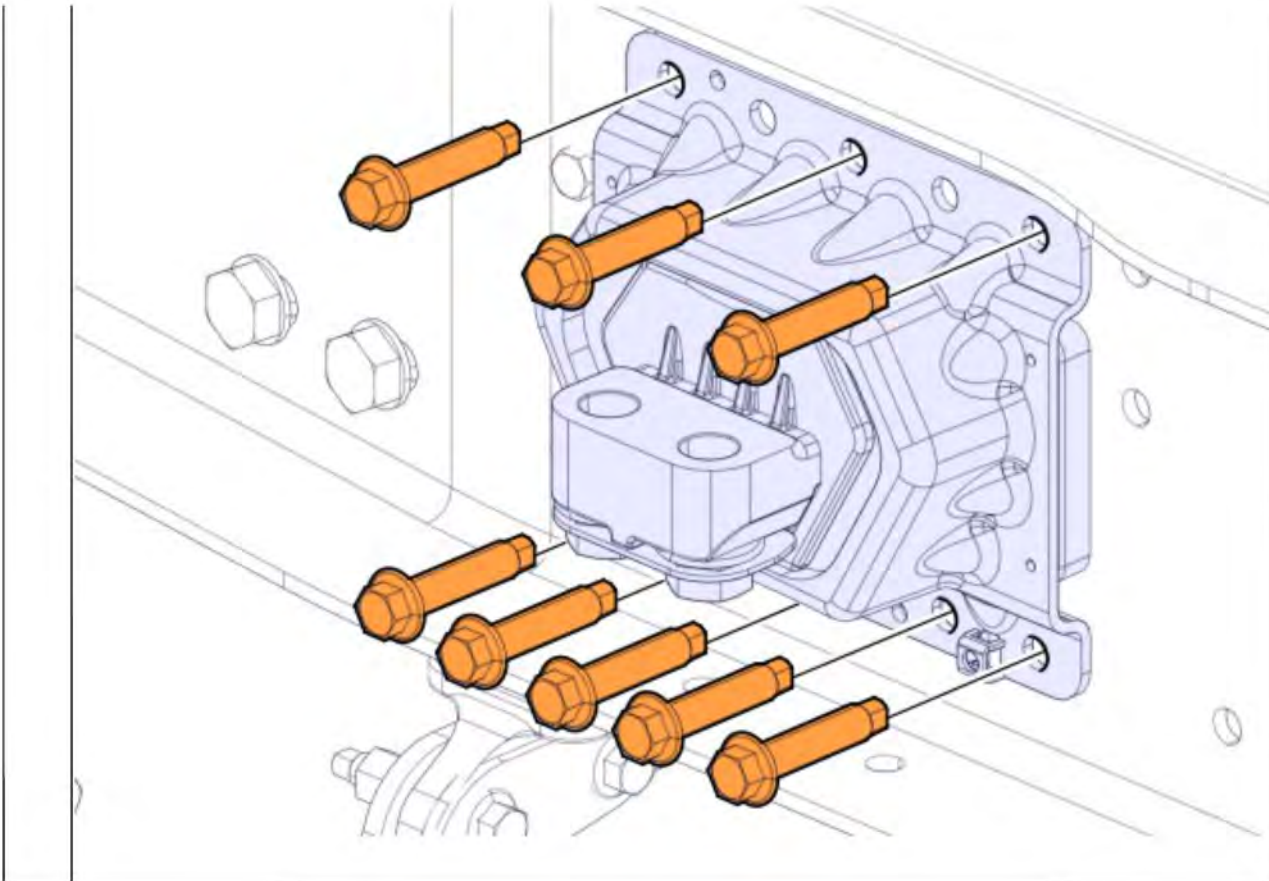
155 Remove the rubber cushion.



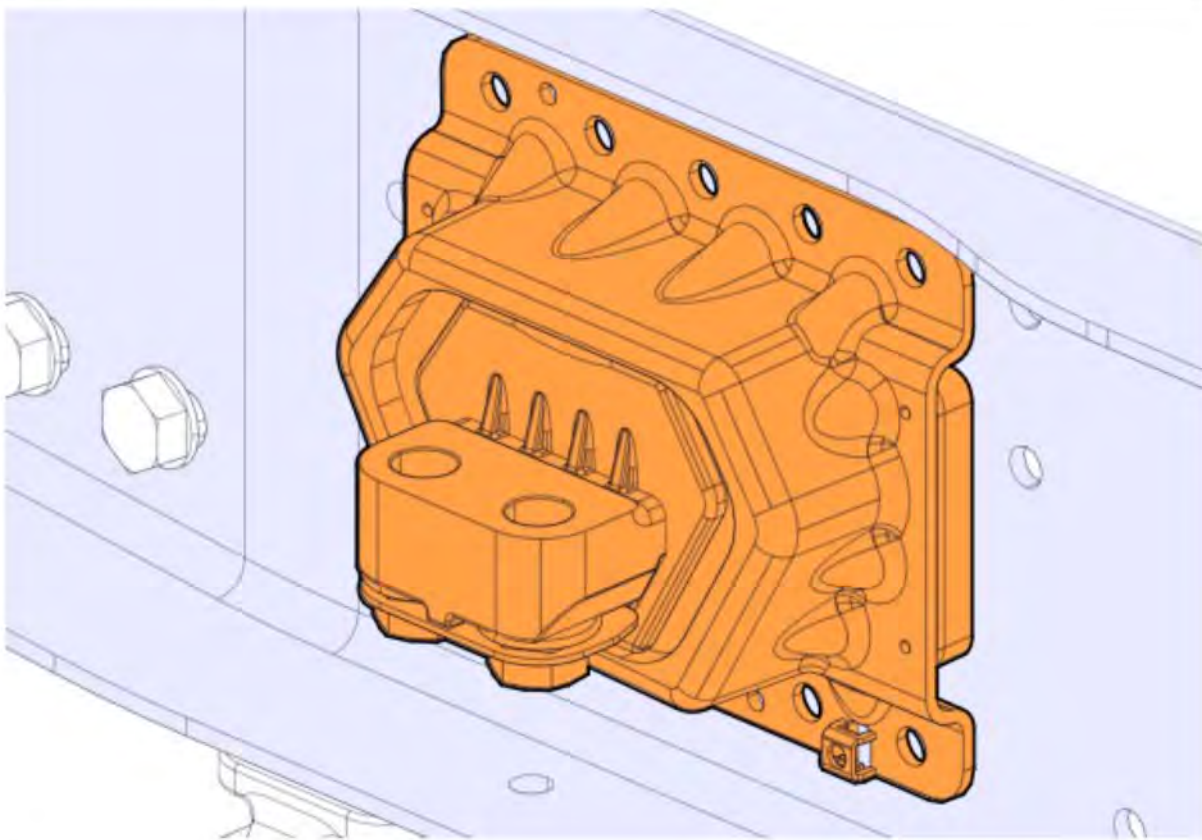
156 Remove the nuts.



157	Perform this procedure when the condition below is met.
	Conditions
	<ul style="list-style-type: none"> • If the screw has a non-removable nut
	<ul style="list-style-type: none"> ▶ Cut the nut to remove it.
	<ul style="list-style-type: none"> ▶ Remove the screws.

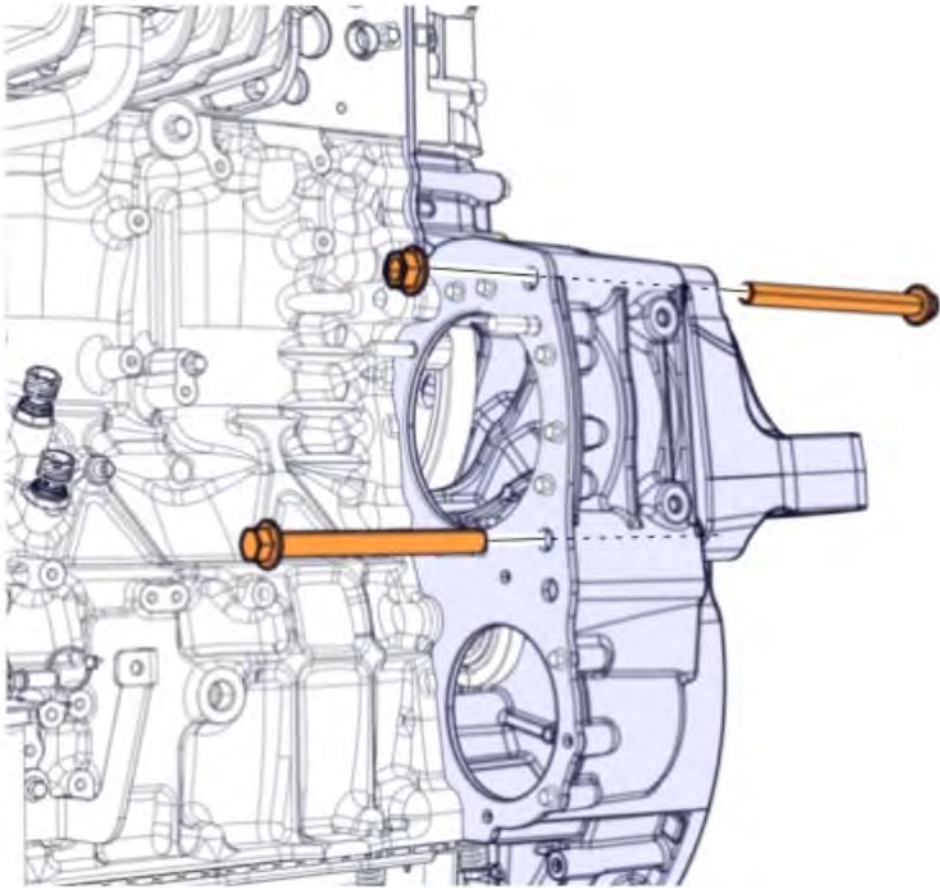


158 Remove the rubber cushion.



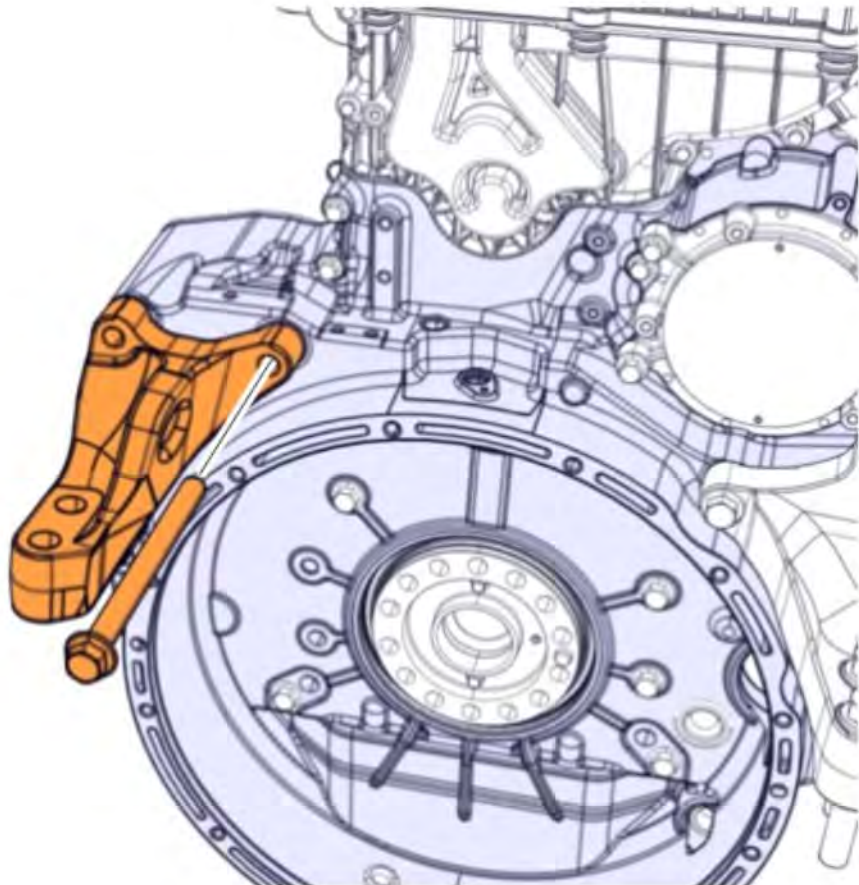
159 Remove the nut and screw.

160 Remove the screw.



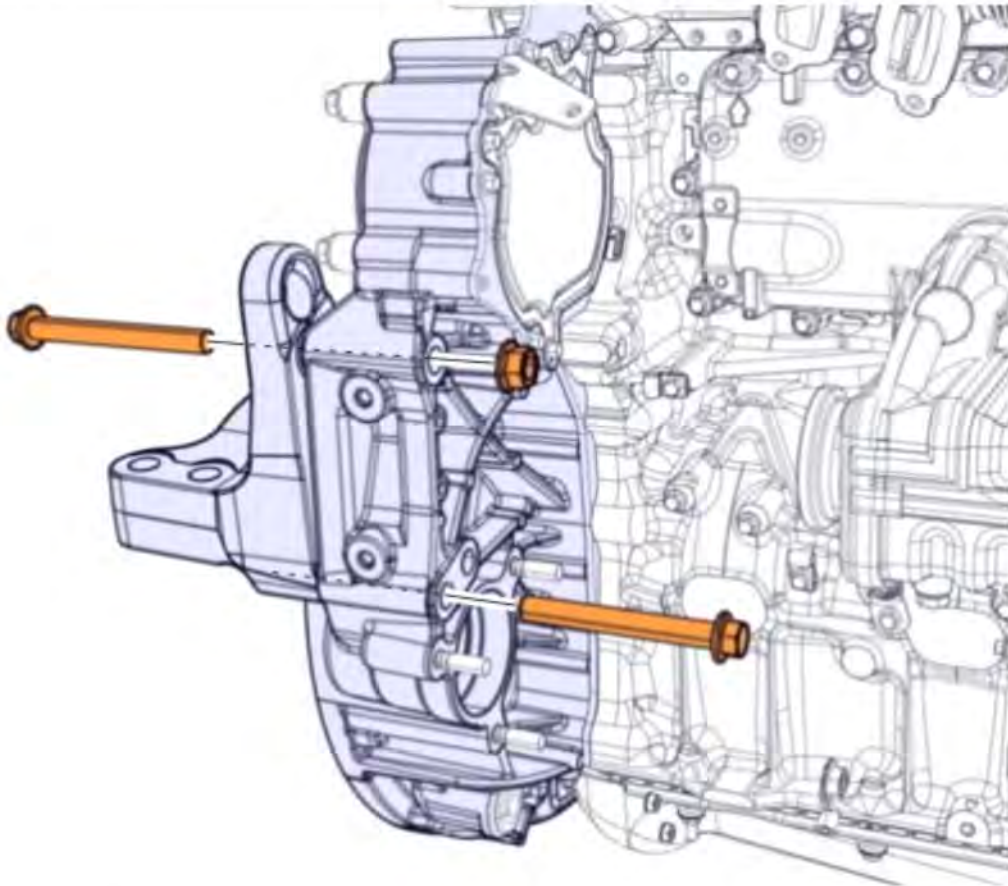
161	Remove the screw.
-----	-------------------

162	Remove the bracket.
-----	---------------------



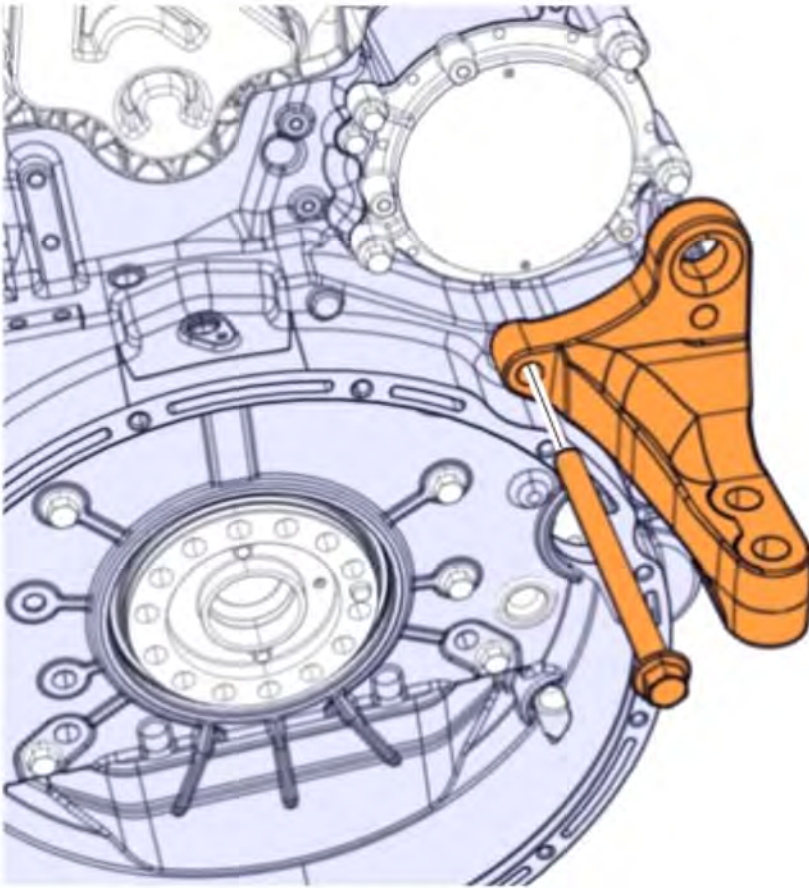
163	Remove the nut and screw.
-----	---------------------------

164	Remove the screw.
-----	-------------------

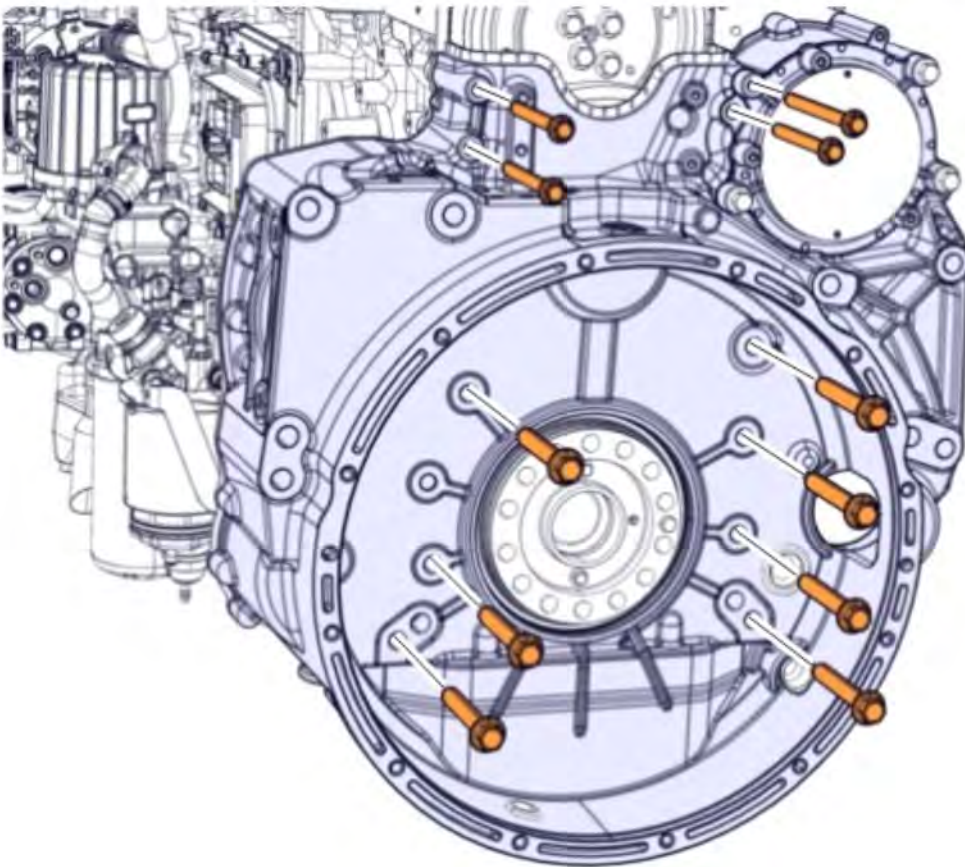



165	Remove the screw.
-----	-------------------

166	Remove the bracket.
-----	---------------------



167 Remove the screws.



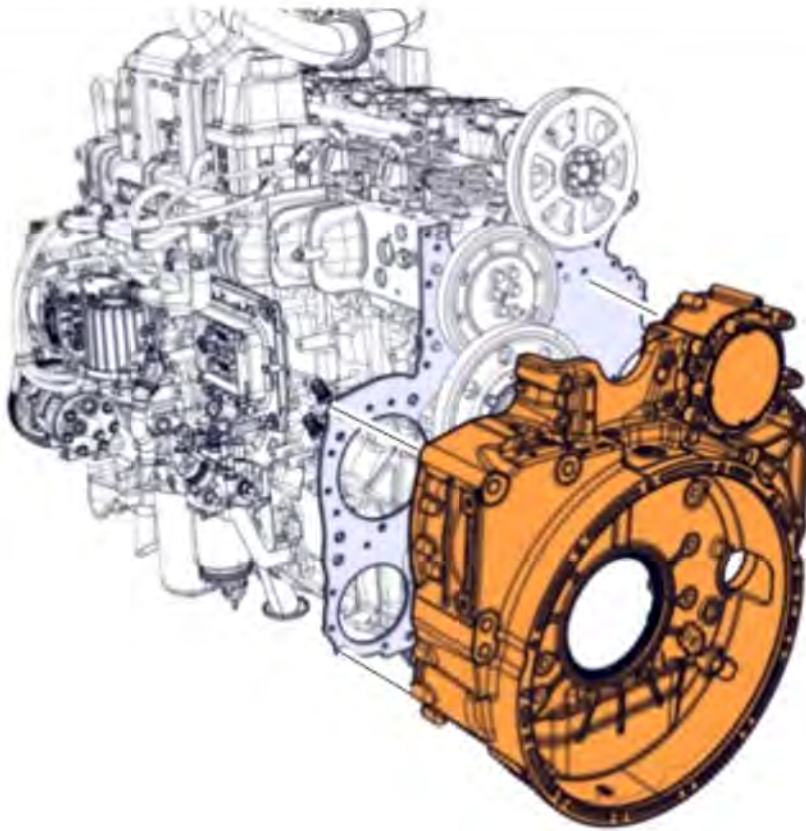
 CAUTION
--

Risk of serious injury.

Heavy component.

▶ Exercise caution when moving the component. Use appropriate tools.

168 Remove the flywheel housing.



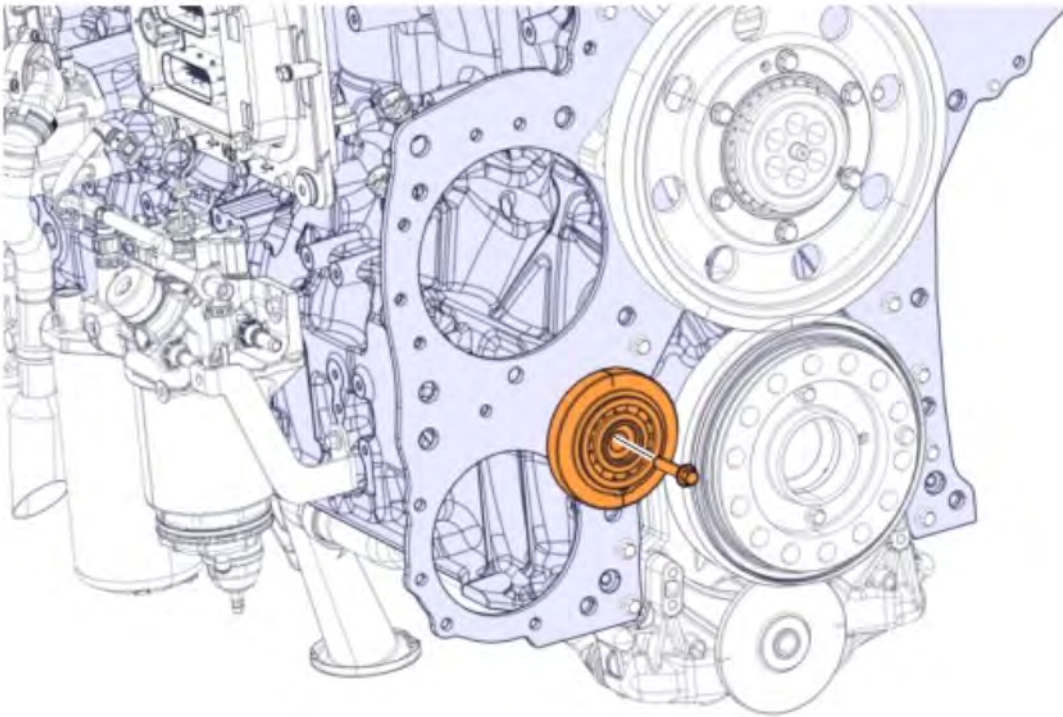
169 Remove the screw.

170 Remove the gear.

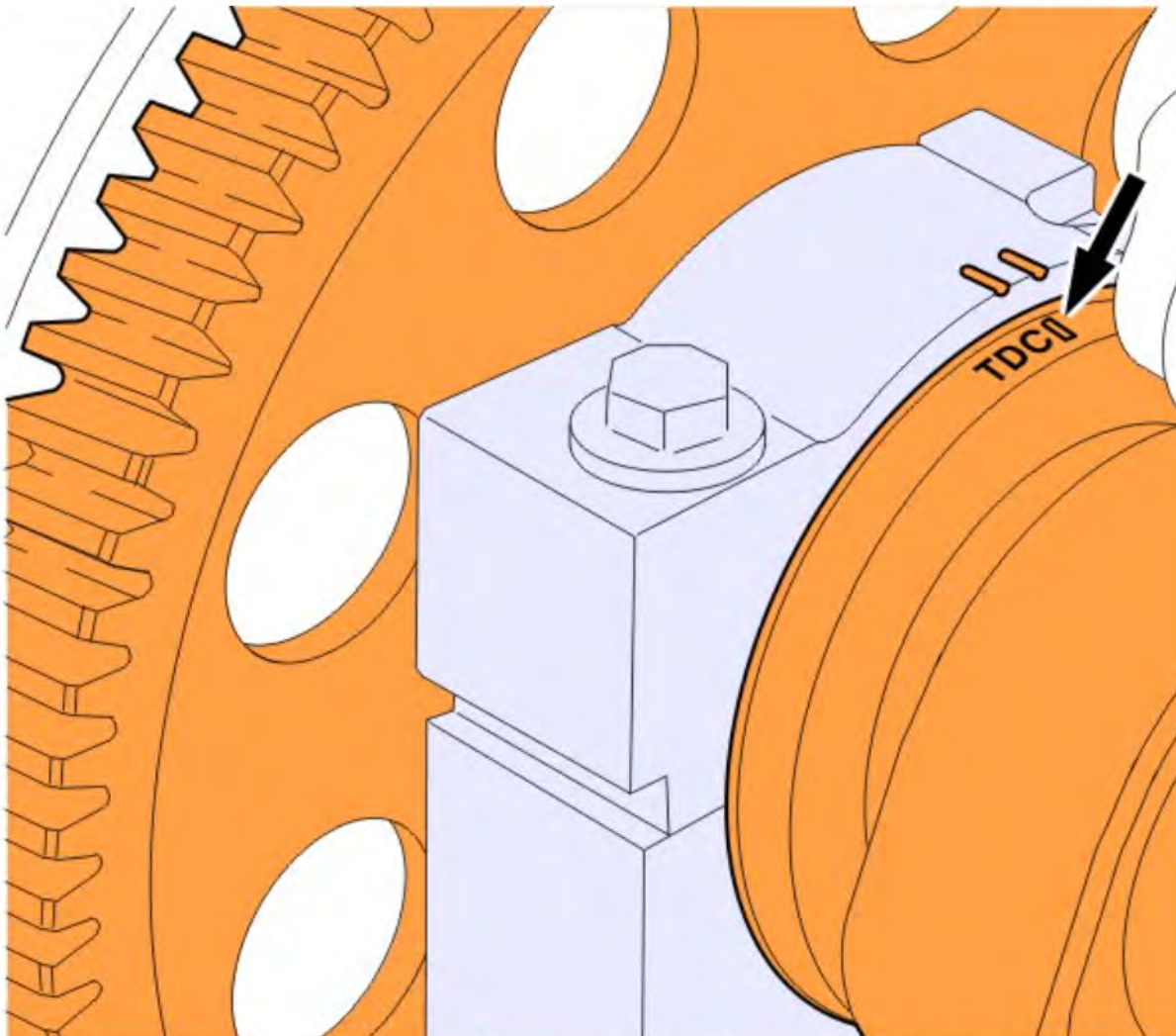


Service hint

The gear may be stuck in the timing gear plate. Loosely reinstall the fastener and use a suitable puller.



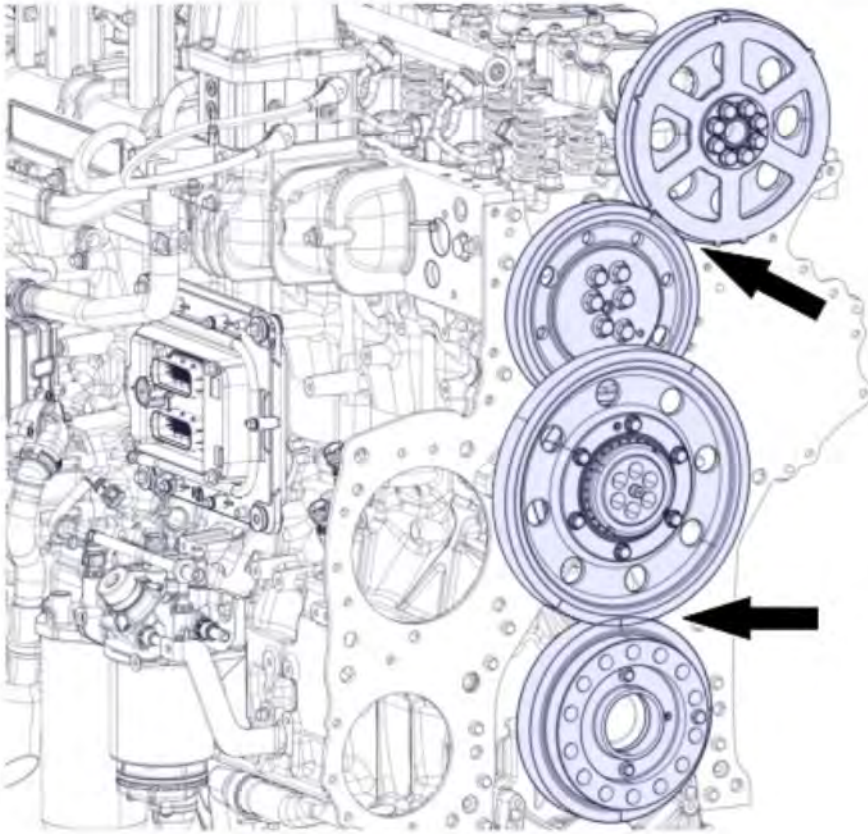
171 Check that the timing marks are at TDC.



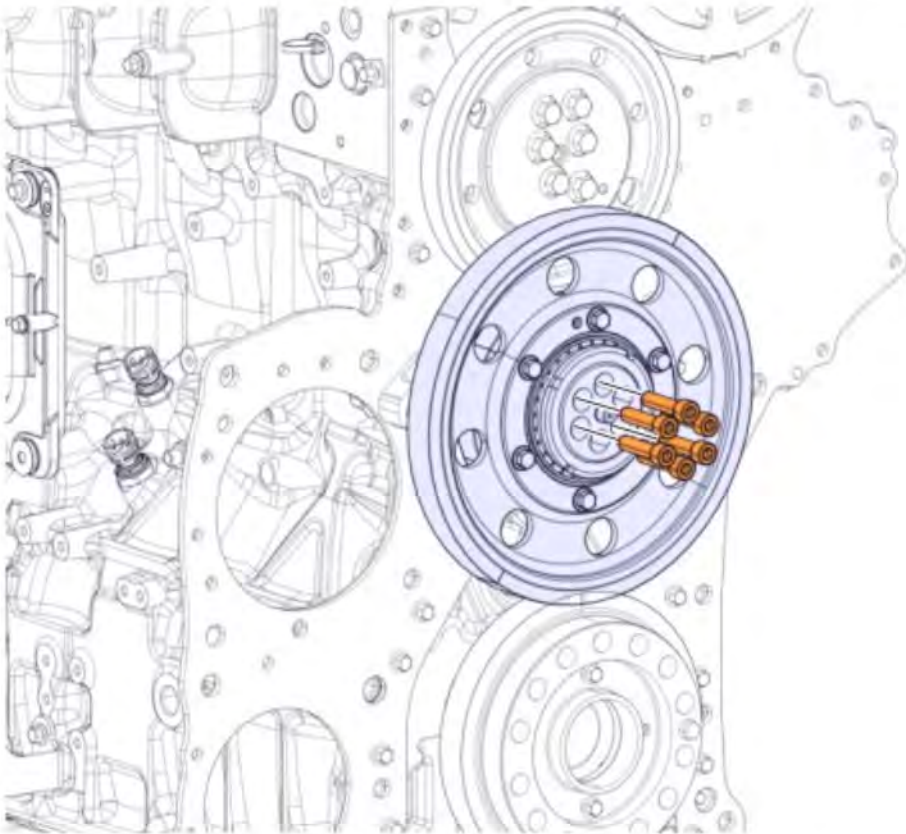
Copyright to this documentation belongs to the Volvo Group. No reproduction, copying, change, amendment or other similar disposal is entitled without prior written consent by the Volvo Group

The information contained herein is current at the time of its original distribution, but is subject to change. The reader is advised that printed copies are uncontrolled.

172 Mark the gears for reference.



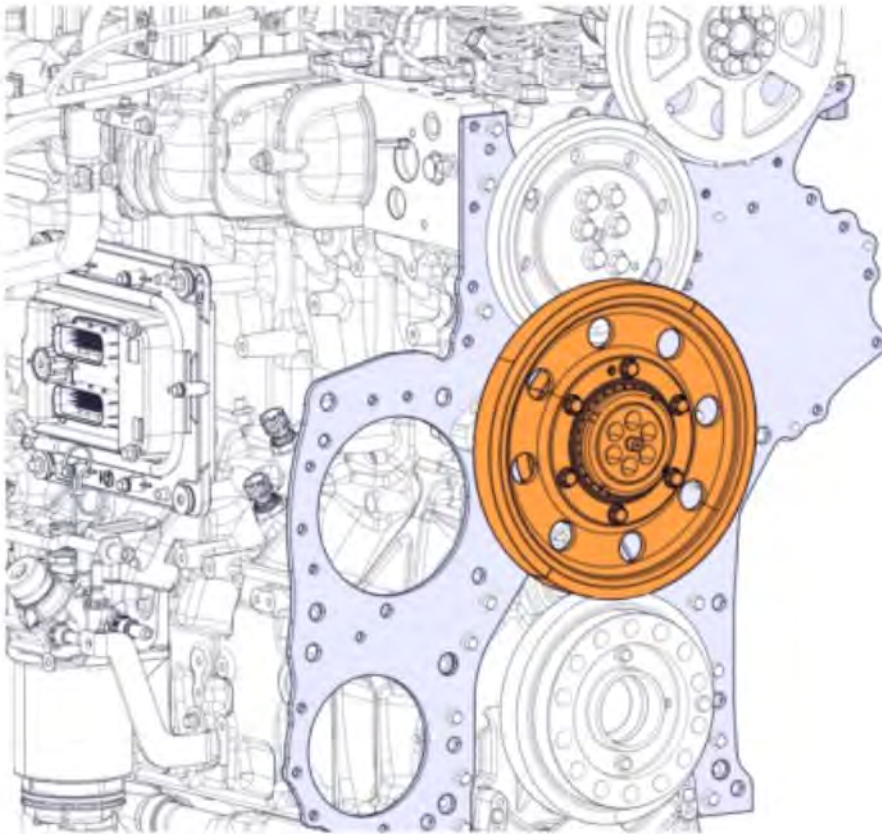
173 Remove the screws.



174 Remove the gears.

**Note**

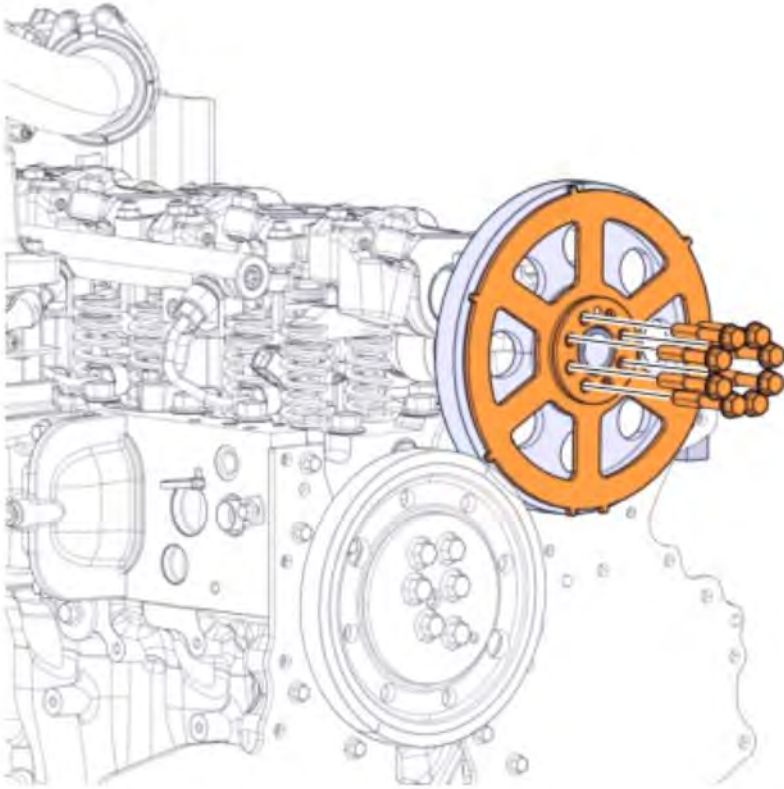
Do not separate the gears.



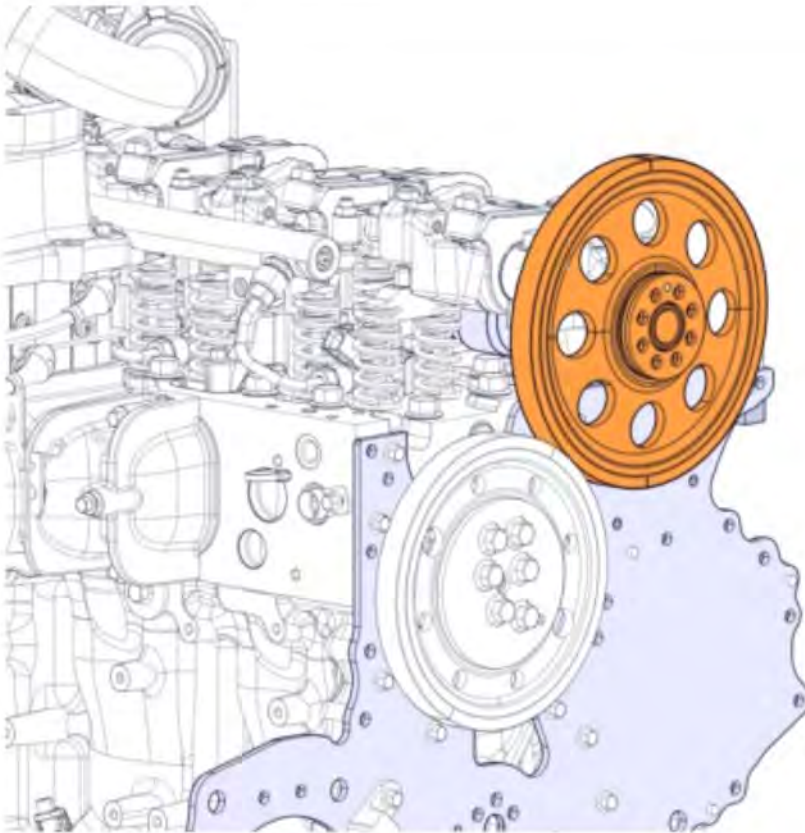
175 Remove the screws and the tone wheel.

**Note**

Discard the screws.



176 Remove the gear.



CAUTION

Copyright to this documentation belongs to the Volvo Group. No reproduction, copying, change, amendment or other similar disposal is entitled without prior written consent by the Volvo Group

The information contained herein is current at the time of its original distribution, but is subject to change. The reader is advised that printed copies are uncontrolled.

Risk of material damage.

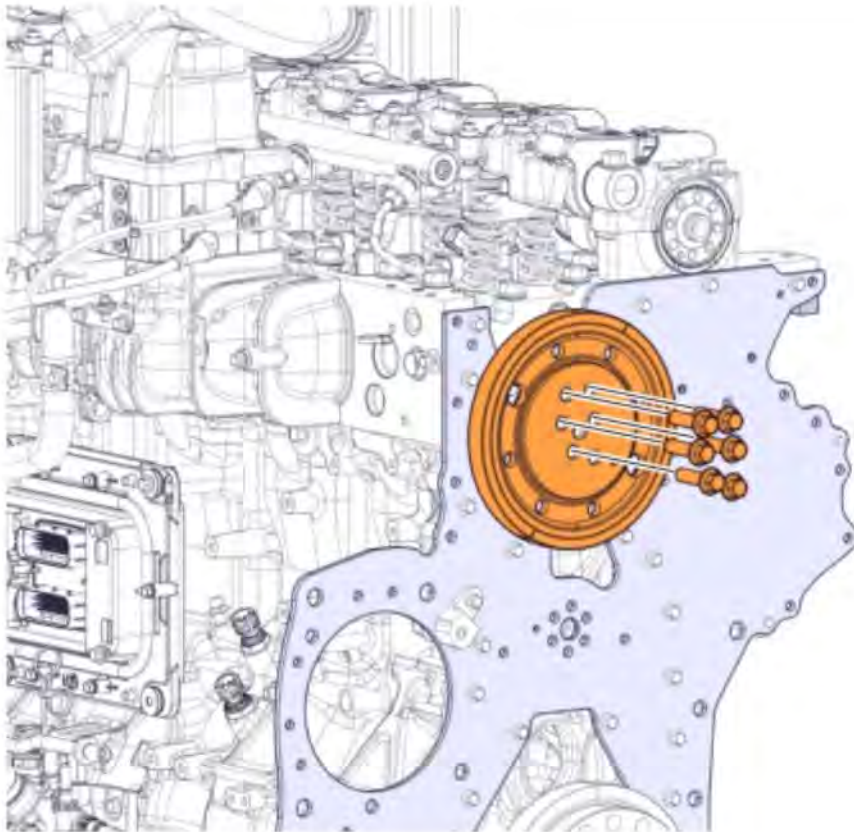
The idler gear can be damaged if mishandled.

- ▶ Take care while removing the idler gear screws.
- ▶ Secure the idler gear while removing the idler gear hub screws.

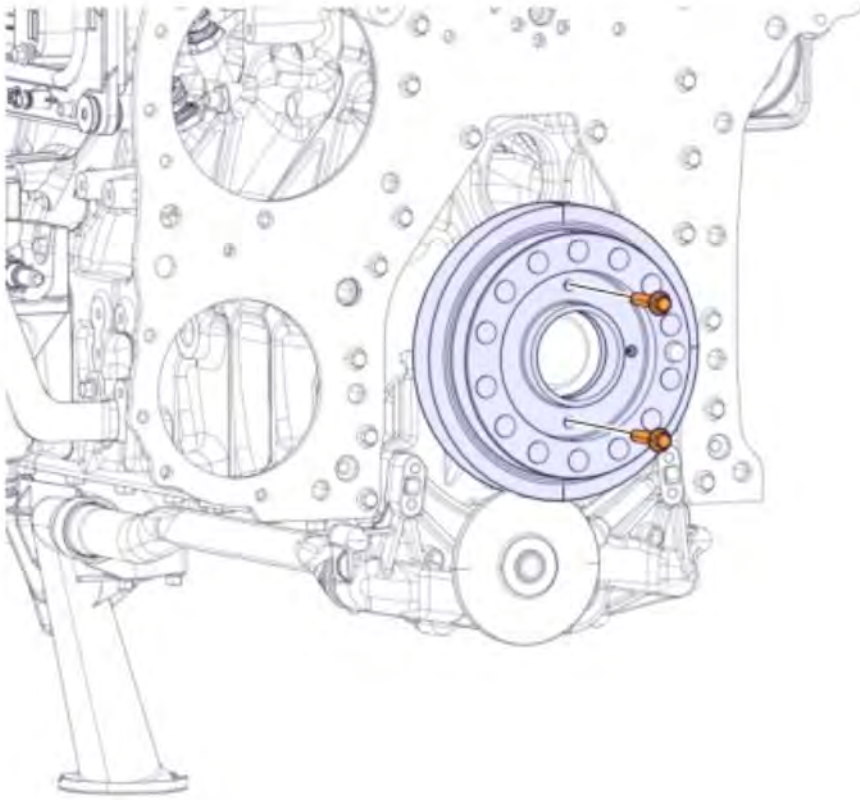
177 Remove the screws.

178 Remove the gear.

179 Remove the thrust washer.



180 Remove the screws.

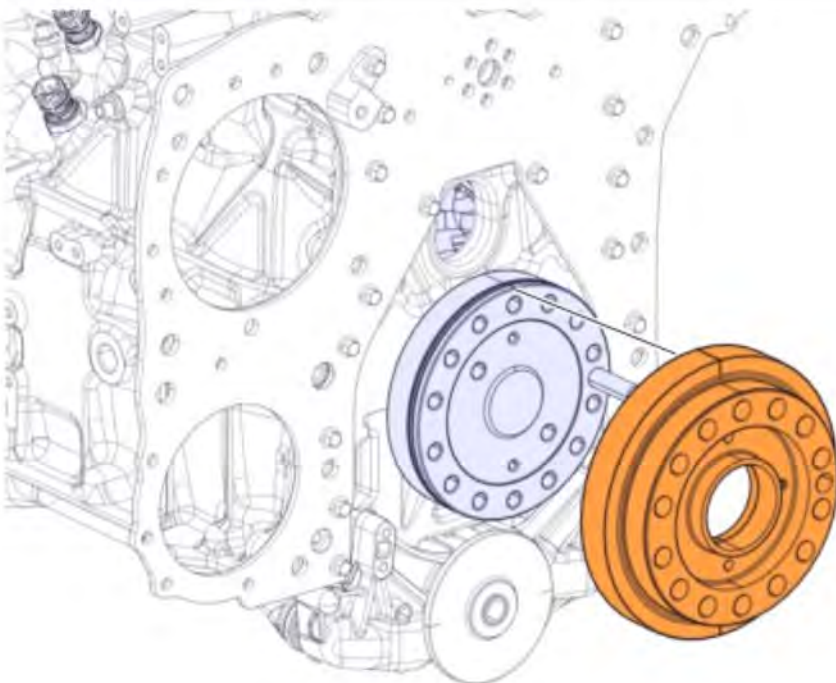


181 Remove the gear and the seal.



Note

Use a suitable tool.



182 Clean the crankshaft.

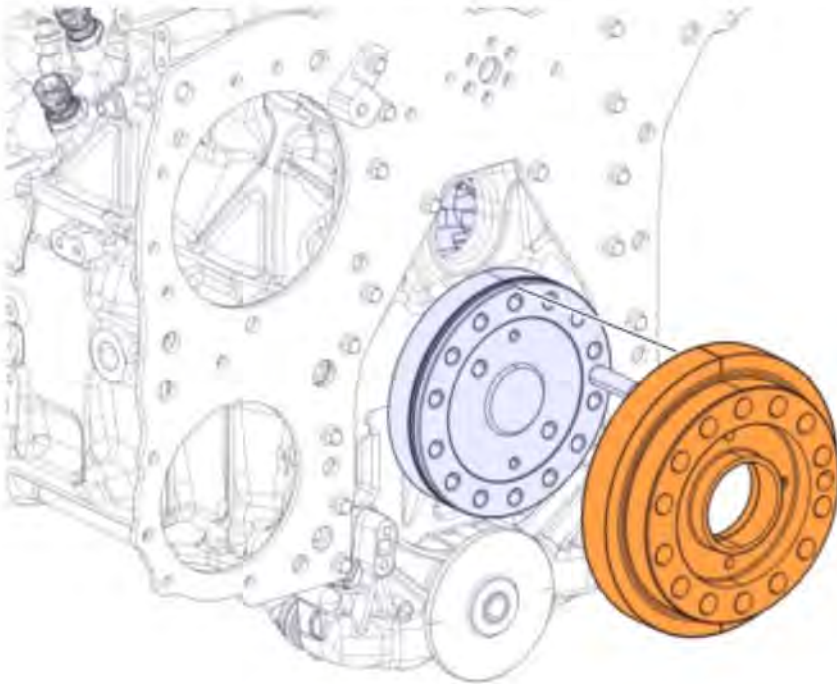
Copyright to this documentation belongs to the Volvo Group. No reproduction, copying, change, amendment or other similar disposal is entitled without prior written consent by the Volvo Group

The information contained herein is current at the time of its original distribution, but is subject to change. The reader is advised that printed copies are uncontrolled.

183	Install the seal.		
	<table border="1" style="width: 100%;"> <tr> <td style="width: 20px; text-align: center;">i</td> <td>Note Use a new part.</td> </tr> </table>	i	Note Use a new part.
i	Note Use a new part.		

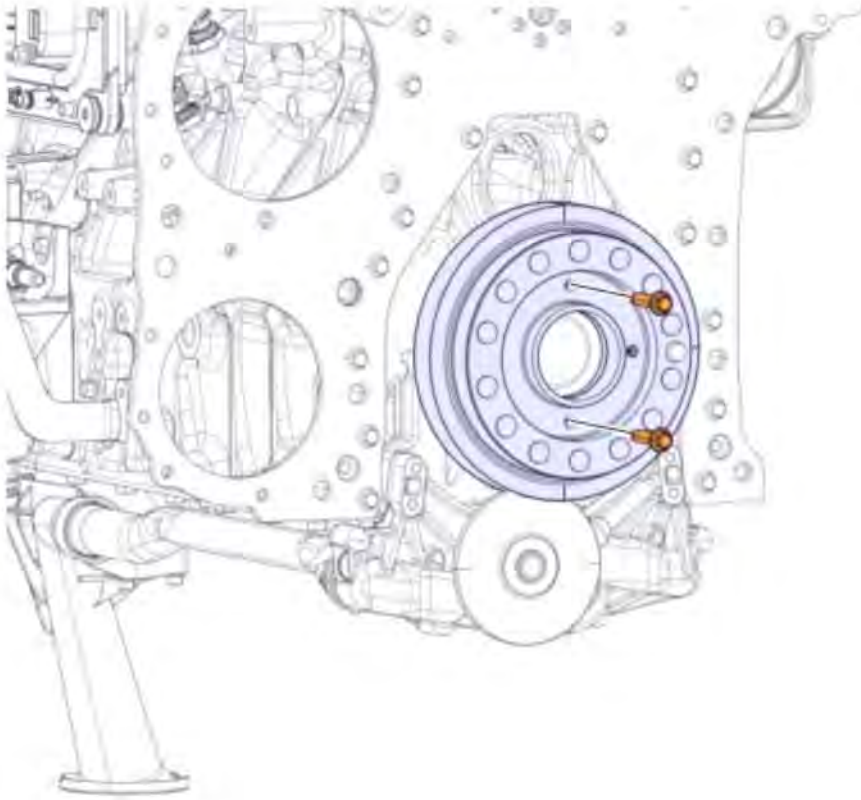
184	Lubricate the gear contact surface.		
	<table border="1" style="width: 100%;"> <tr> <td style="width: 20px; text-align: center;">i</td> <td>Note Use recommended lubricant.</td> </tr> </table>	i	Note Use recommended lubricant.
i	Note Use recommended lubricant.		

185	Install the gear.
------------	-------------------



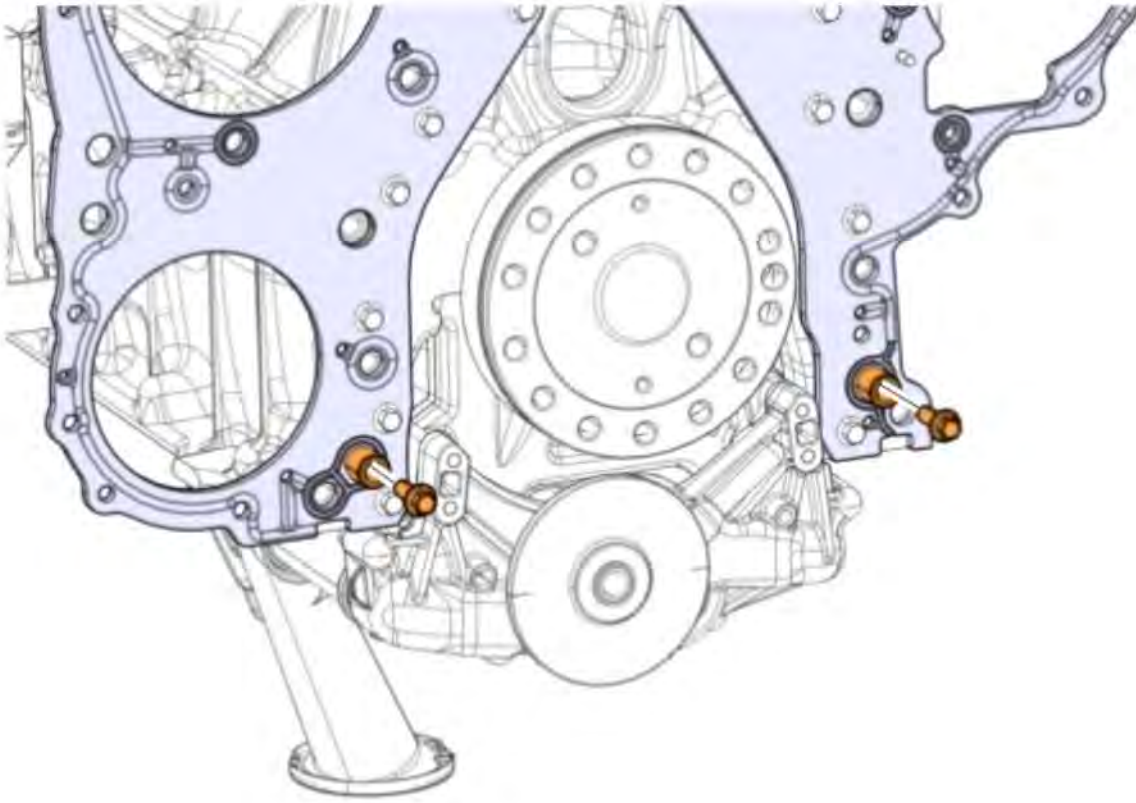
186	Install the screws.
------------	---------------------

187	Torque tighten the screws.	
	Tightening torque	
	Crankshaft gear, screw	24 ±4 Nm (18 ±3 lb _f -ft)



188	Install the tools.							
	Required material							
	GUIDE	9998267	2 pcs					
	<table border="1" style="width: 100%;"> <tr> <td style="text-align: center;">i</td> <td>Note</td> </tr> <tr> <td colspan="2">The tools act as guides for timing gear plate alignment.</td> </tr> <tr> <td colspan="2">Do not remove the tools until the timing gear plate is installed.</td> </tr> </table>			i	Note	The tools act as guides for timing gear plate alignment.		Do not remove the tools until the timing gear plate is installed.
i	Note							
The tools act as guides for timing gear plate alignment.								
Do not remove the tools until the timing gear plate is installed.								

189	Torque tighten the screws.	
	Tightening torque	
	Timing gear plate, tool, screw	60 Nm (44 lb _f ·ft)

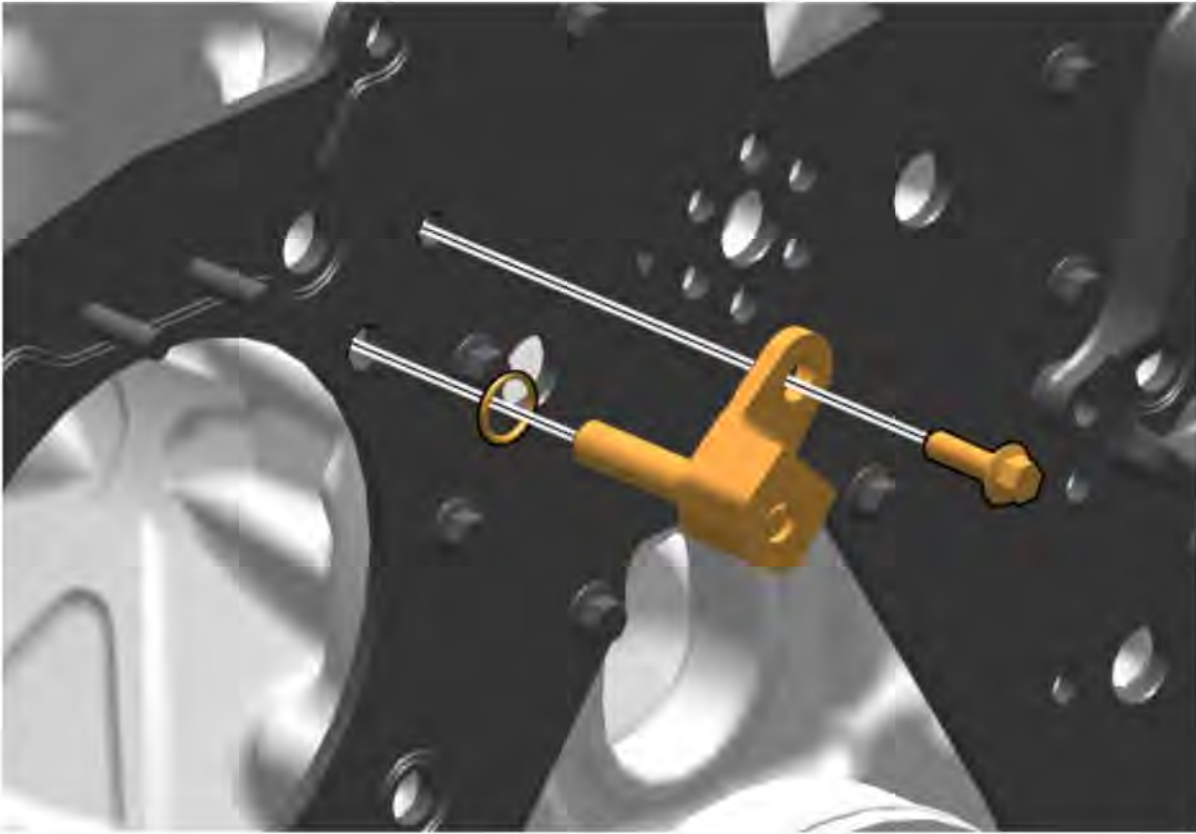


190	Remove the screw.
-----	-------------------

191	Remove the bracket.
-----	---------------------

**Note**

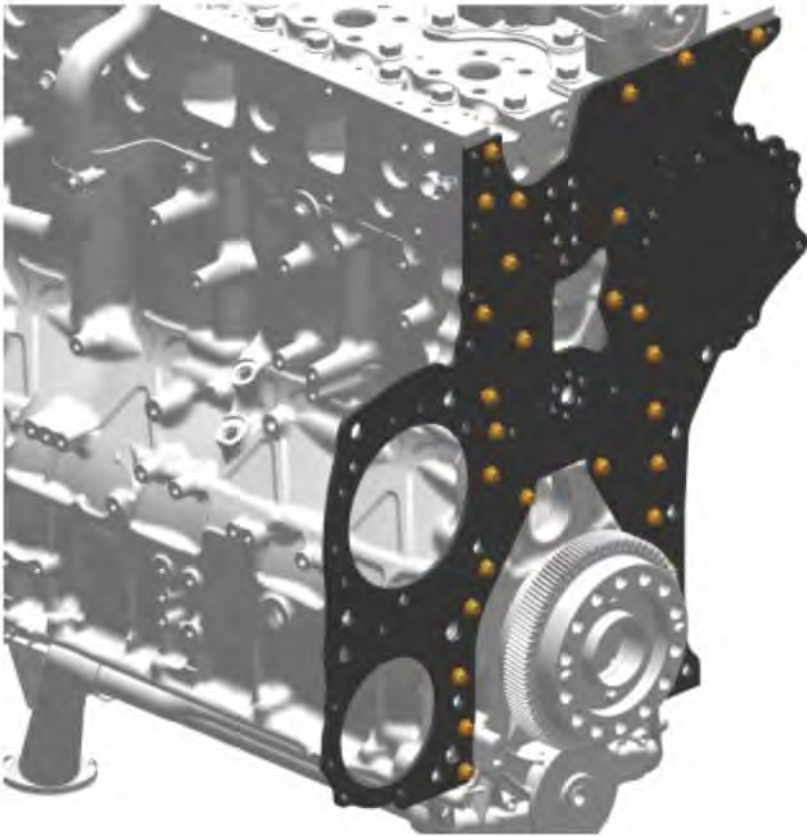
Discard the O-ring.

**CAUTION****Risk of serious injury.**

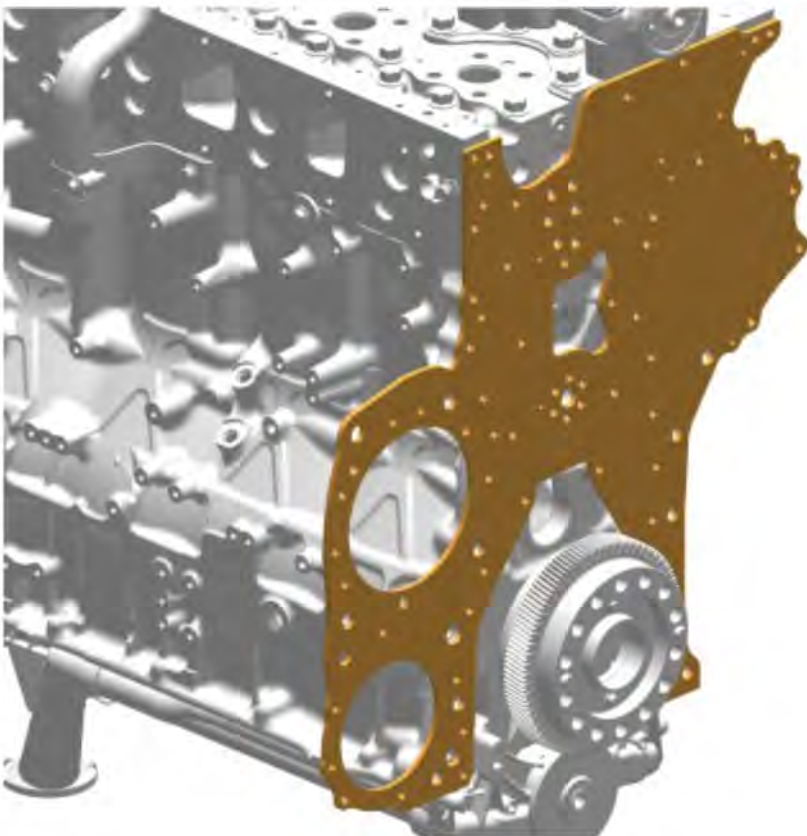
Heavy component.

▶ Exercise caution when moving the component. Use appropriate tools.

192 Remove the screws.



193	Remove the timing gear plate.
------------	-------------------------------



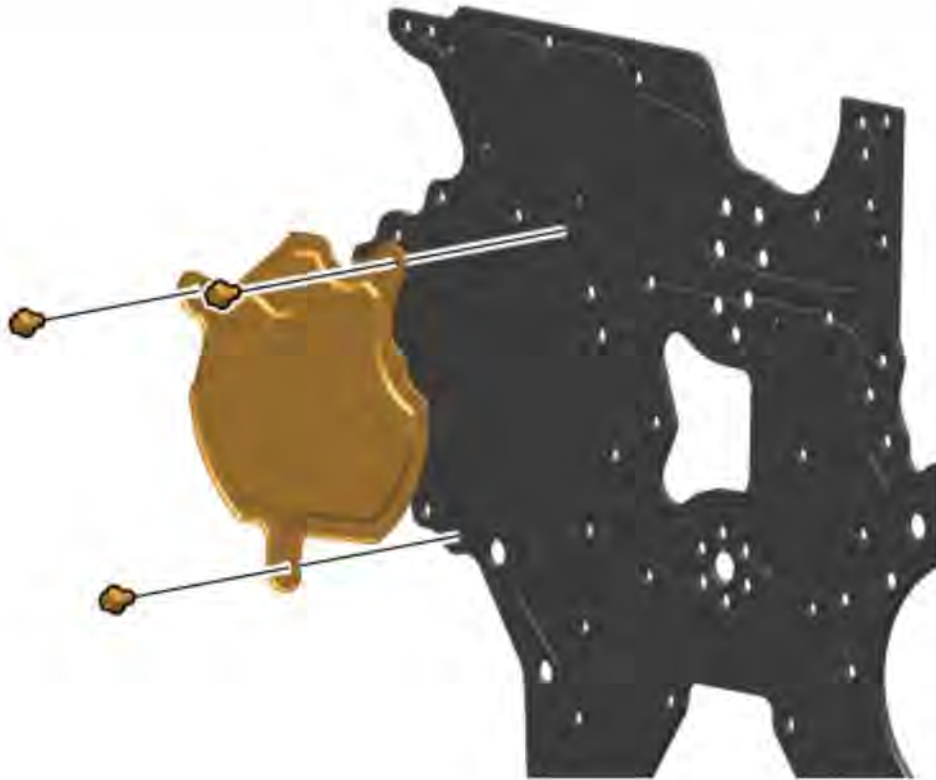
194	Remove the screws.
------------	--------------------

195	Remove the noise shield.
------------	--------------------------

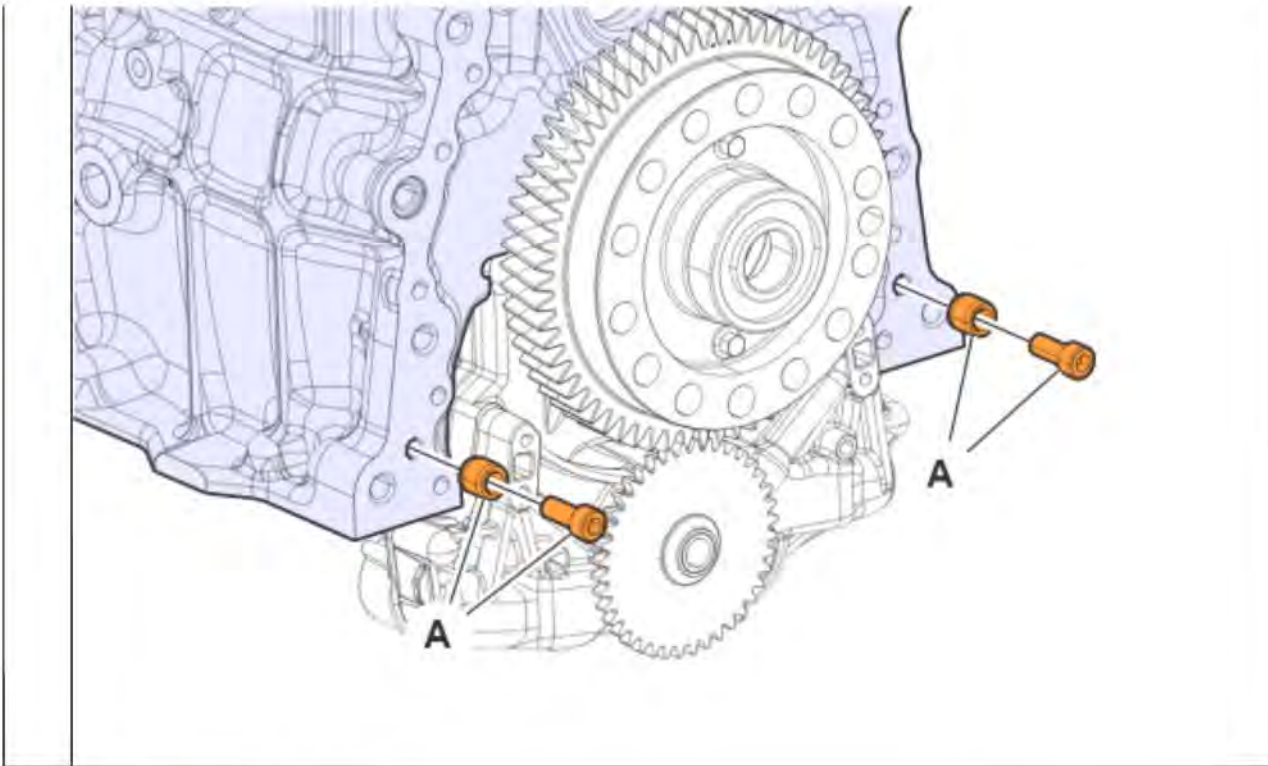
[Service hint](#)



Discard the noise shield if the timing gear plate has integrated seals, because a new noise shield will come with the timing gear plate.



196	Perform this procedure when the condition below is met.				
Conditions					
<ul style="list-style-type: none"> If not previously installed 					
▶ Install the tools (A).					
Required material					
A	GUIDE	9998267	2 pcs		
<table border="1" style="width: 100%;"> <tr> <td style="width: 5%; text-align: center;">i</td> <td>Note Ensure that the tools are clean and damage free.</td> </tr> </table>				i	Note Ensure that the tools are clean and damage free.
i	Note Ensure that the tools are clean and damage free.				
▶ Install the screws.					
<table border="1" style="width: 100%;"> <tr> <td style="width: 5%; text-align: center;">i</td> <td>Note Hand tighten.</td> </tr> </table>				i	Note Hand tighten.
i	Note Hand tighten.				



197 Install the timing gear plate.



Note

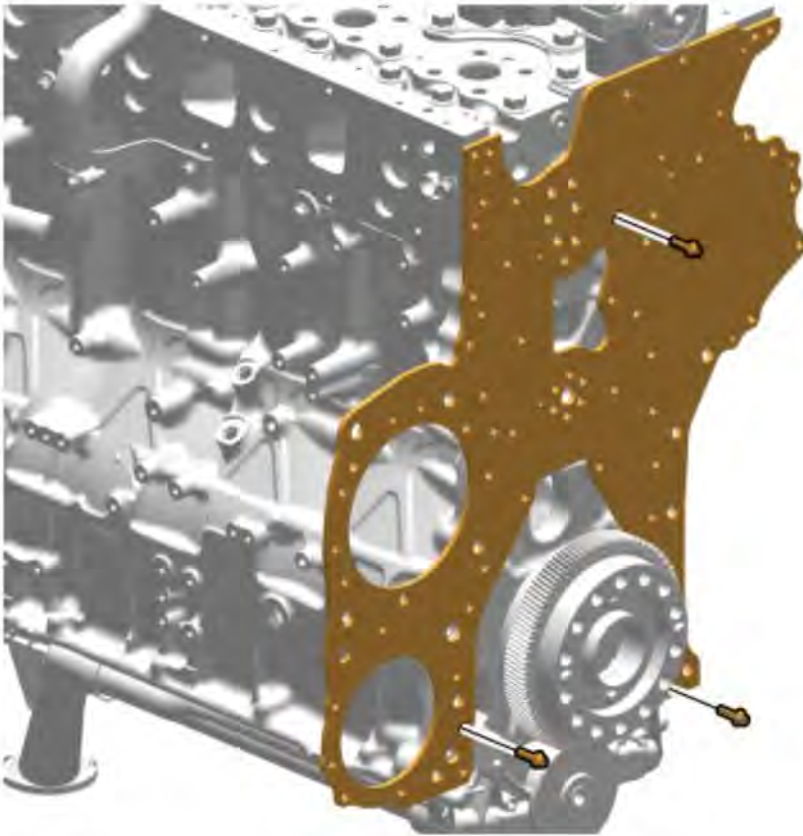
Ensure that the timing gear plate and the engine block are clean of sealant.




198 Install the screws.



Note

Hand tighten the screws.

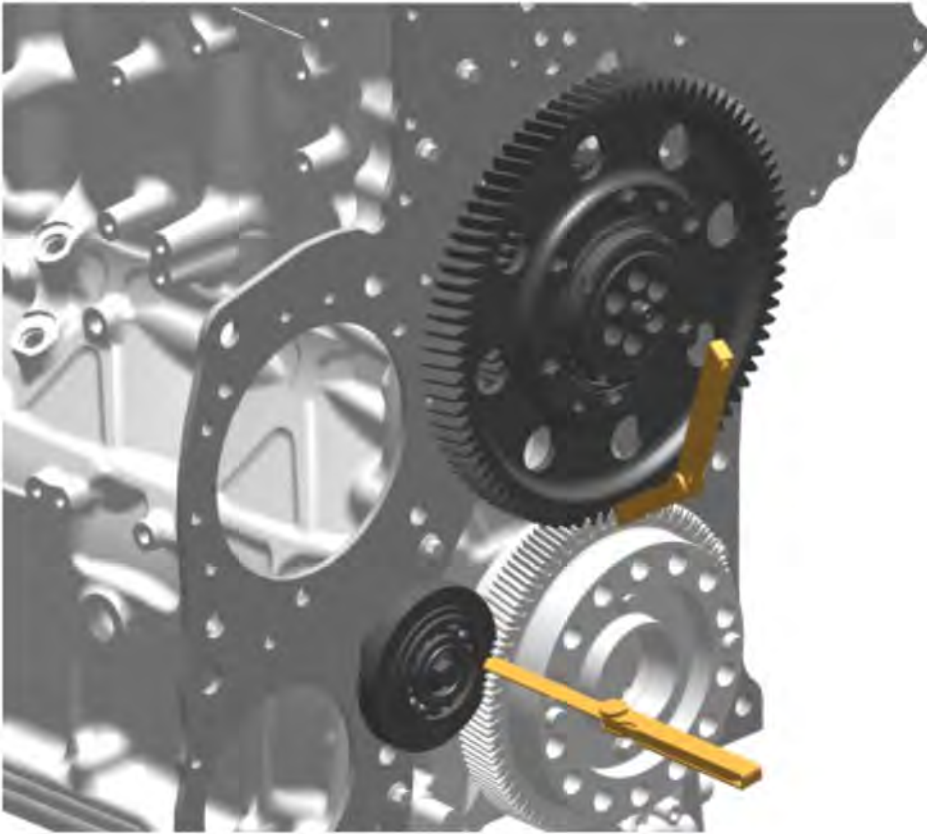


199	Install the gears.		
200	Install the screws. <table border="1" data-bbox="161 1086 683 1182"><tr><td data-bbox="161 1086 236 1182"></td><td data-bbox="240 1086 683 1182">Note Use a washer for the small idler gear.</td></tr></table>		Note Use a washer for the small idler gear.
	Note Use a washer for the small idler gear.		
201	Hand tighten the screws.		

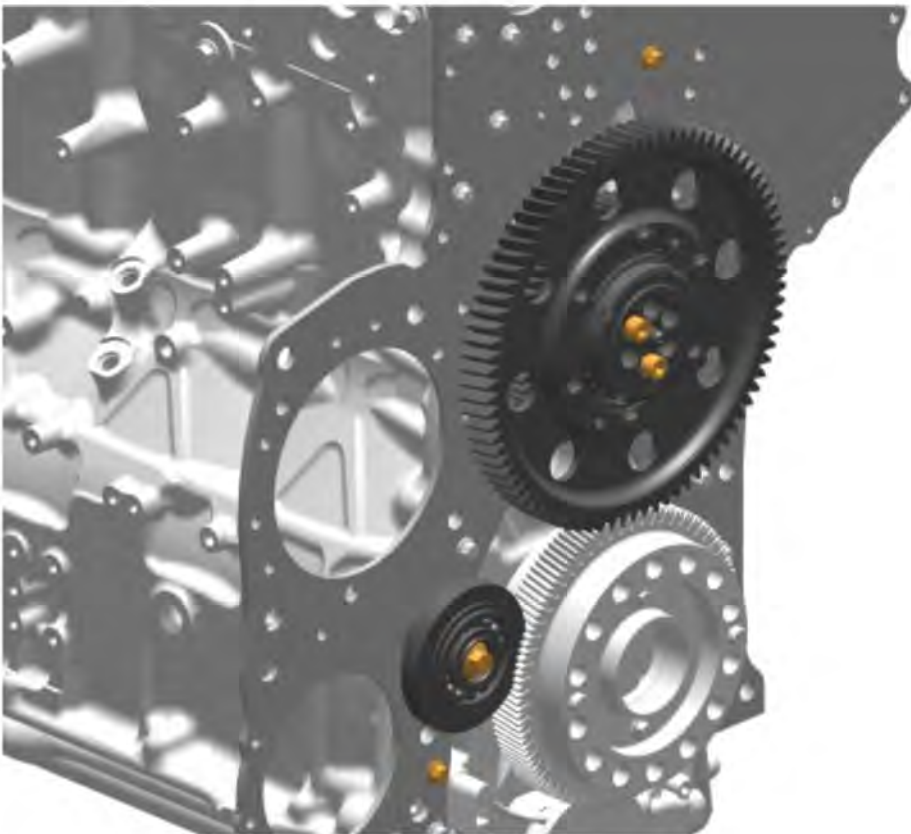


202	Install the feeler gauges.	
	Tech data	
	Feeler gauge, thickness	0.1 mm (0.004 in)

203	Adjust the clearance.	
	i	Note Use a plastic mallet to adjust the timing gear plate.
	i	Note Ensure that the feeler gauges are difficult to move between the teeth.
	i	Note Ensure equal resistance on both feeler gauges.



204 Tighten the screws.



205 Place a dial indicator into position.

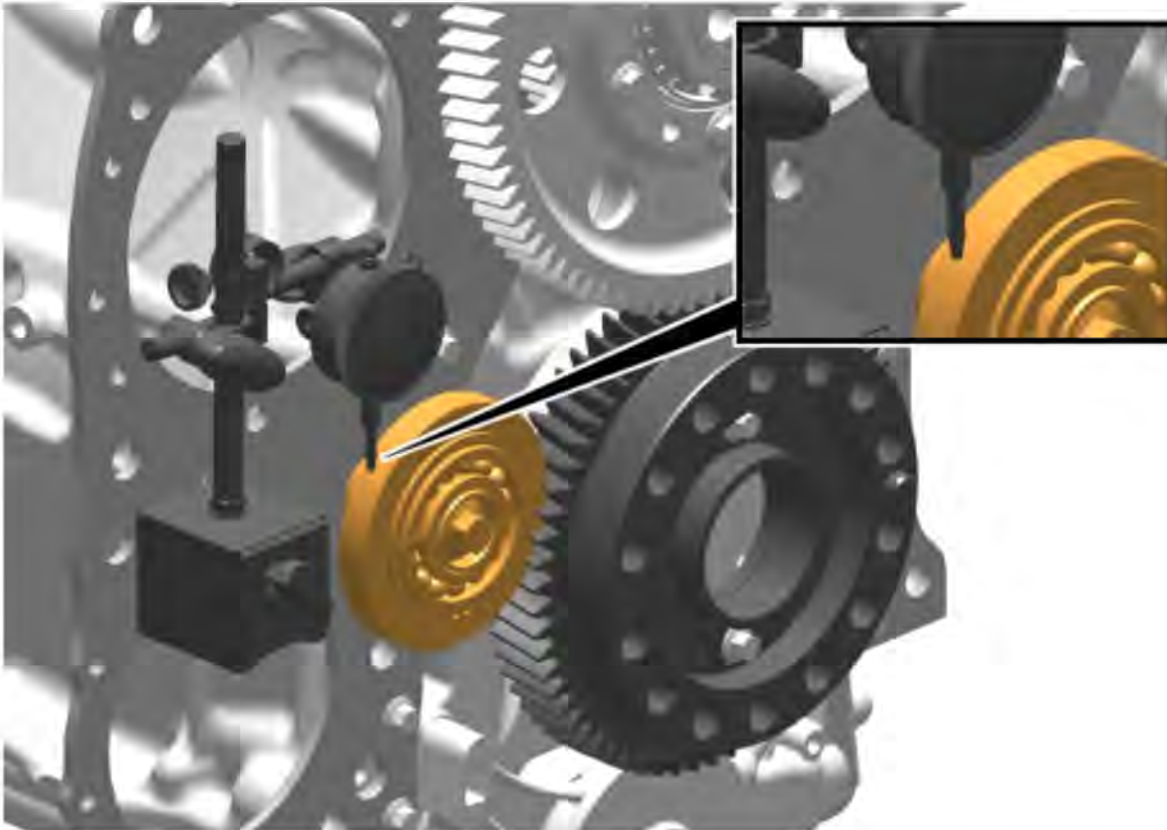
i **Note**
Use caution that the timing plate seal is not damaged.



Note

Ensure that the probe tip touches the gear tooth.

206 Set the dial to zero.



207 Turn the idler gear by hand.

208 Read and record the amount of backlash.

Tech data

Idler gear, tooth flank clearance	0.05 – 0.17 mm (0.002 – 0.0067 in)
-----------------------------------	---------------------------------------

209 Perform this procedure when the condition below is met.

Conditions

- If the backlash is out of specification
- ▶ Adjust the timing plate.

210 Install the tools.

Required material

ROCKER_INDICATOR	9999683
MAGNETIC STAND	9999696



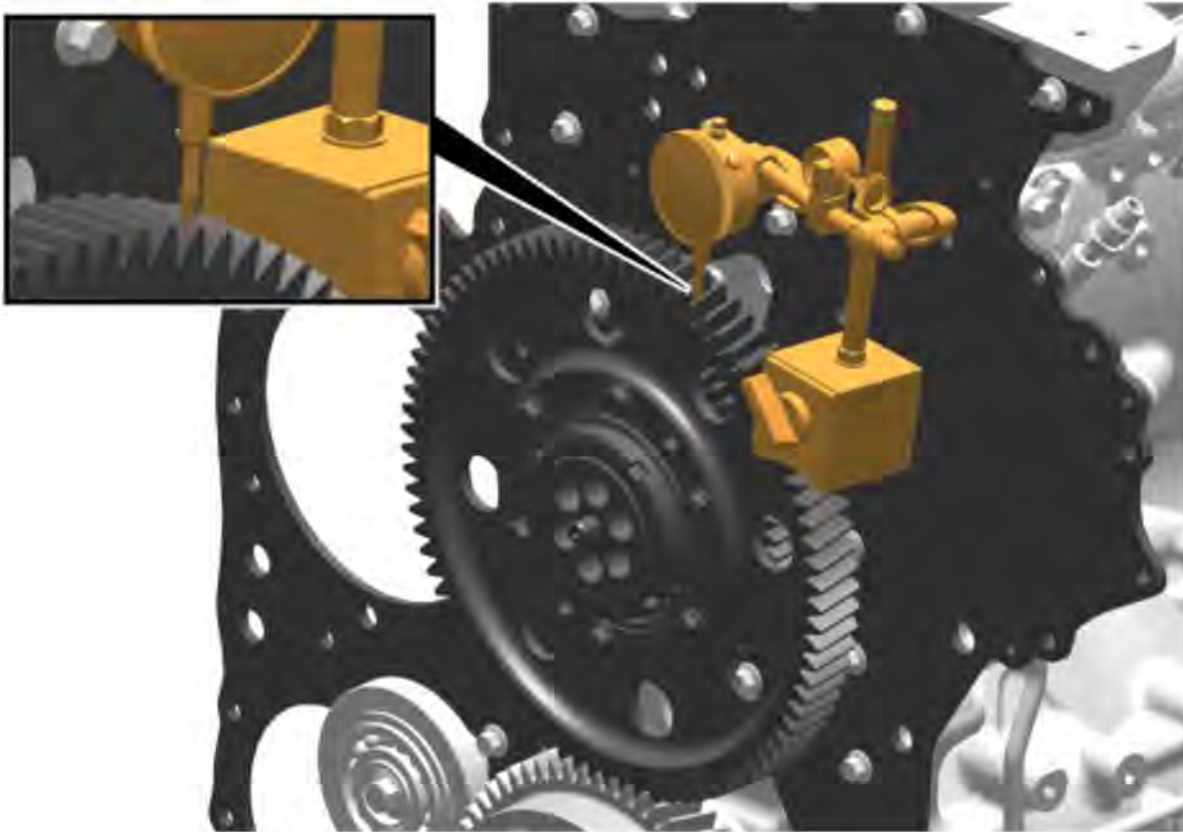
Note

Ensure that the probe tip touches the gear tooth.

211 Check the backlash.

Tech data

Gear, backlash	0.05 – 0.17 mm (0.002 – 0.0067 in)
----------------	---------------------------------------



212 Perform this procedure when the condition below is met.

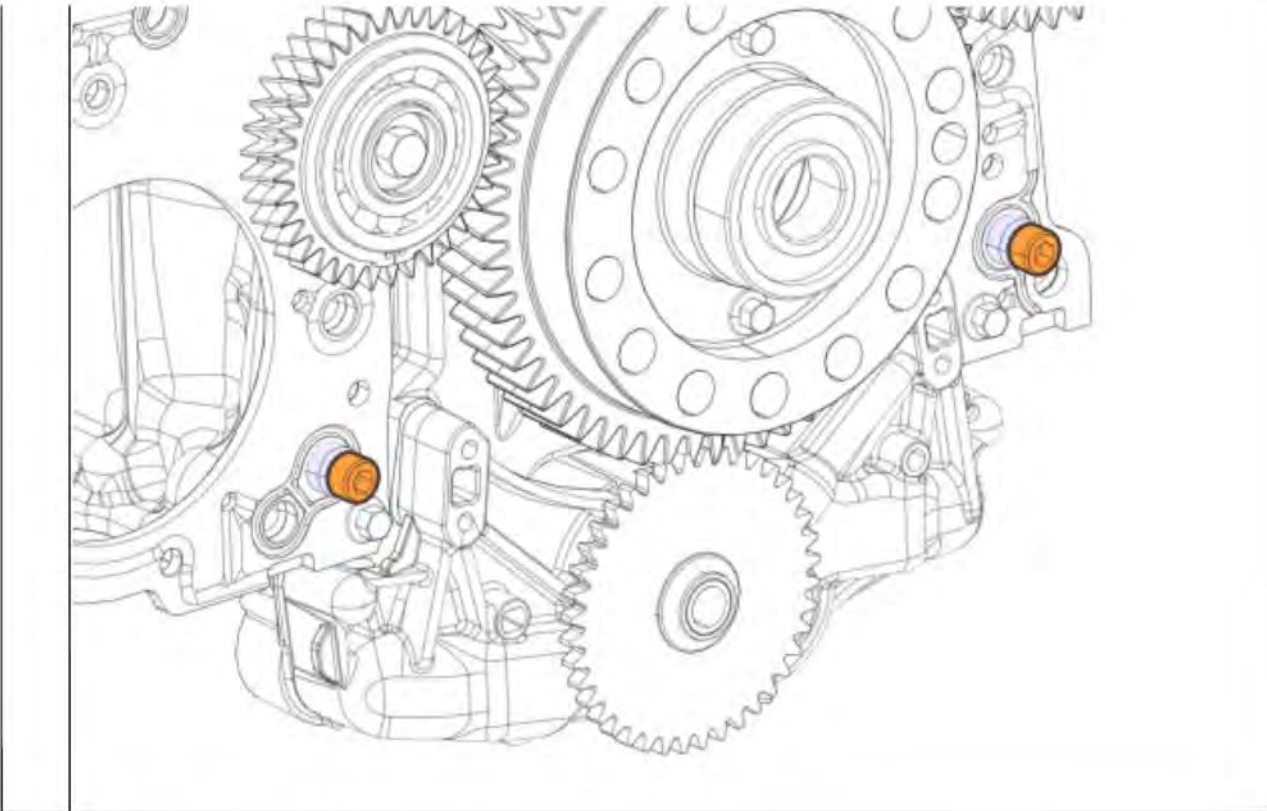
Conditions

- If the backlash is out of the specification
- ▶ Adjust the timing gear plate.

213 Perform this procedure when the condition below is met.

Conditions

- If all of the clearances are within the specifications
- ▶ Tighten the screws.



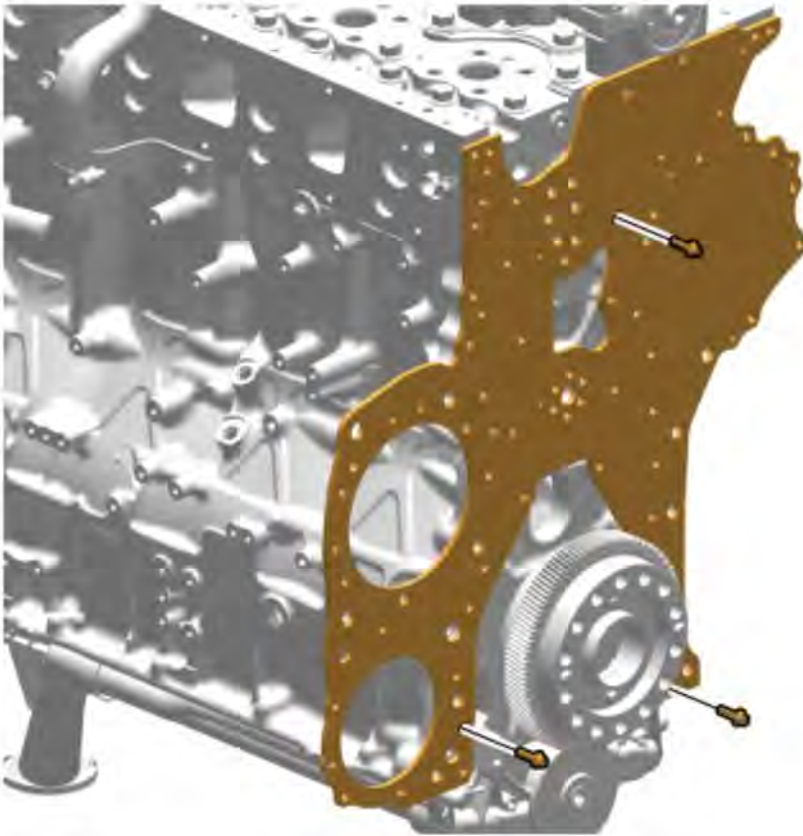
214 Remove the screws.

215 Remove the gears.



216 Remove the screws.

217 Remove the timing gear plate.



218 Clean the contact surfaces carefully.






Note

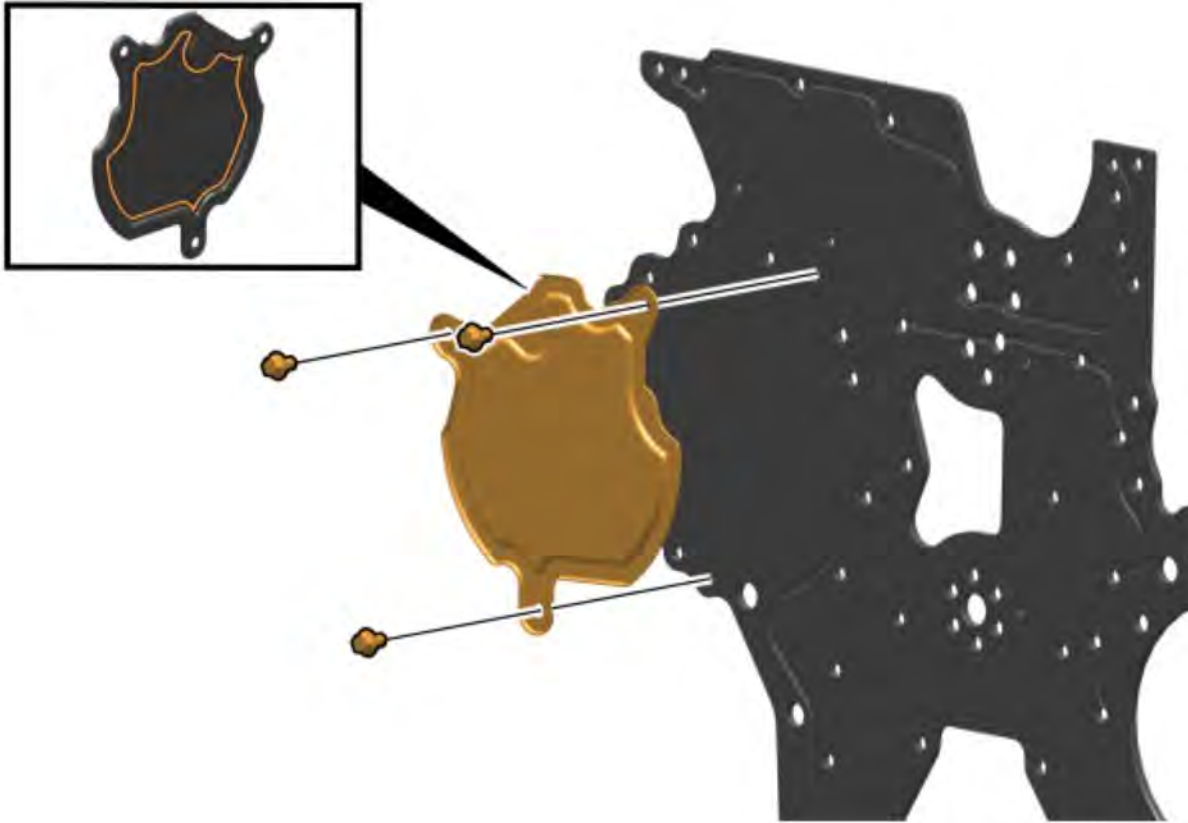
Do not use any tools that may damage the sealing surfaces.

219 Inspect the sealing strip surfaces on both side of the timing gear plate.

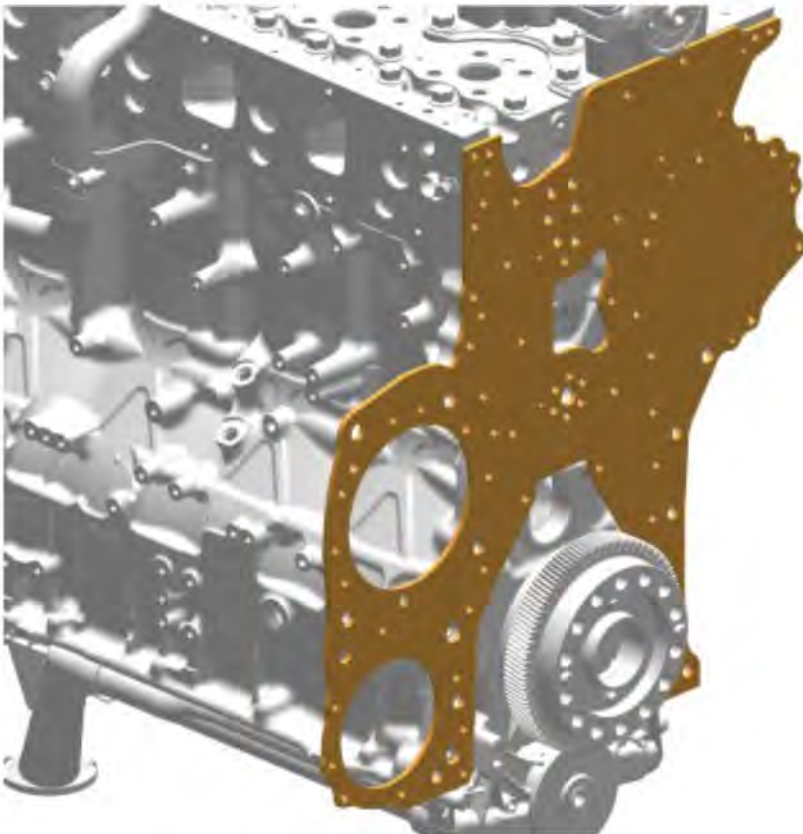
220 If the sealing strip is completely loose or damaged, the timing gear plate must be replaced.



221	Apply the sealant.
Tech data	
Sealant, bead thickness	2 mm (0.08 in)
	Note Use recommended sealant.
	Note Ensure that the surfaces are completely clean of oil and grease.
222	Install the noise shield.
	Note Install the noise shield within 20 minutes of applying the sealant.
223	Install the screws.



224 Install the timing gear plate.



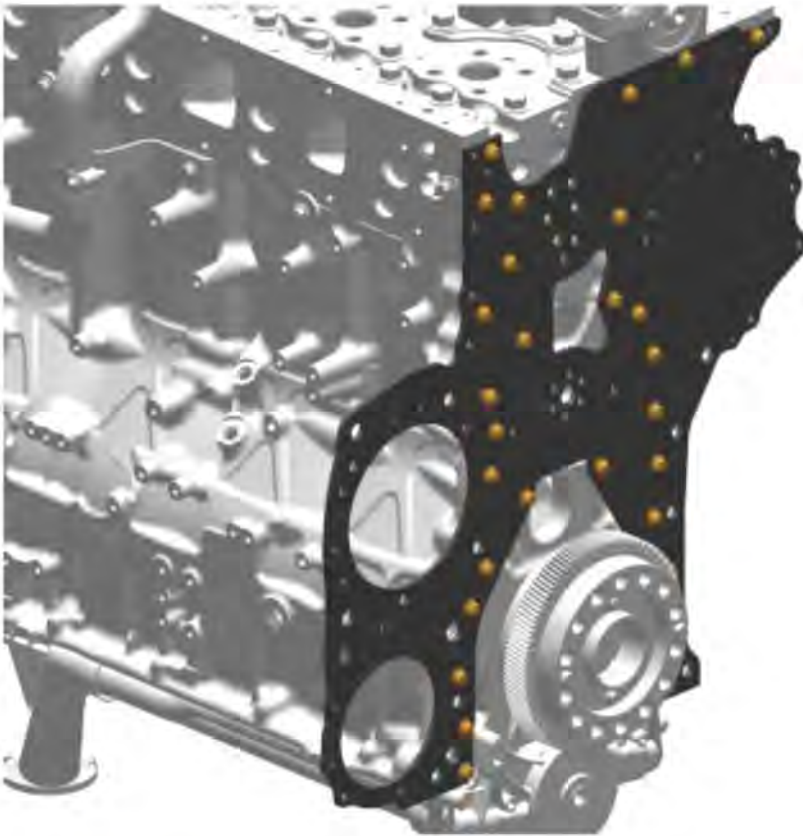
225 Install the screws.

i **Note**
Use new parts.



Note

Only use screws that are pre-treated with locking compound.



226 Lubricate the O-ring.



Note

Use a new part.



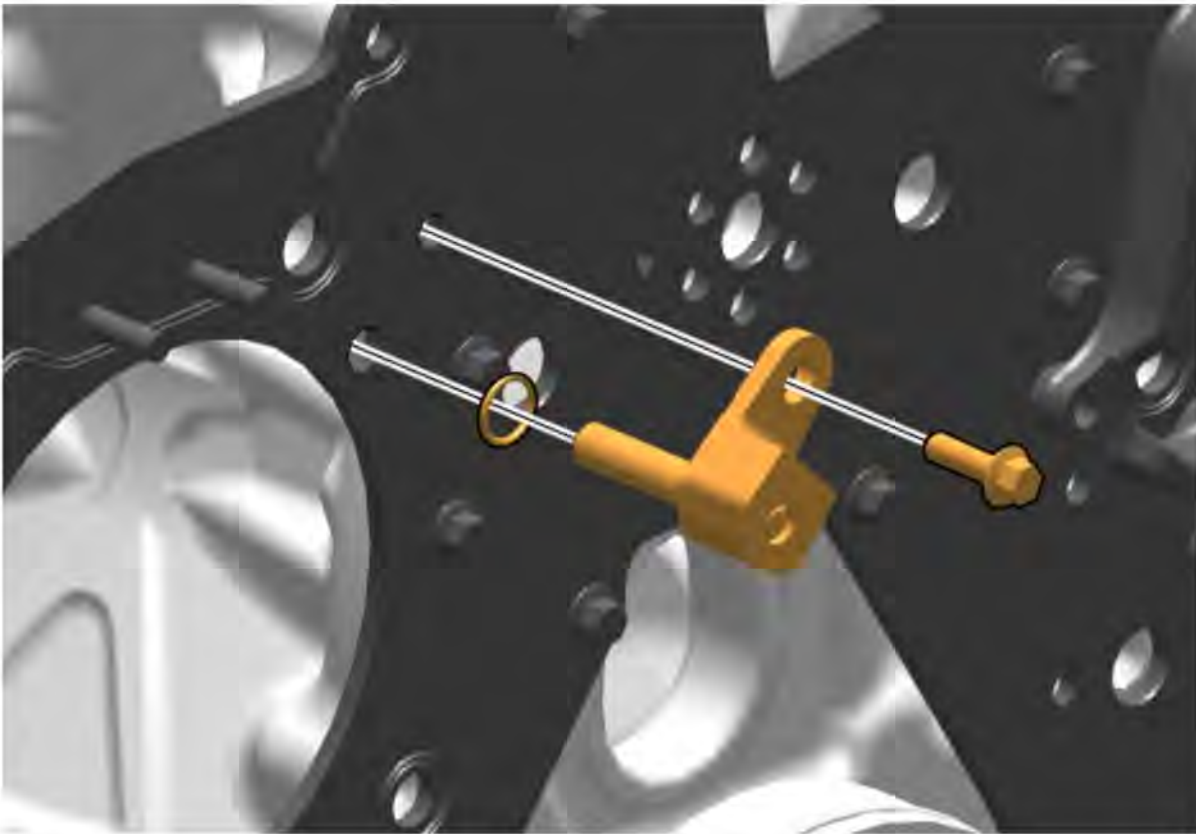
Note

Use recommended oil.

227 Install the O-ring.

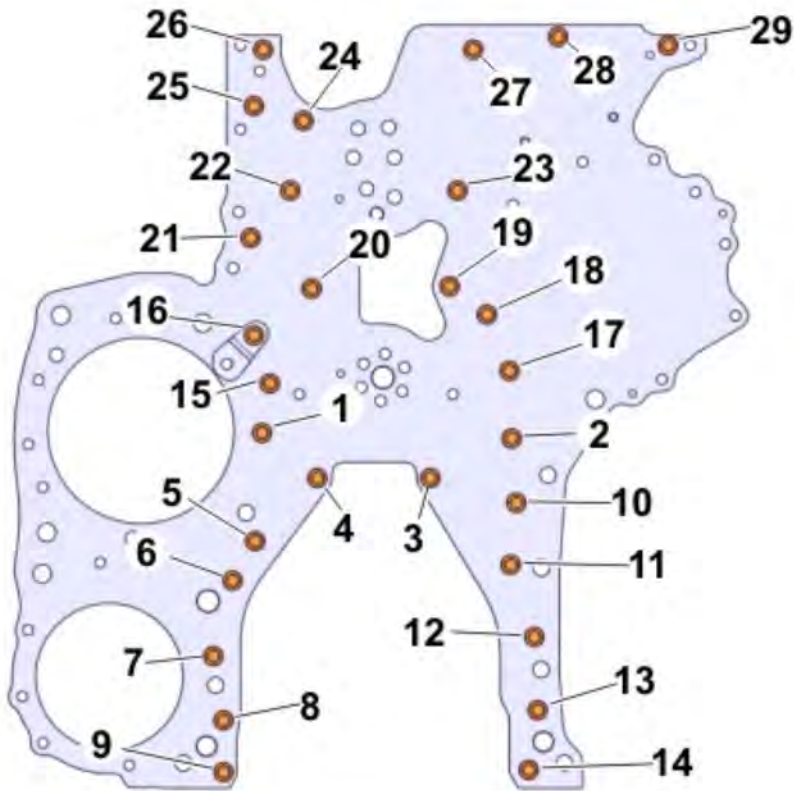
228 Install the bracket.

229 Install the screw.

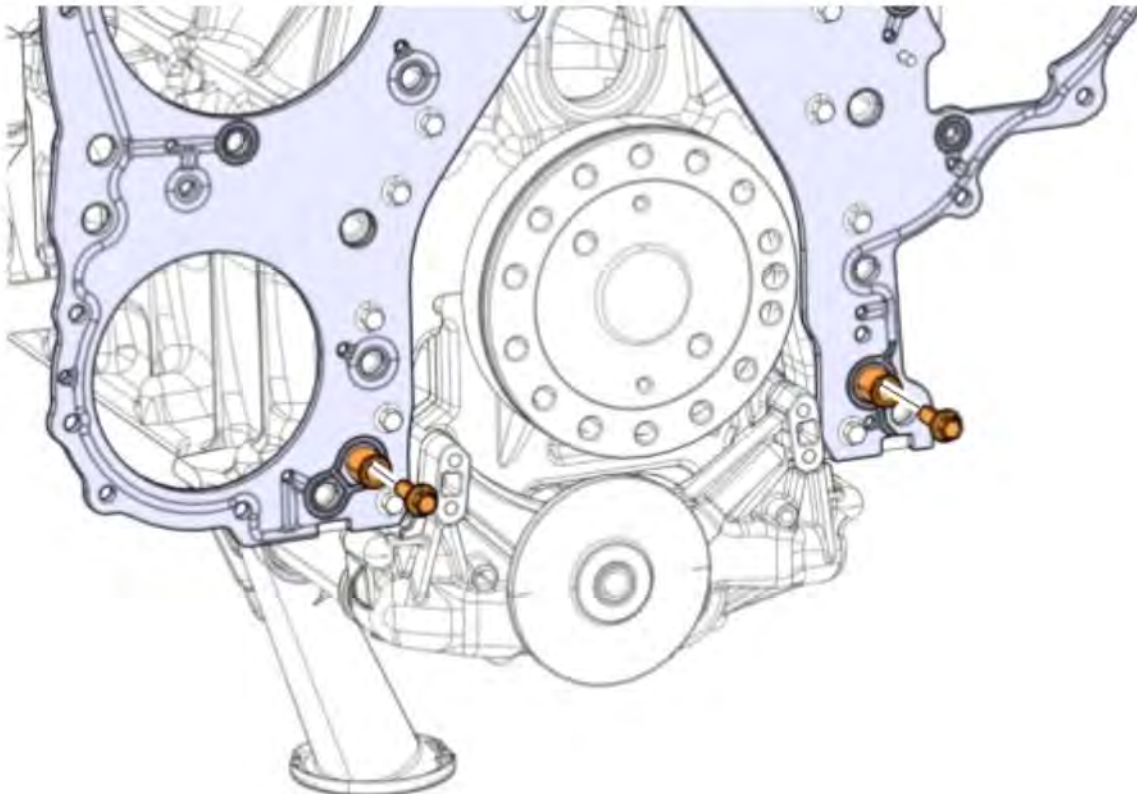


230	Torque tighten the screws.
-----	----------------------------

Tightening torque	
Timing gear plate, screw	Tightening sequence: 1 - 28
	28 ±4 Nm
	(21 ±3 lb _f ·ft)



231	Remove the tools.
------------	-------------------

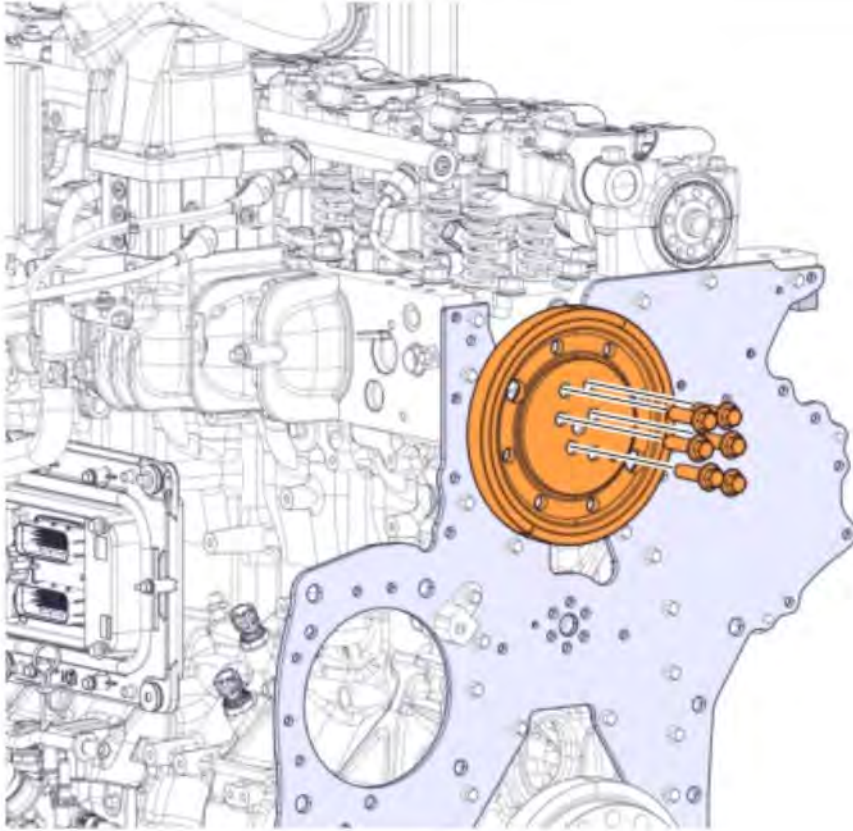


232	Clean the timing gear plate.
------------	------------------------------

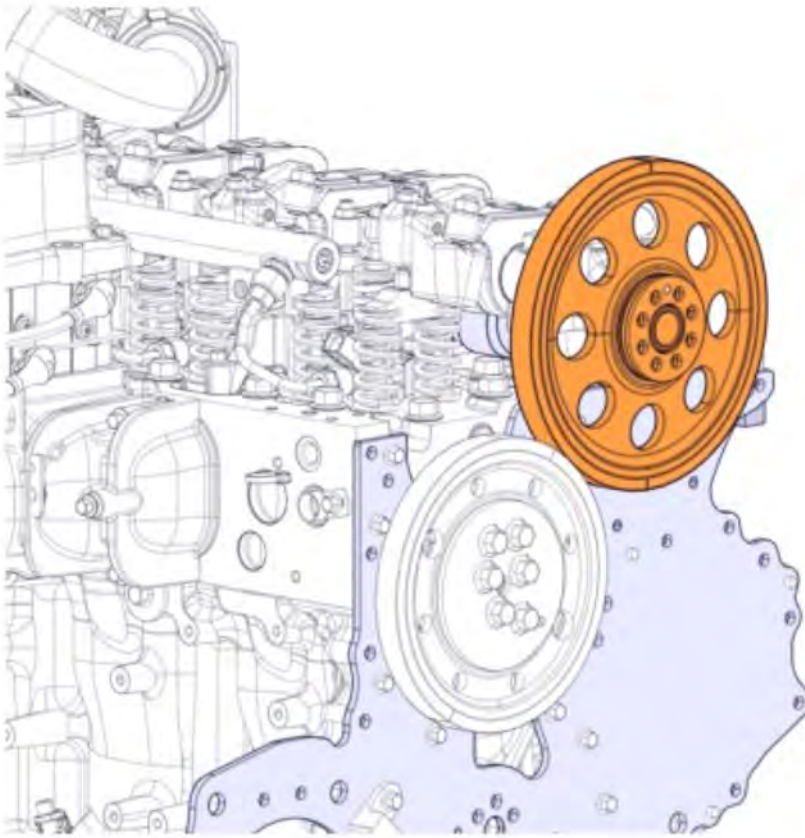
233	Install the thrust washer.
------------	----------------------------

234	Install the gear.
-----	-------------------

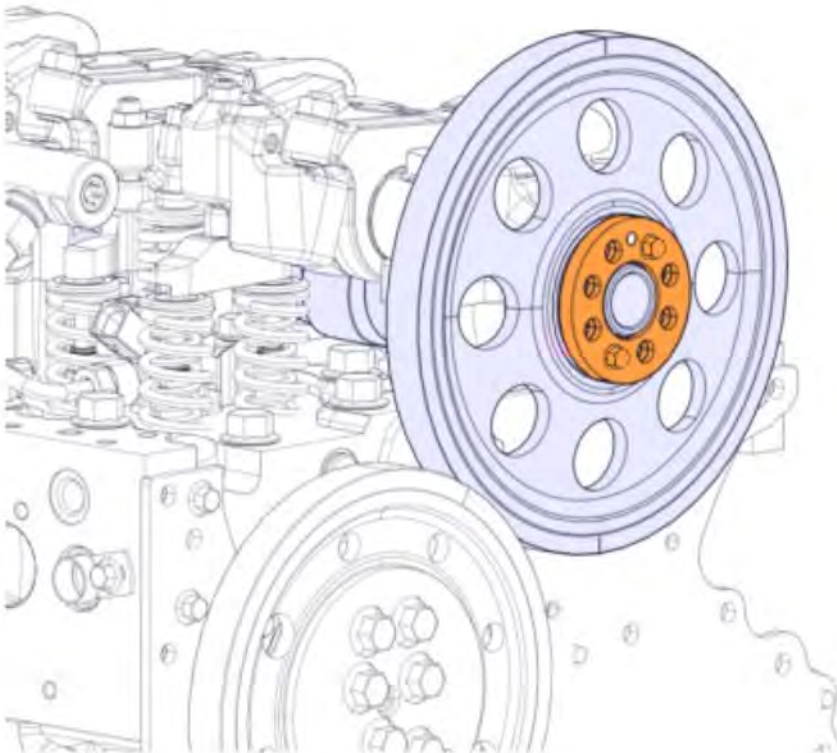
235	Install the screws.		
	<table border="1"><tr><td>i</td><td>Note Hand tighten the screws.</td></tr></table>	i	Note Hand tighten the screws.
i	Note Hand tighten the screws.		



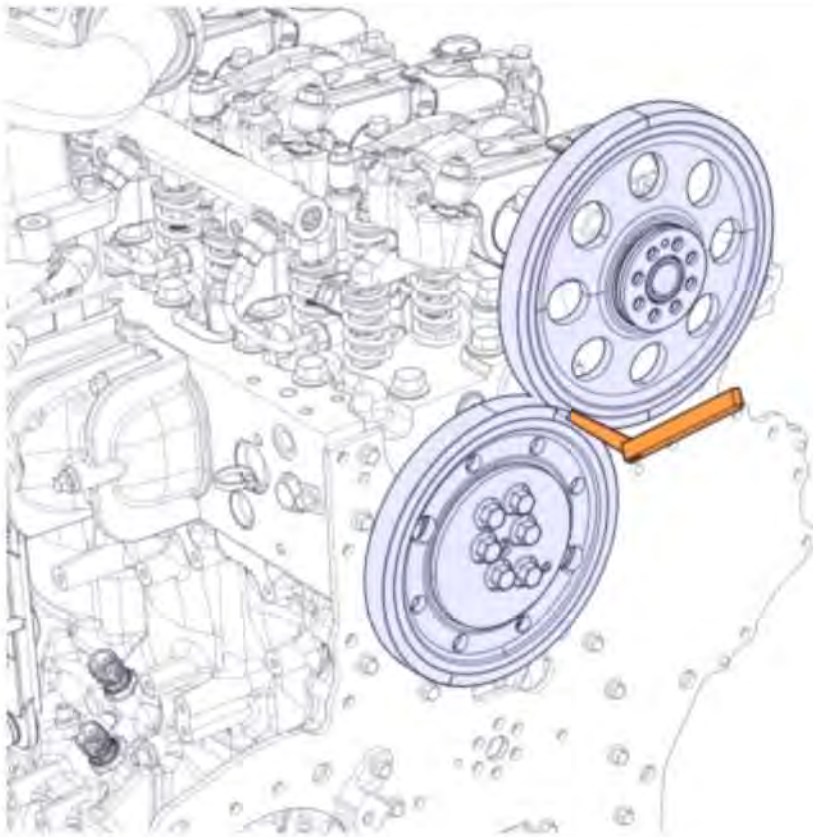
236	Install the gear.
-----	-------------------



237	Install the tool.	
	Required material	
	kit	88870039

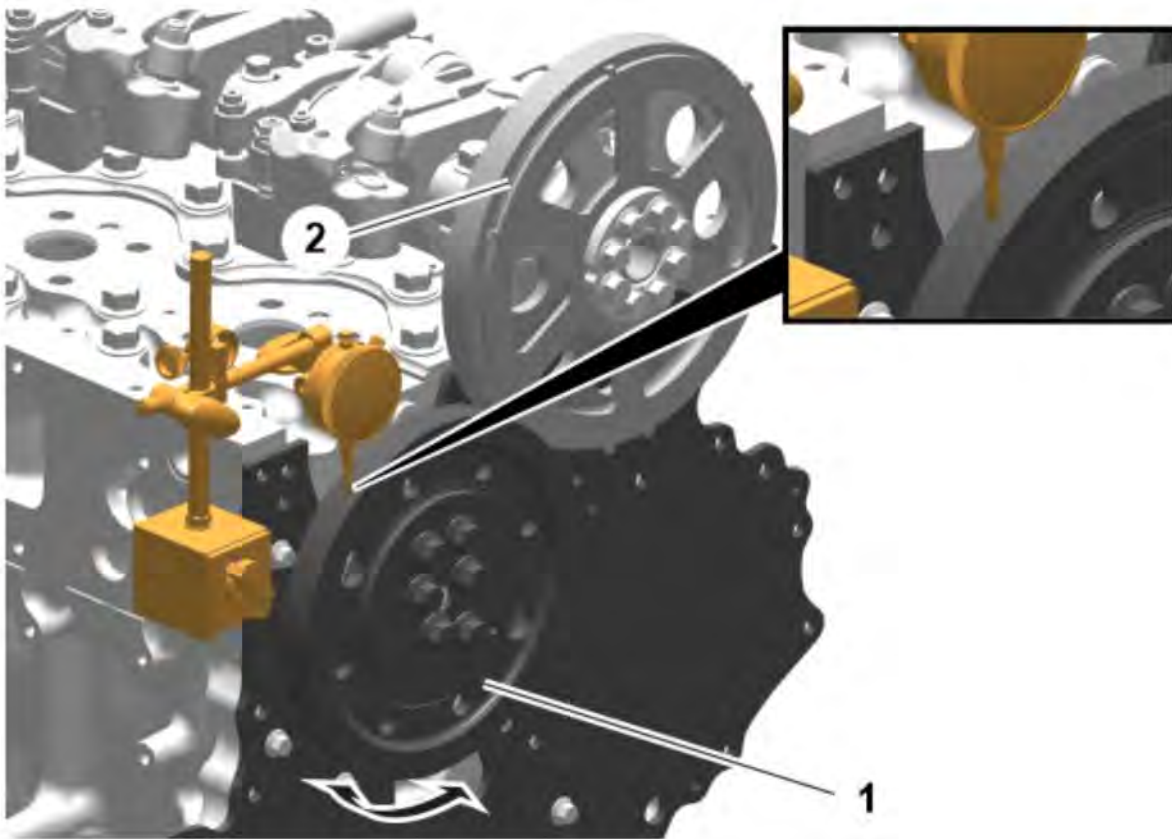


238	Install the feeler gauge.	
	Tech data	
	Feeler gauge, thickness	0.1 mm (0.004 in)

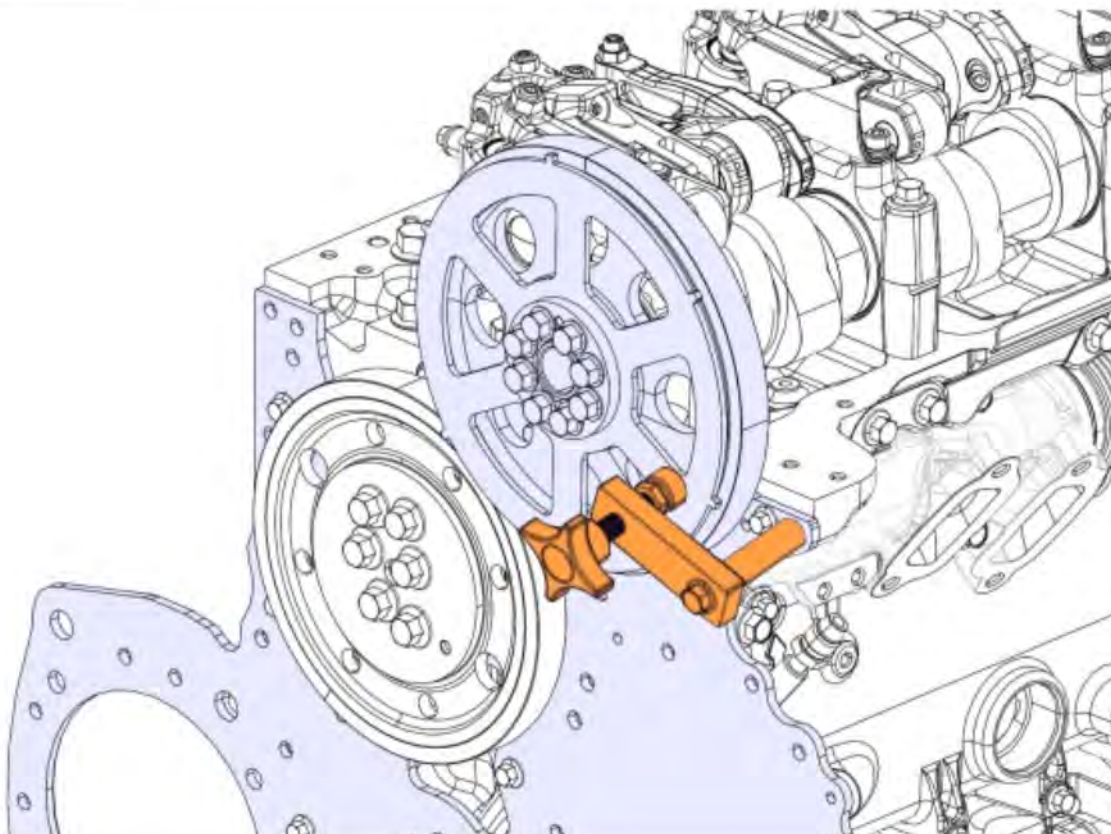


239	Adjust the clearance.	
	i	Note Adjust the idler gear to adjust the clearance.
i	Note Ensure that a feeler gauge inserted between the teeth is difficult to move.	

240	Install the tools.	
	Required material	
	MAGNETIC STAND	9999696
	ROCKER_INDICATOR	9999683
i	Note Ensure that the probe tip touches the gear tooth.	



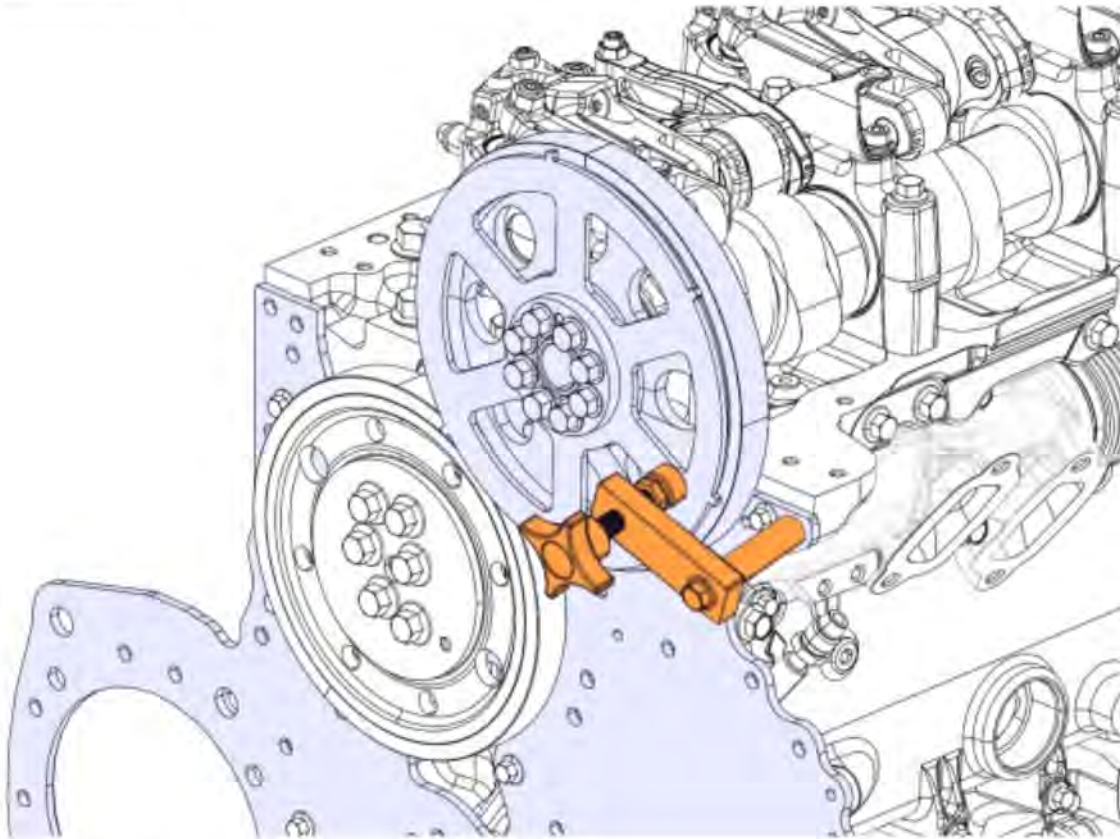
241	Install the tool.
Required material	
kit	88870039



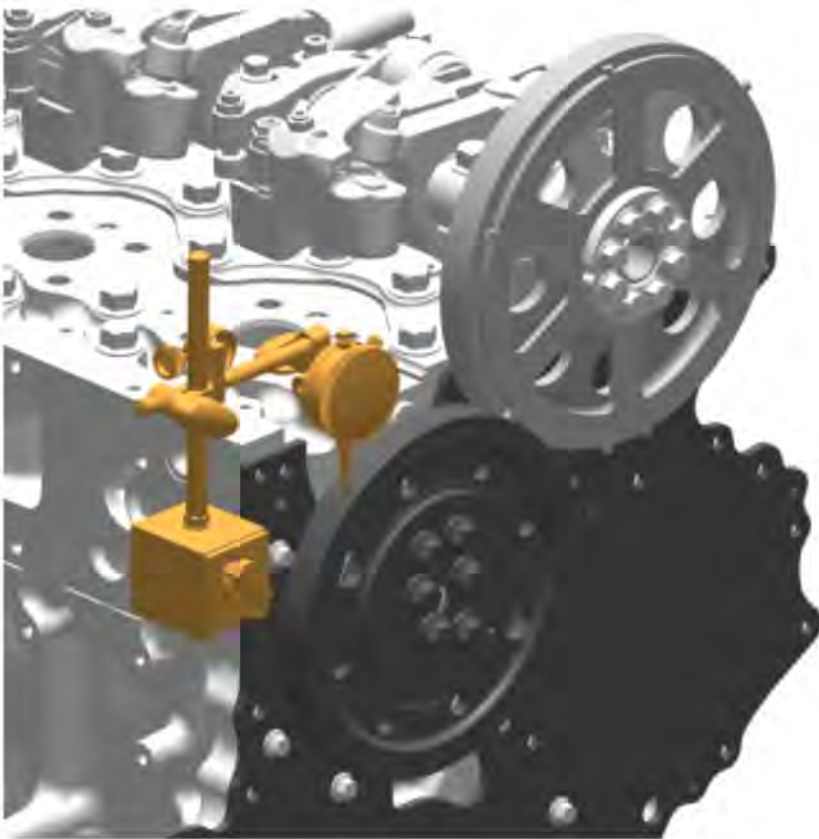
242	Check the backlash between gears 1 and 2.	
Tech data		
Backlash clearance		0.1 ±0.05 mm (0.004 ±0.002 in)

243	Perform this procedure when the condition below is met.			
Conditions				
<ul style="list-style-type: none"> If the backlash is not within specified value. 				
<ul style="list-style-type: none"> Readjust the gears. 				
<table border="1" style="width: 100%;"> <tr> <td style="width: 10%; text-align: center;">i</td> <td>Note The tool must be removed to readjust the gears.</td> </tr> </table>			i	Note The tool must be removed to readjust the gears.
i	Note The tool must be removed to readjust the gears.			

244	Remove the tool.
------------	------------------

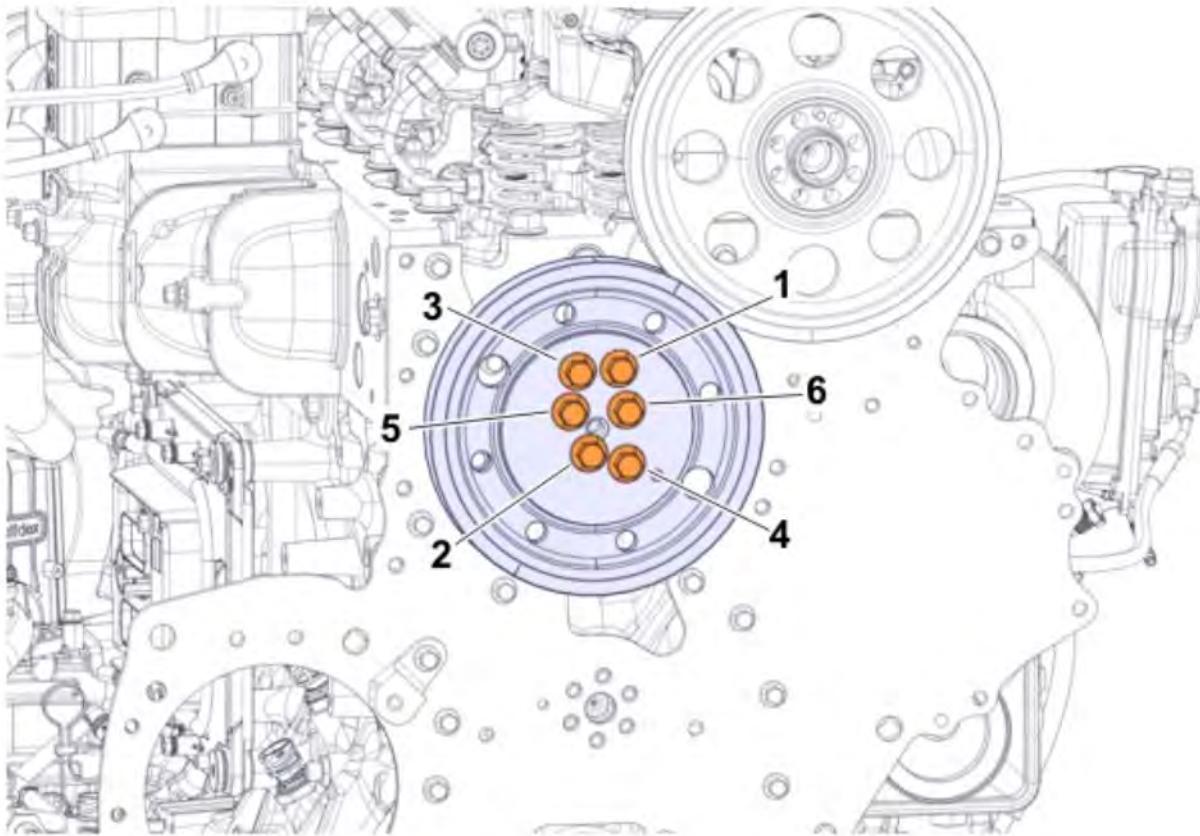


245	Remove the tools.
------------	-------------------

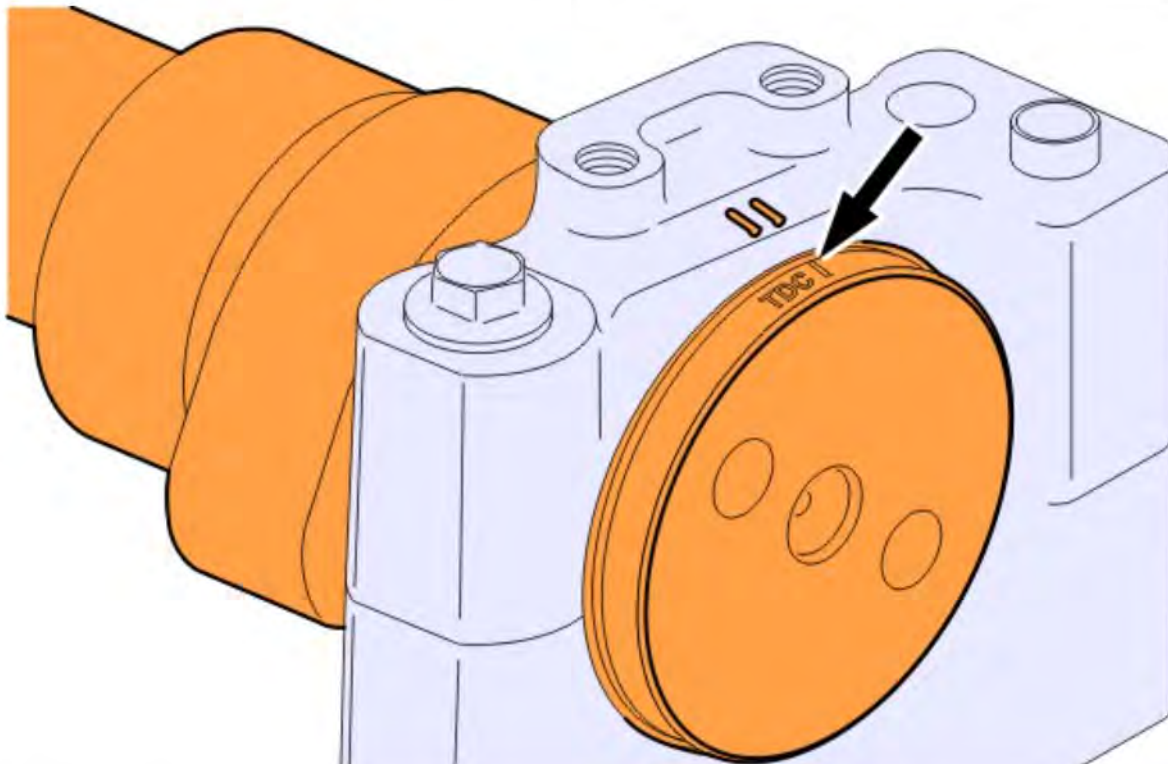


246	Torque tighten the screws.
-----	----------------------------

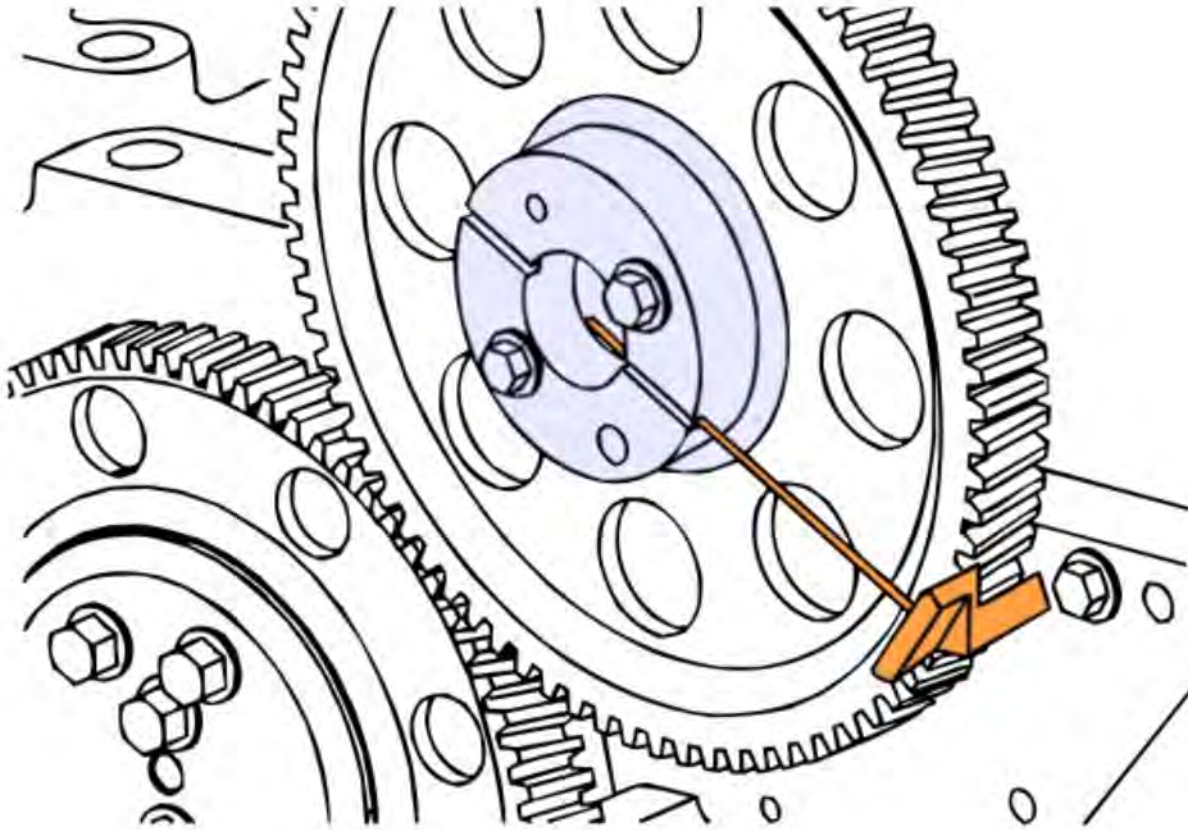
Tightening torque		
Idler gear, screw	1.	Tightening sequence: 1-6
		35 ±4 Nm (26 ±3 lb _f -ft)
	2.	Tightening sequence: 1-6
		120 ±5°



247 Verify that the camshaft position markings are at (TDC).



248	Install the cam gear aligner.
Required material	
kit	88870039



249 Install the gears.



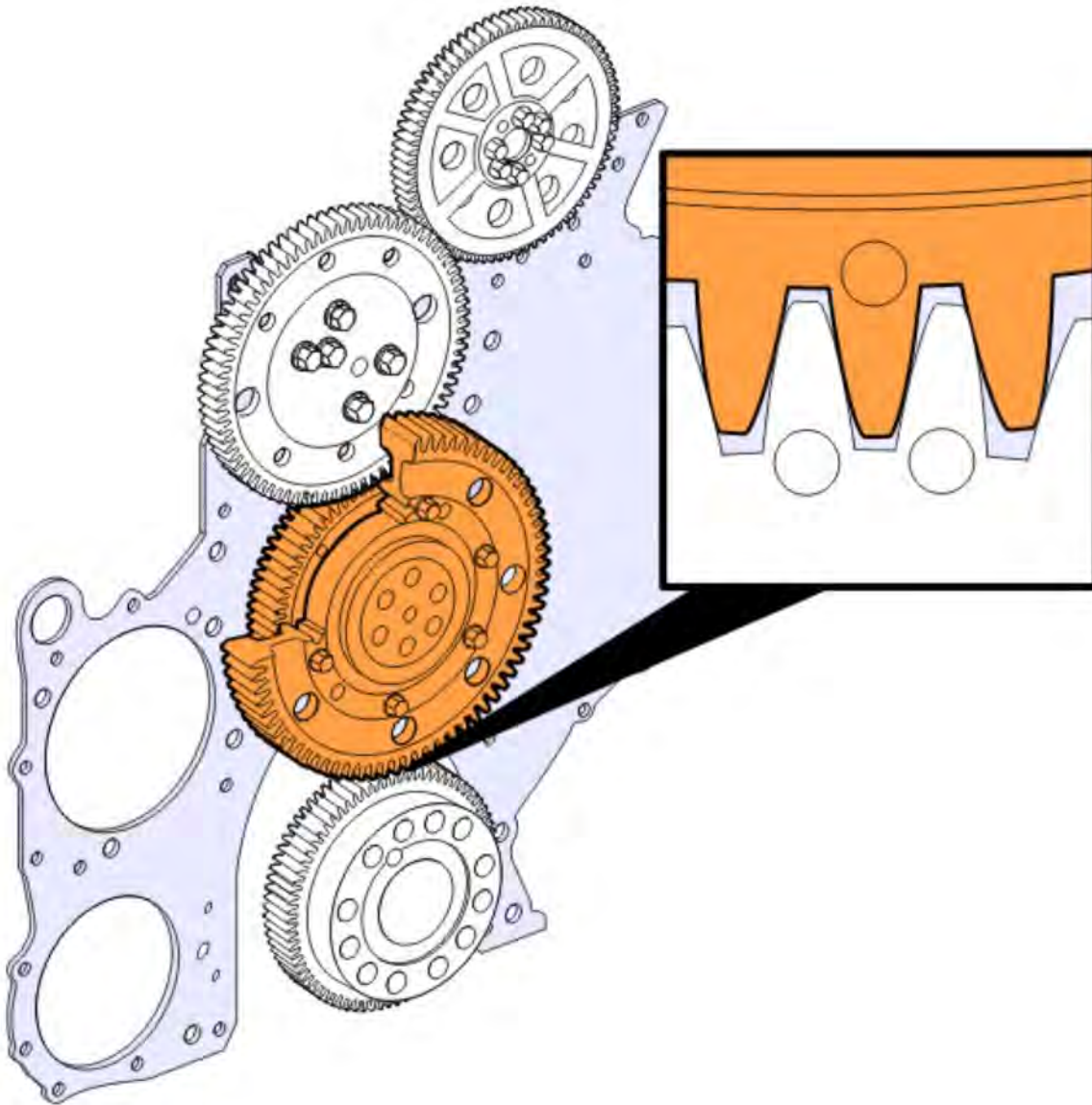
Note

Ensure the markings correctly align.



Note

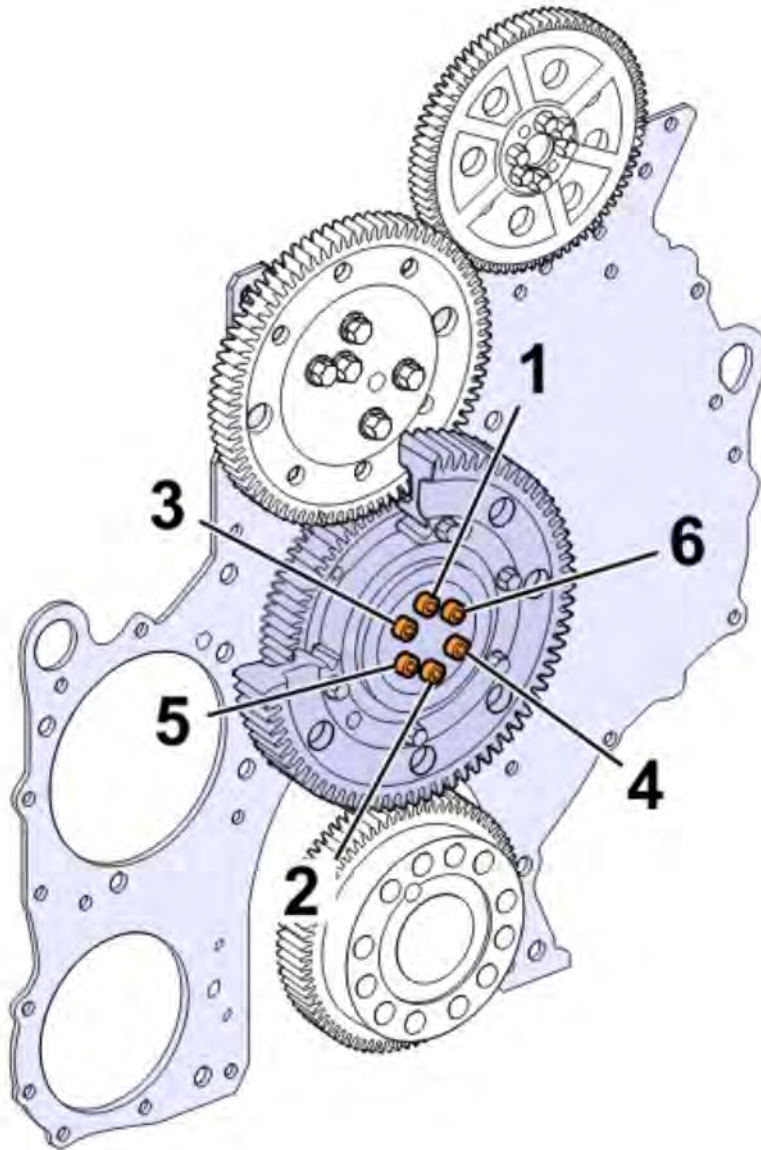
Remove the cam gear aligner.



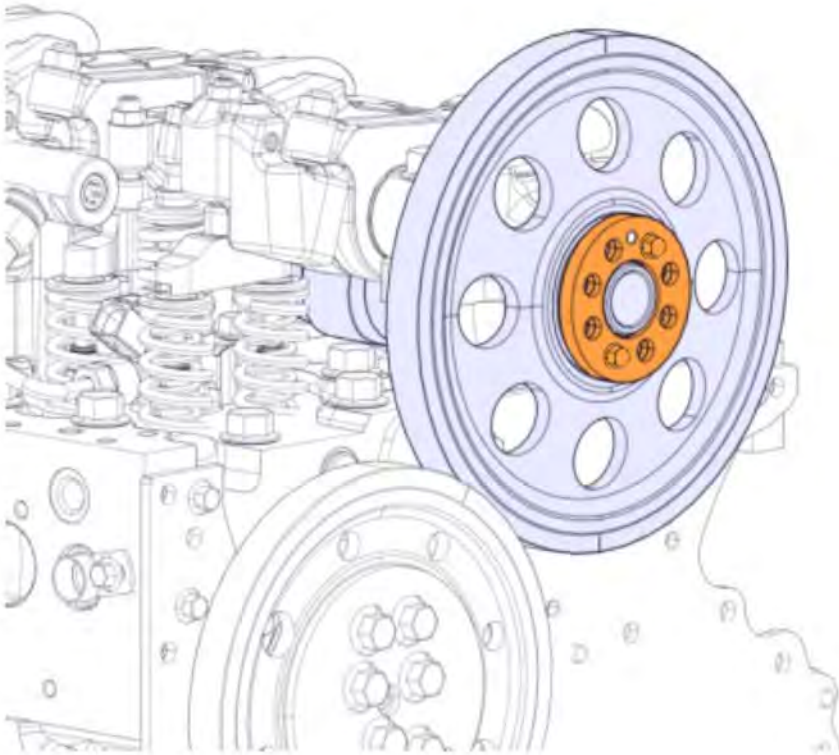
250	Install the screws.				
	<table border="1" style="border-collapse: collapse;"> <tr> <td style="text-align: center; width: 20px;">i</td> <td>Note</td> </tr> <tr> <td></td> <td>Use new parts.</td> </tr> </table>	i	Note		Use new parts.
i	Note				
	Use new parts.				

251	Torque tighten the screws.
------------	----------------------------

Tightening torque		
Double idler gear, screw	1.	Tightening sequence: 1-6
		25 ±3 Nm
		(18 ±2 lb _f -ft)
	2.	Tightening sequence: 1-6
		110 ±5°



252	Remove the tool.
-----	------------------

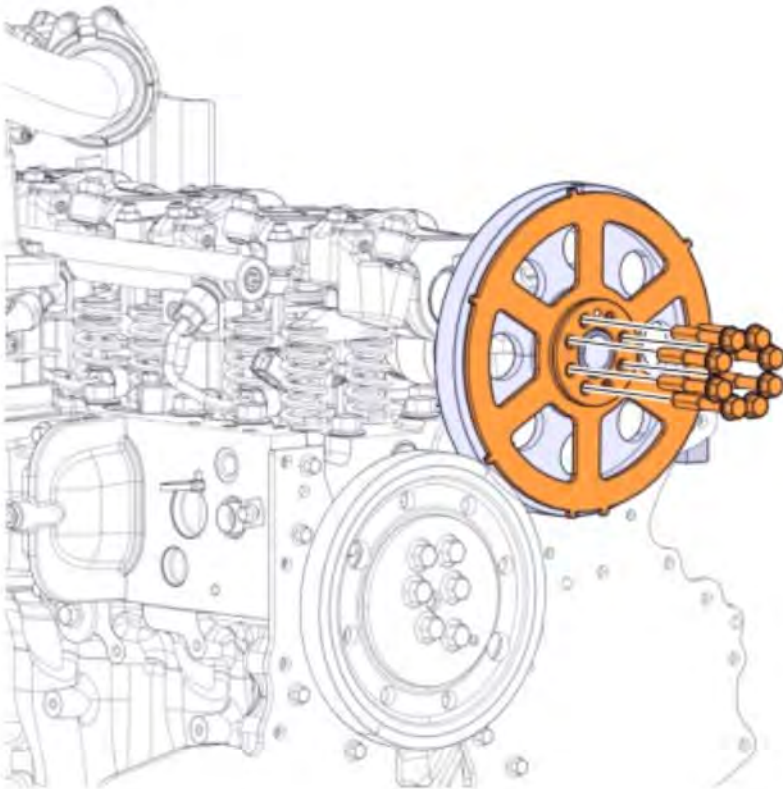


253 Install the tone wheel and screws.



Note

Use new screws.

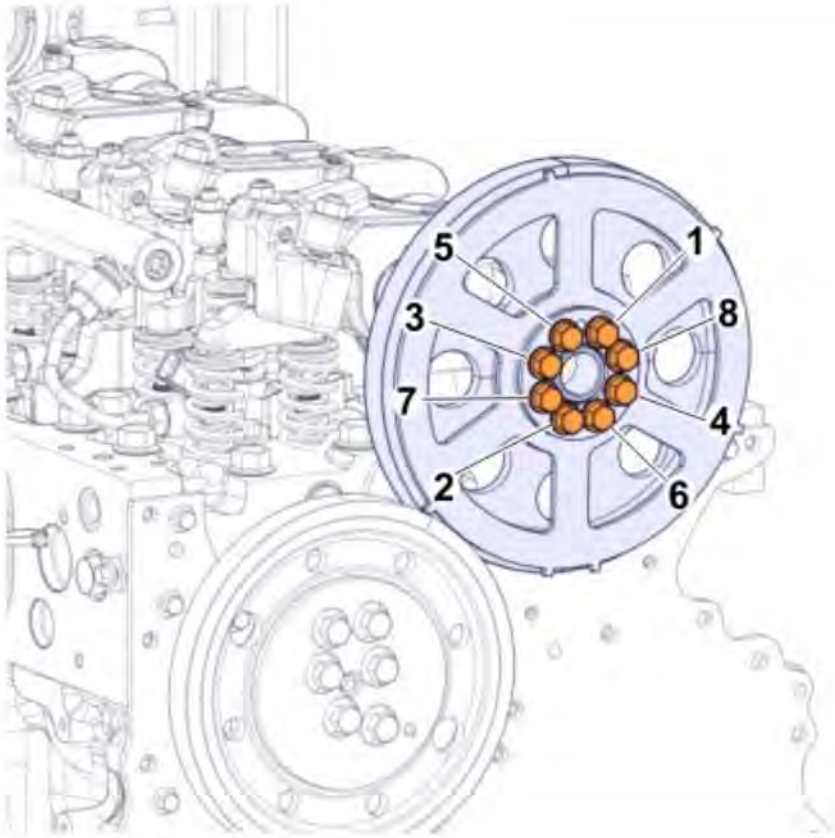


254 Torque tighten the screws.

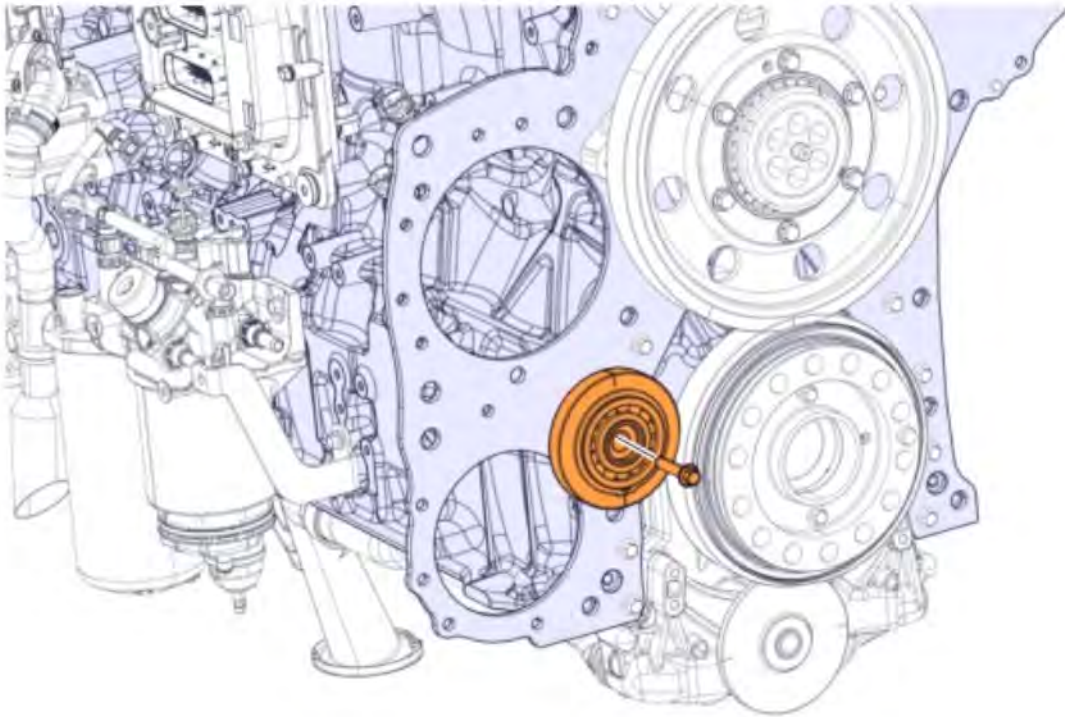
Copyright to this documentation belongs to the Volvo Group. No reproduction, copying, change, amendment or other similar disposal is entitled without prior written consent by the Volvo Group

The information contained herein is current at the time of its original distribution, but is subject to change. The reader is advised that printed copies are uncontrolled.

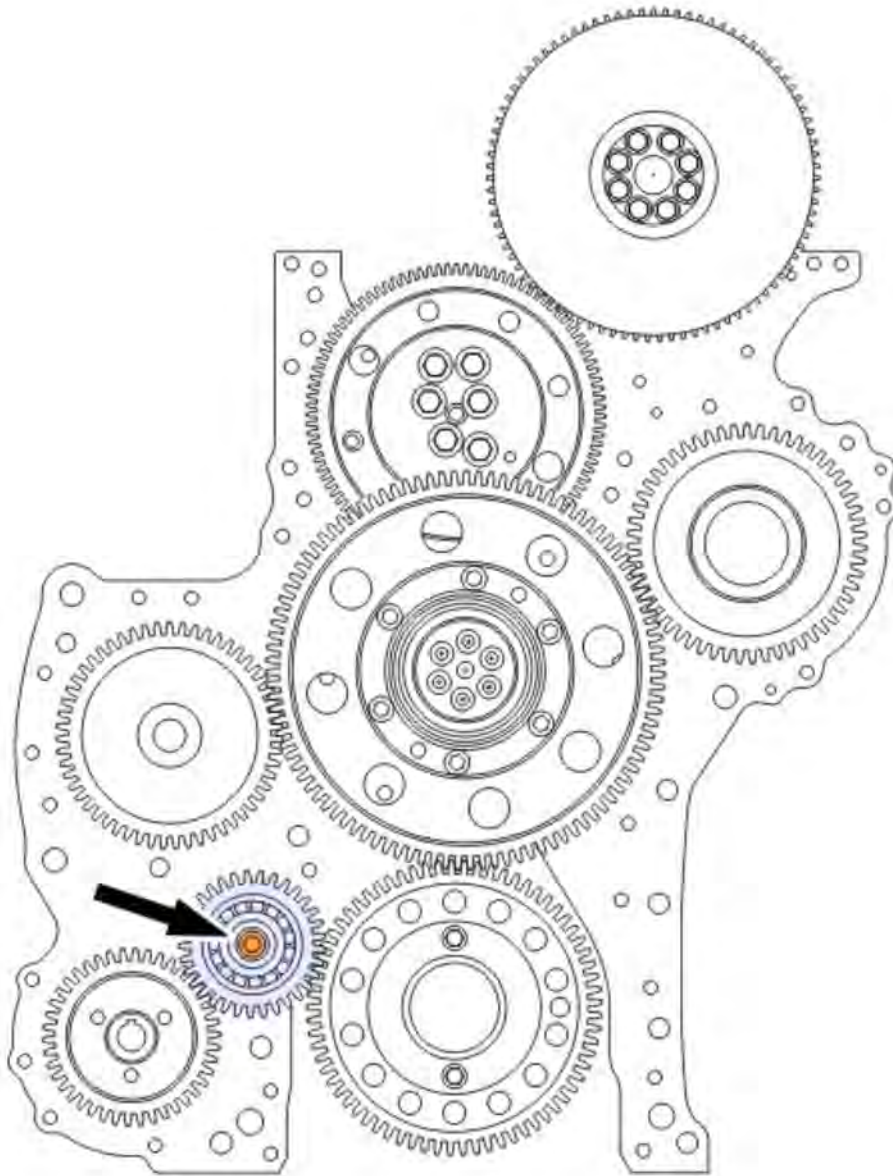
Tightening torque		
Camshaft gear, screw	1.	Tightening sequence: 1-8
		45 ±5 Nm (33 ±4 lb _f .ft)
	2.	Tightening sequence: 1-8
		90 ±5°



- | | |
|-----|---------------------------|
| 255 | Install the gear. |
| 256 | Install the screw. |
| 257 | Torque tighten the screw. |



Tightening torque	
Idler gear, servo pump, screw	140 ±10 Nm (103 ±7 lb _f ·ft)



258 Clean the contact surfaces carefully.

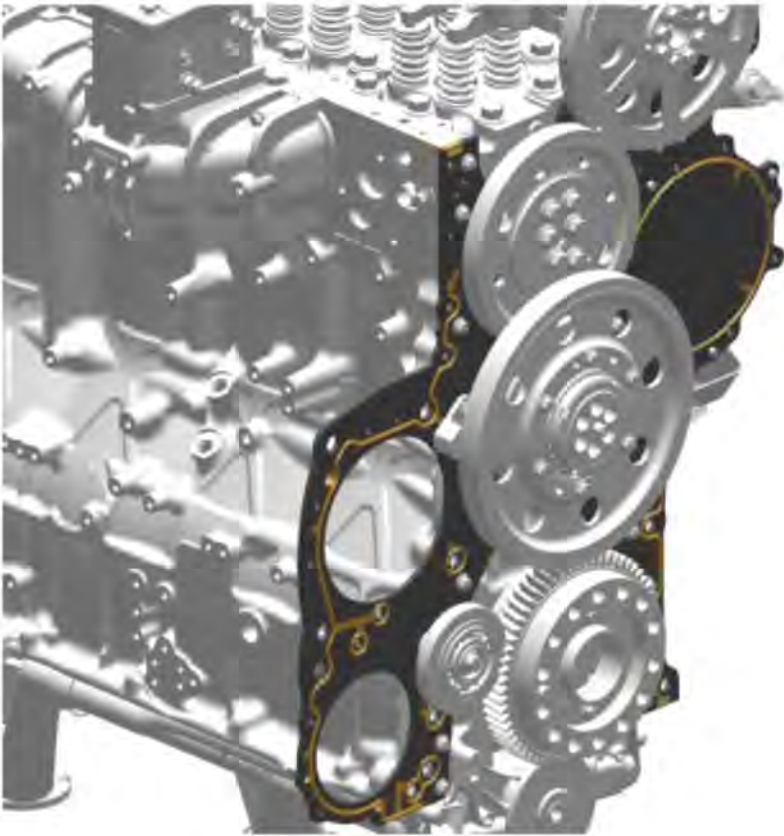


Note

Do not use any tools that may damage the sealing surfaces.

259 Inspect the sealing strip surfaces on both side of the timing gear plate.

260 If the sealing strip is completely loose or damaged, the timing gear plate must be replaced.

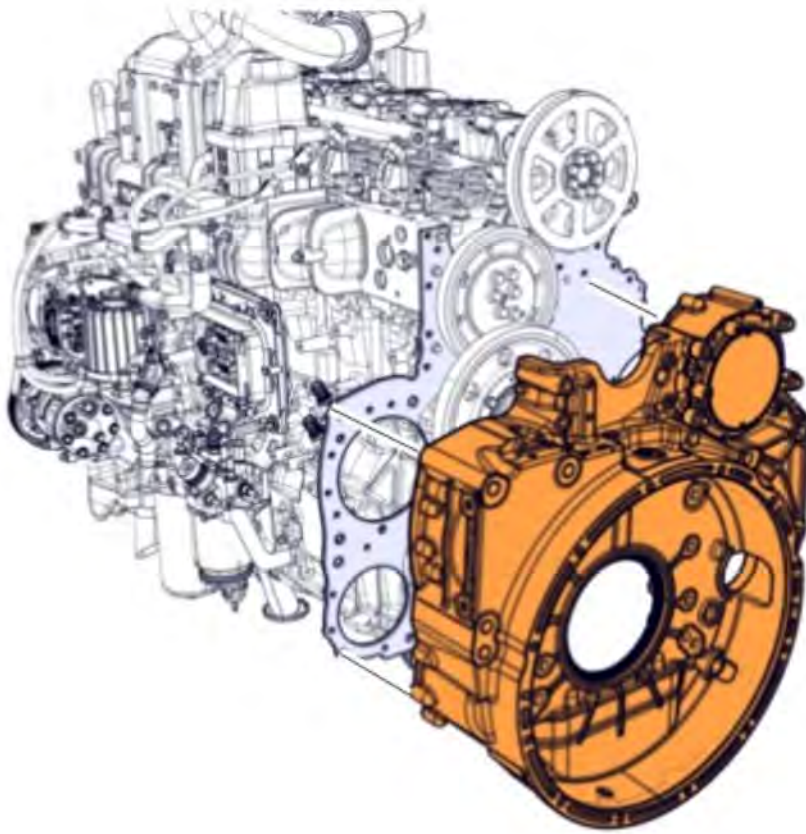
**CAUTION**

Risk of serious injury.

Heavy component.

- ▶ Exercise caution when moving the component. Use appropriate tools.

261 Install the flywheel housing.

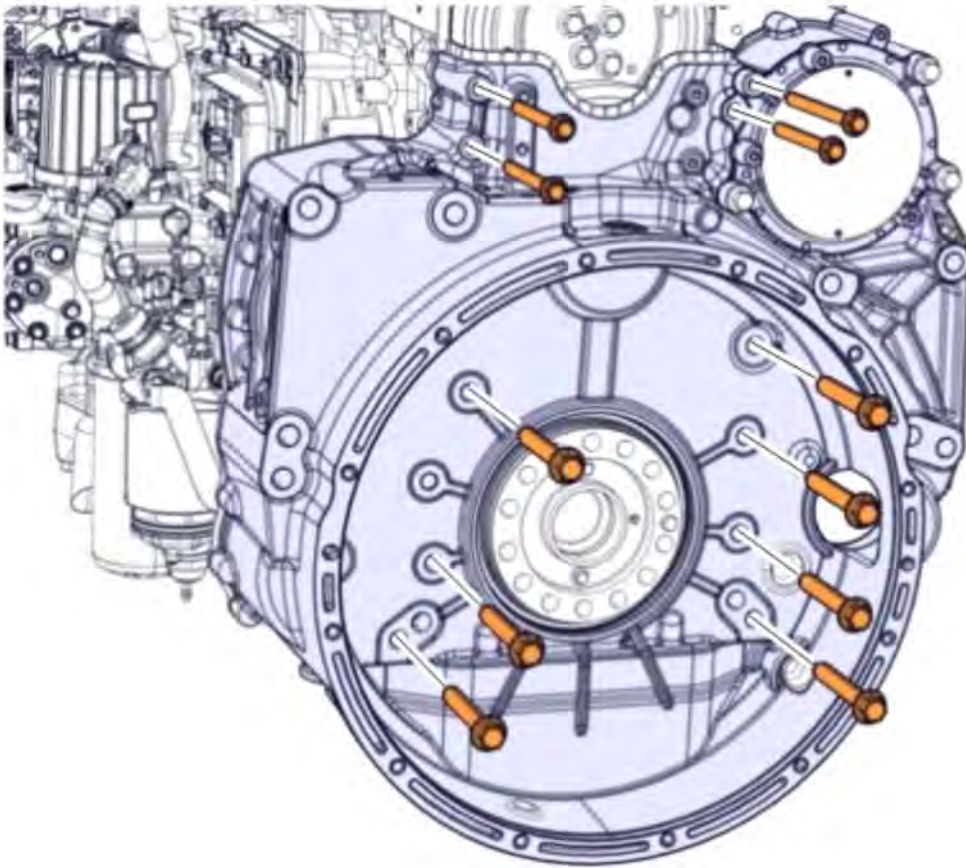


262 Install the screws.



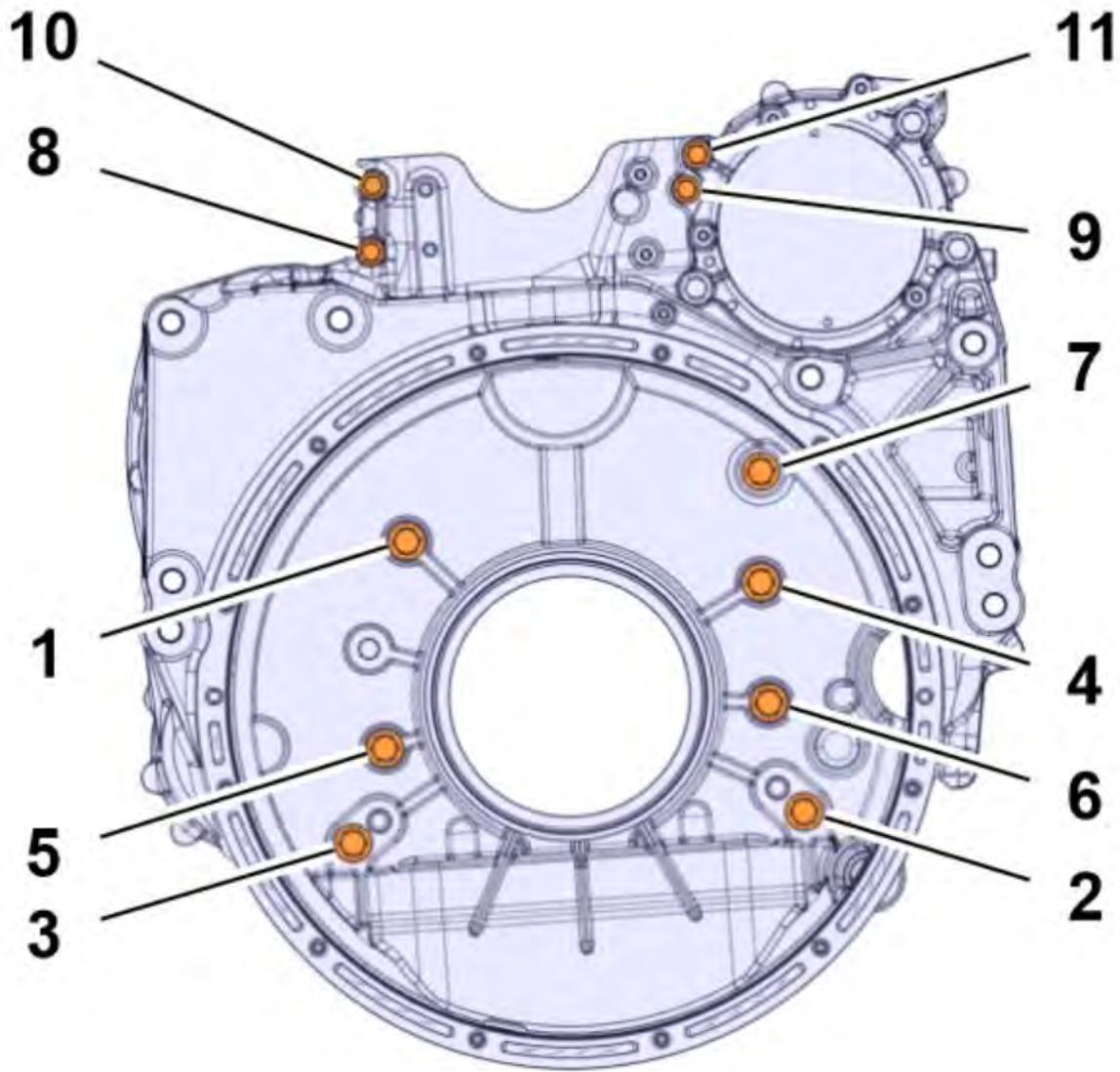
Note

Remove the alignment dowels.



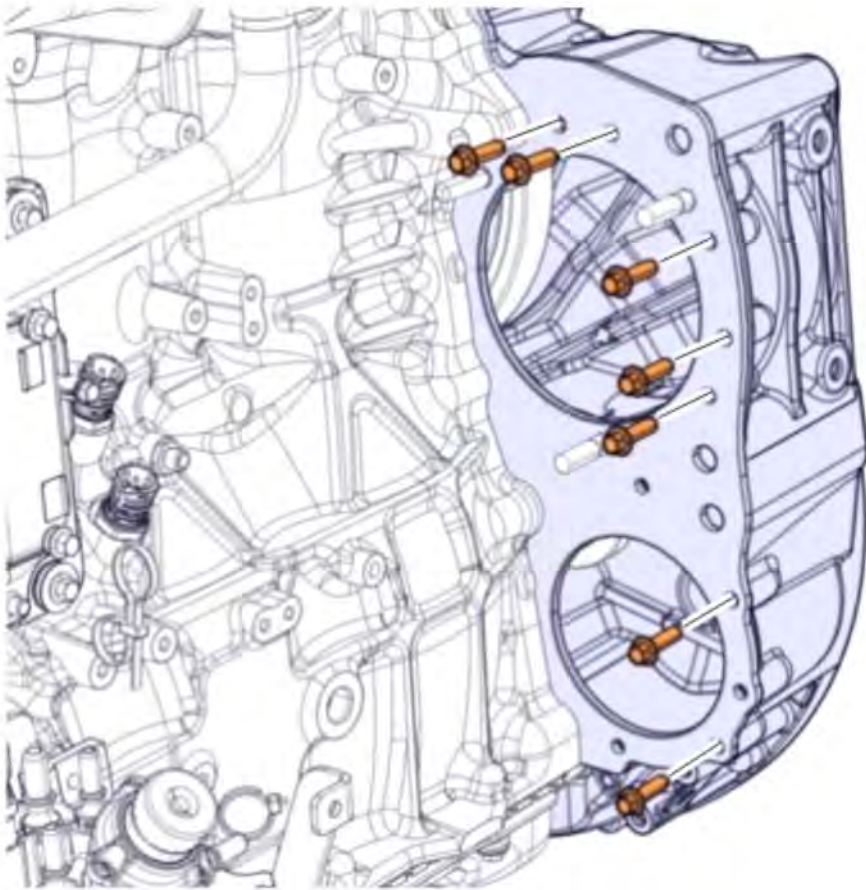
263 Torque tighten the screws.

Tightening torque		
Flywheel housing, screw	1.	M14
		Tightening sequence: 1-7
		36 ±10 Nm (27 ±7 lb _f .ft)
	2.	M14
		Tightening sequence: 1-7
		160 ±20 Nm (118 ±15 lb _f .ft)
	3.	M10
		Tightening sequence: 8-11
		60 ±10 Nm (44 ±7 lb _f .ft)



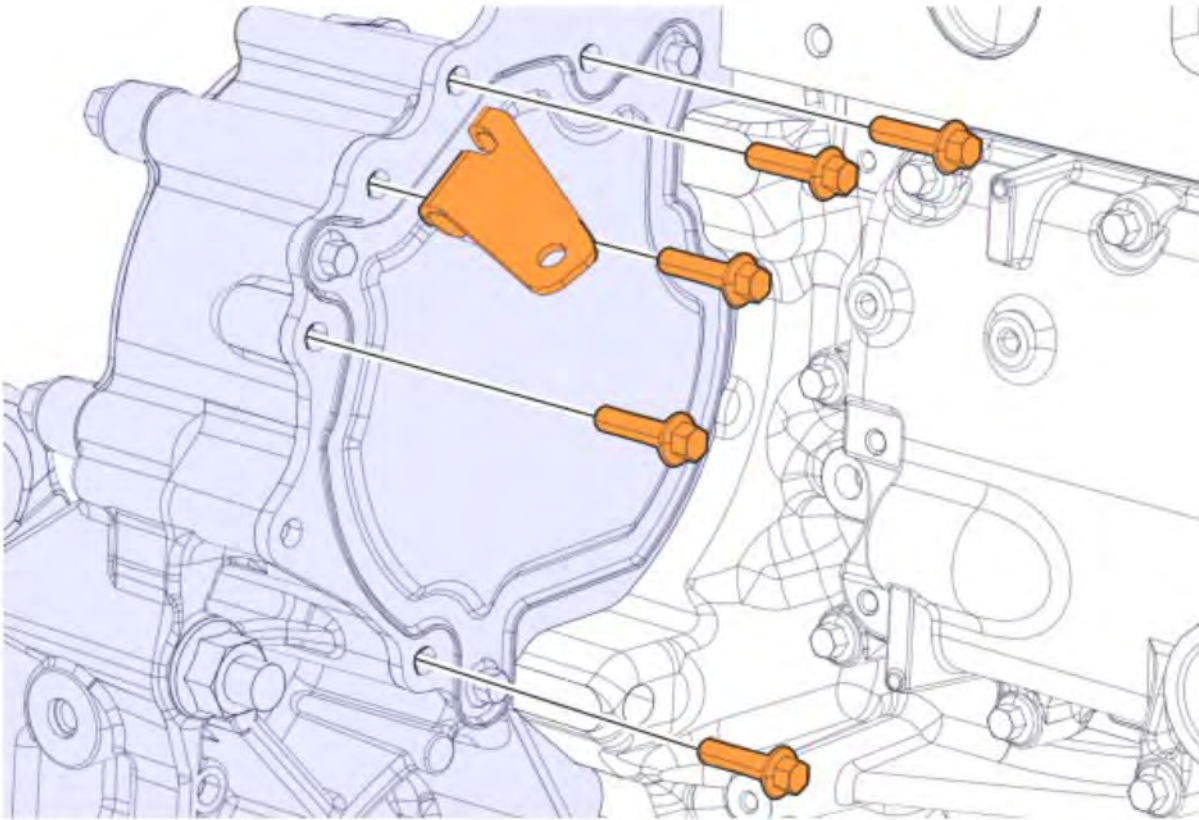
264	Install the screws.		
	<table border="1" style="width: 100%;"> <tr> <td style="width: 20px; text-align: center;">i</td> <td>Note Some housings may not include all the screws shown.</td> </tr> </table>	i	Note Some housings may not include all the screws shown.
i	Note Some housings may not include all the screws shown.		

265	Torque tighten the screws.	
	Tightening torque	
	Screw	M8
		24 ±4 Nm
		(18 ±3 lb _f -ft)



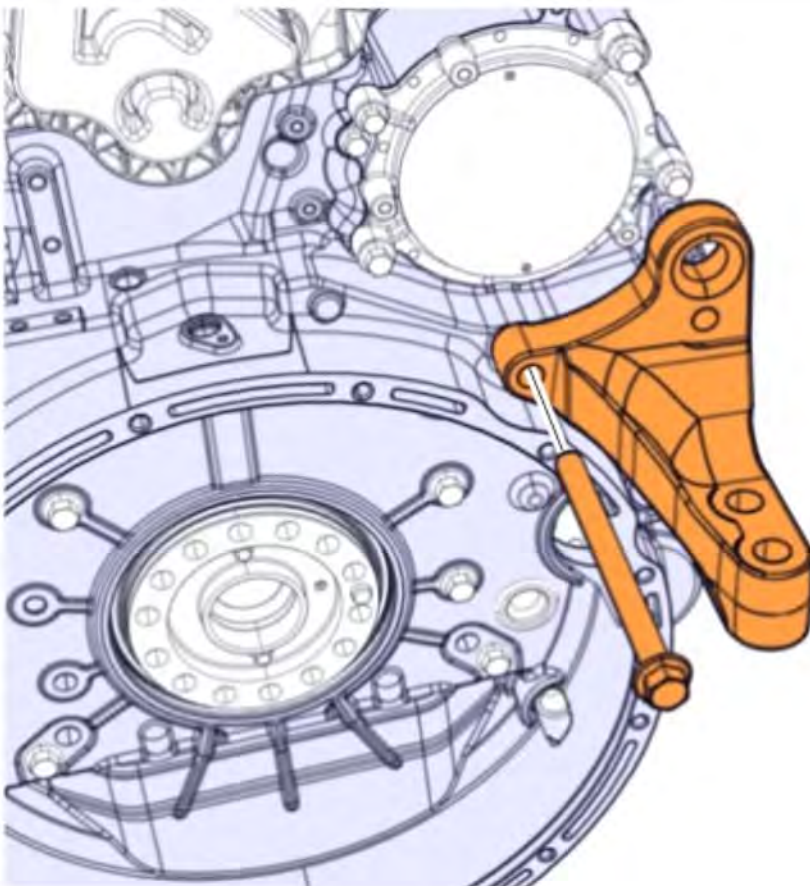
266	Install the bracket and the screws.
-----	-------------------------------------

267	Torque tighten the screws.	
	Tightening torque	
	Screw	M8
		24 ±4 Nm
		(18 ±3 lb _f -ft)



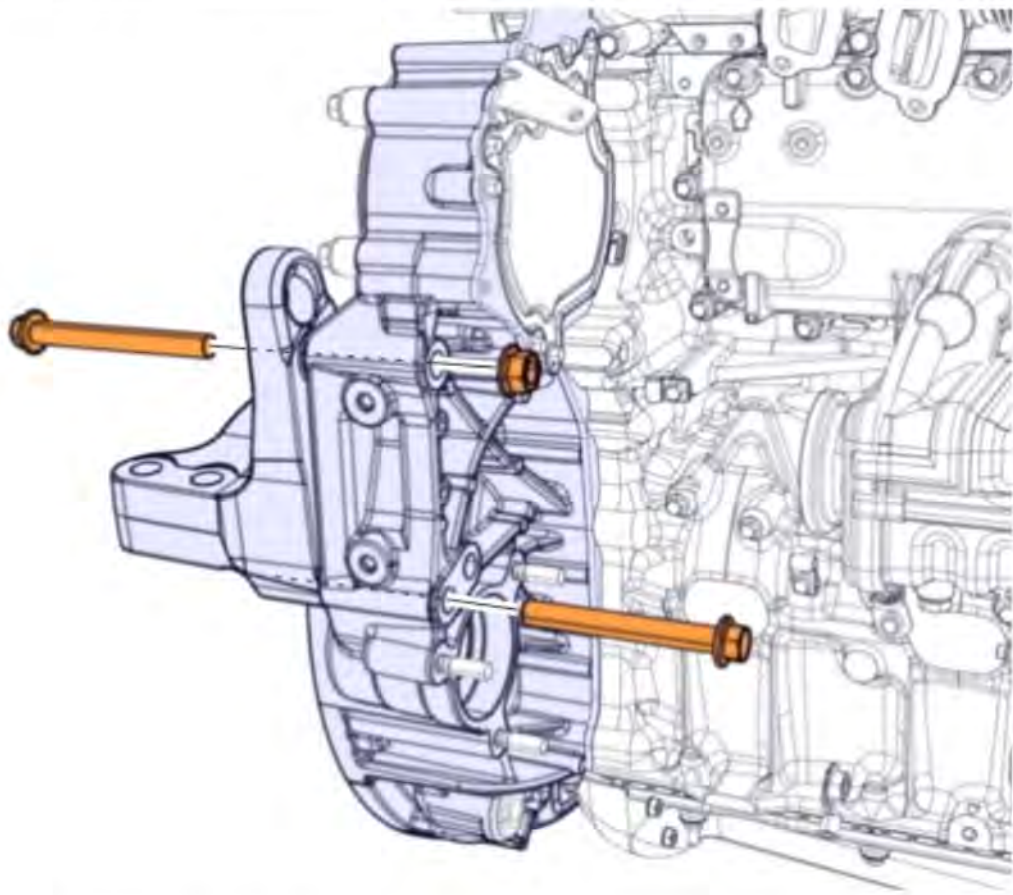
268	Install the bracket.
-----	----------------------

269	Install the screw.
-----	--------------------



270	Install the screw.
-----	--------------------

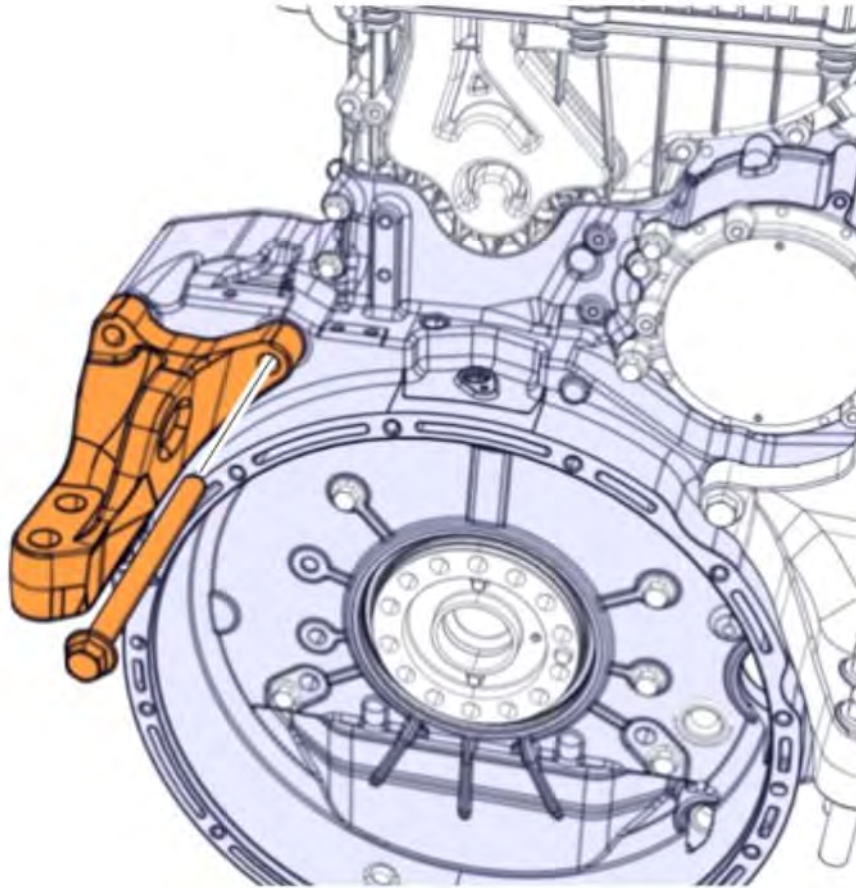
271 Install the screw and nut.



272	Torque tighten the screws and nut.	
	Tightening torque	
	Engine bracket, flywheel housing, rear, screw	275 ±45 Nm (203 ±33 lb _f -ft)

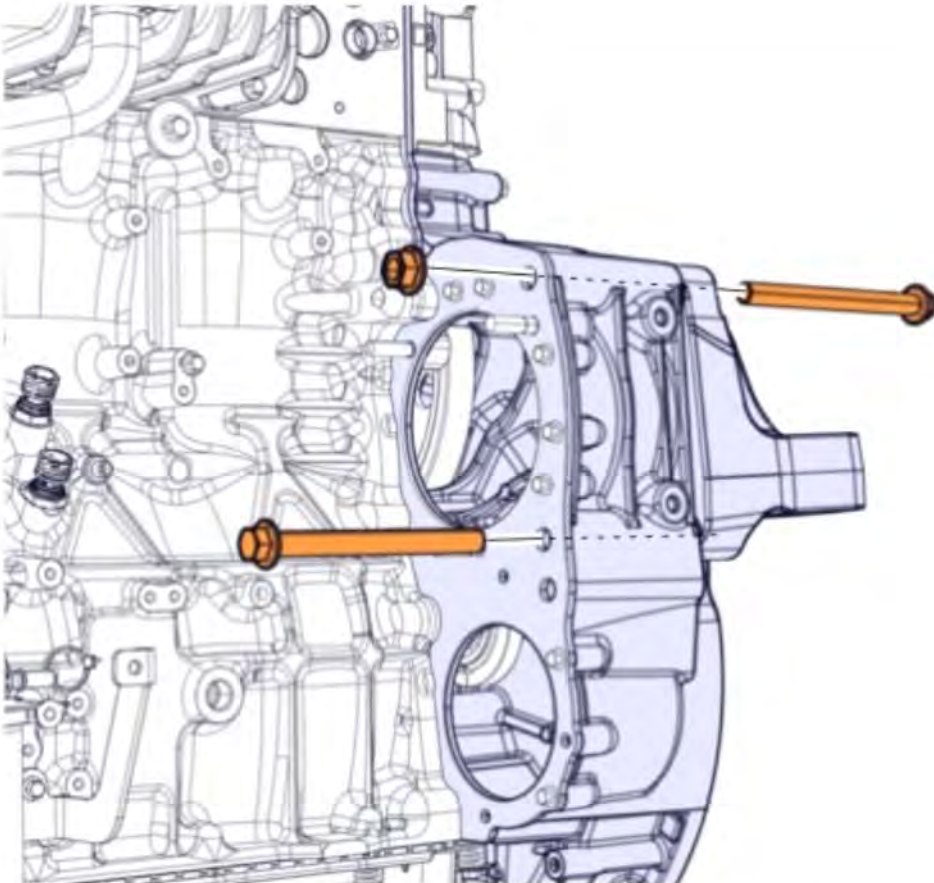
273 Install the bracket.

274 Install the screw.



275	Install the screw.
-----	--------------------

276	Install the screw and nut.
-----	----------------------------



277 Torque tighten the screws and nut.

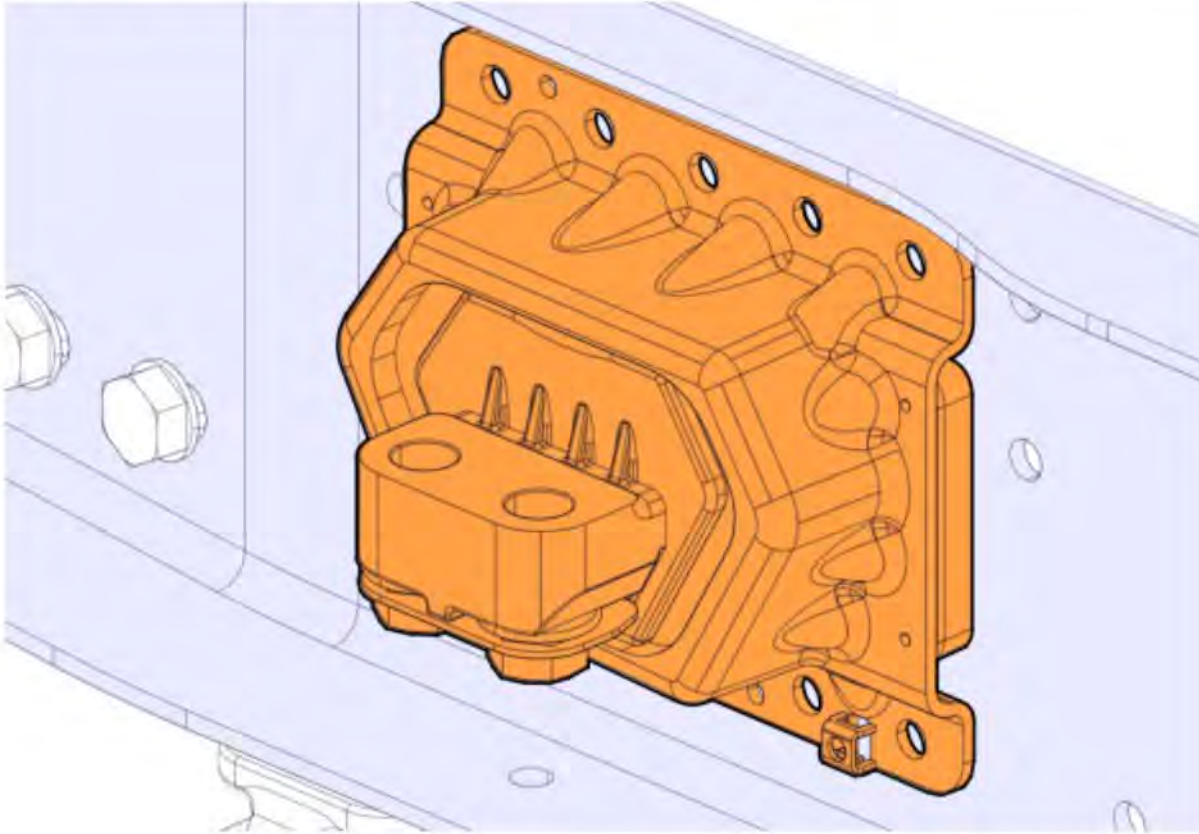
Tightening torque

Engine bracket, flywheel housing, rear, screw

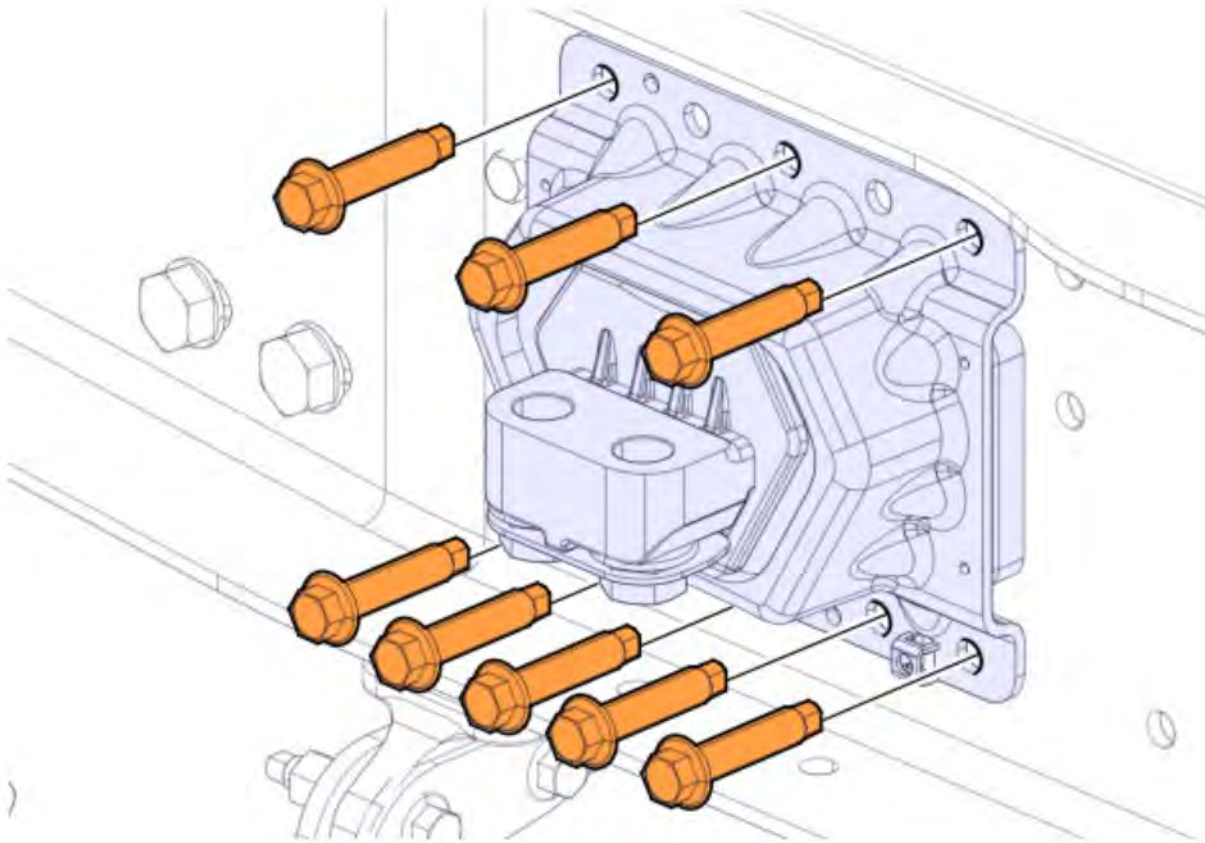
275 ±45 Nm

(203 ±33 lb_f·ft)

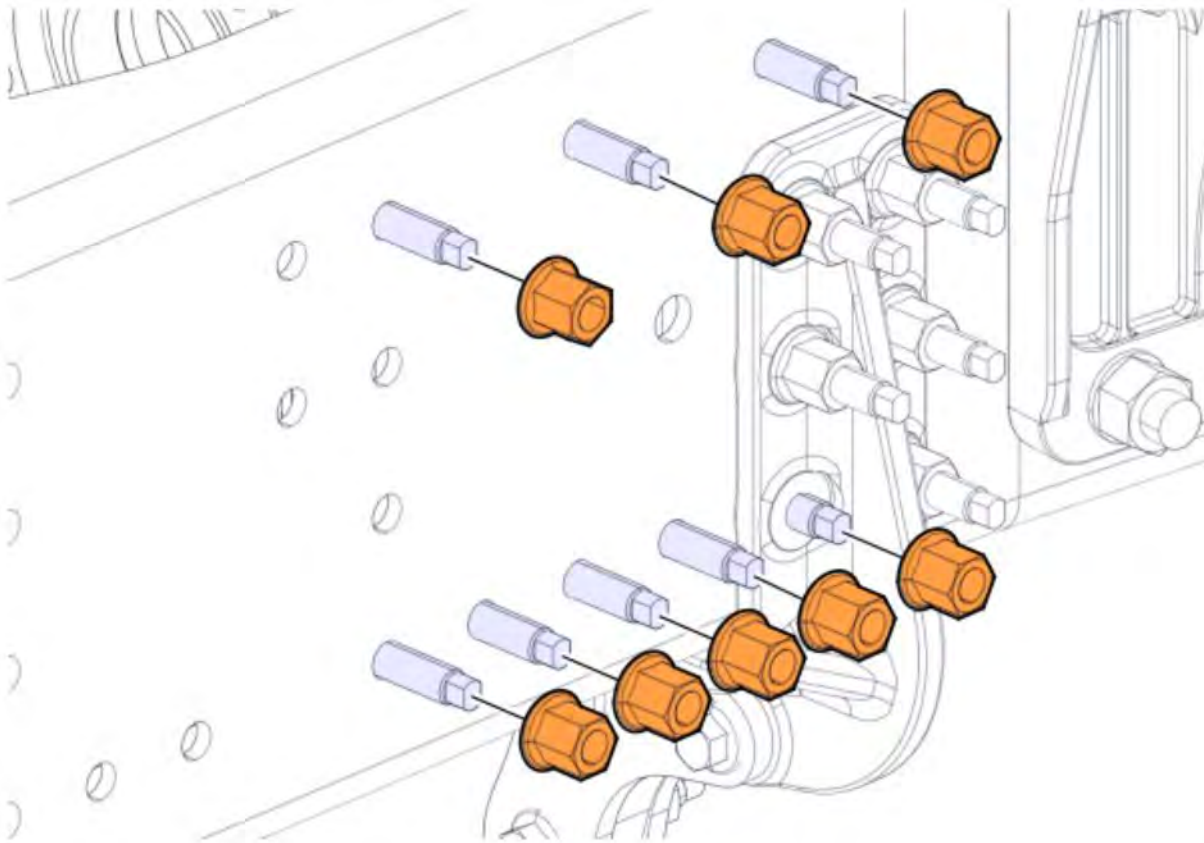
278 Install the rubber cushion.



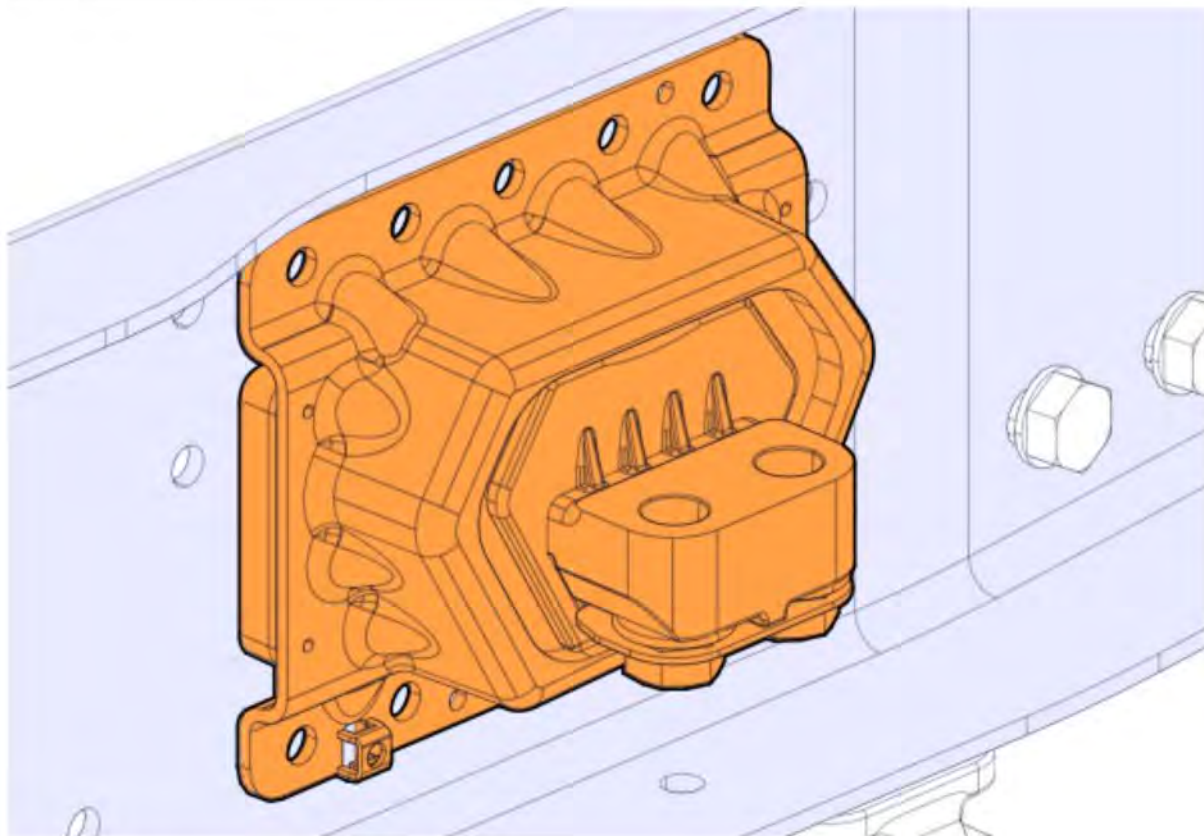
279 Install the screws.



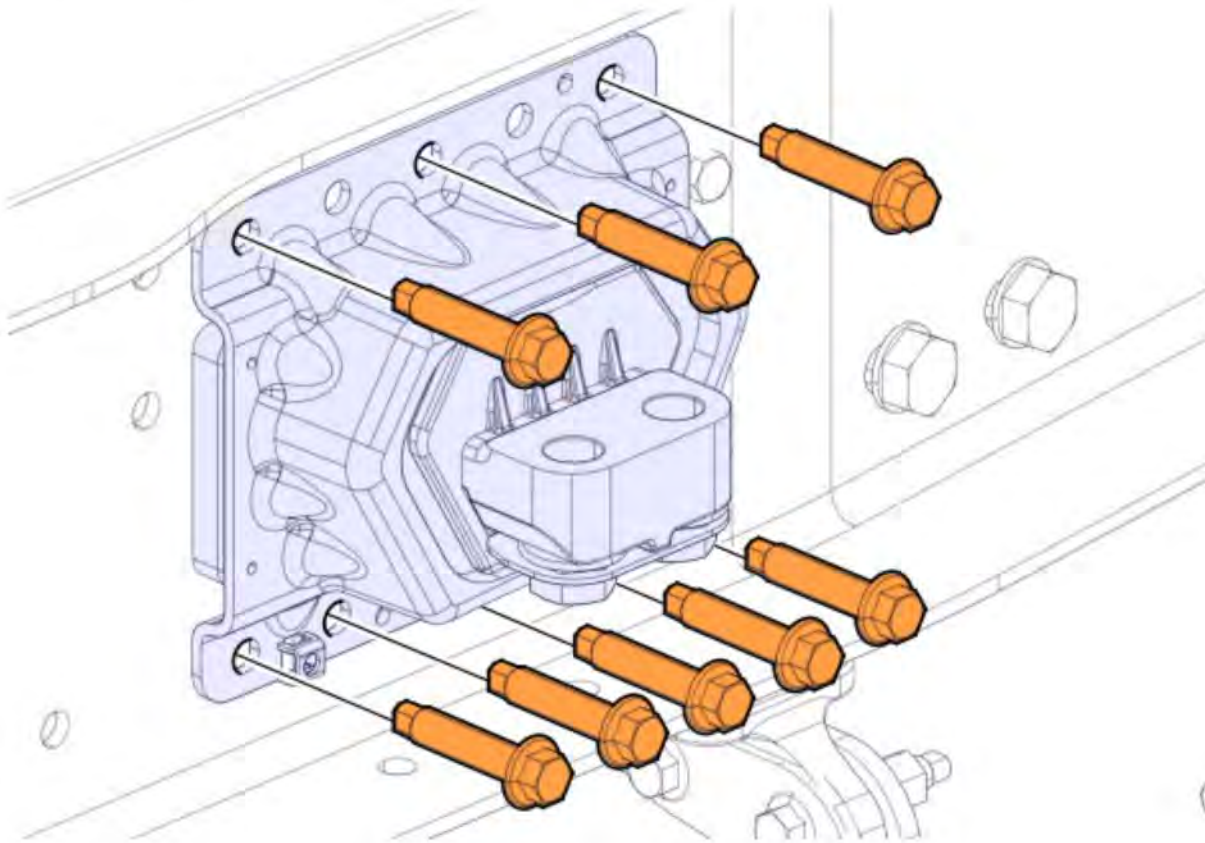
280	Install the nuts.	
281	Torque tighten the nuts.	
	Tightening torque	
	Rear cushion, screw	140 ±25 Nm (103 ±18 lb _f ·ft)



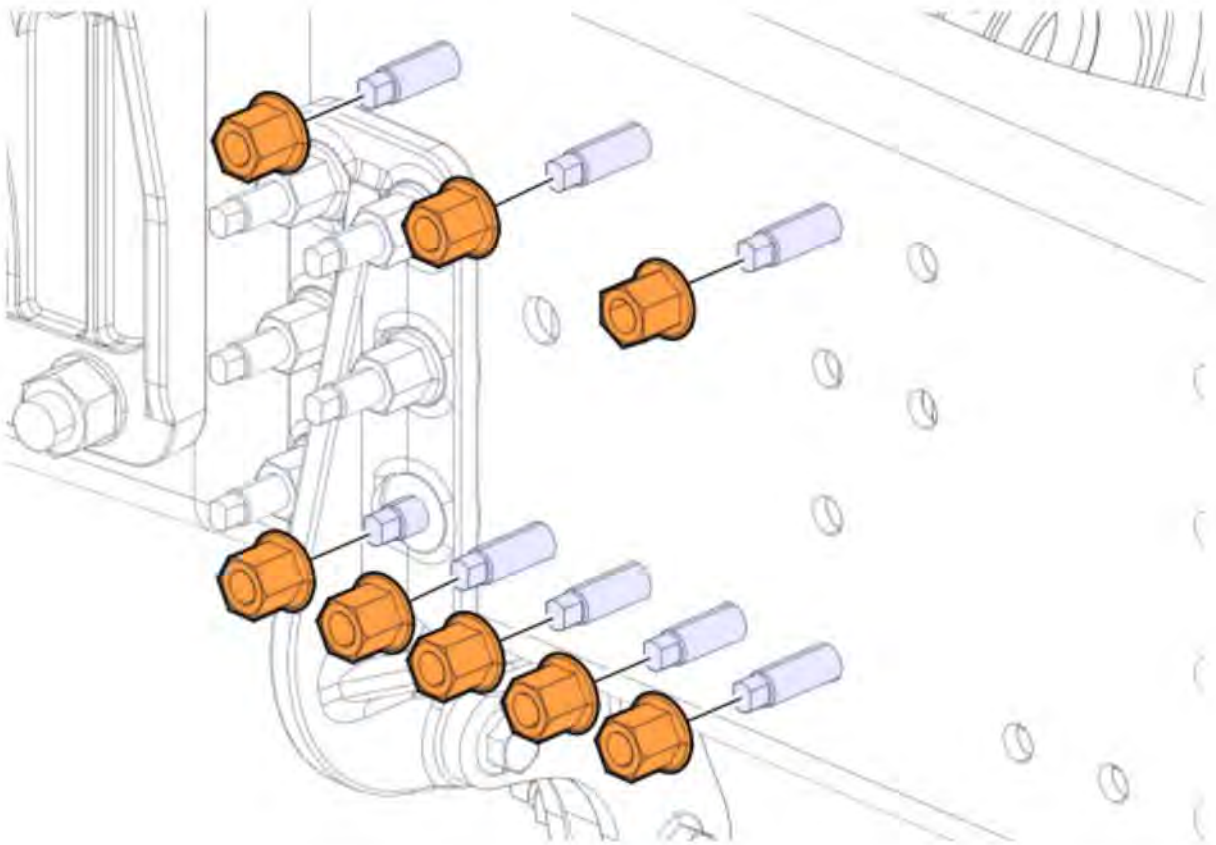
282 Install the rubber cushion.



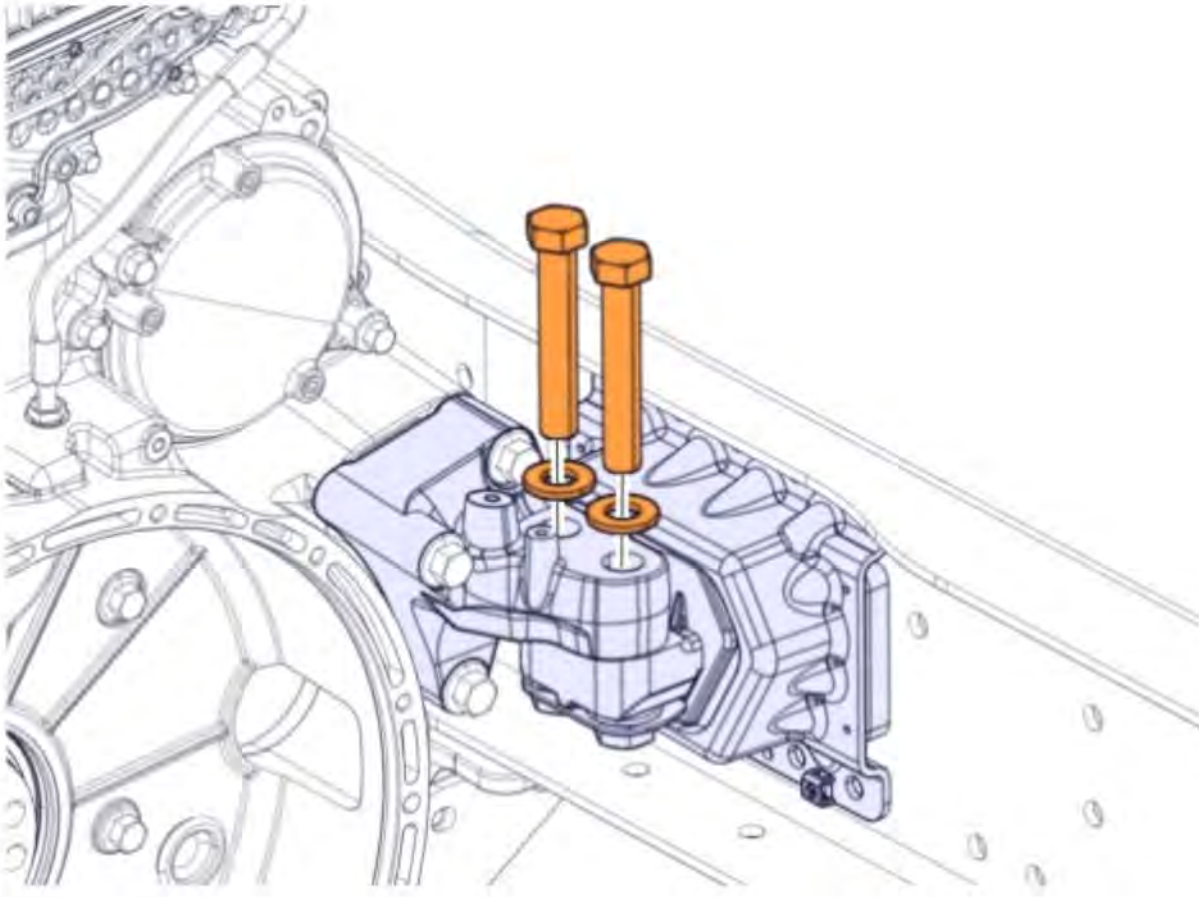
283 Install the screws.



284	Install the nuts.	
285	Torque tighten the nuts.	
	Tightening torque	
	Rear cushion, screw	140 ±25 Nm (103 ±18 lb _f -ft)



286	Lower the engine onto the rubber cushions.	
287	Install the screws and washers.	
288	Torque tighten the screws.	
	Tightening torque	
	Engine bracket, rubber cushion, screw	540 ±90 Nm (398 ±66 lb _f ·ft)

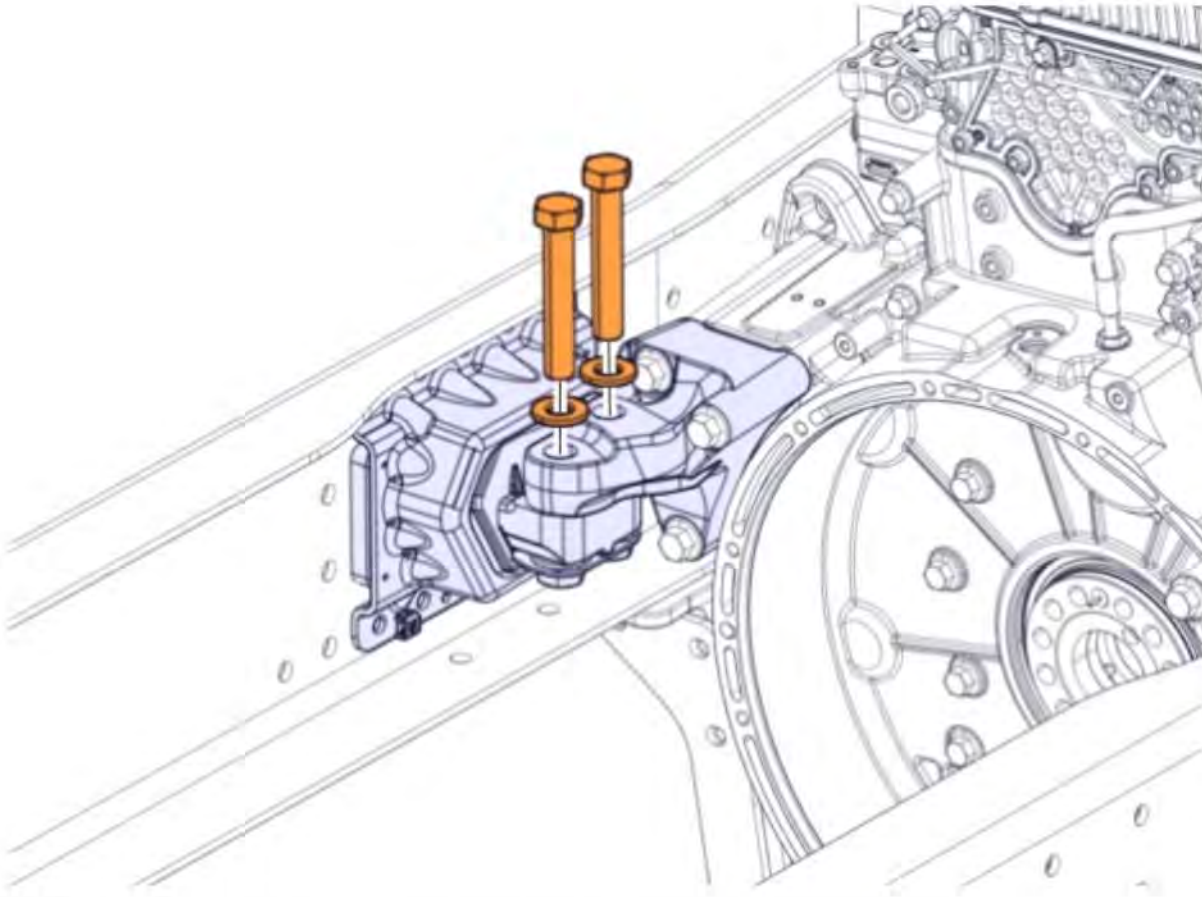


289	Install the screws and washers.
-----	---------------------------------

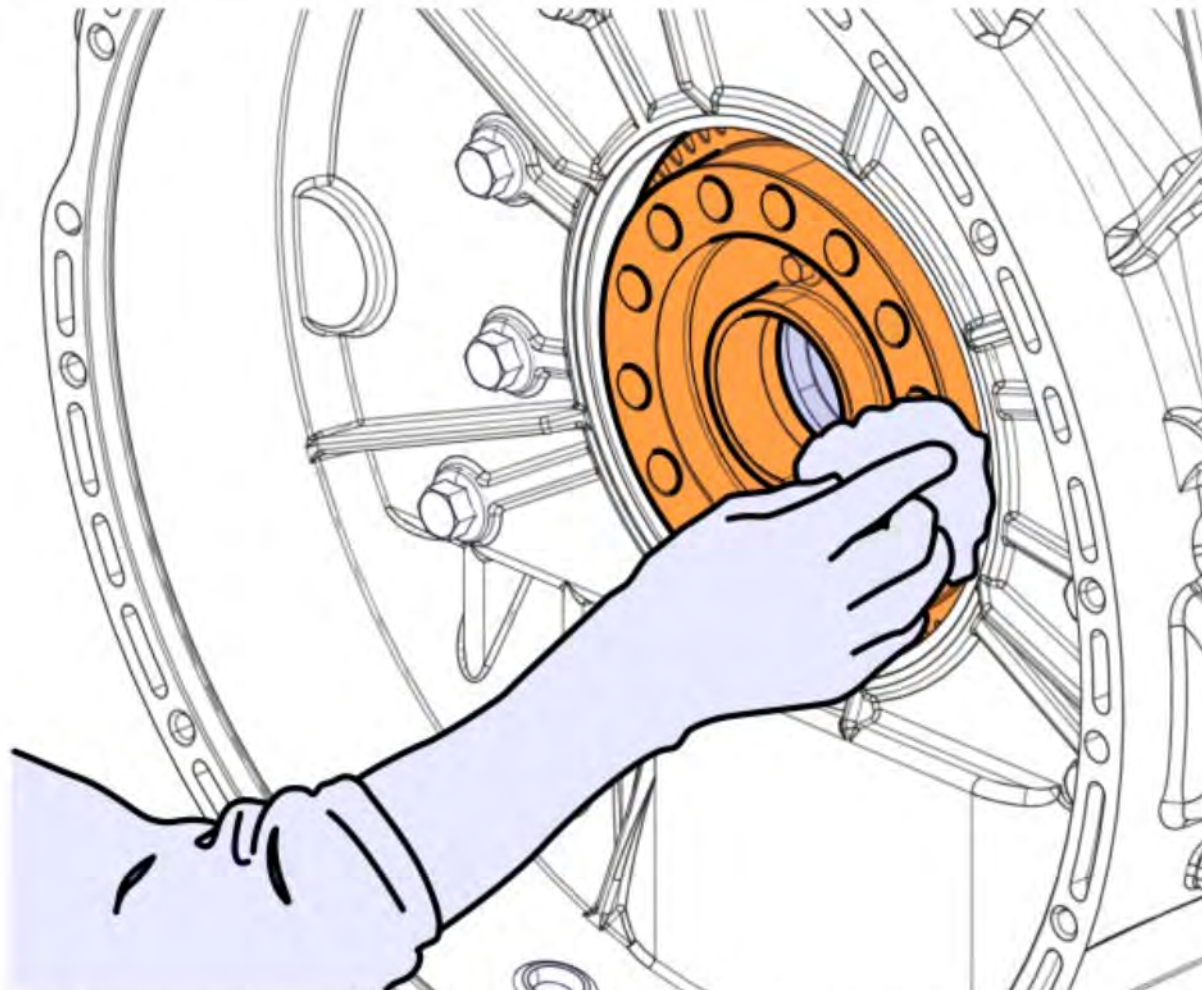
290	Torque tighten the screws.
-----	----------------------------

Tightening torque	
--------------------------	--

Engine bracket, rubber cushion, screw	540 ±90 Nm (398 ±66 lb _f ·ft)
---------------------------------------	---




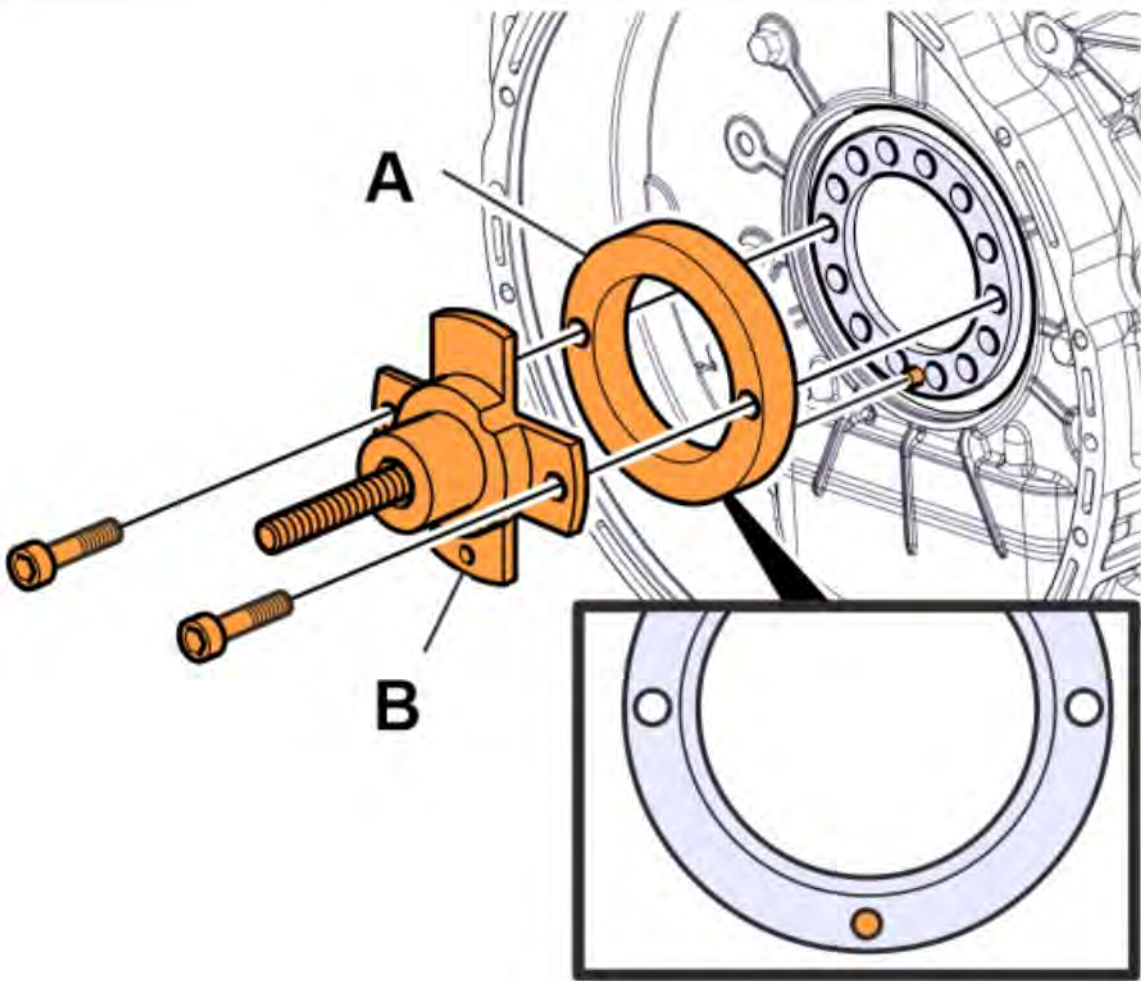
291 Clean the contact surfaces.






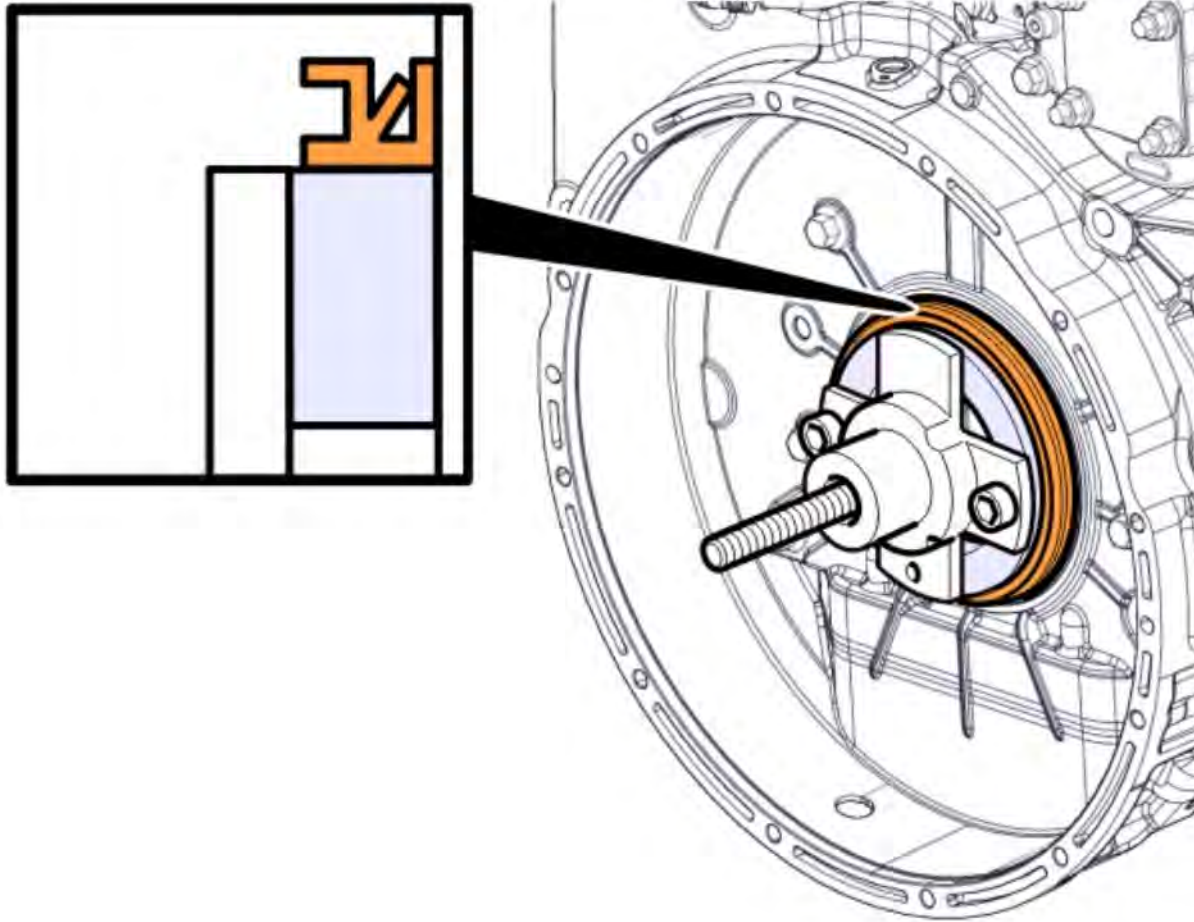
Copyright to this documentation belongs to the Volvo Group. No reproduction, copying, change, amendment or other similar disposal is entitled without prior written consent by the Volvo Group

The information contained herein is current at the time of its original distribution, but is subject to change. The reader is advised that printed copies are uncontrolled.

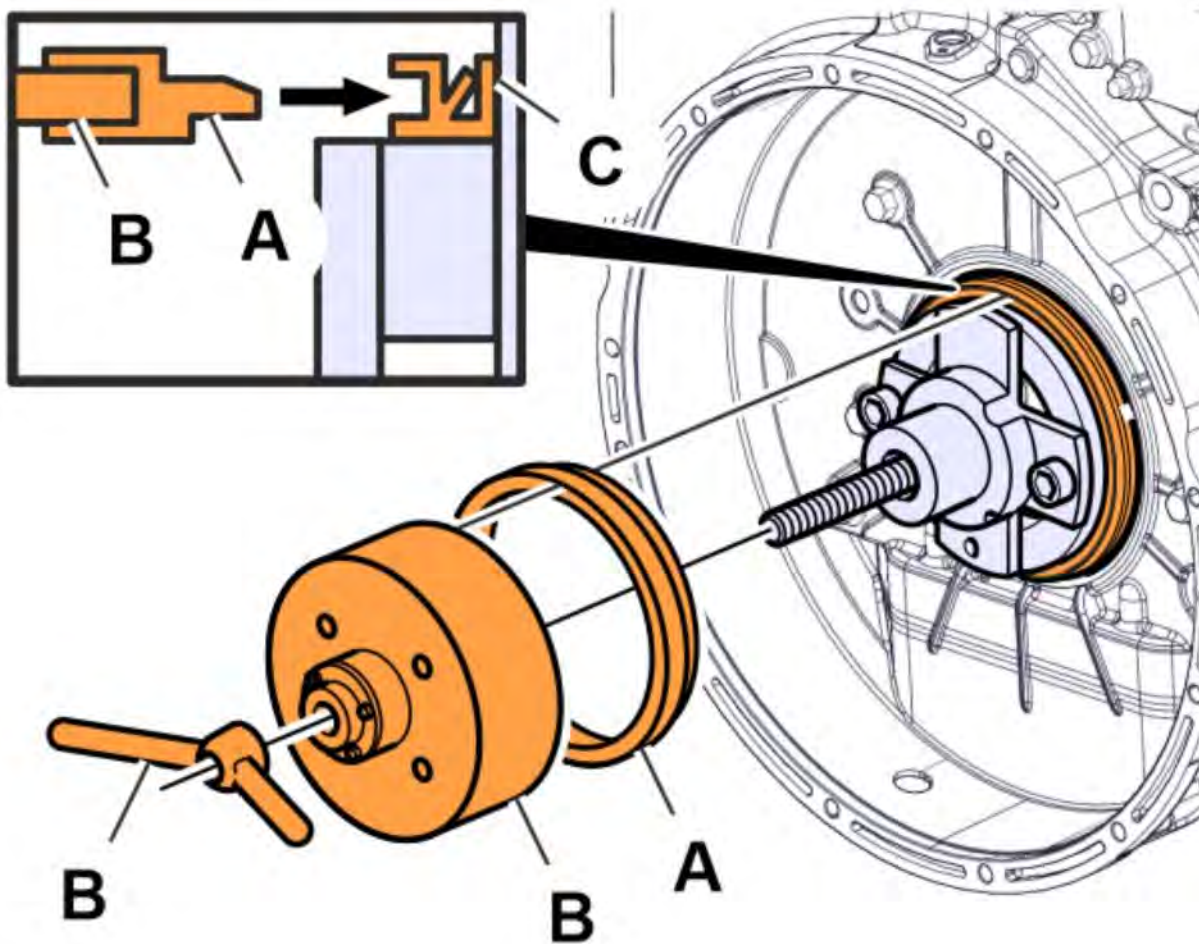
292	Install the spacer and the tool on the crankshaft.		
293	Install the screws.		
	Required material		
	A	ASSEMBLY TOOL	88800619
	B	ASSEMBLY TOOL	9990166
	 Service hint Ensure that the spacer and the tool are properly positioned on the crankshaft's internal guide and are flat against the crankshaft before tightening the screws.		



294	Position the seal.		
 Note Always use a new type of seal.			
 Note Lubricate the seal to facilitate installation.			
 Service hint The text on the seal must be turned away from the engine.			



295	Install the installation tool.		
	Required material		
	A	ASSEMBLY TOOL	88800619
	B	ASSEMBLY TOOL	9990166
	C	Seal	

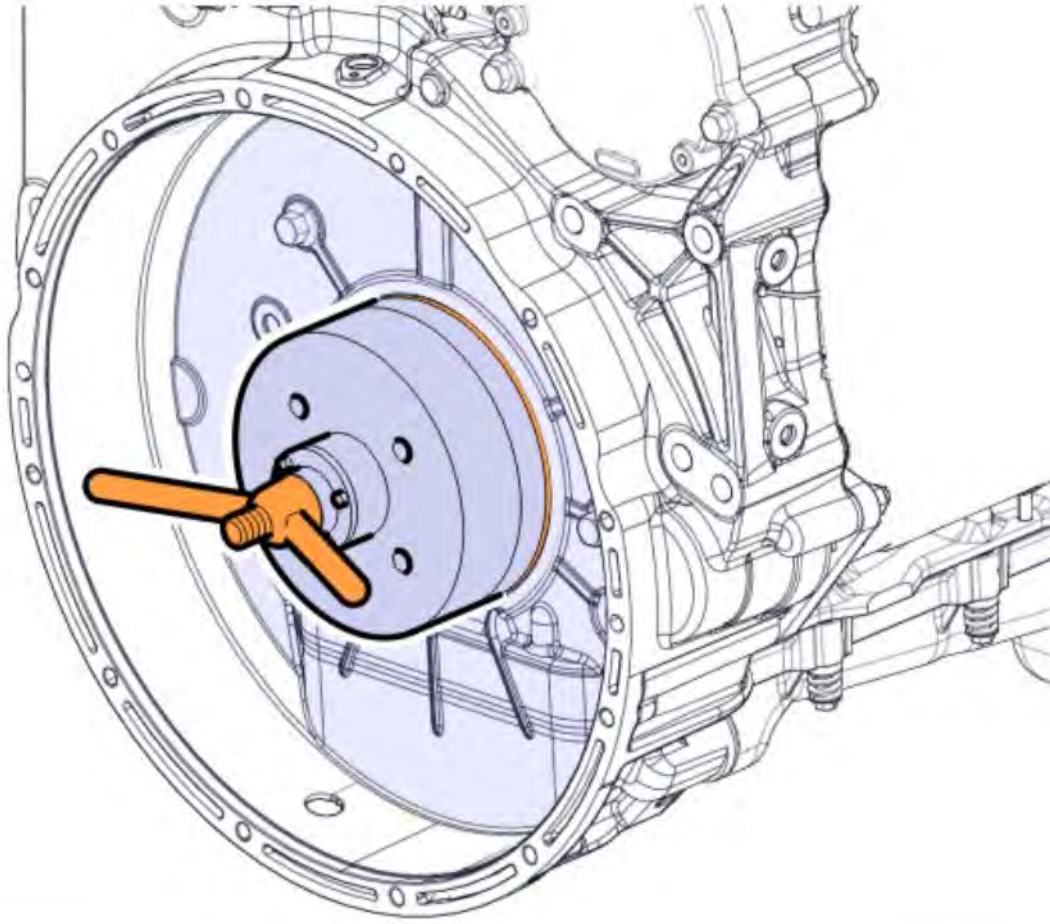


296 Press the cassette seal into place by turning the handle.

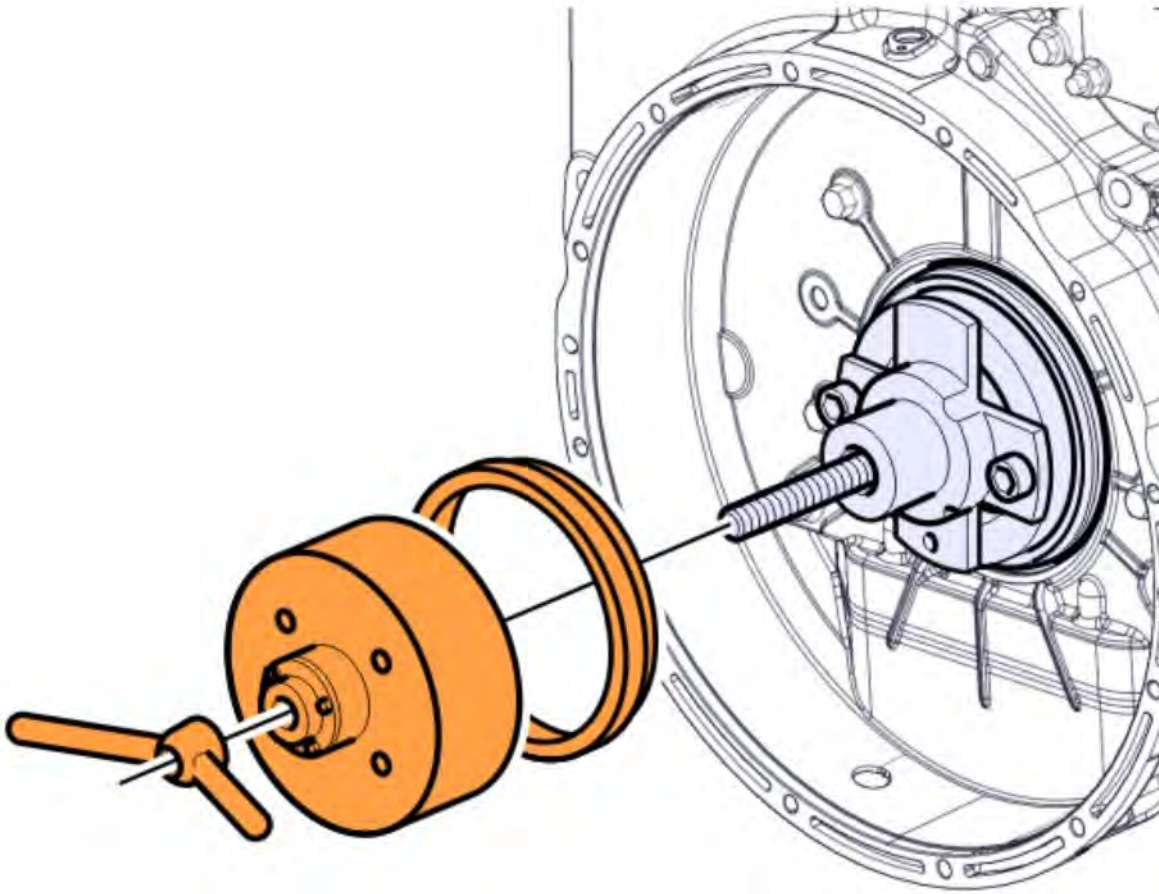


Note

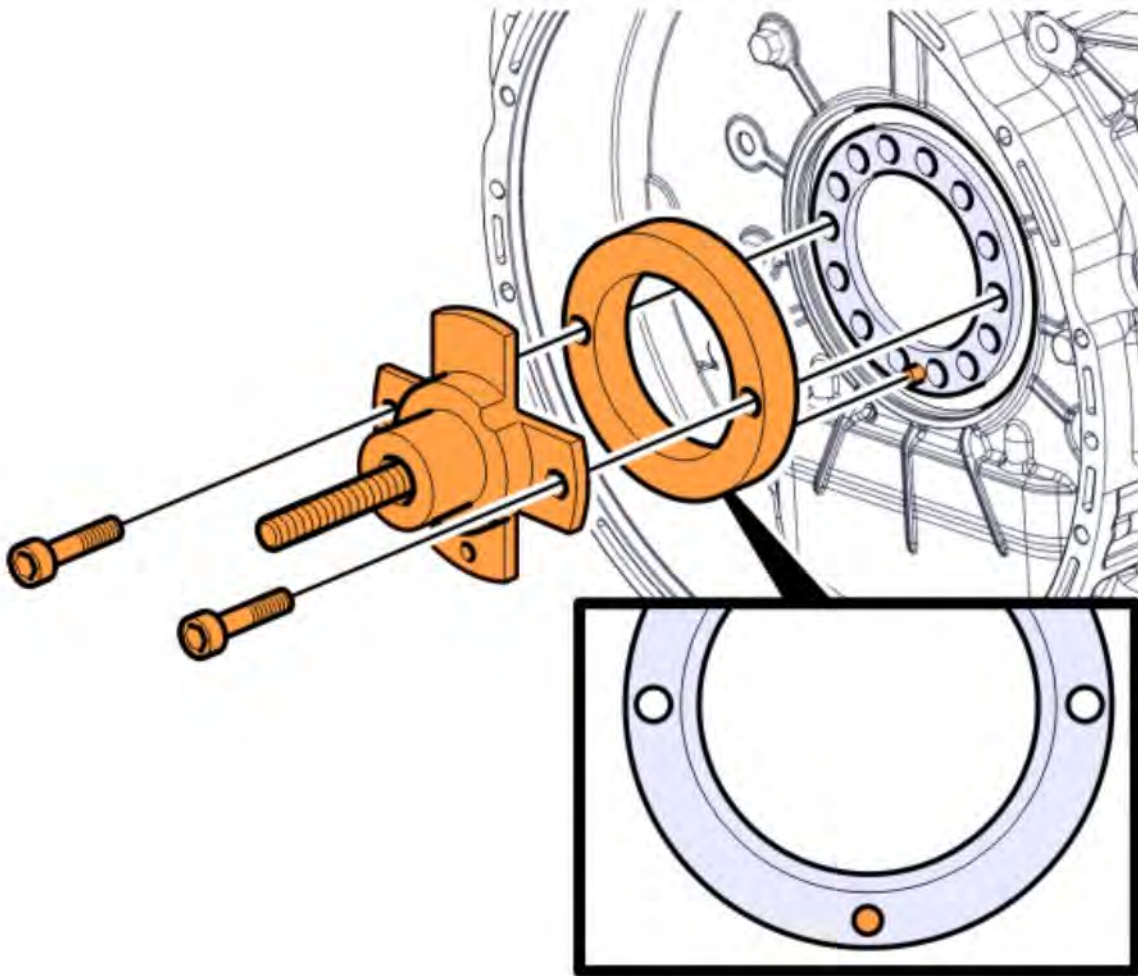
The cassette seal is correctly located in the flywheel housing when the tool bottoms out.



297	Remove the adapter and cover.
-----	-------------------------------



298	Remove the tool and the spacer.
-----	---------------------------------

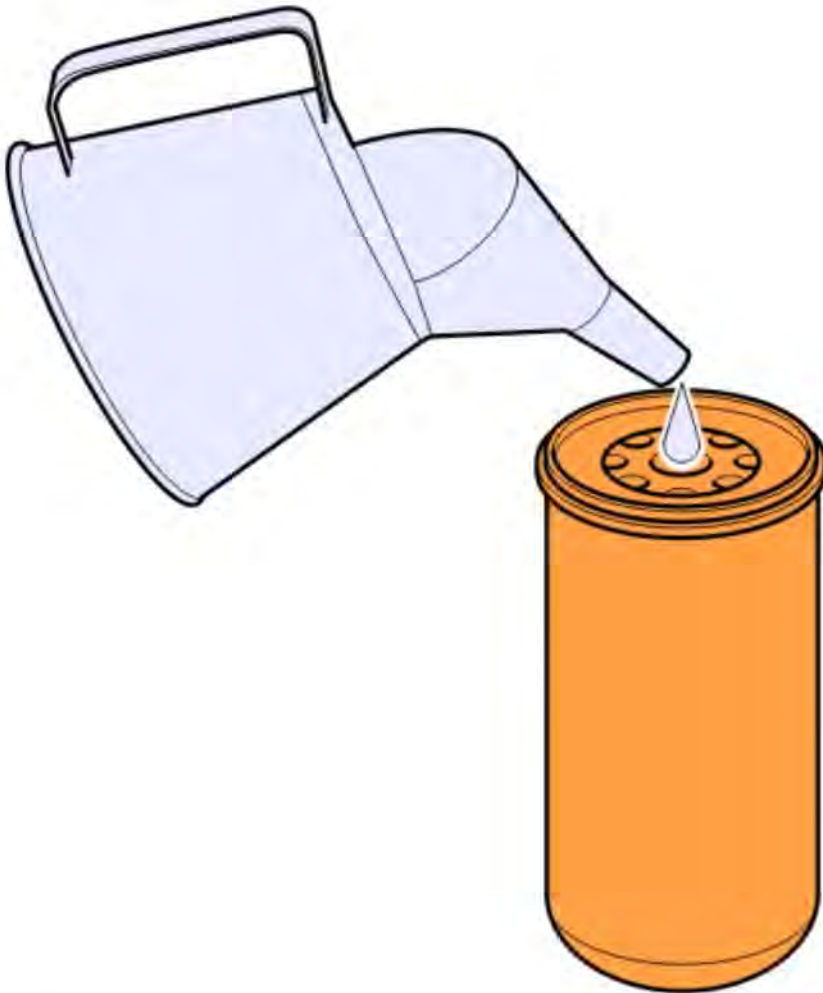


299 Fill the filters with engine oil.



Note

Use new filters.

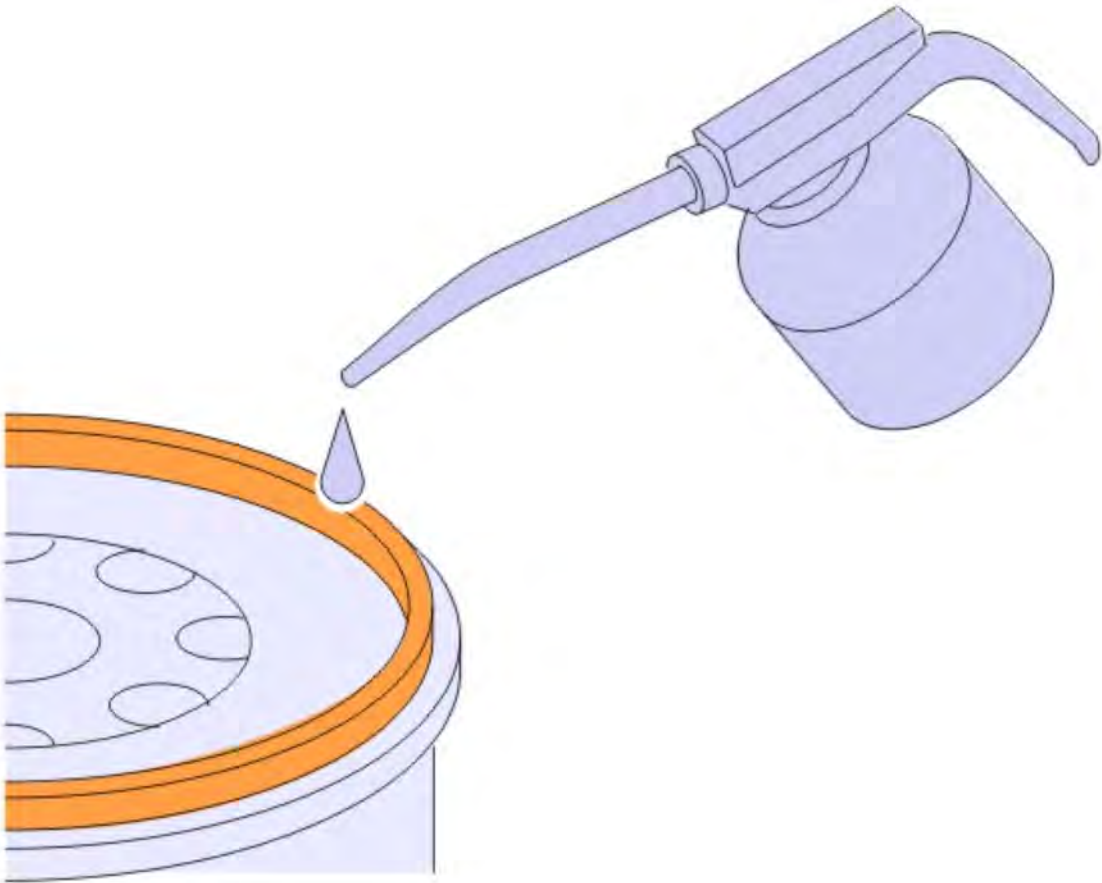


300 Apply engine oil to the gasket.

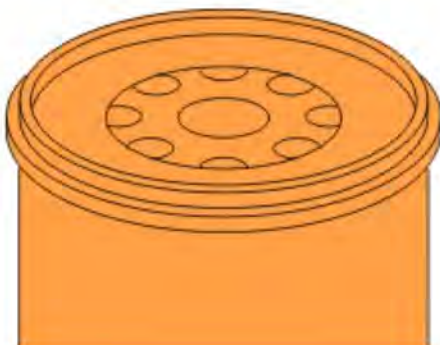
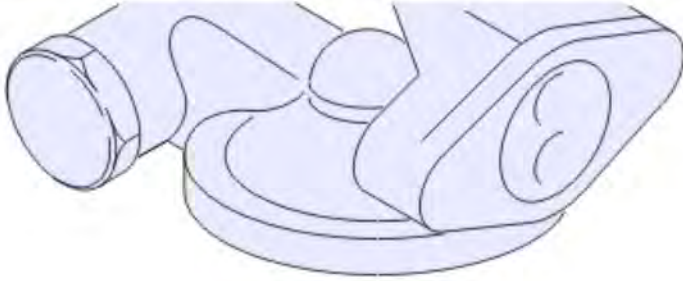


Note

Use recommended oil.



301	Install the filters.
------------	----------------------



⚠ DANGER

Risk of material damage, serious personal injury or death.

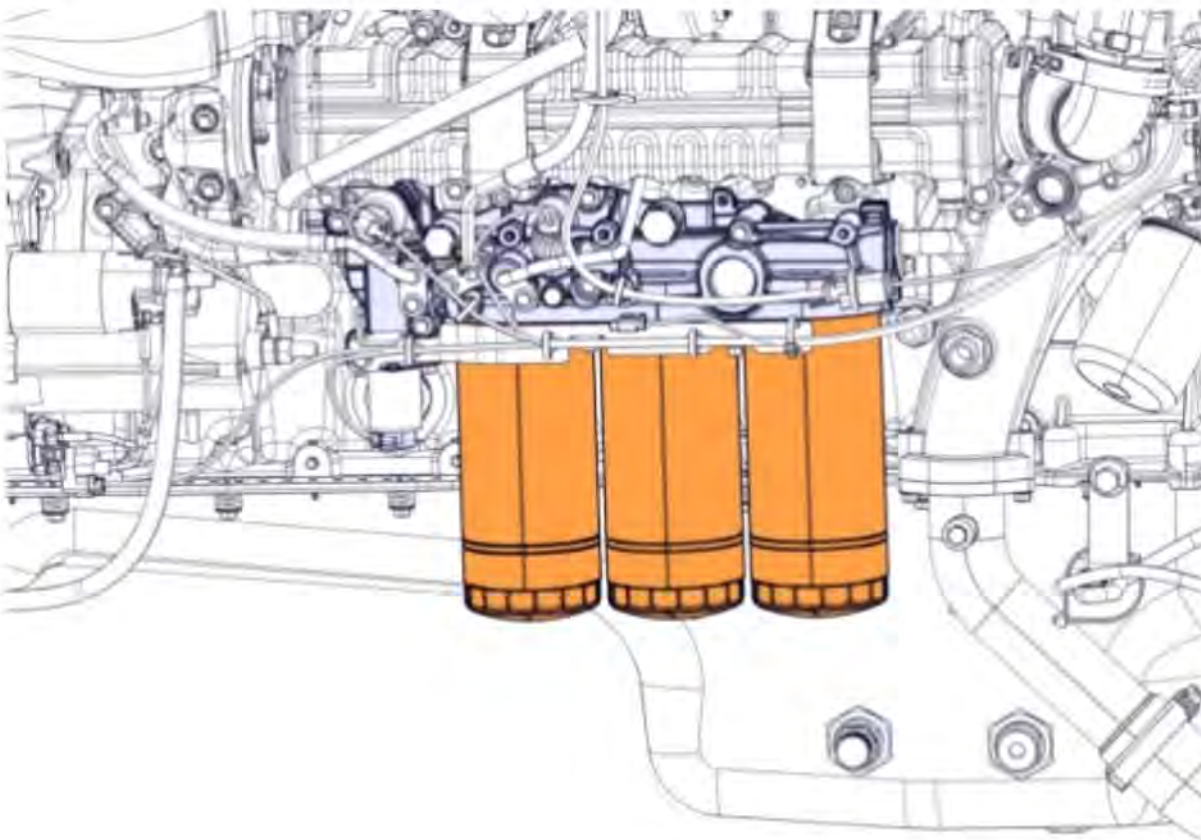
Connections that are not tightened in accordance with specified tightening torques may cause leakage.

- ▶ Tighten connections according to service information.

302 Torque-tighten the filters.

Tightening torque

Oil filter	25 ±5 Nm (18 ±4 lb _f .ft)
------------	---



303 Clean the contact surfaces.



Note

Ensure that the surfaces are completely clean of oil and grease

304 Remove hardened sealant.

305 Apply recommended sealant as illustrated.

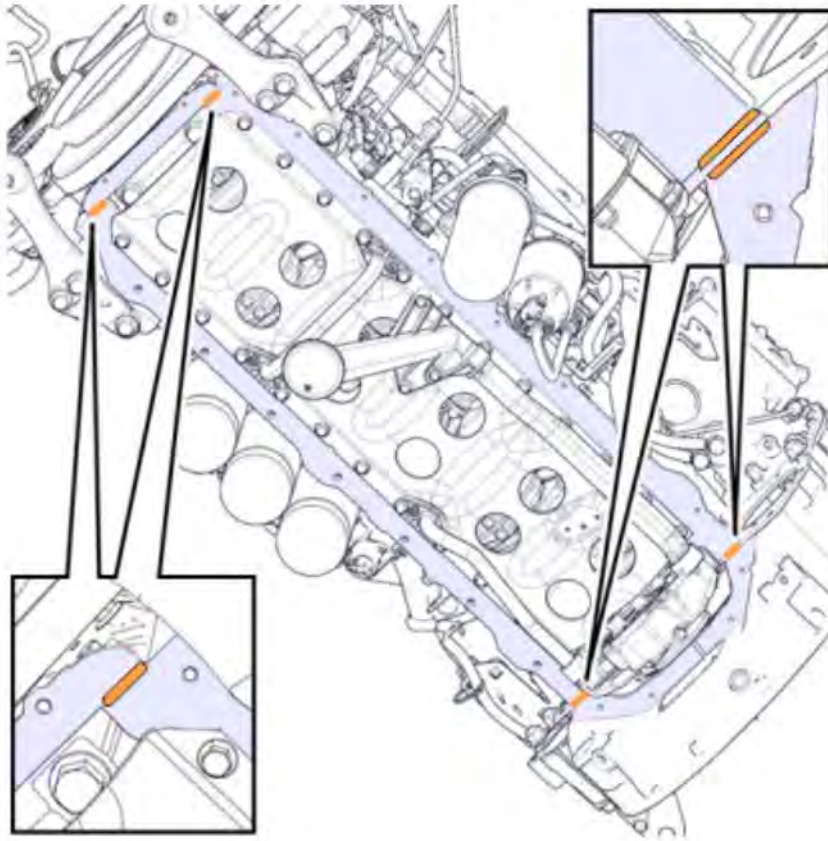
Tech data

Sealant, bead thickness	2 mm
-------------------------	------

Copyright to this documentation belongs to the Volvo Group. No reproduction, copying, change, amendment or other similar disposal is entitled without prior written consent by the Volvo Group

The information contained herein is current at the time of its original distribution, but is subject to change. The reader is advised that printed copies are uncontrolled.

(0.08 in)



306 Install the gasket.



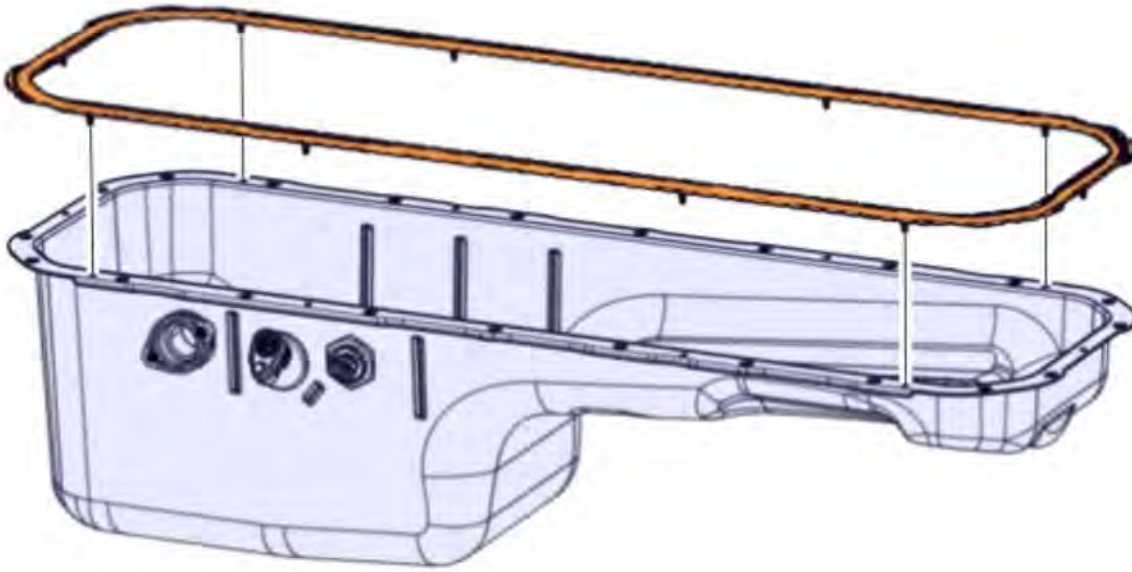
Note

Use a new part.



Note

Install the gasket within 20 minutes of sealant application.

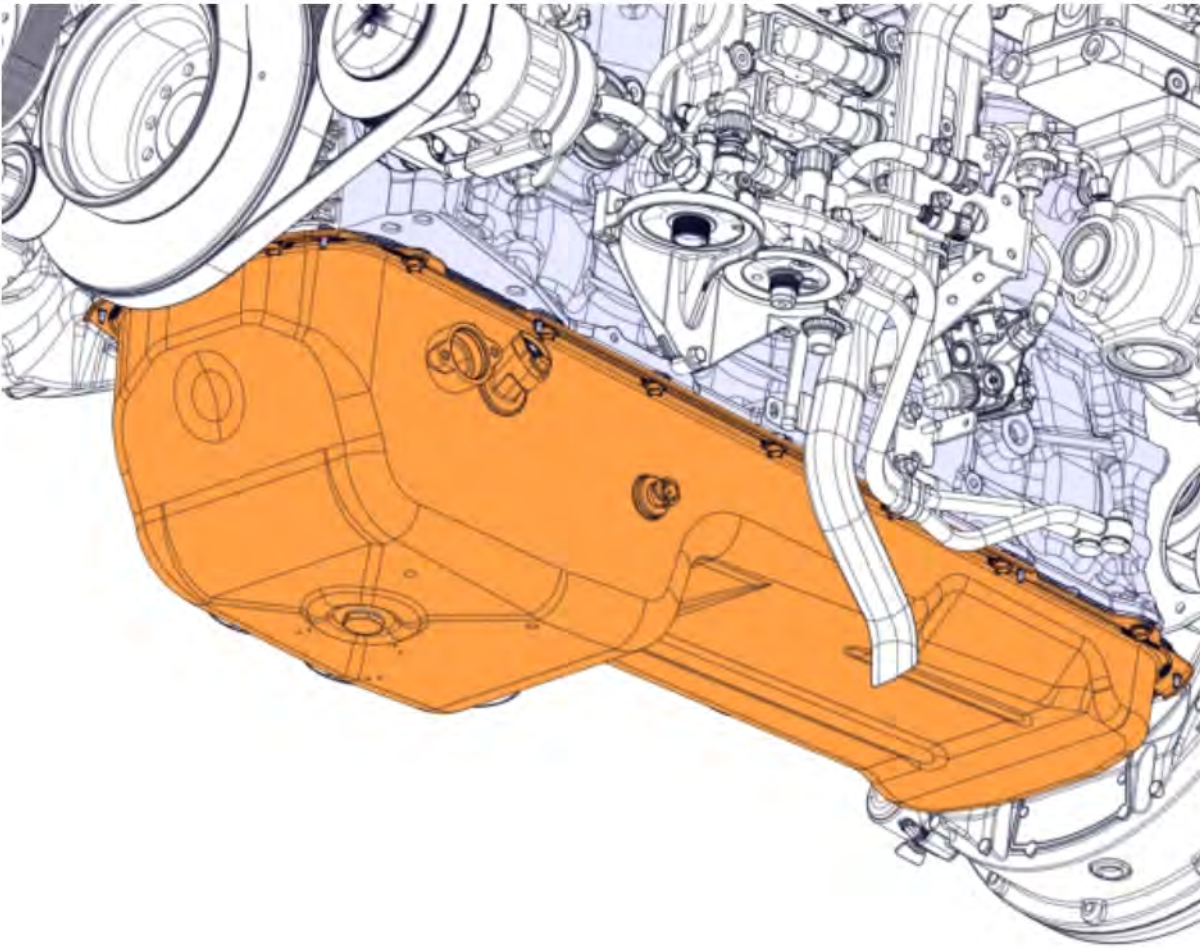


307 Install the oil pan.



Note

Assistance may be required.

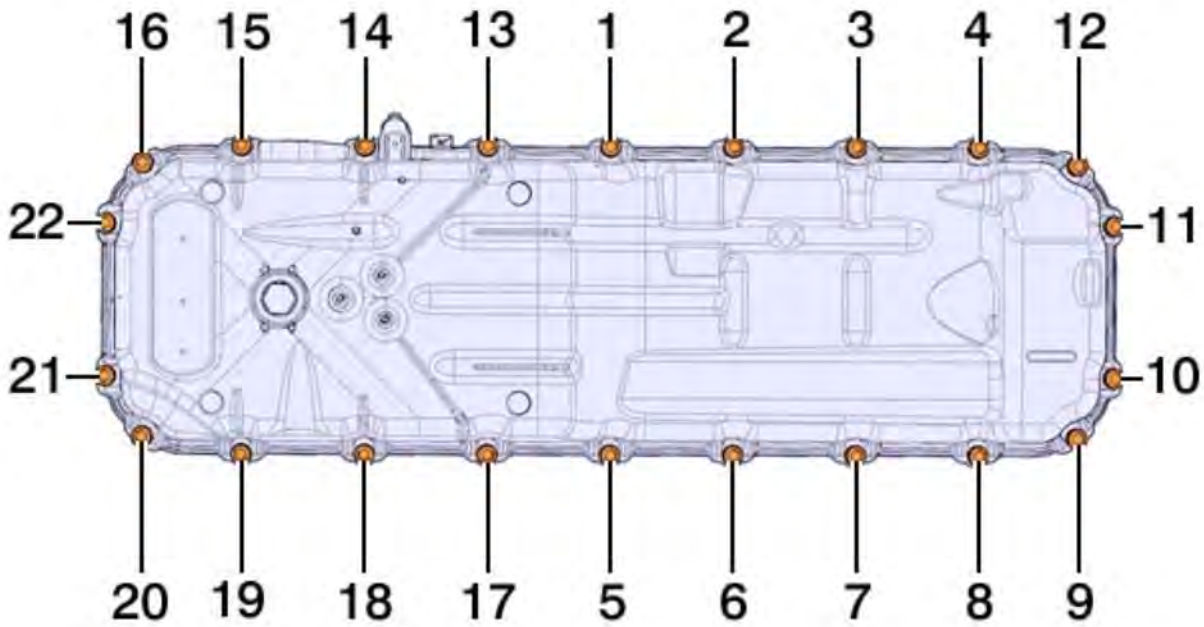


308	Install the screws.
-----	---------------------



309 Torque tighten the screws.

Tightening torque	
Oil pan, screw	Tightening sequence: 1-22
	24 ±4 Nm (18 ±3 lb _f ·ft)



310 Install the seal.

i	Note Use a new part.
----------	--------------------------------

311 Install the pipe (A).

312 Install the outer casing (B).

i	Note Check the outer casing for correct position.
----------	---

313 Connect the connector (C).



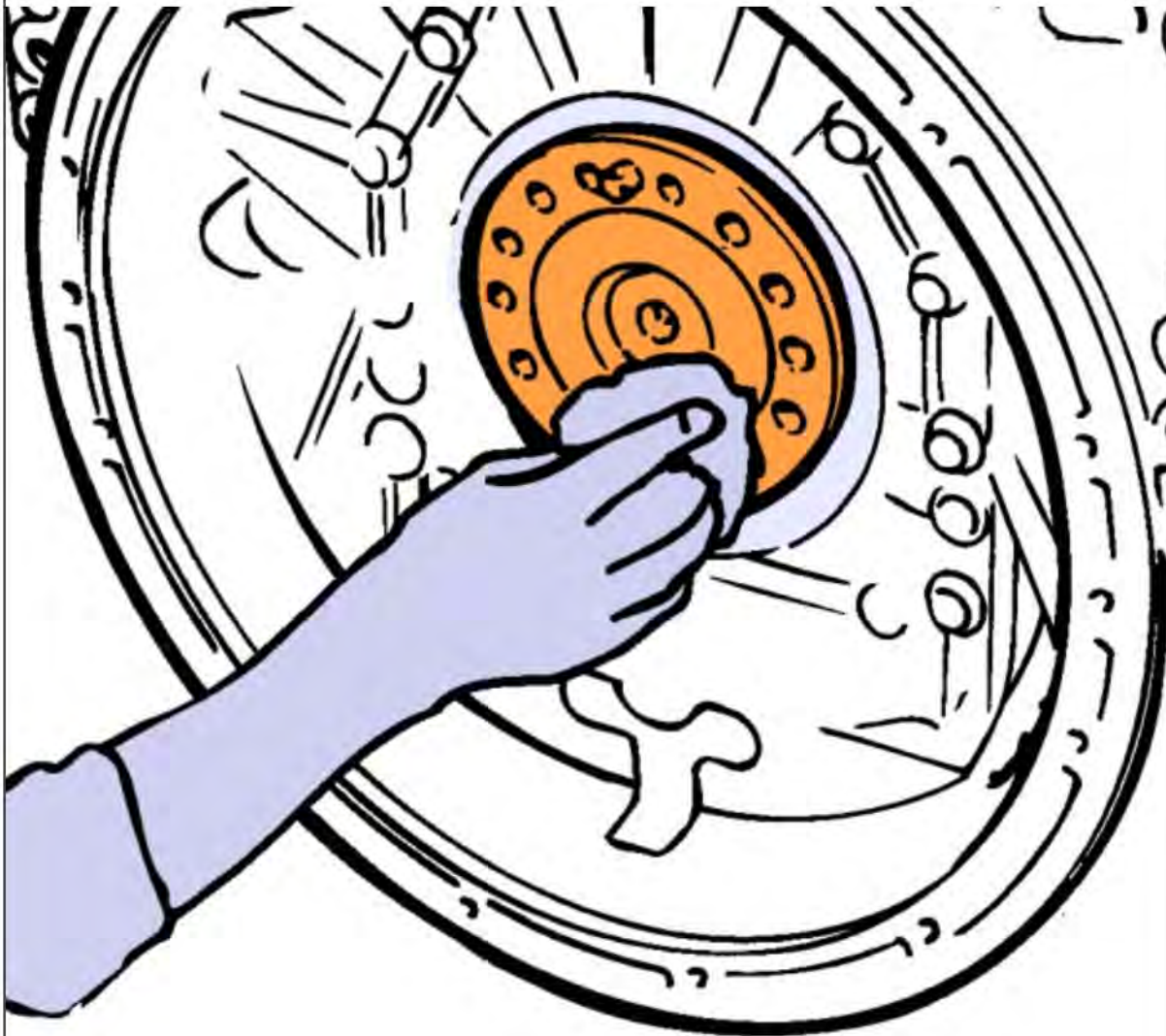
314 This step contains 2 alternatives.

Select one of the valid alternatives below.

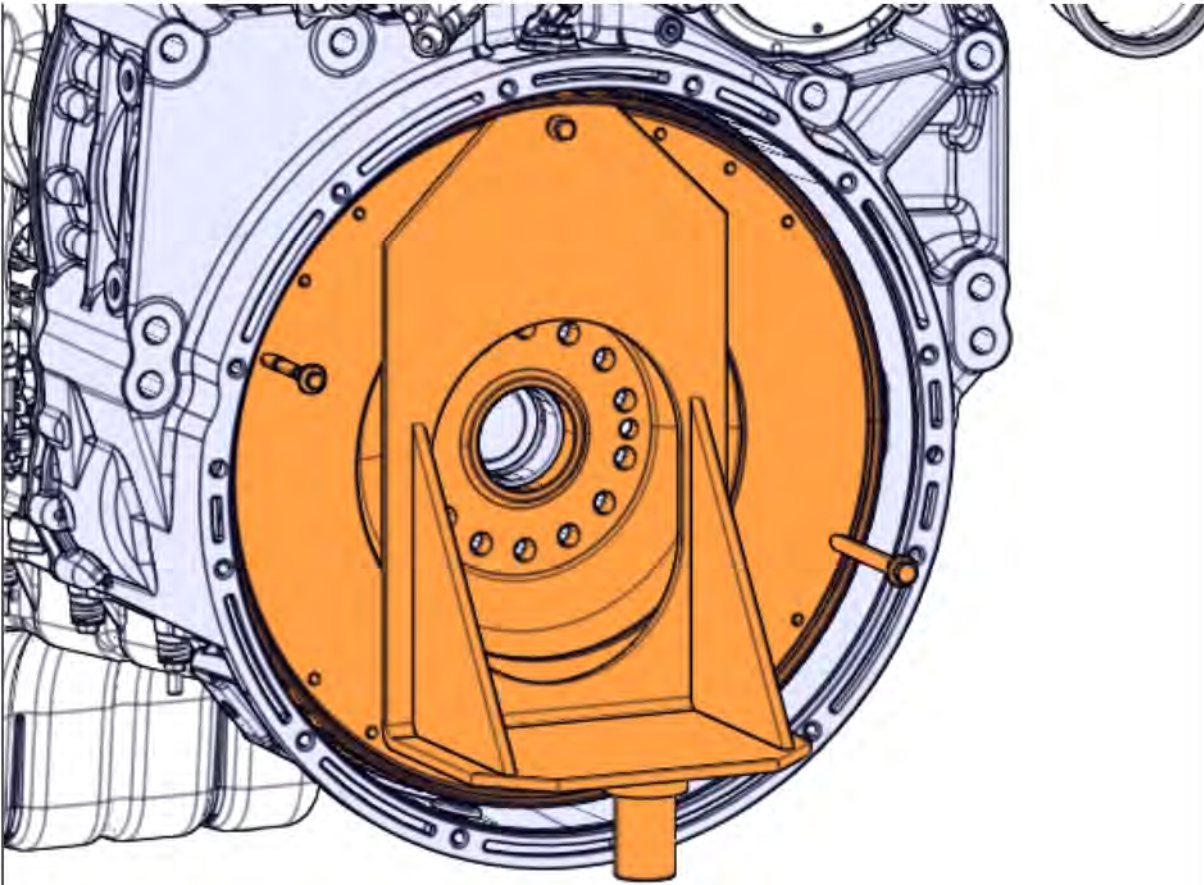
Alternative 1 / 2

▶ Clean the crankshaft flange.

▶ Check the crankshaft seal.



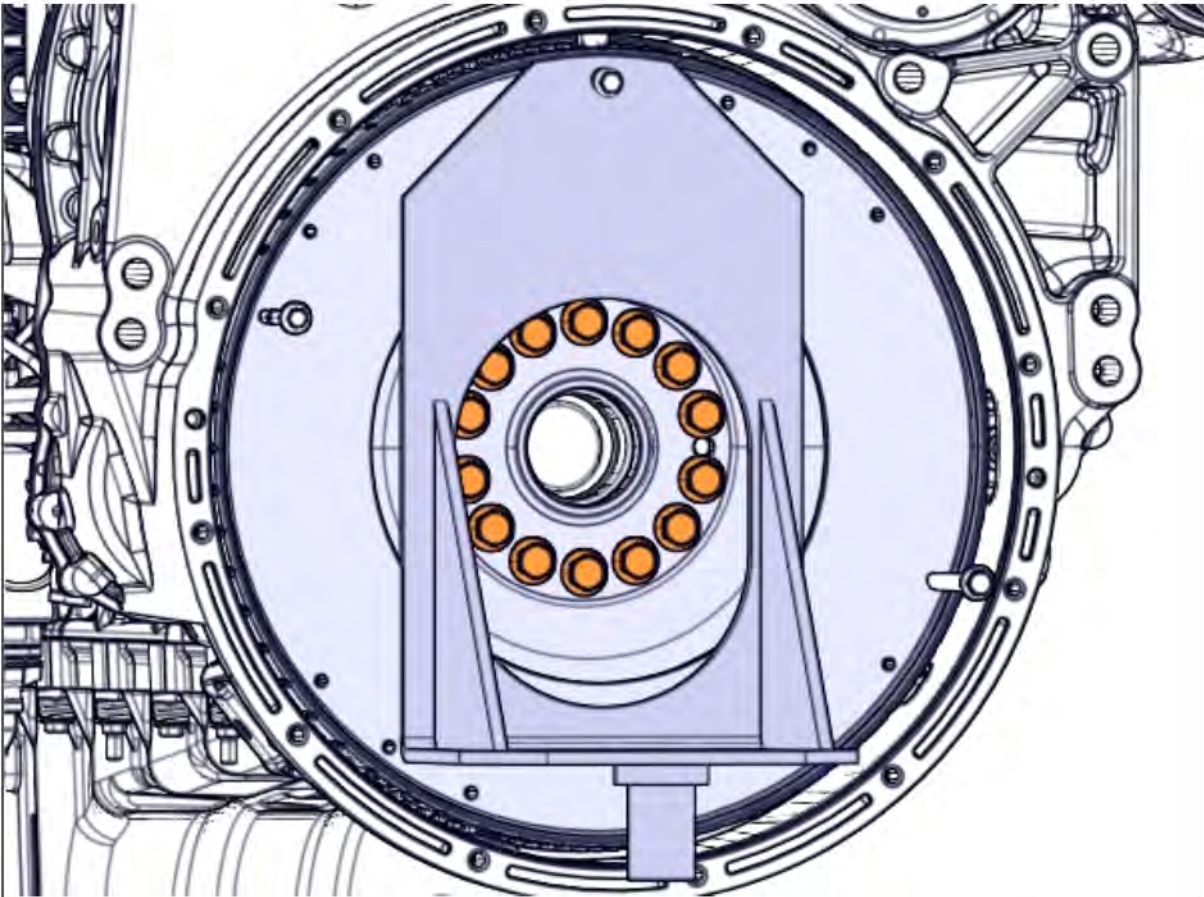
▶ Install the flywheel.



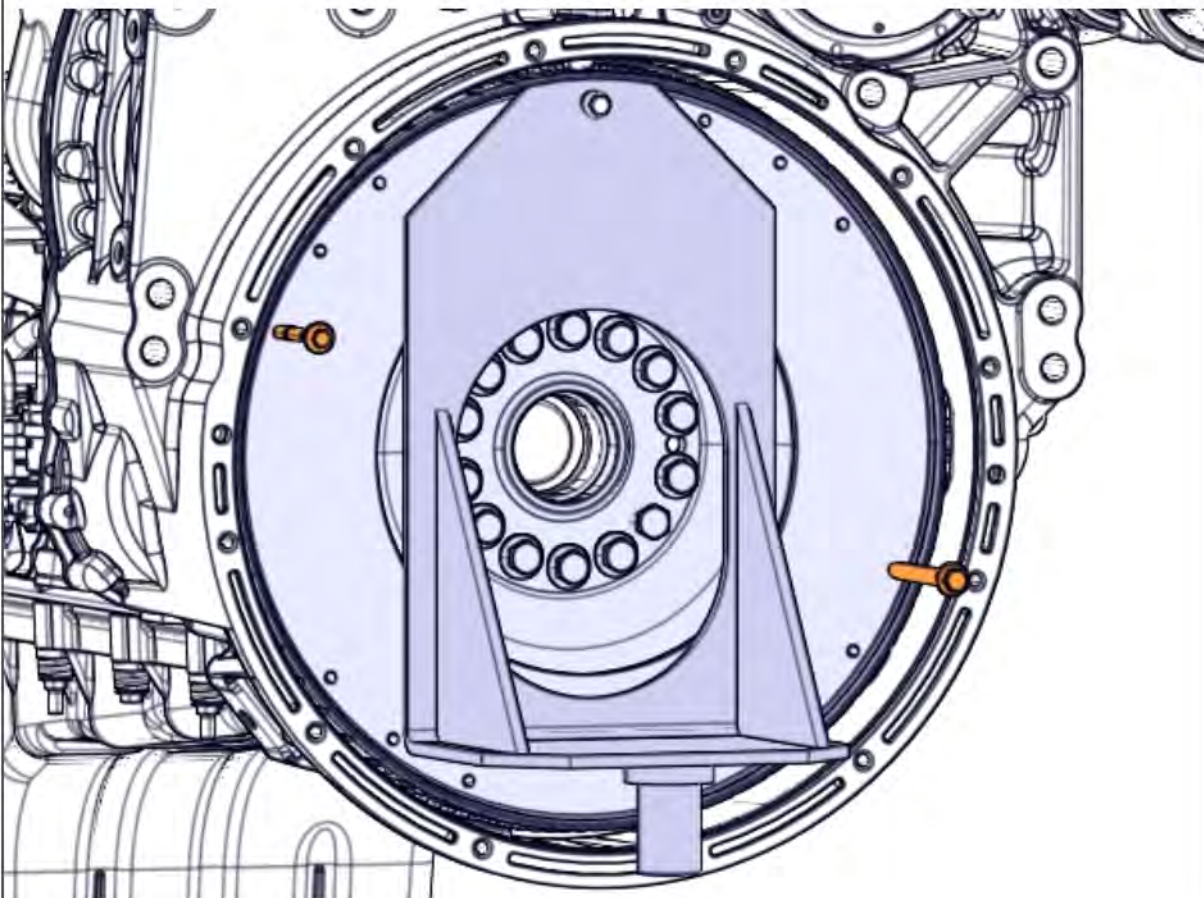
- ▶ Install the screws.

**Note**

Hand tighten the screws.

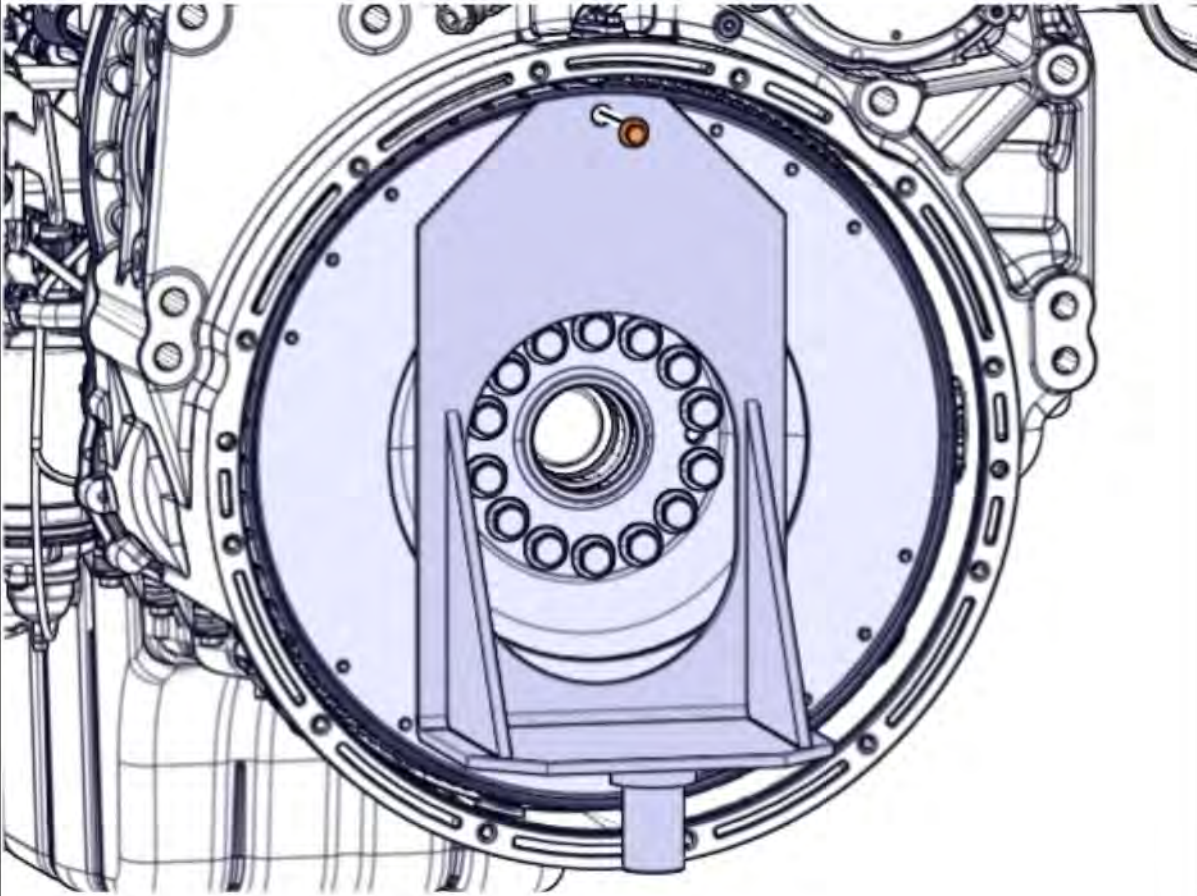


▶ Remove the screws.



▶ Remove the screw.

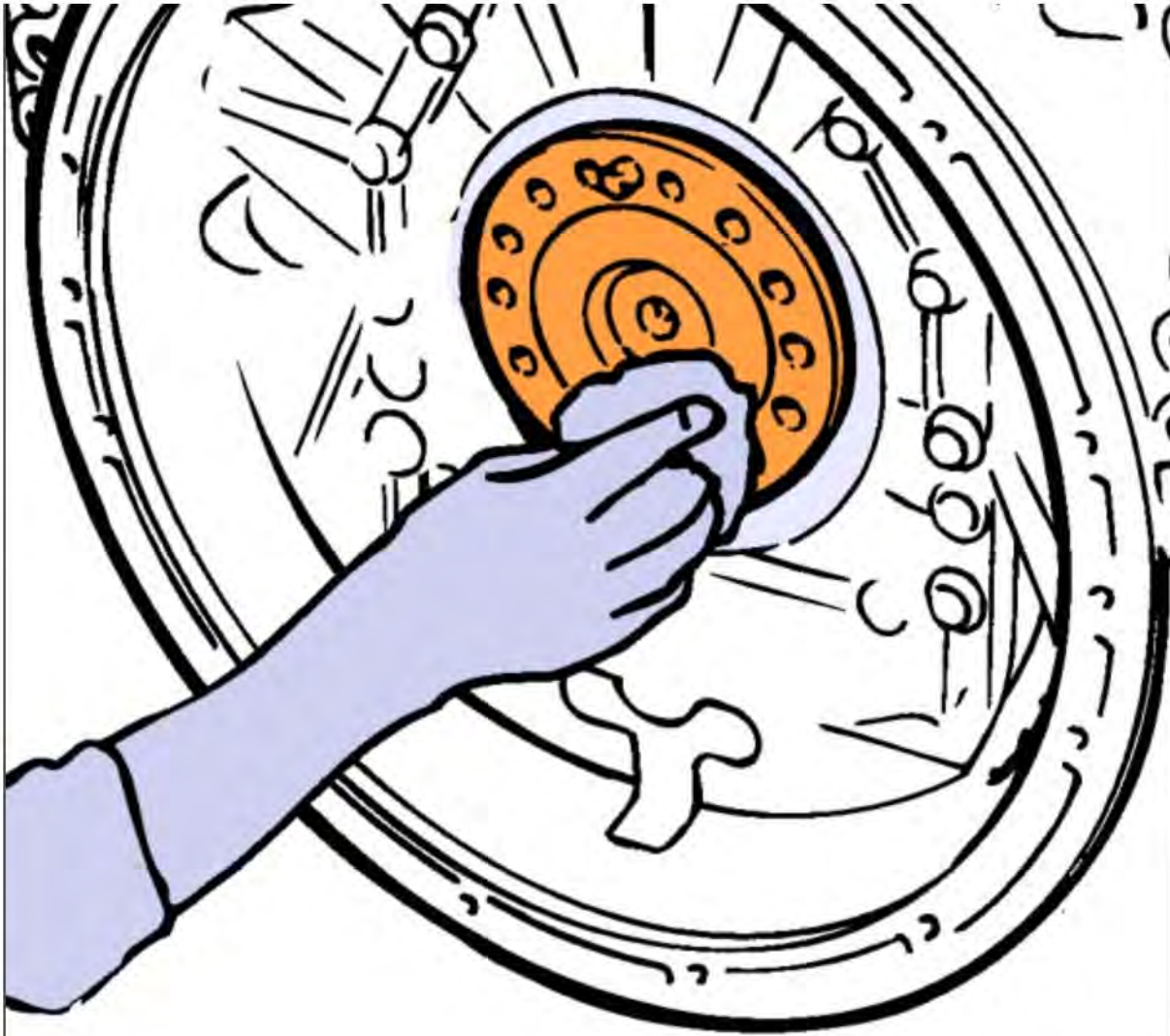
▶ Remove the tool.



Alternative 2 / 2

▶ Clean the crankshaft flange.

▶ Check the crankshaft seal.



▶ Install the flywheel.

▶ Install the flexplate.

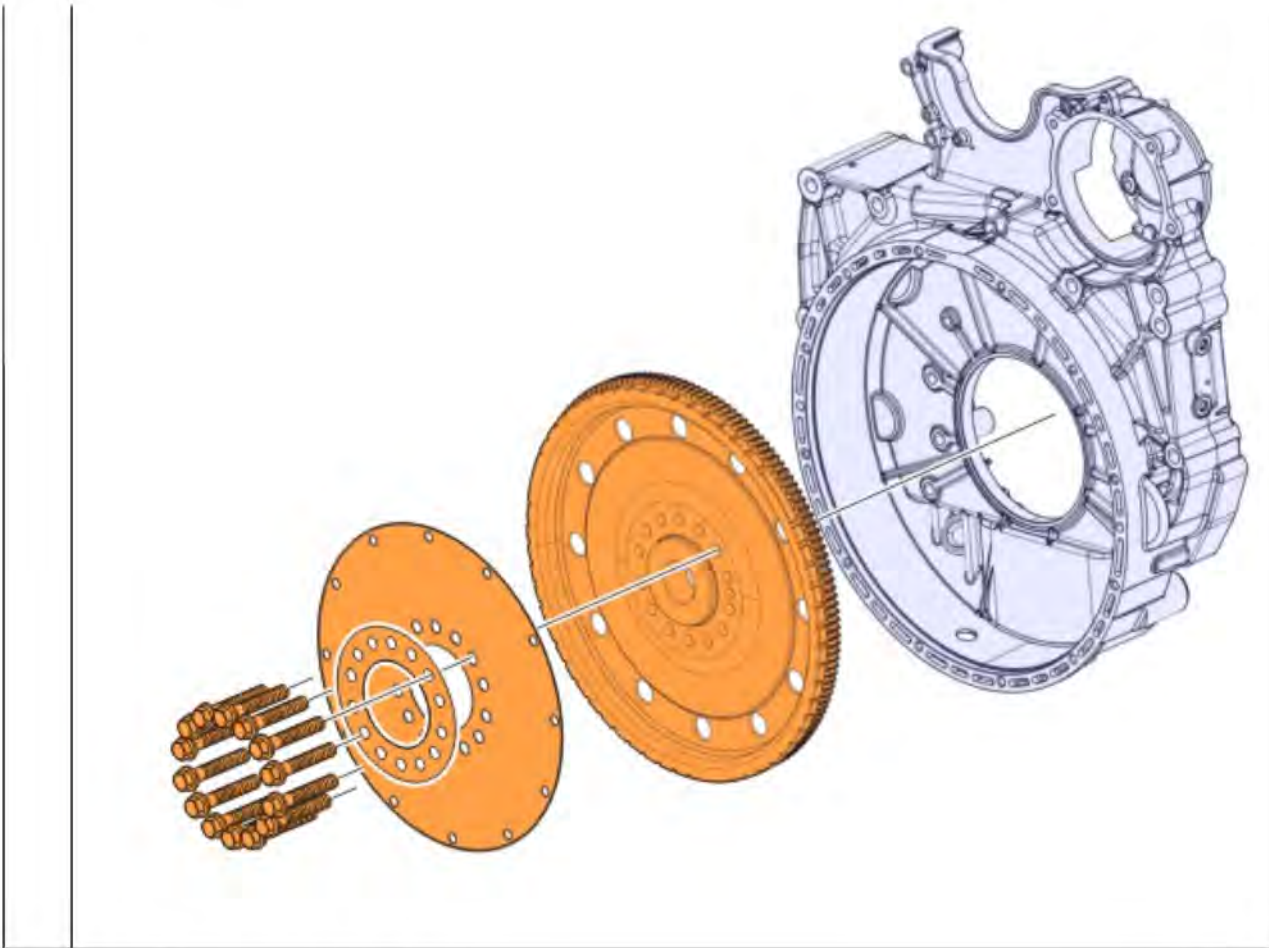
▶ Install the thrust plate.

▶ Install the screws.

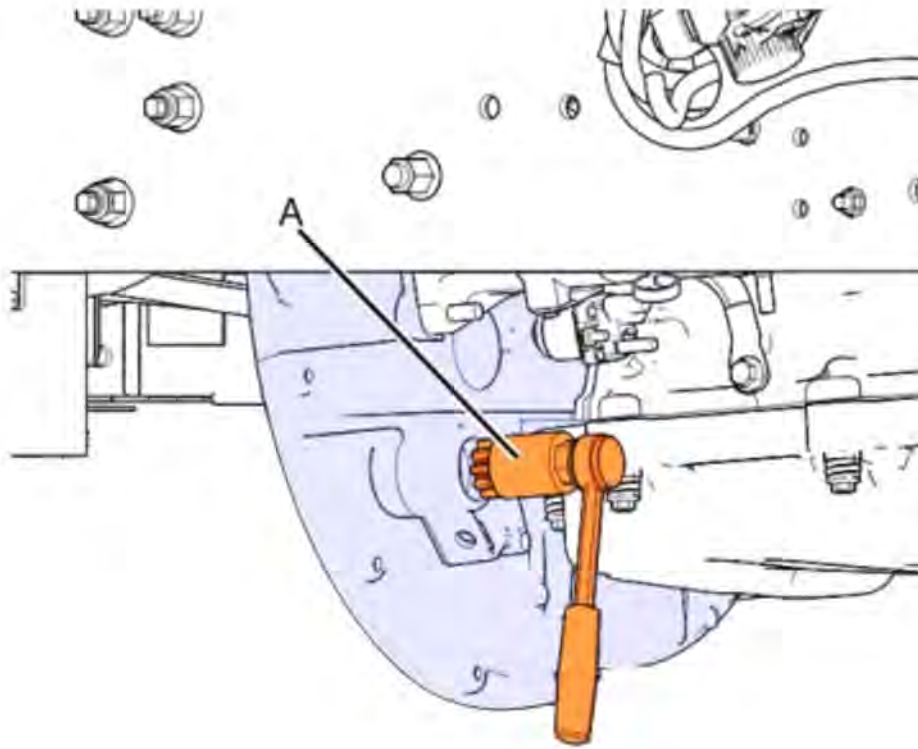


Note

Hand tighten.

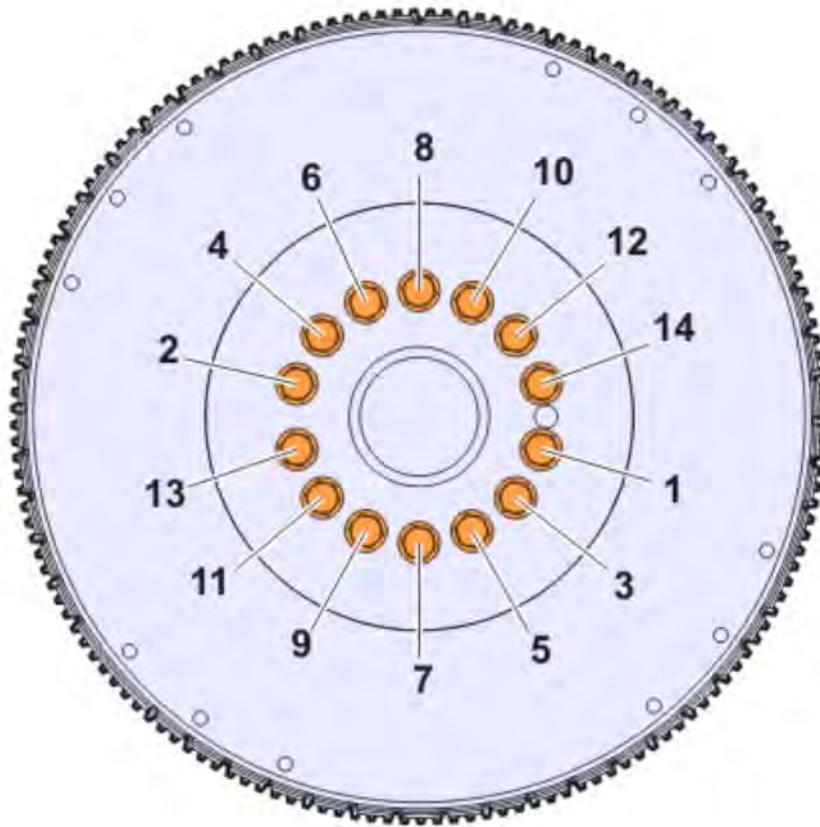


315	Install the cranking tool (A).	
	Required material	
	CRANKING TOOL	88840317



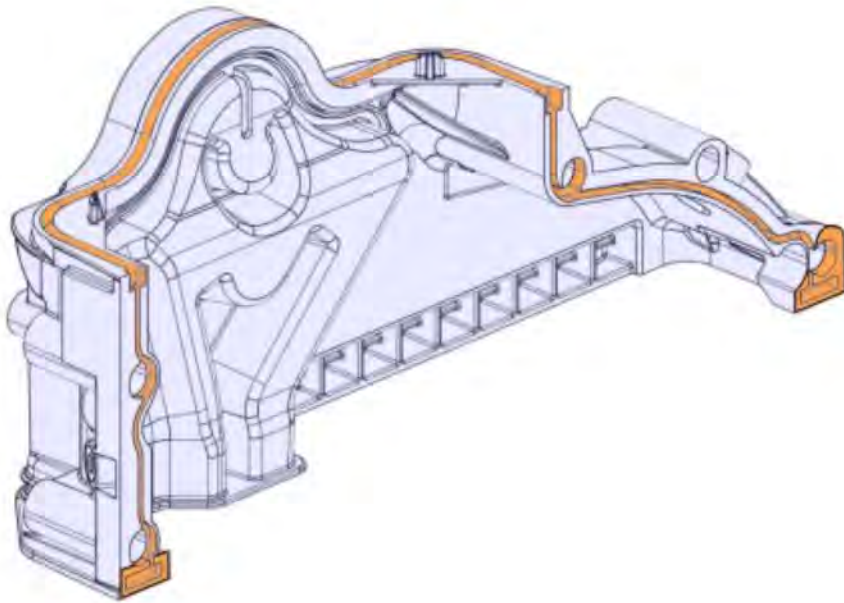
316 Torque tighten the screws.

Tightening torque		
Flywheel, screw	1.	Tightening sequence: 1-14
		60 ±5 Nm (44 ±4 lb _f -ft)
	2.	Tightening sequence: 1-14
		120 ±10°



i	<p>Note Use the cranking tool with a drawbar handle as counterhold.</p>
----------	--

317	Clean the contact surfaces.
------------	-----------------------------

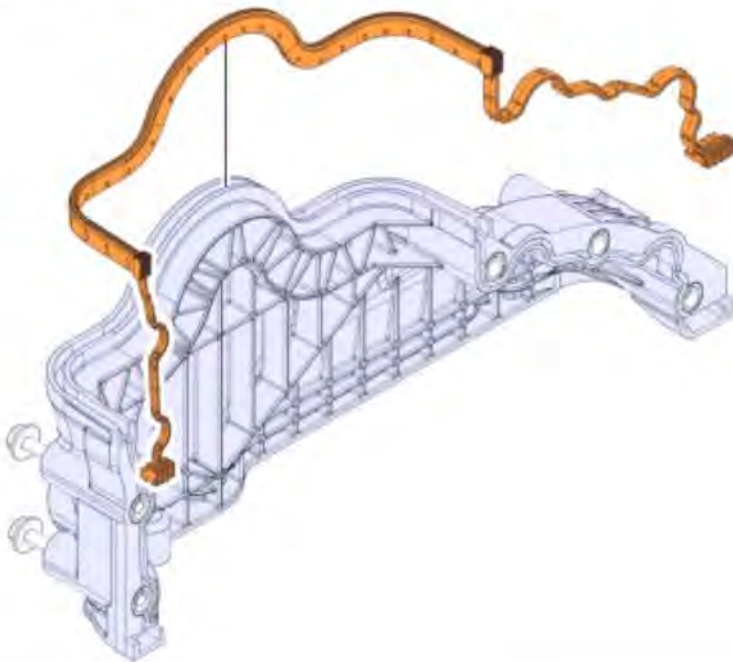


318 Install the gasket.



Note

Use a new part.



319 Clean the contact surfaces carefully.

320 Install the timing gear cover.



Note

Take care not to damage the gasket.

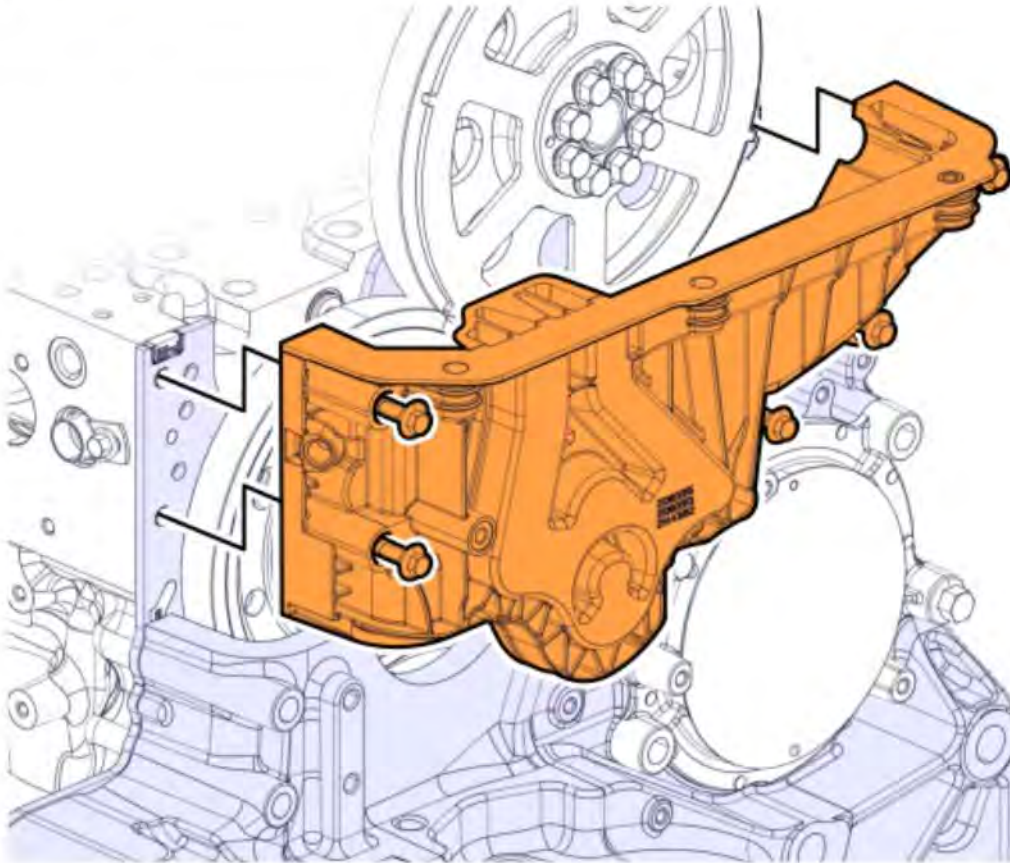
Note

Copyright to this documentation belongs to the Volvo Group. No reproduction, copying, change, amendment or other similar disposal is entitled without prior written consent by the Volvo Group

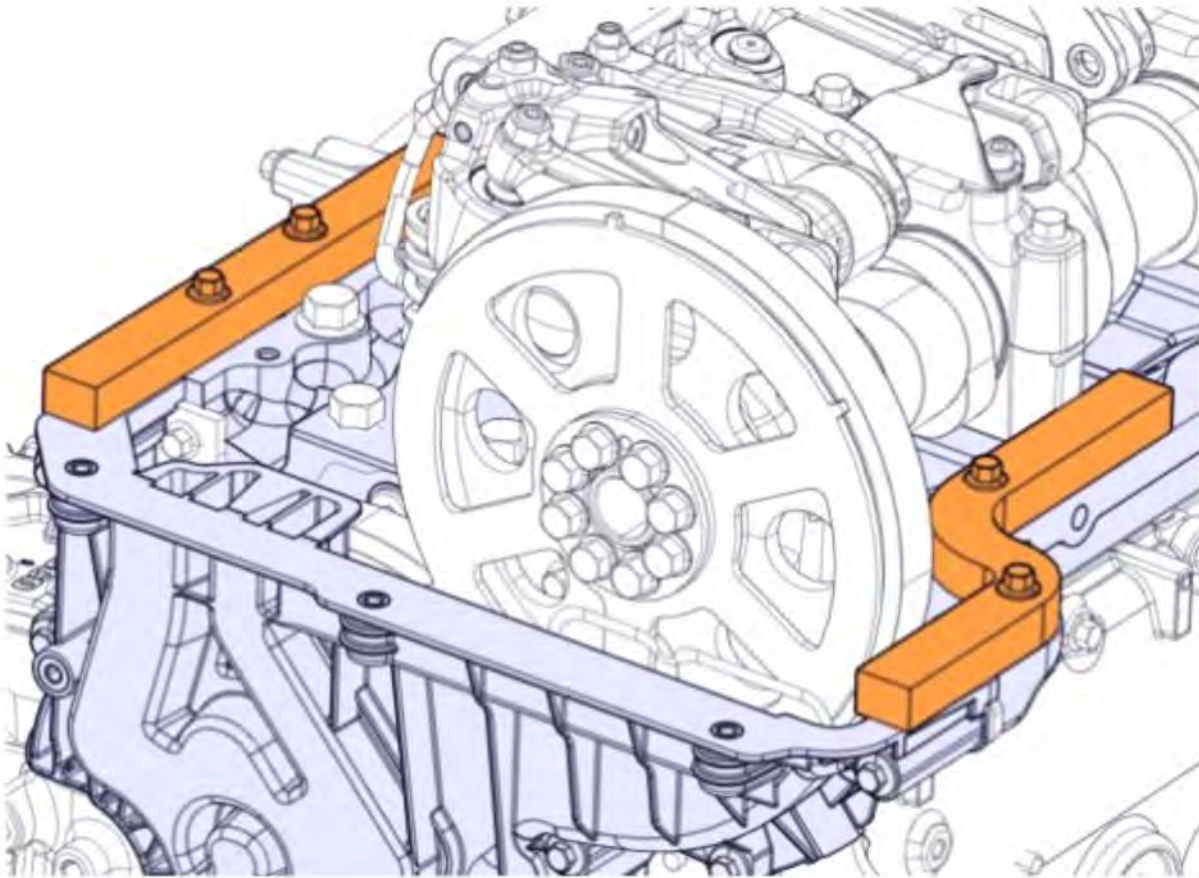
The information contained herein is current at the time of its original distribution, but is subject to change. The reader is advised that printed copies are uncontrolled.



Check that the gasket is correctly located in the groove.



321	Install the tools.
Required material	
kit	88870012



322 Gently tighten the timing gear cover screws.



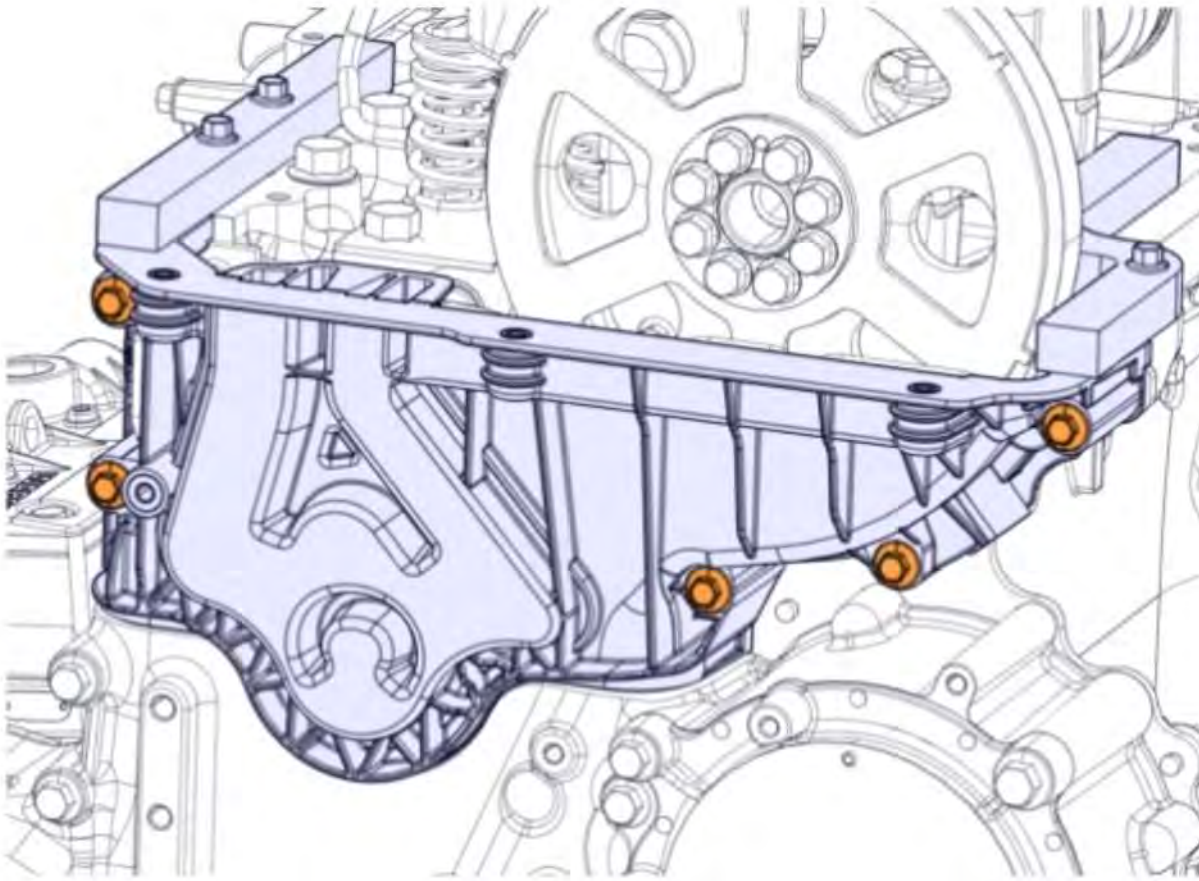
Note

Ensure that the timing gear cover aligns with the cylinder head on both sides.



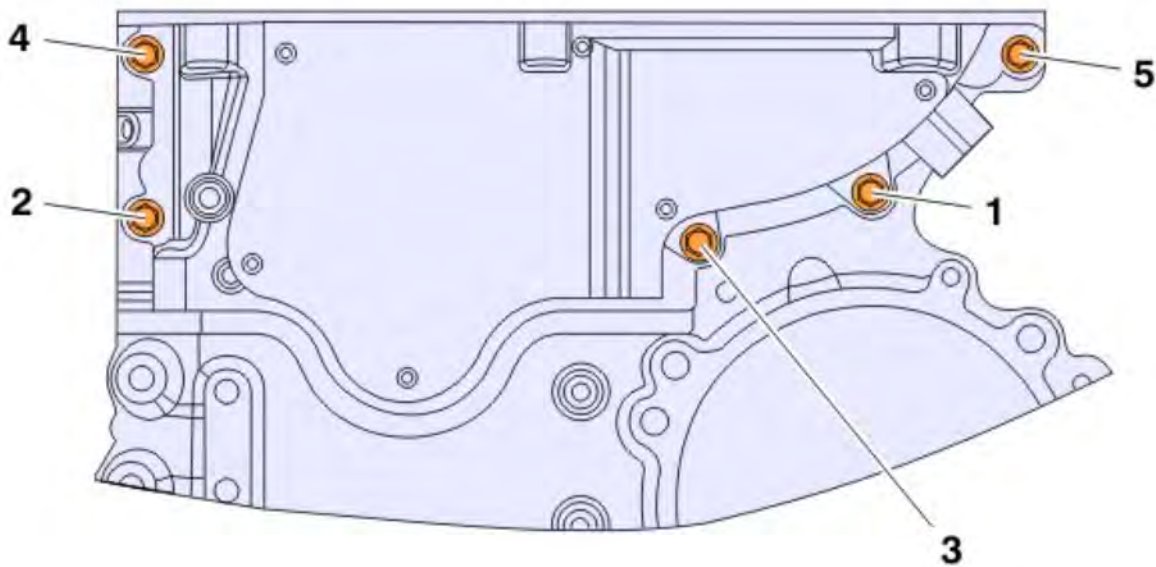
Note

Ensure that the timing gear cover is in contact with the timing gear plate.

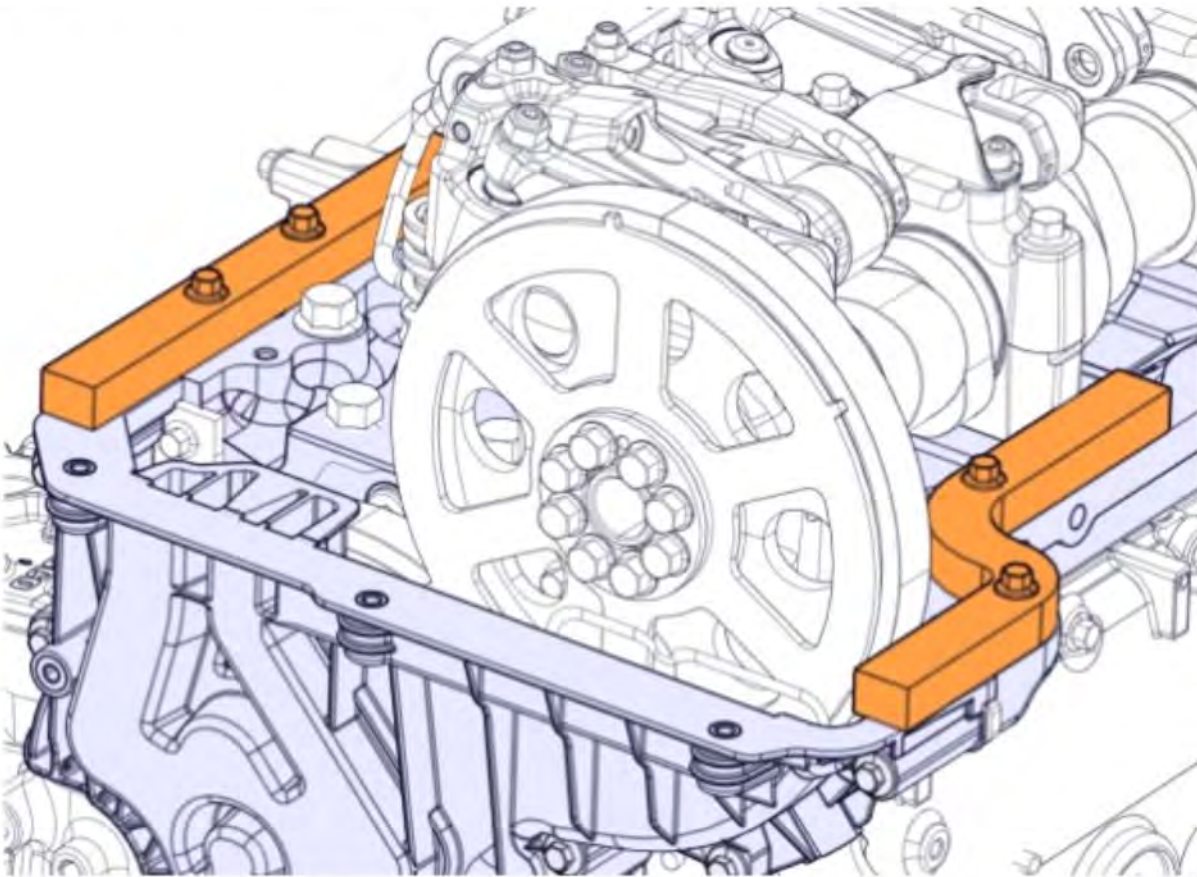


323 Torque tighten the screws.

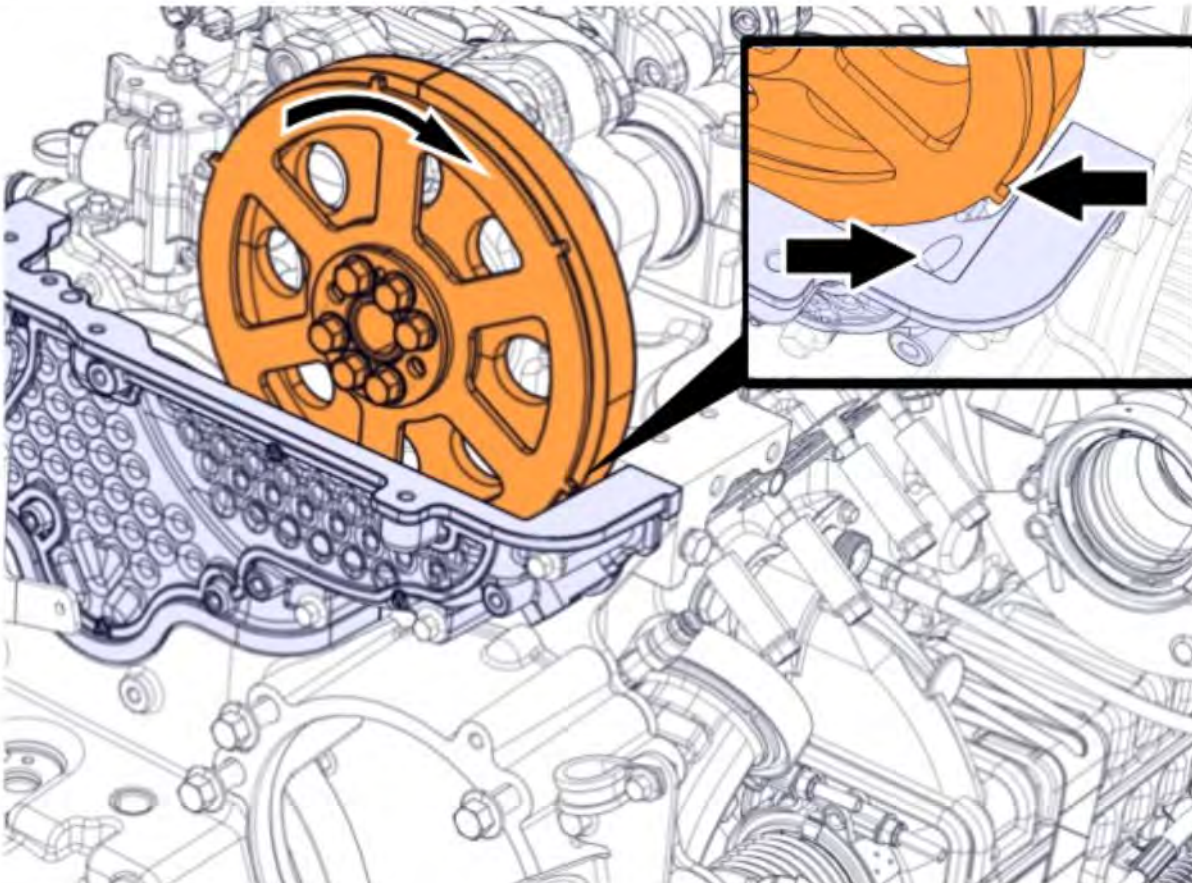
Tightening torque	
Upper timing gear casing, screw	Tightening sequence: 1-5 27 ±3 Nm (20 ±2 lb _f ·ft)



324 Remove the tools.

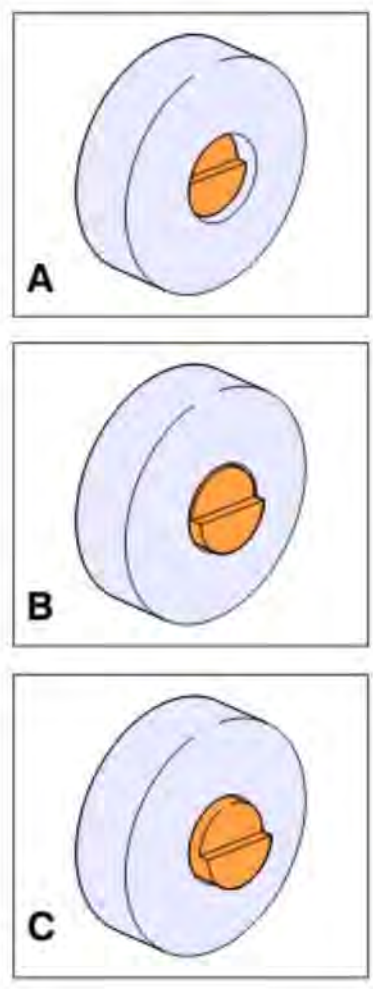
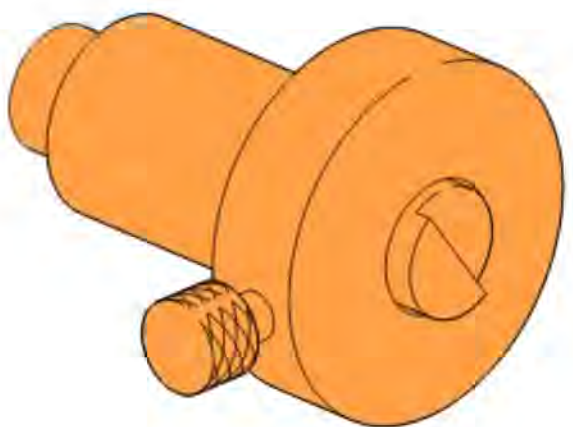


325 Rotate the gear so that a tooth on the sensor wheel aligns with the sensor location.

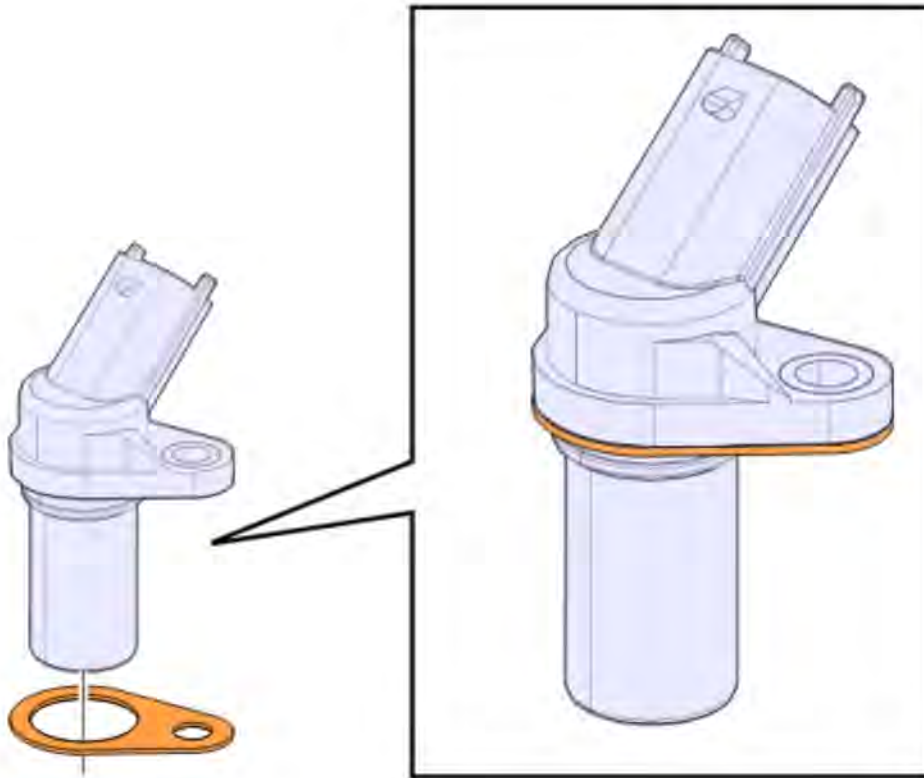


326	Install the setting tool.	
	Required material	
	SETTING TOOL	88800031

327	Read off the setting tool.	
	Impulse sensor, number of shims	
	Conditions: A: No edge outside the tool.	0 pcs
	Conditions: B: One edge outside the tool.	1 pc
	Conditions: C: Two edges outside the tool.	2 pcs



328	Remove the setting tool.
329	Install the shims as needed.



330 Remove the old sealant from the contact surfaces (A).



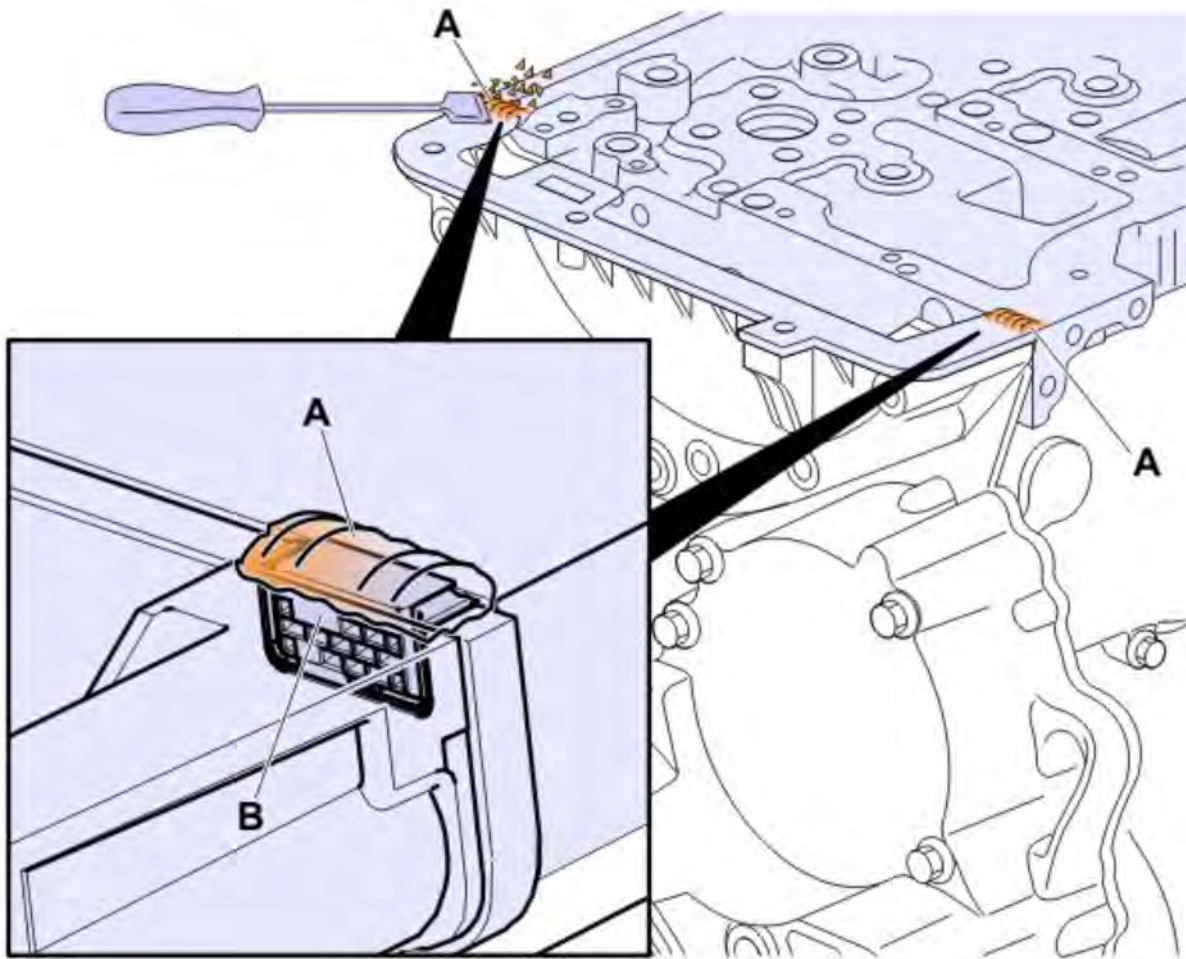
Note

Ensure that the surfaces are completely clean from sealant.

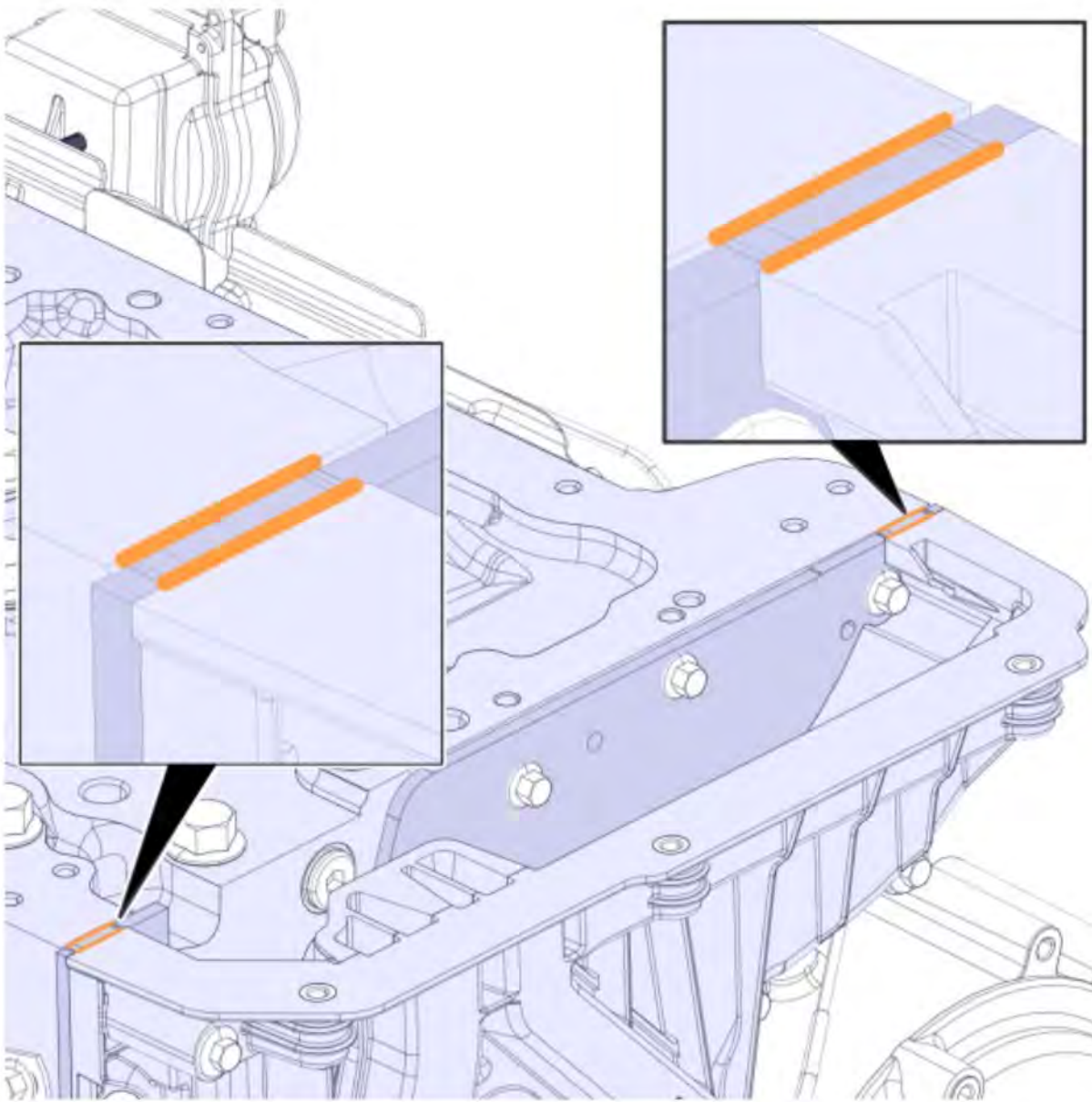


Note


Ensure that the sealant on the timing gear plate is not damaged (B).



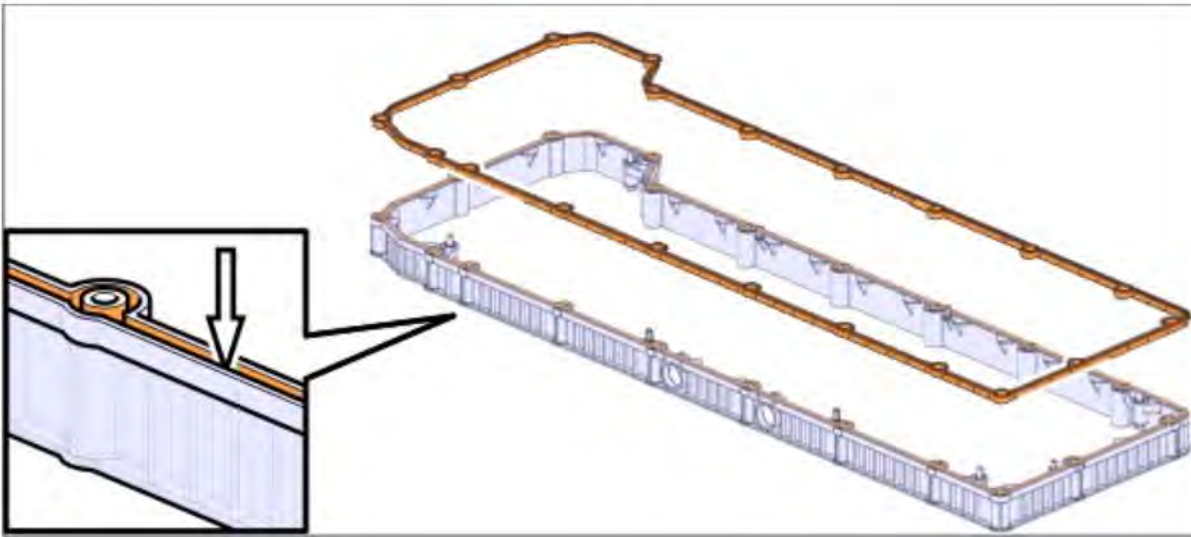
331	Apply sealant.	
Tech data		
Sealant, bead thickness		2 mm (0.08 in)
i	Note Use recommended sealant.	
i	Note Install the valve cover within 20 minutes of applying the sealant.	



332	Clean the contact surfaces carefully.
------------	---------------------------------------

333	Clean the groove.
	Note Ensure that the surfaces are completely clean of oil and grease.

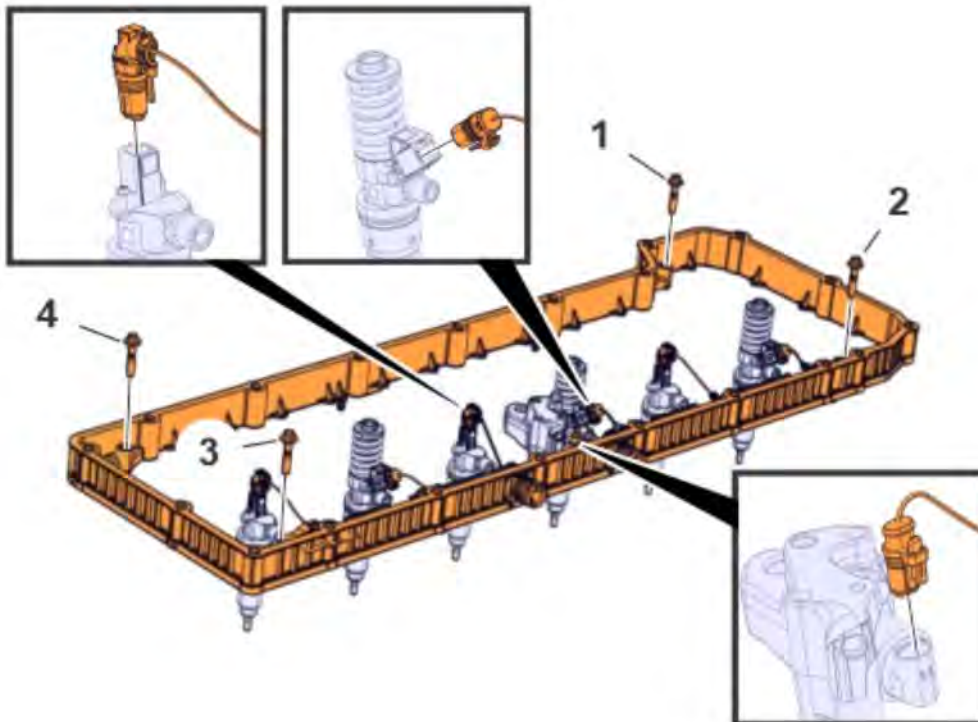
334	Install the gasket.
	Note Use a new part.



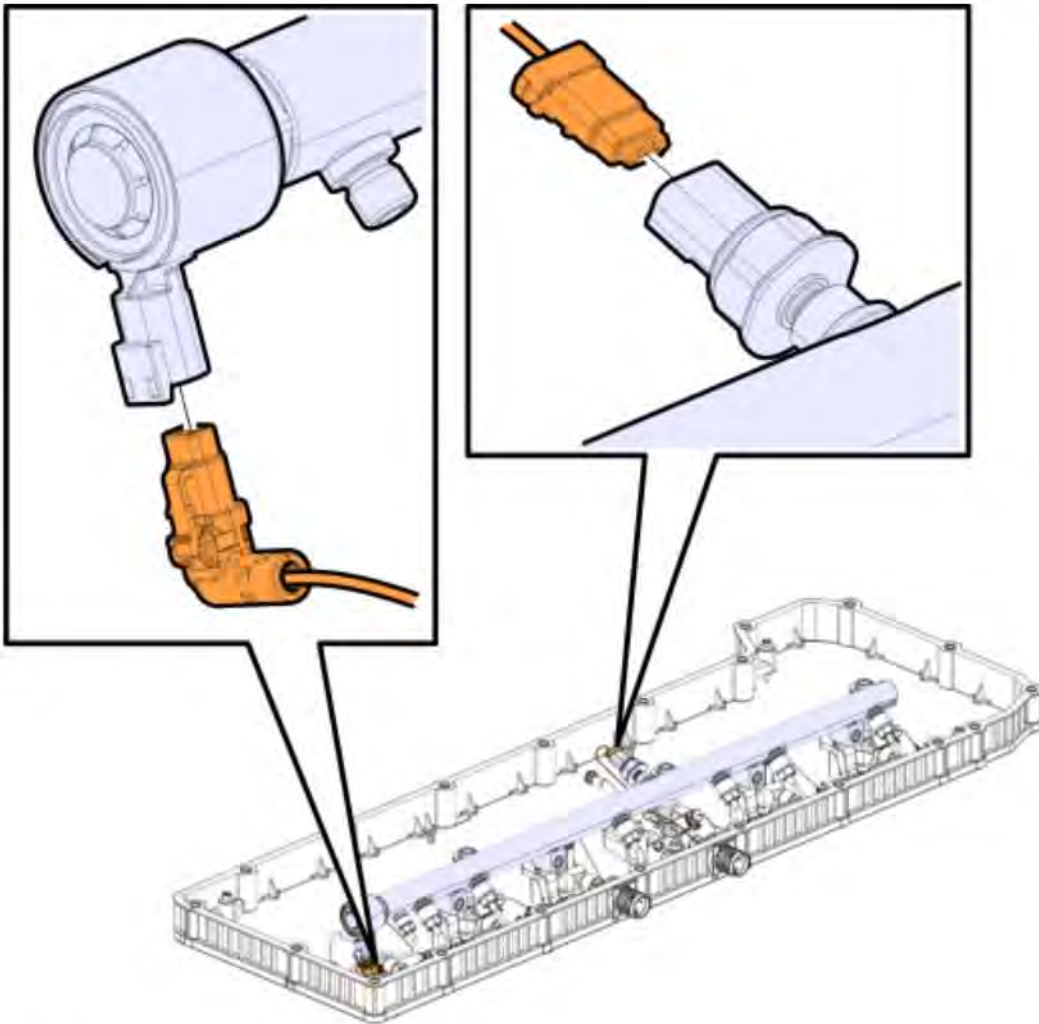
335 Install the frame.

336	Torque tighten the screws.	
	Tightening torque	
	Lower valve cover, screw	Tightening sequence: 1-4 $24 \pm 4 \text{ Nm}$ $(18 \pm 3 \text{ lb}_f\text{-ft})$

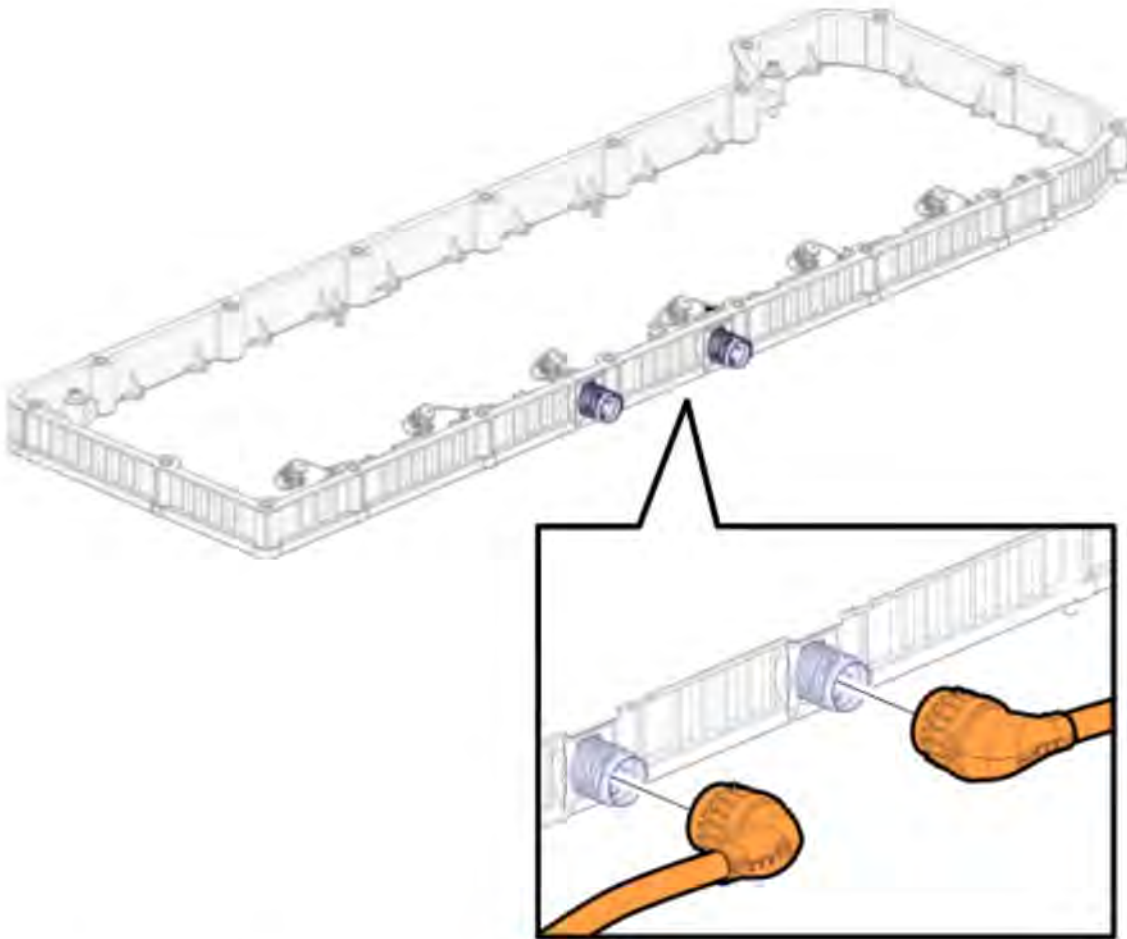
337 Connect the connectors.









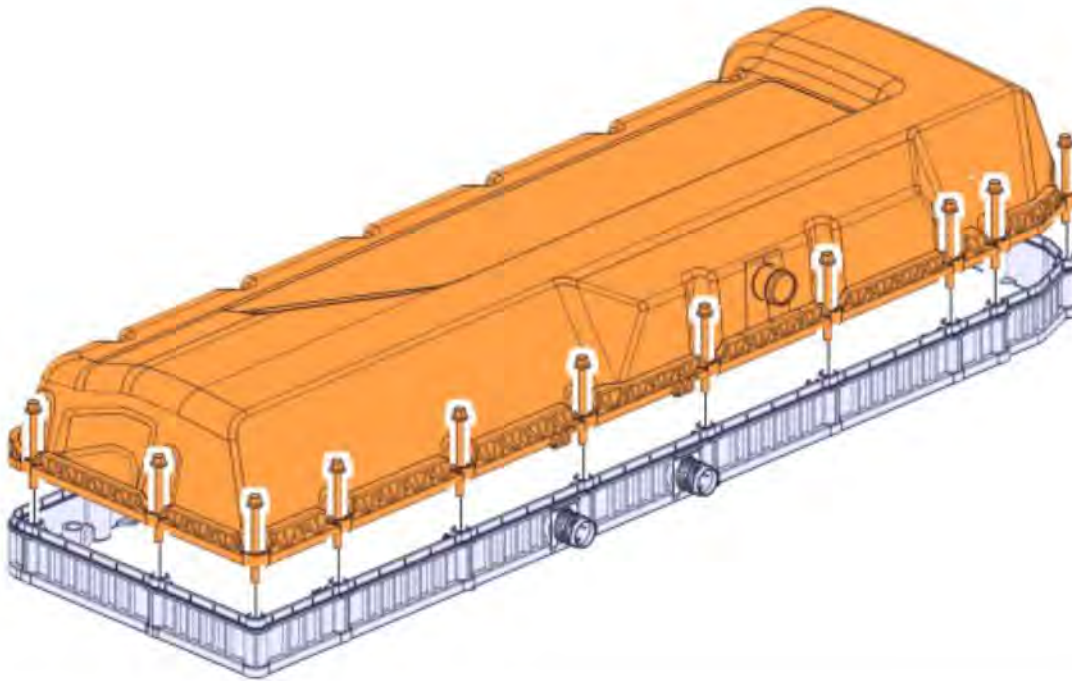
338 Connect the connectors.



339 Connect the connectors.

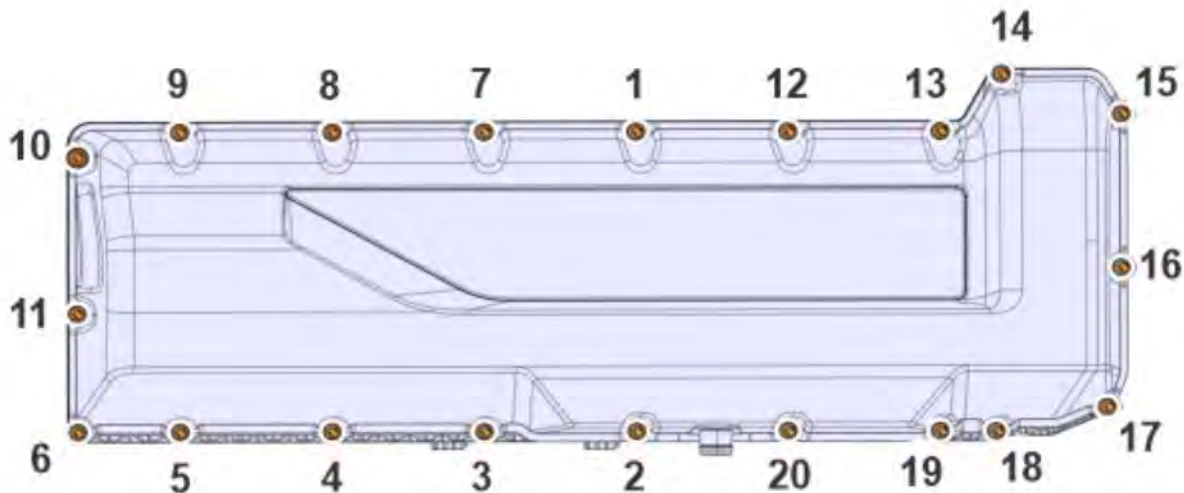


<p>340</p>	<p>Position the screws.</p>			
	<table border="1"> <tr> <td data-bbox="156 1131 236 1232">  </td> <td data-bbox="236 1131 1286 1232"> <p>Note Inspect the gasket, replace as needed.</p> </td> </tr> <tr> <td data-bbox="156 1232 236 1451">  </td> <td data-bbox="236 1232 1286 1451"> <p>Service hint Temporarily securing the screws at the rear of the cover in the uppermost position will aid in installation</p> </td> </tr> </table>		<p>Note Inspect the gasket, replace as needed.</p>	
	<p>Note Inspect the gasket, replace as needed.</p>			
	<p>Service hint Temporarily securing the screws at the rear of the cover in the uppermost position will aid in installation</p>			
<p>341</p>	<p>Install the valve cover.</p>			



342 Tighten the screws to torque.

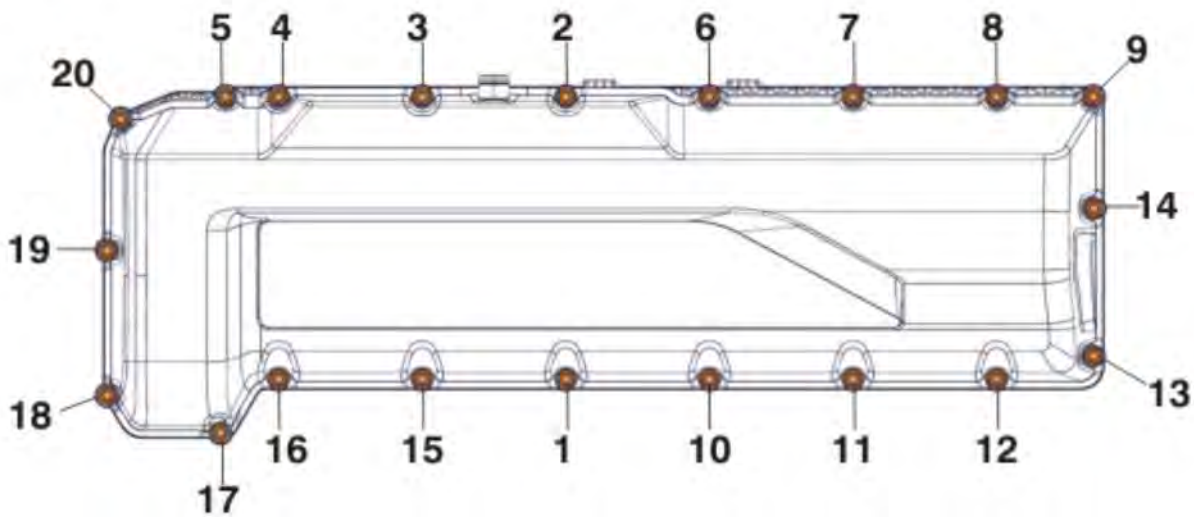
Tightening torque	
Valve cover, screw	Tightening sequence: 1-20
	24 ±4 Nm (18 ±3 lb _f -ft)



Tightening torque	
Valve cover, screw	Tightening sequence: 1-20
	24 ±4 Nm (18 ±3 lb _f -ft)

Copyright to this documentation belongs to the Volvo Group. No reproduction, copying, change, amendment or other similar disposal is entitled without prior written consent by the Volvo Group

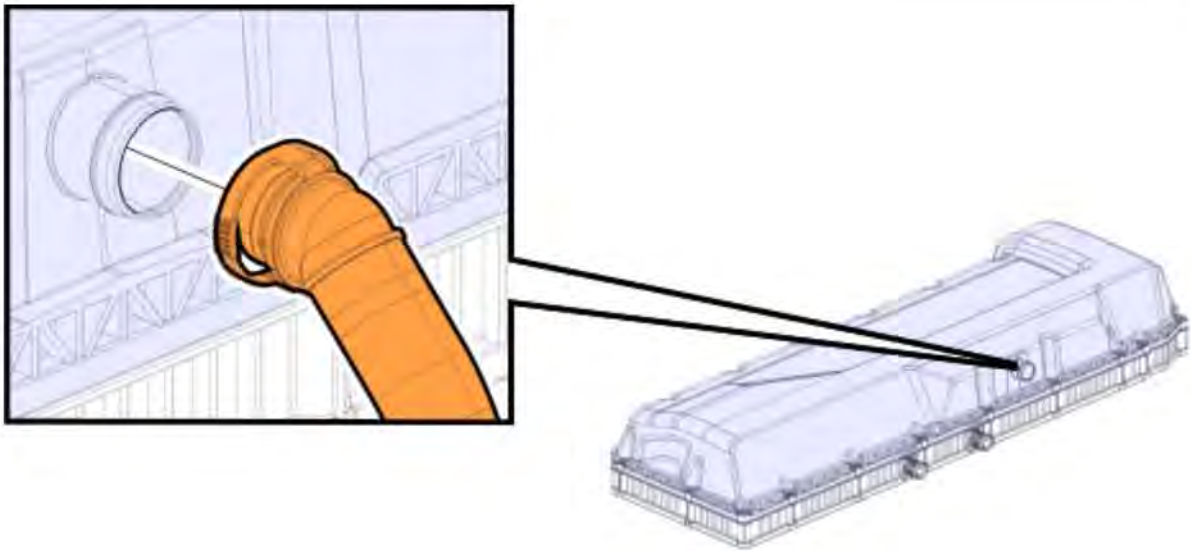
The information contained herein is current at the time of its original distribution, but is subject to change. The reader is advised that printed copies are uncontrolled.



343 Install the pipe.

Note
If not previously installed.

Note
Inspect the internal sealing ring.

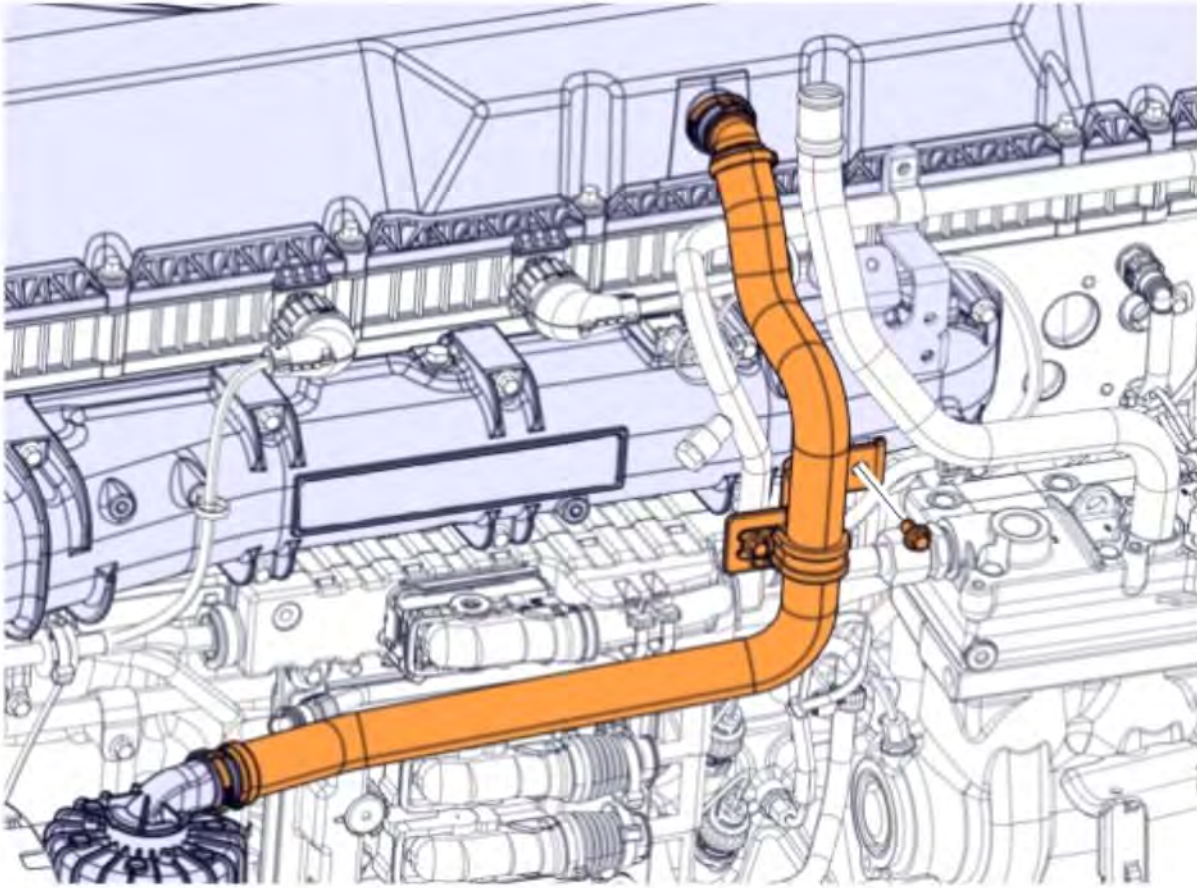


344 Install the pipe.

345 Install the screw.

346 Torque-tighten the screw.

Tightening torque	
Screw	M8
	24 ±4 Nm
	(18 ±3 lb _f ·ft)

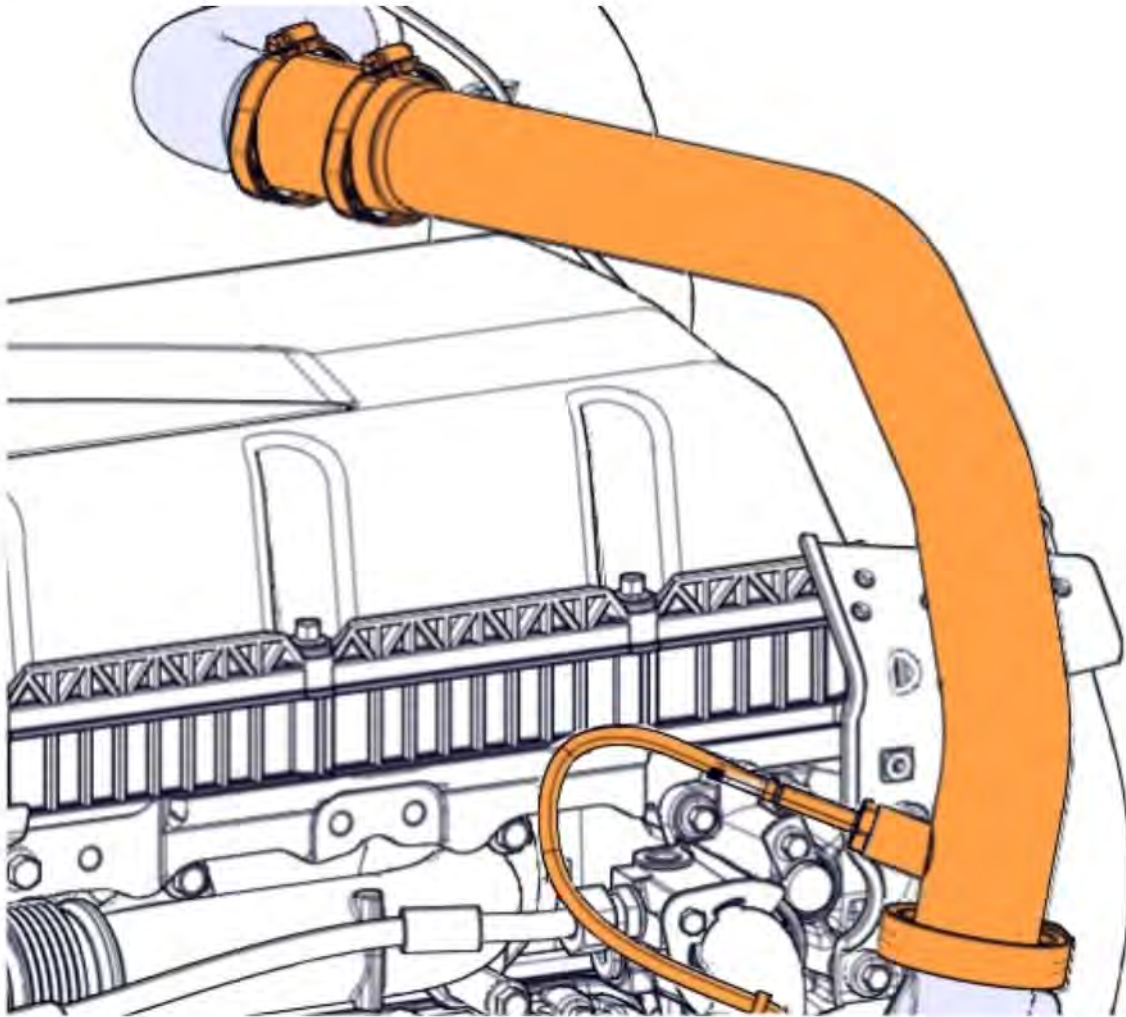


347 Install the pipe.



Note

Check the sealing ring and hose for damage; replace as needed.

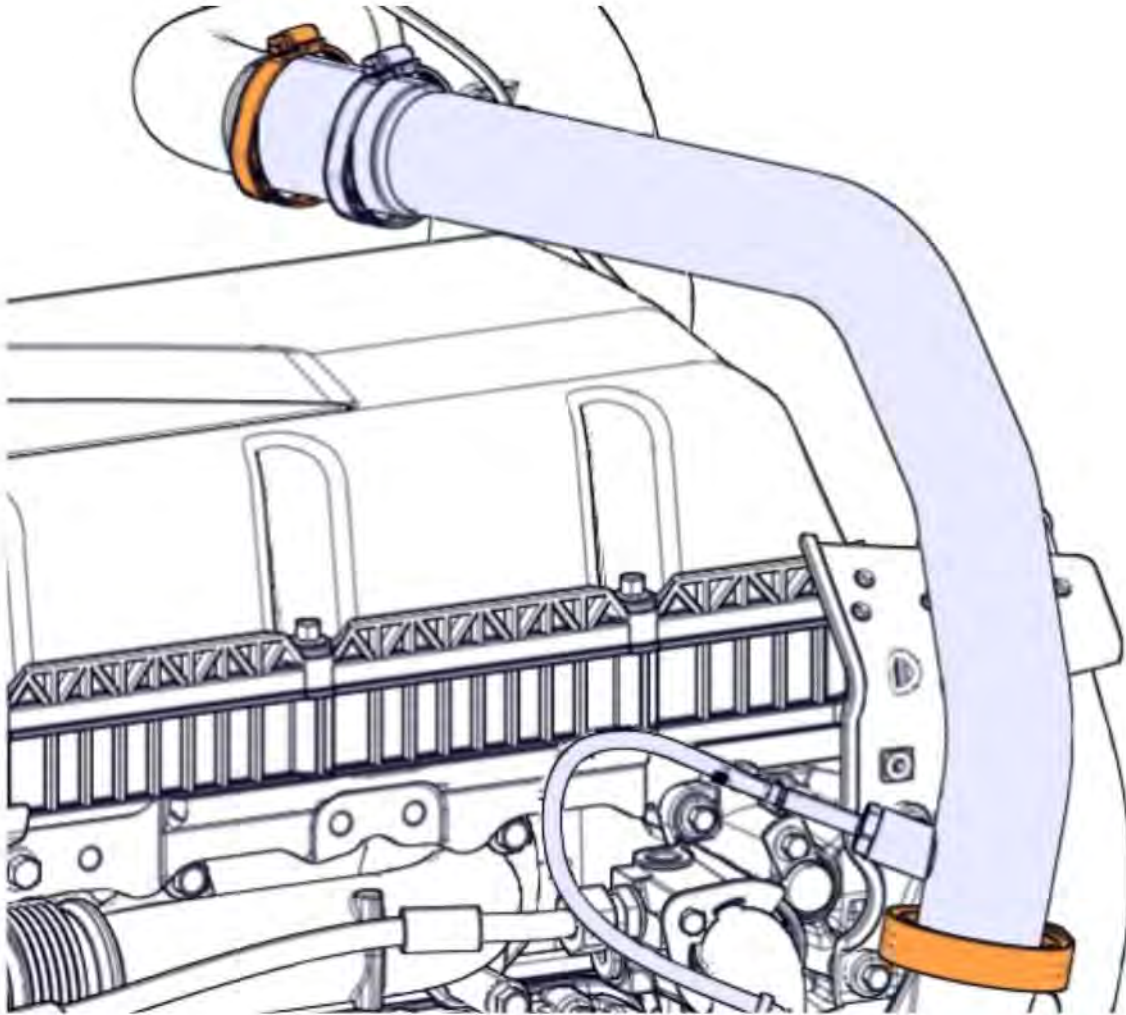


348 Position the clamps.

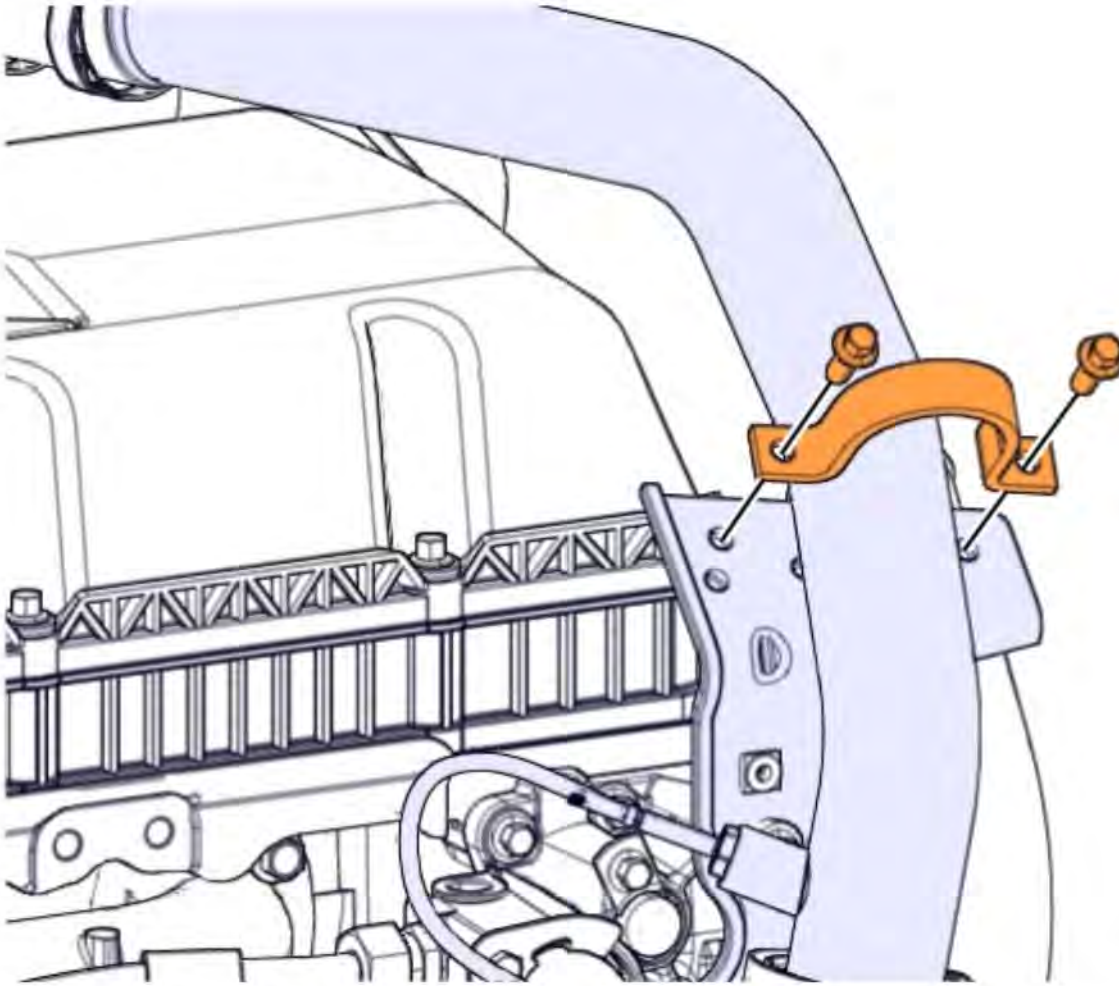
i	Note As noted.
----------	--------------------------

349 Tighten the clamps to torque.

Tightening torque	
V band clamp screw	10.2 ±1 Nm (90 ±9 lb _f ·in)
Tightening torque	
Hose clamp	11.9 ±2 Nm (105 ±18 lb _f ·in)



350	Install the clamp.	
351	Torque tighten the screws.	
	Tightening torque	
	Screw	M8 24 ±4 Nm (18 ±3 lb _f .ft)

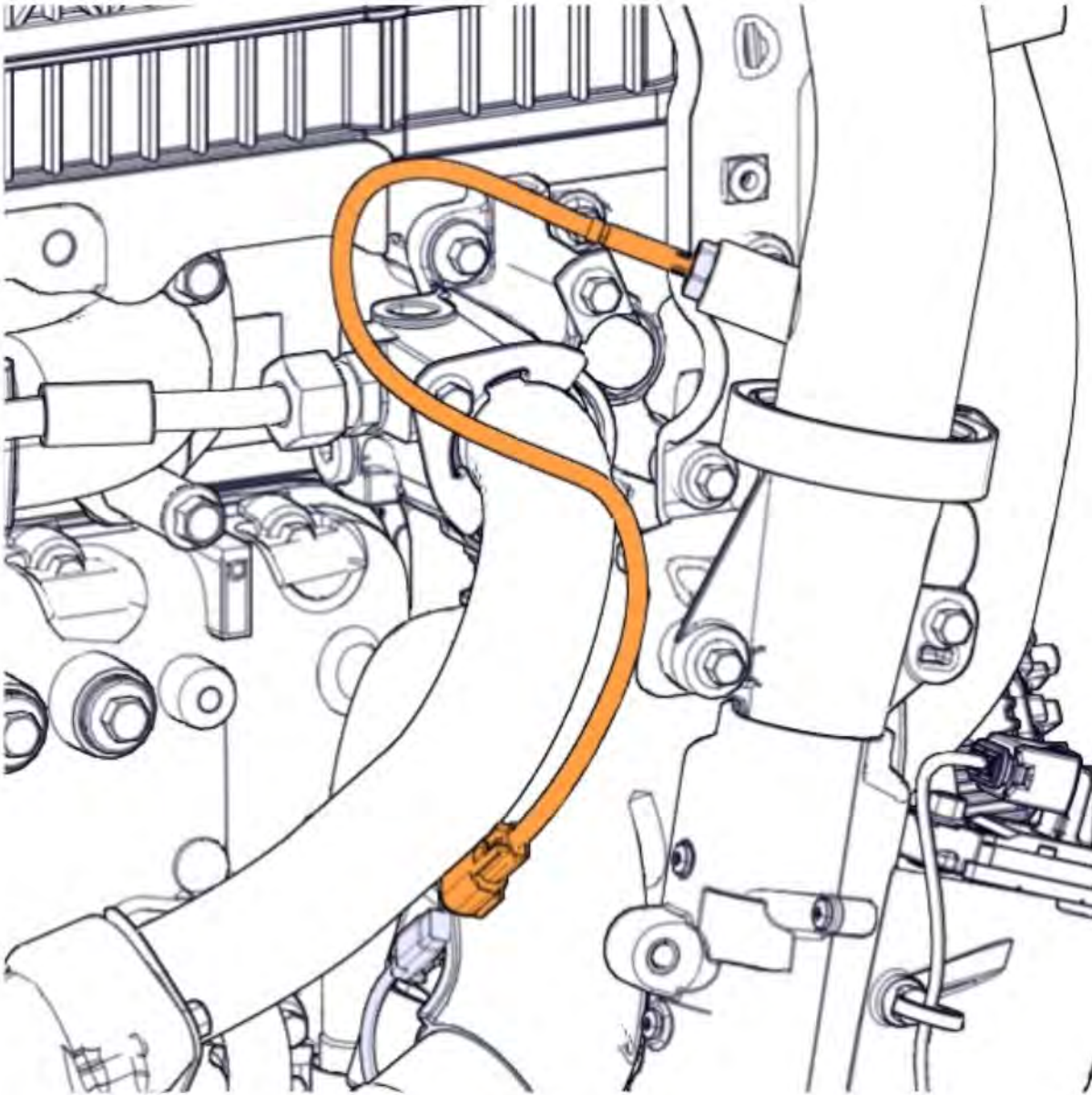


352	Connect the connector.
-----	------------------------

353	Install the cable tie.
-----	------------------------

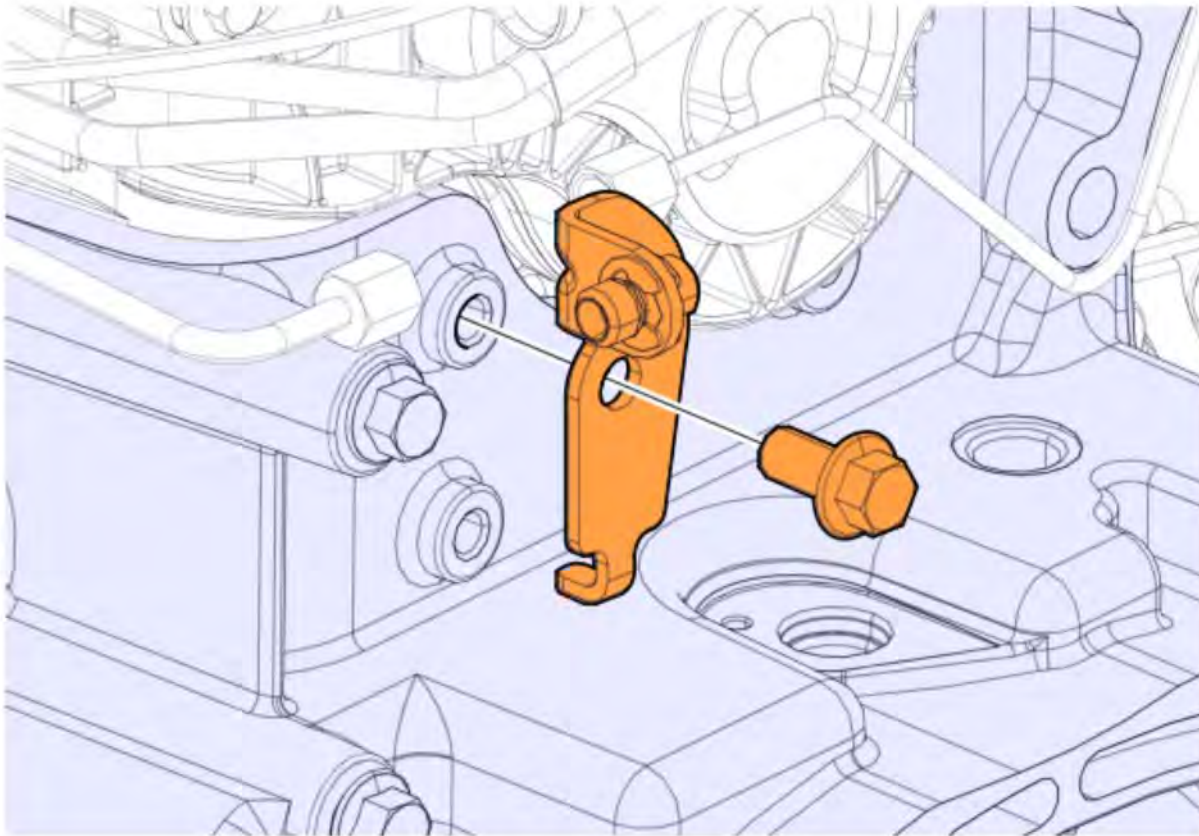
**Note**

Use a new part.



354	Install the bracket.
-----	----------------------

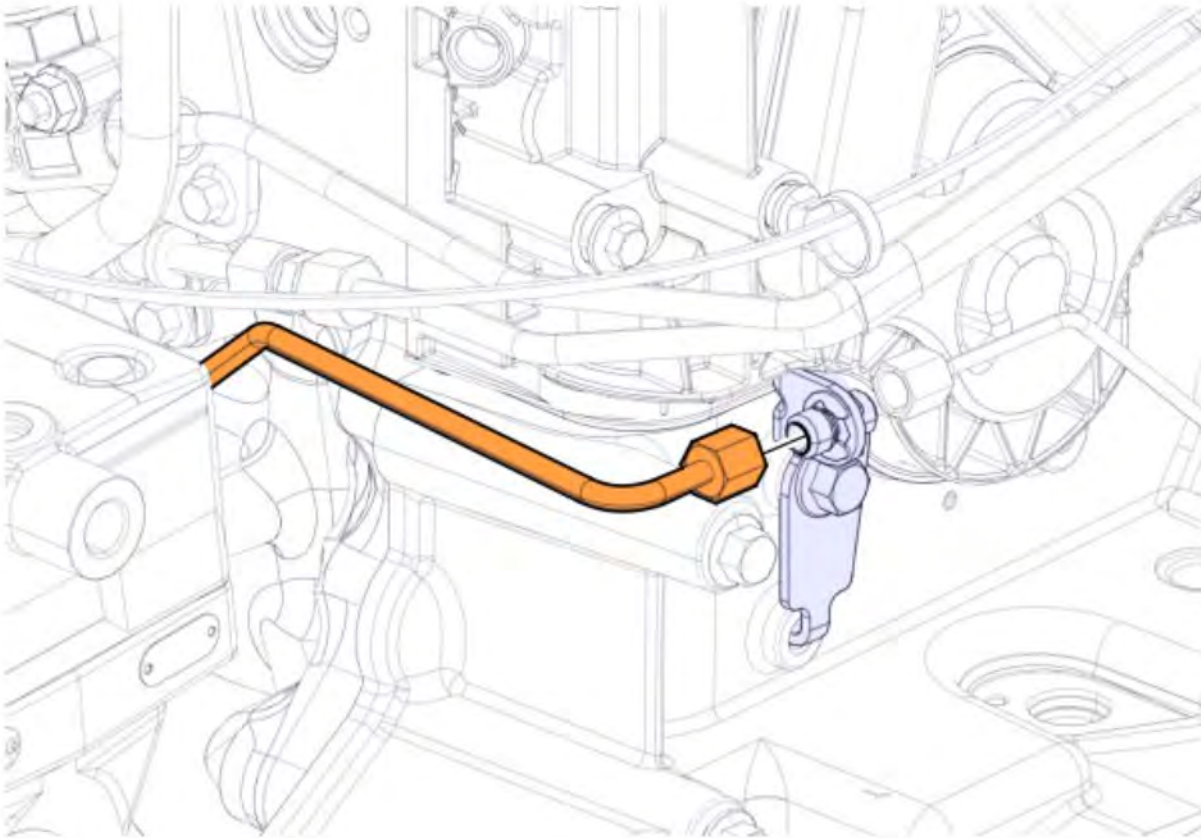
355	Install the screw.
-----	--------------------



356	Install the nut.
------------	------------------

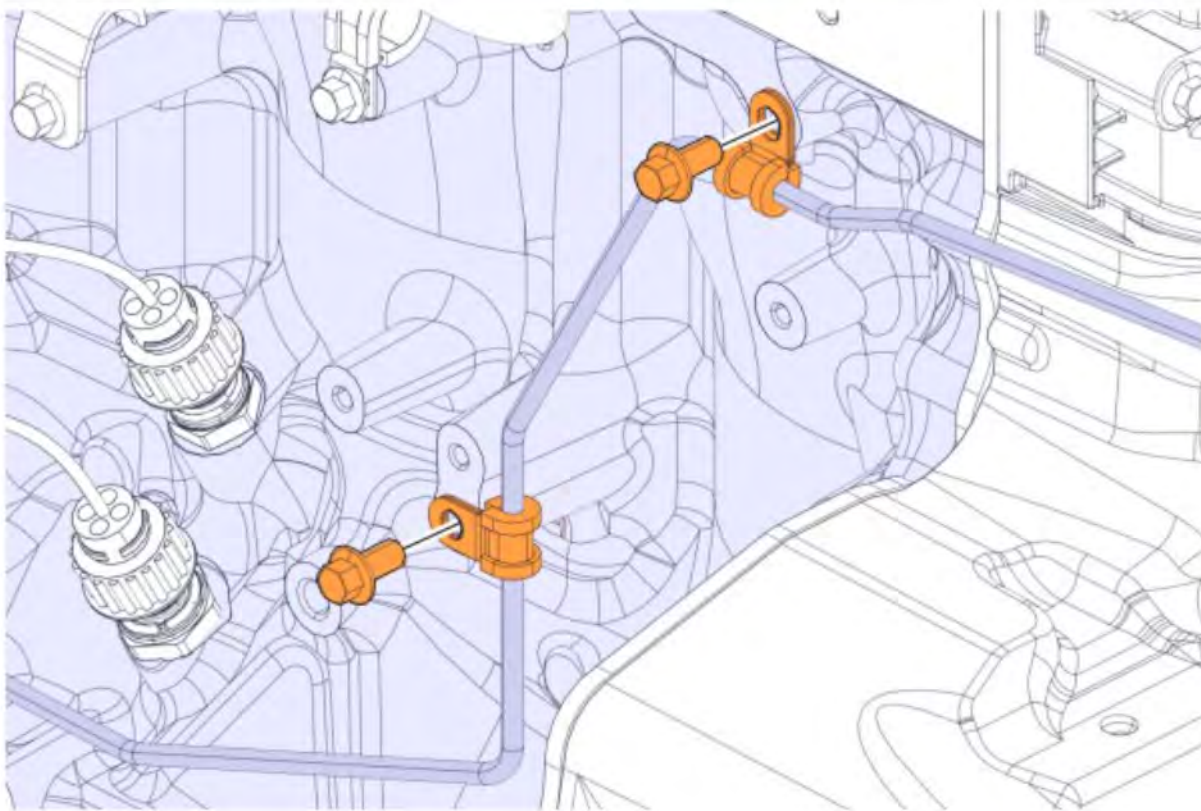
357	Torque tighten the nut.
------------	-------------------------

Tightening torque	
Fitting	#4
	15 ±1 Nm (11 ±1 lb _f .ft)



358	Install the clamps.
-----	---------------------

359	Install the screws.
-----	---------------------

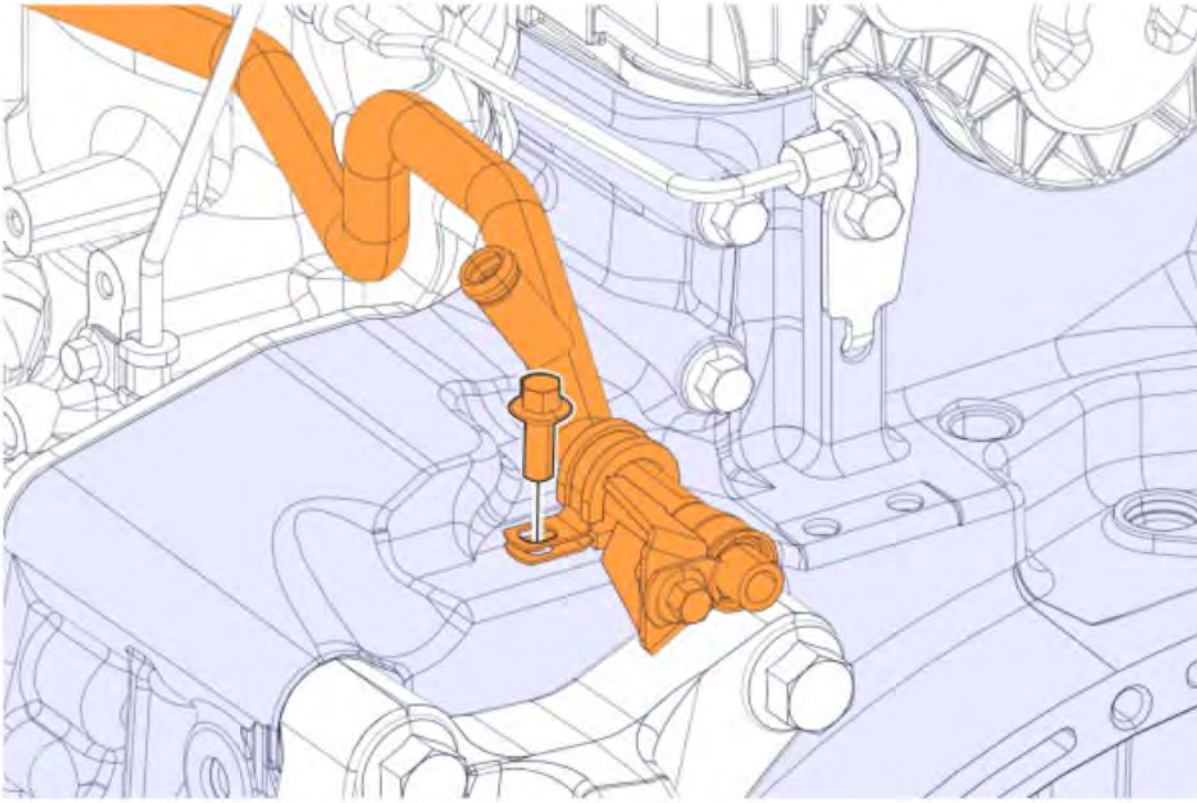


360	Position the pipe.
-----	--------------------

361	Install the screw.
-----	--------------------

Copyright to this documentation belongs to the Volvo Group. No reproduction, copying, change, amendment or other similar disposal is entitled without prior written consent by the Volvo Group

The information contained herein is current at the time of its original distribution, but is subject to change. The reader is advised that printed copies are uncontrolled.



362 Lubricate the O-ring.



Note

Use a new part.



Note

Use recommended oil.

363 Install the O-ring.




 CAUTION
--

Risk of serious injury.
 Heavy component.

▶ Exercise caution when moving the component. Use appropriate tools.

364 Install the compressor.

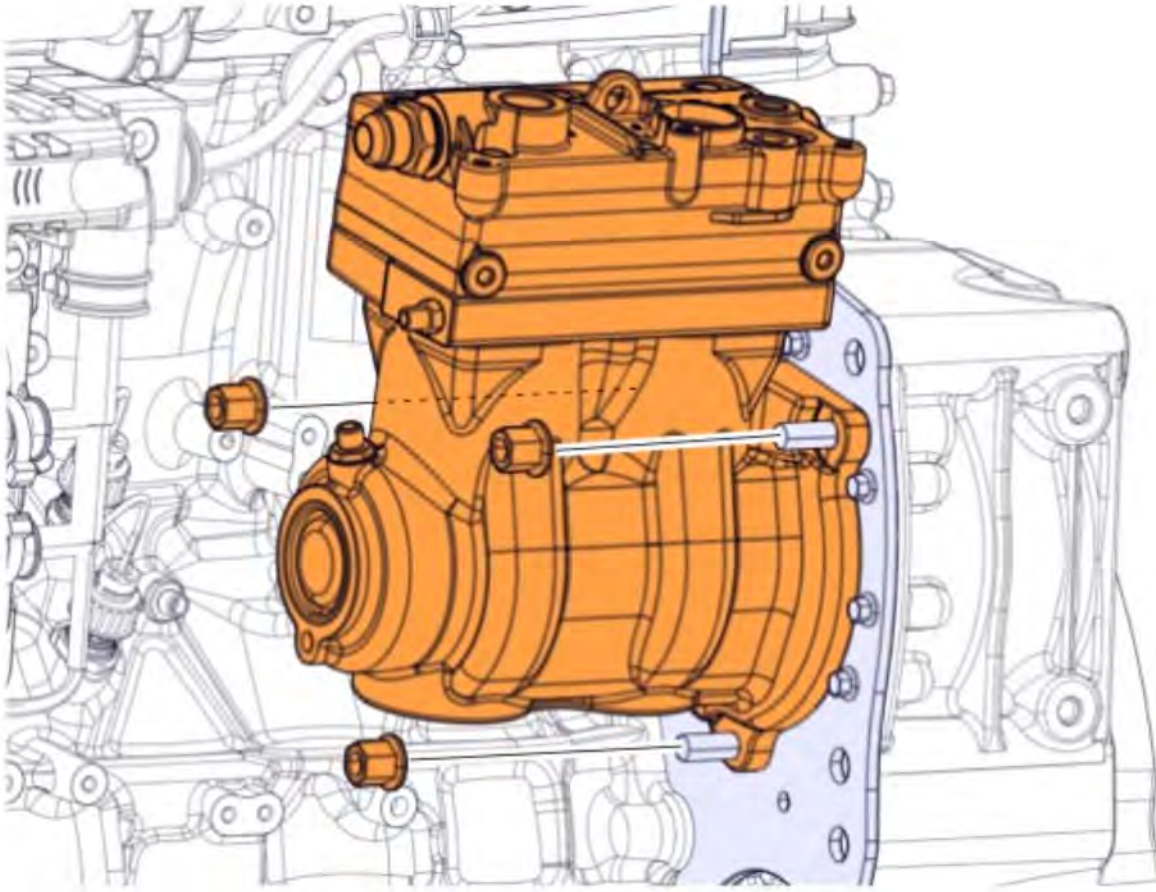
	Note Take care not to damage surrounding components.
---	--

365 Install the nuts.

366 Torque tighten the nuts diagonally.

Tightening torque	
Compressor, mounting nut	85 ±15 Nm (63 ±11 lb _f -ft)

367 Repeat the operation a second time.

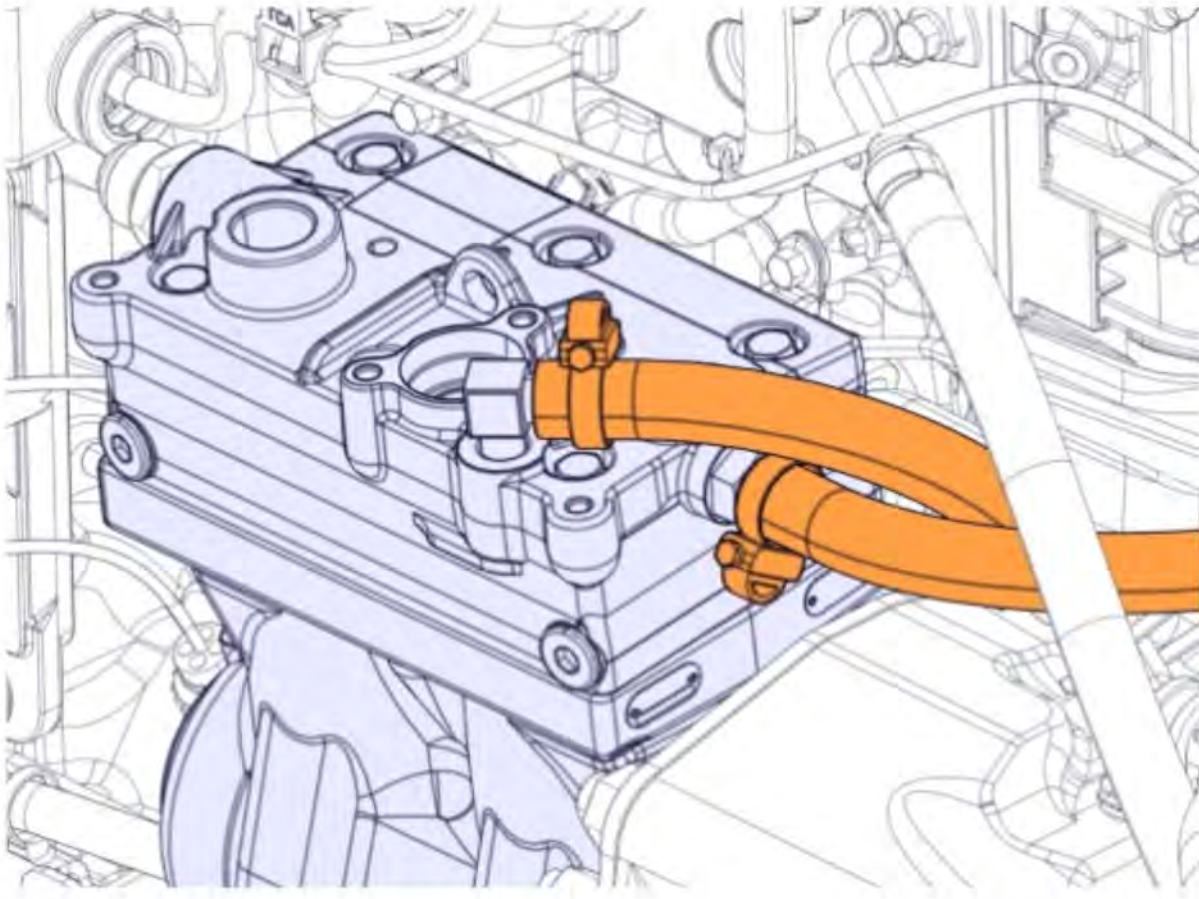


368	Connect the hoses.
------------	--------------------

369	Torque tighten the clamps.
------------	----------------------------

Tightening torque	
--------------------------	--

Compressor, coolant hose, clamp	3 ±0.5 Nm (2 ±0.4 lb _f ·ft)
---------------------------------	---



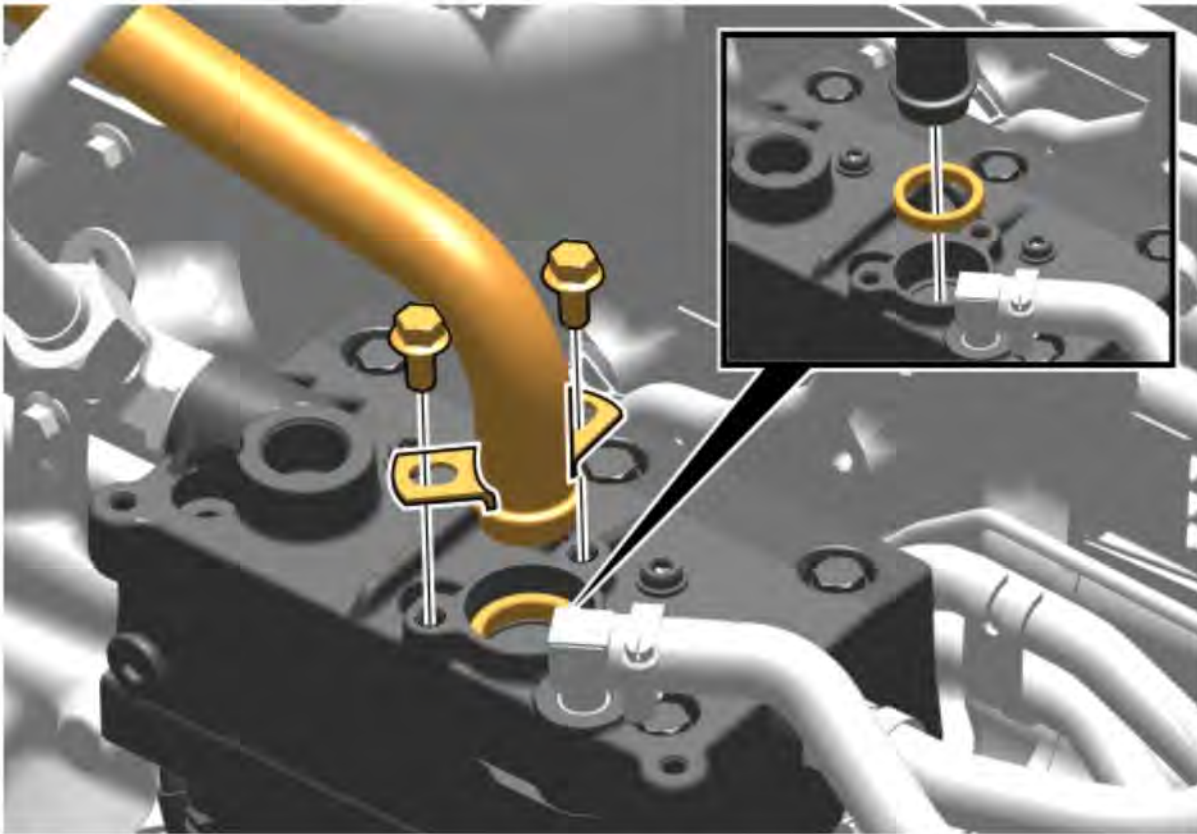
370	Lubricate the sealing ring.		
	<table border="1" style="width: 100%;"> <tr> <td style="width: 20px; text-align: center;">i</td> <td>Note Use recommended oil.</td> </tr> </table>	i	Note Use recommended oil.
i	Note Use recommended oil.		

371	Install the sealing ring.		
	<table border="1" style="width: 100%;"> <tr> <td style="width: 20px; text-align: center;">i</td> <td>Note Use a new part.</td> </tr> </table>	i	Note Use a new part.
i	Note Use a new part.		

372	Install the pipe along with the lock braces.
------------	--

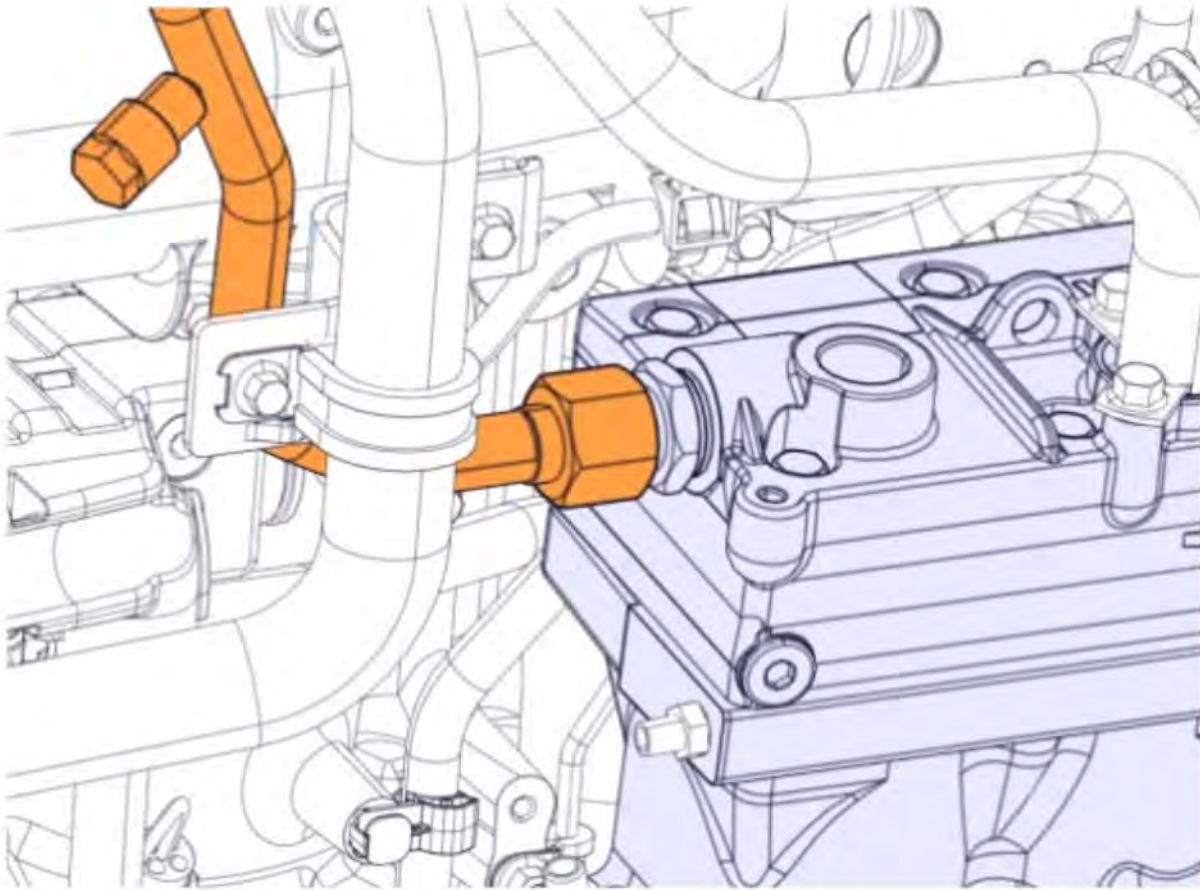
373	Install the screws.
------------	---------------------

374	Torque tighten the screws.						
	Tightening torque						
	<table border="1" style="width: 100%;"> <tr> <td style="width: 50%;">Lock brace, screw</td> <td>M8</td> </tr> <tr> <td></td> <td>24 ±4 Nm</td> </tr> <tr> <td></td> <td>(18 ±3 lb_f·ft)</td> </tr> </table>	Lock brace, screw	M8		24 ±4 Nm		(18 ±3 lb _f ·ft)
Lock brace, screw	M8						
	24 ±4 Nm						
	(18 ±3 lb _f ·ft)						



375	Install the pipe.
------------	-------------------

376	Torque tighten the nut.	
	Tightening torque	
	Compressor, air outlet, nut	130 ±20 Nm (96 ±15 lb _f -ft)

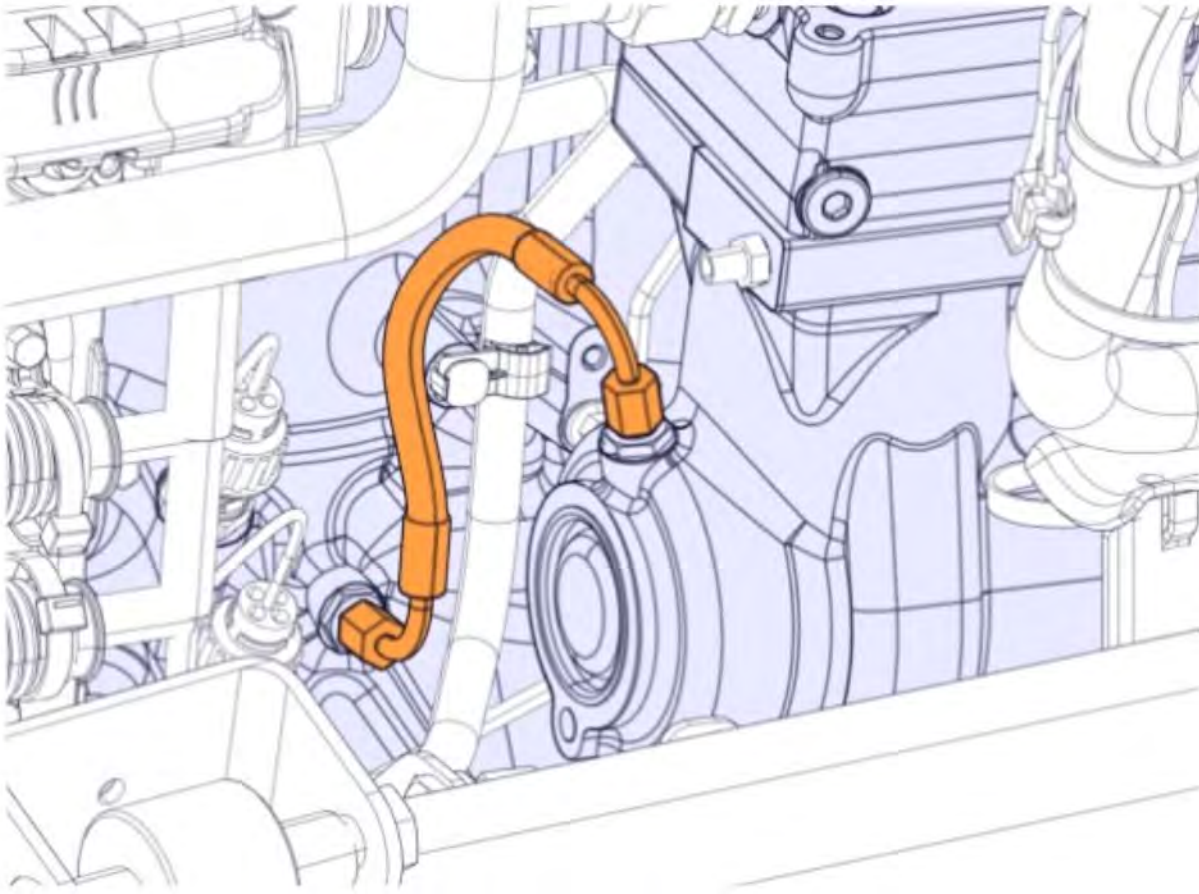


377	Install the oil hose.
------------	-----------------------

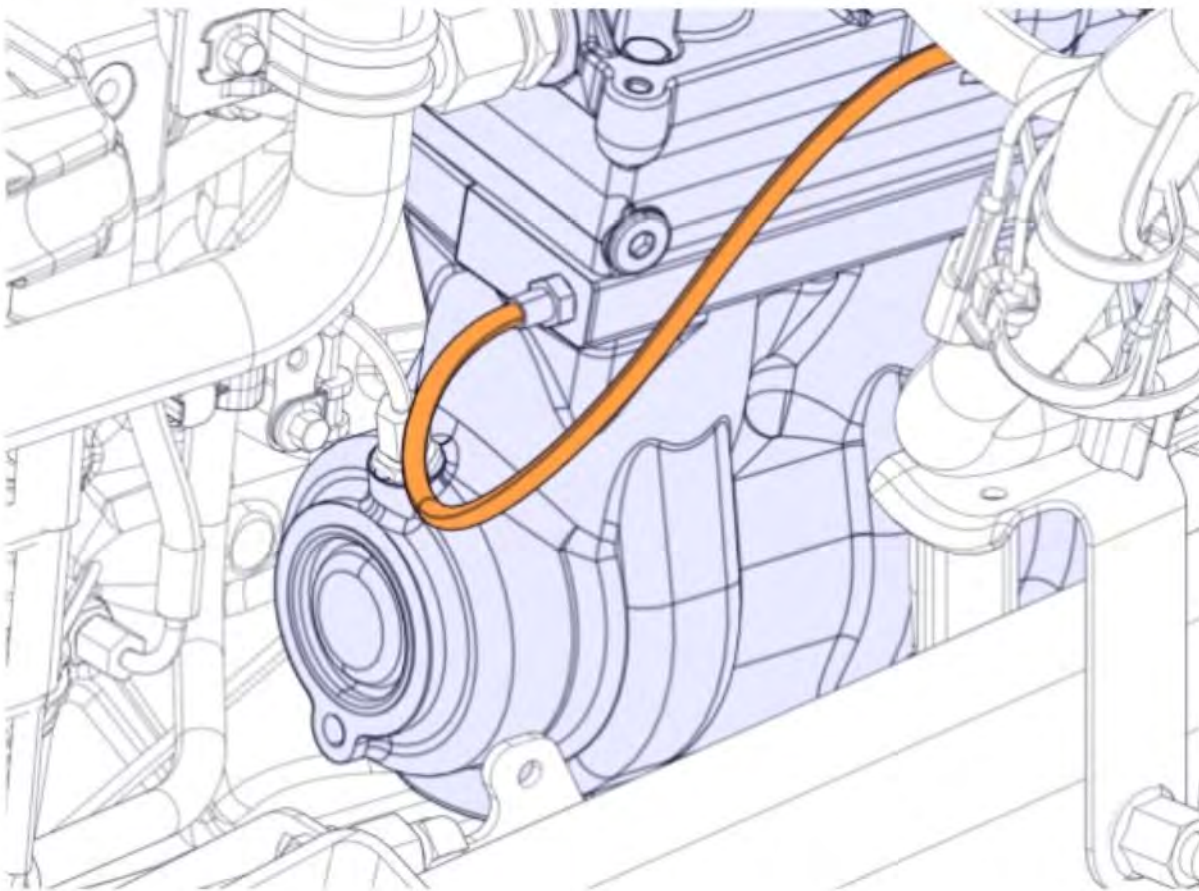
378	Torque tighten the fitting nuts.
------------	----------------------------------

Tightening torque	
--------------------------	--

Compressor, oil hose, fitting	15 ±3 Nm (11 ±2 lb _f ·ft)
-------------------------------	---



379 Connect the air line.

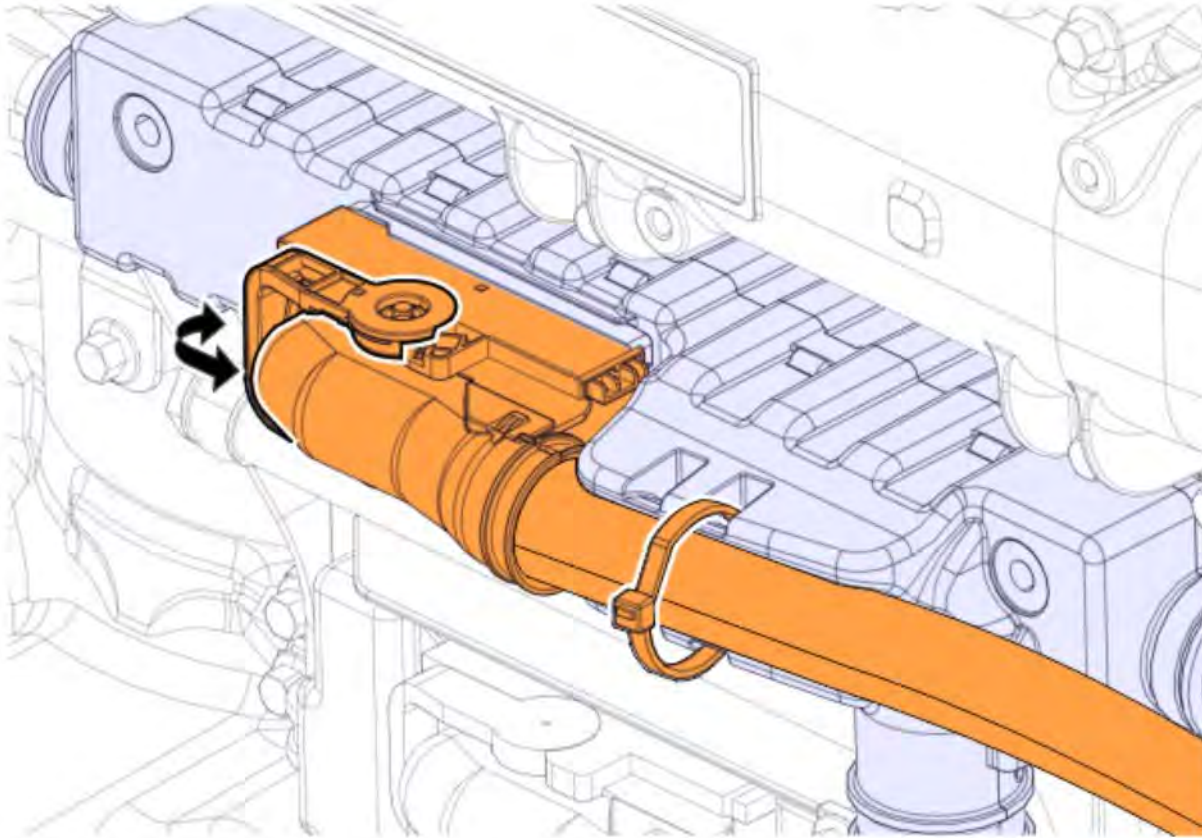


380 Connect the connector.

381 Install the cable ties.

i **Note**
Use new parts.

i **Note**
As noted.



382 Lubricate the seal.

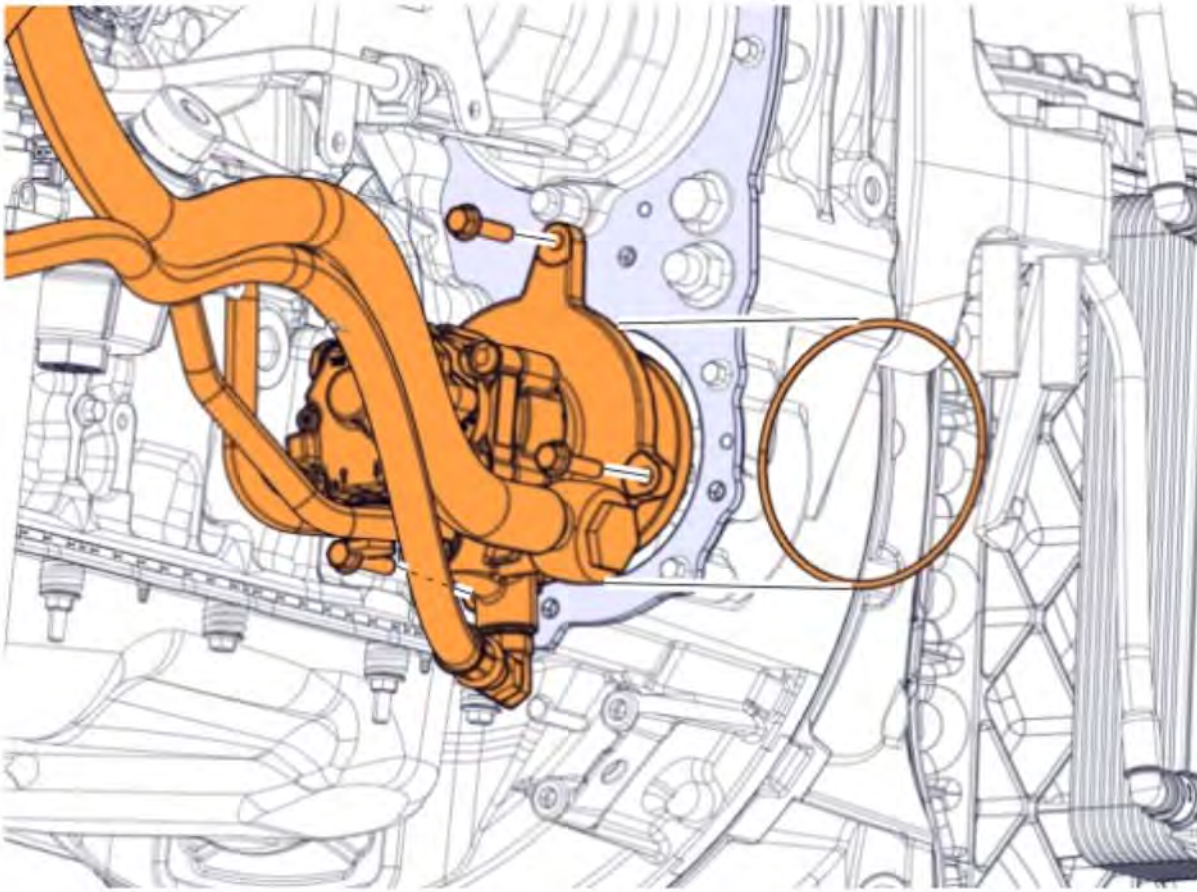
383 Install the seal.

i **Note**
Use a new part

i **Note**
Use recommended oil.

384 Install the pump.

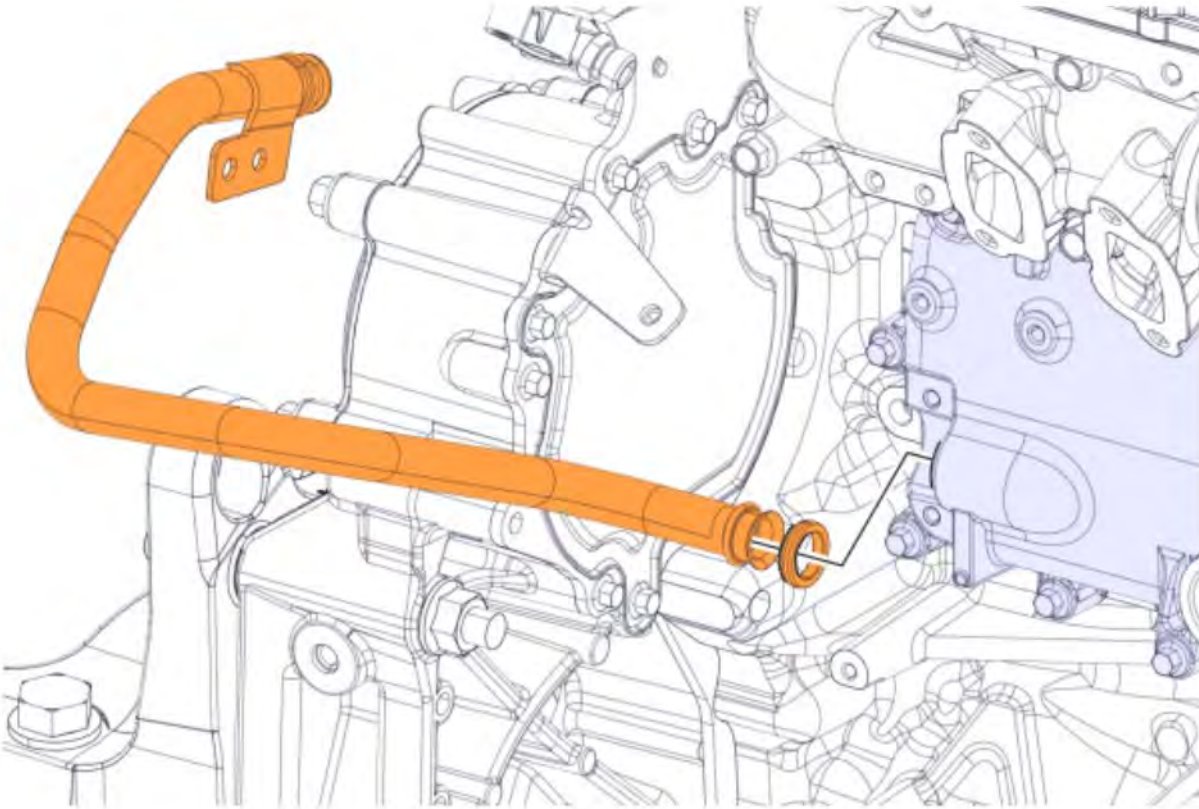
385 Install the screws.



386	Torque tighten the screws.	
	Tightening torque	
	Screw	M8
		24 ±4 Nm (18 ±3 lb _f .ft)

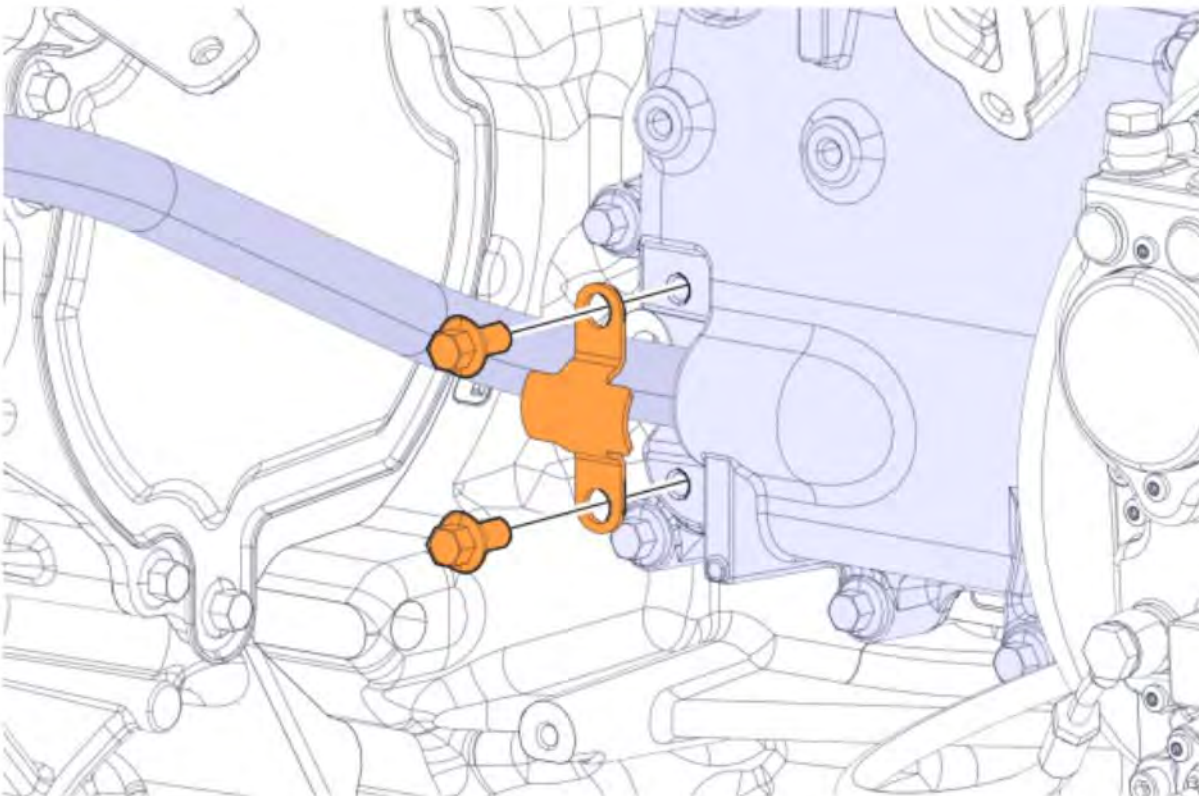
387	Install the seal.	
	i	Note Use a new part.

388	Install the pipe.
------------	-------------------

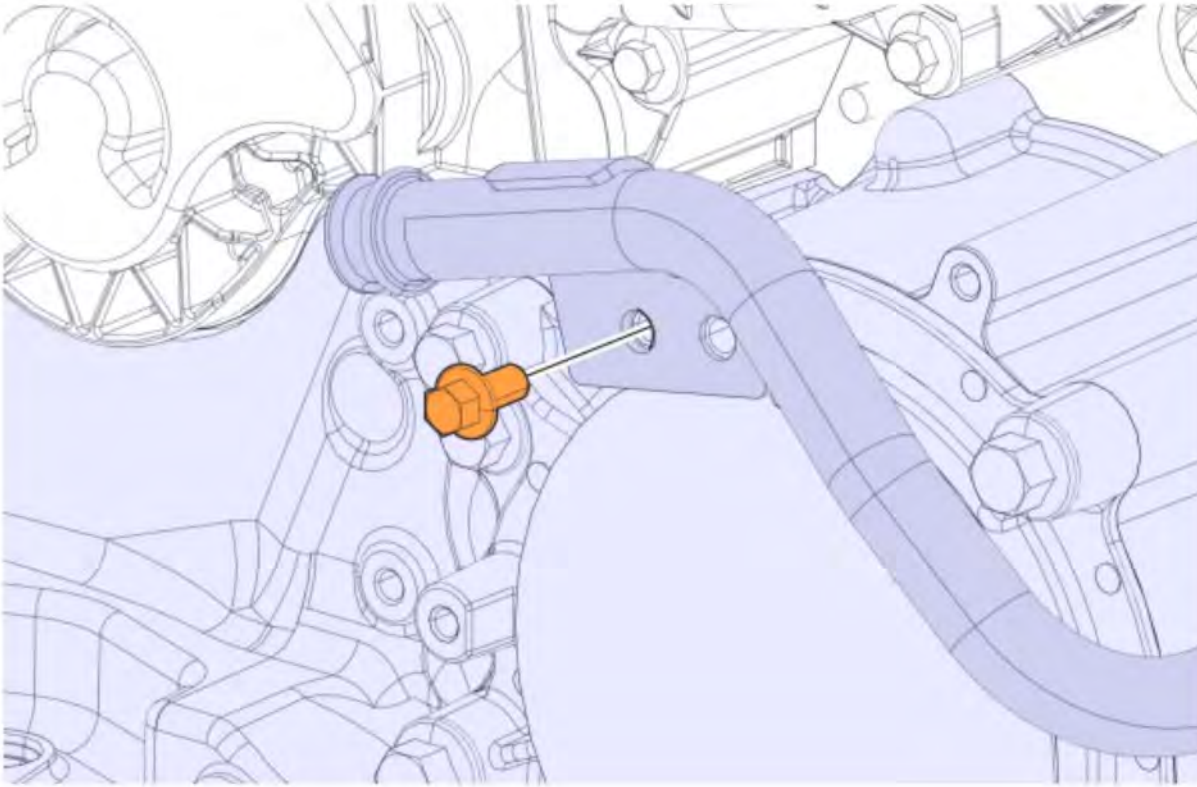


389	Install the clamp.
------------	--------------------

390	Install the screws.
------------	---------------------

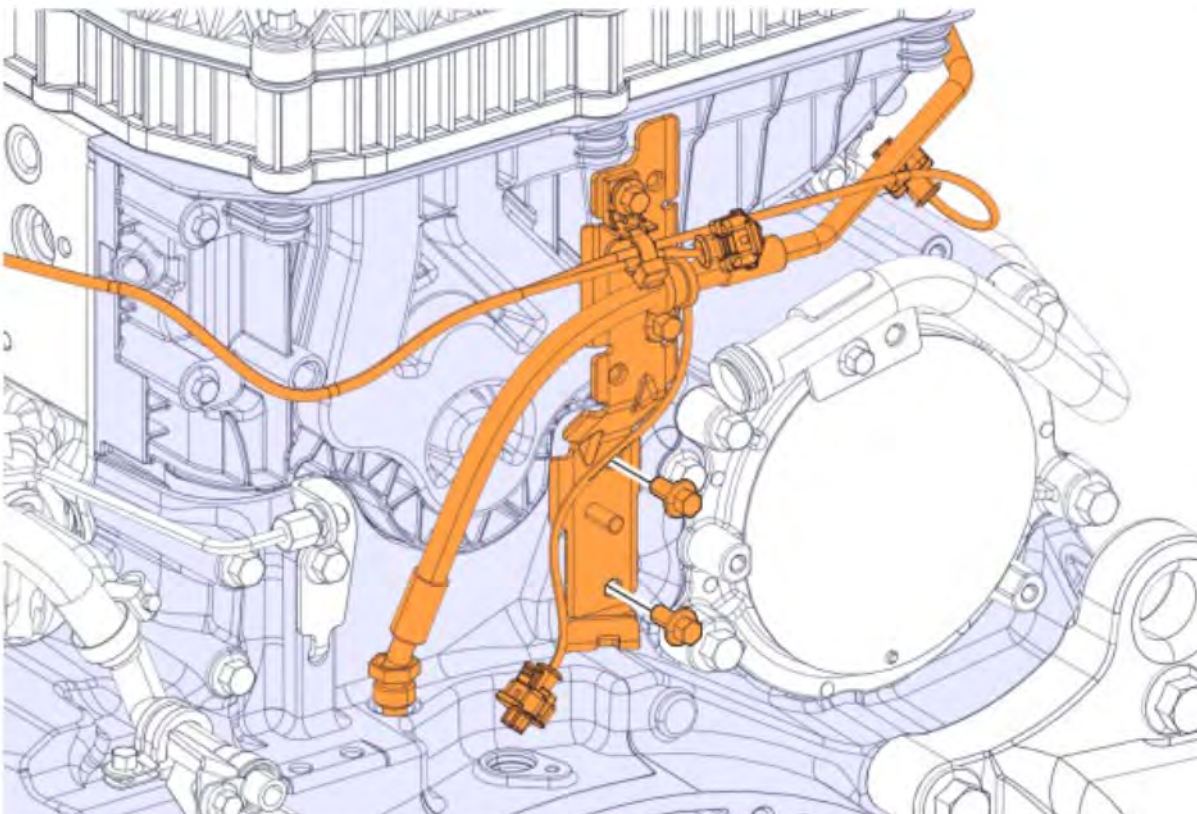


391	Install the screw.
------------	--------------------



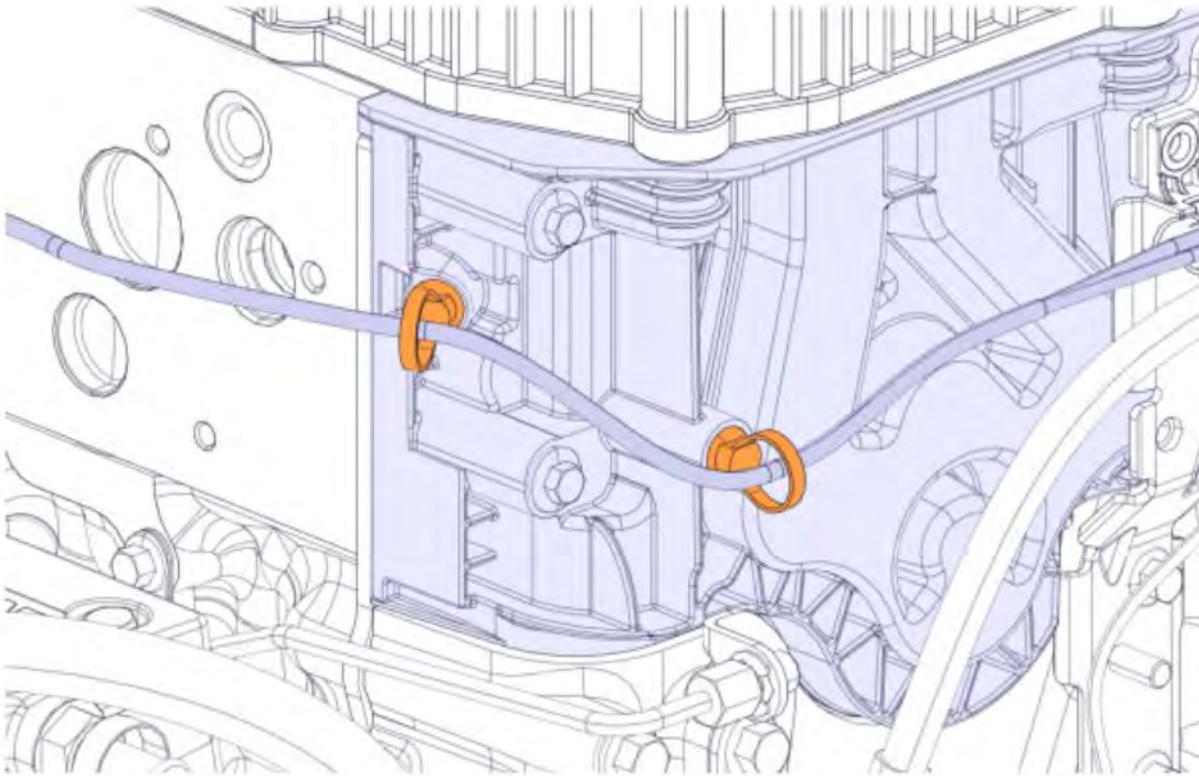
392 Position the assembly.

393 Install the screws.



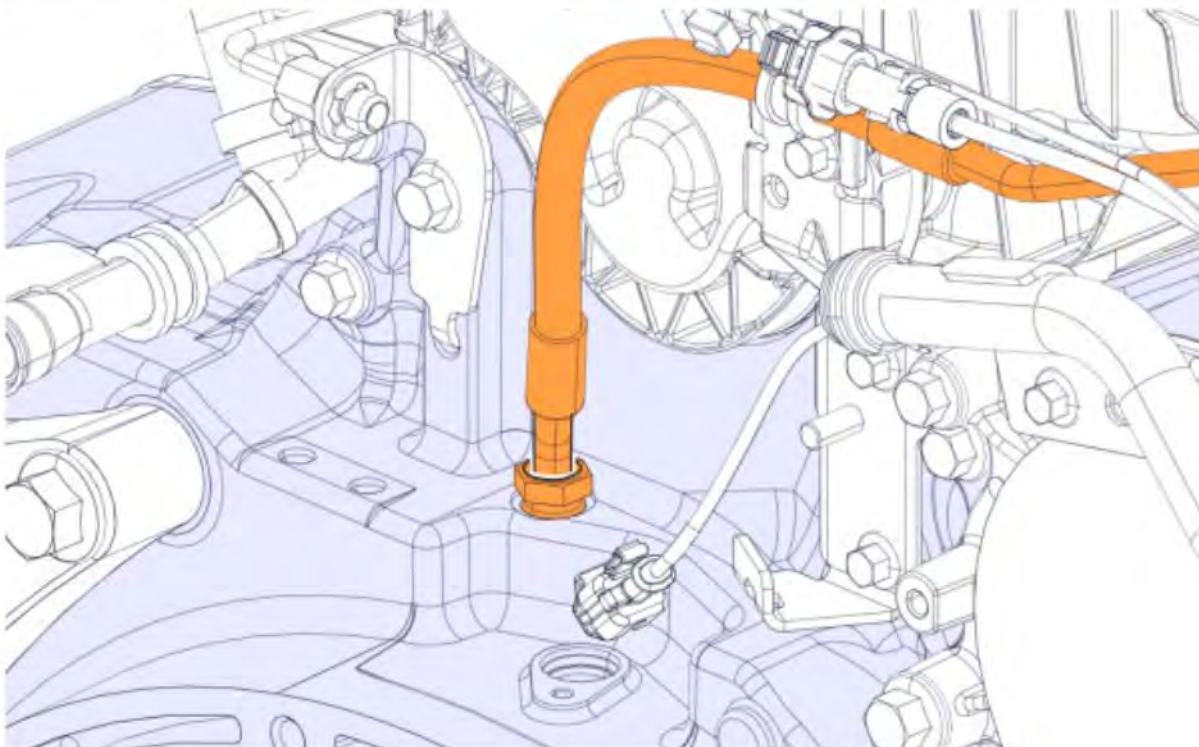
394 Install the cable ties.

i **Note**
Use new parts.



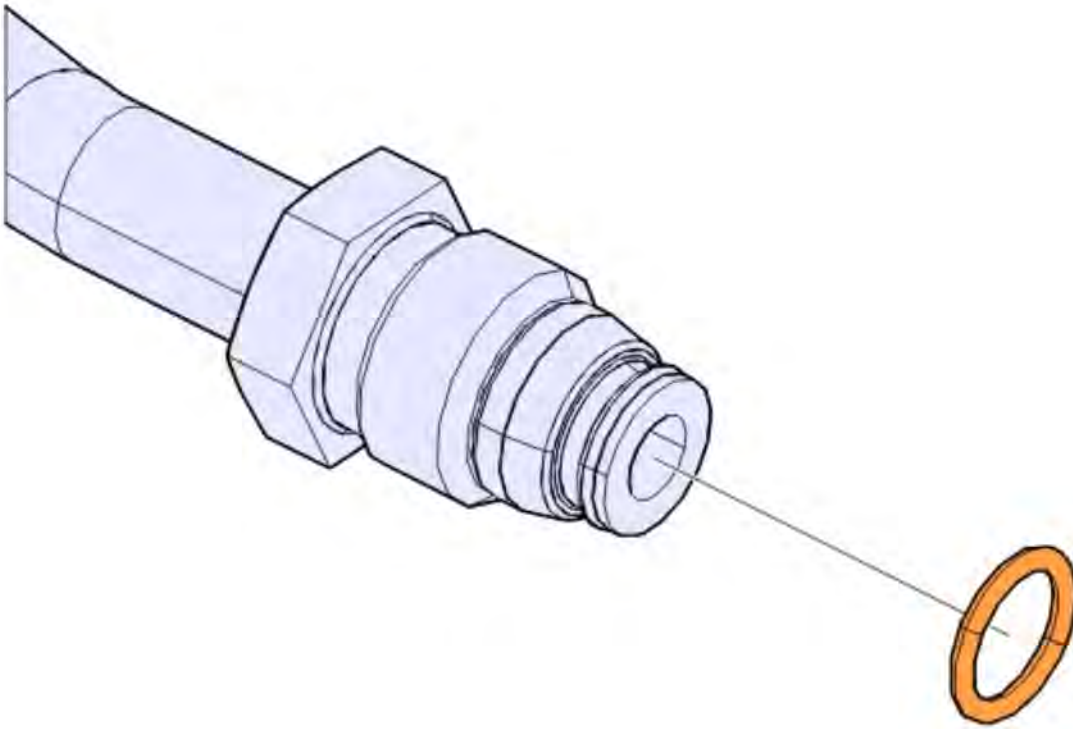
395	Install the hose.
------------	-------------------

396	Tighten the nut.
------------	------------------

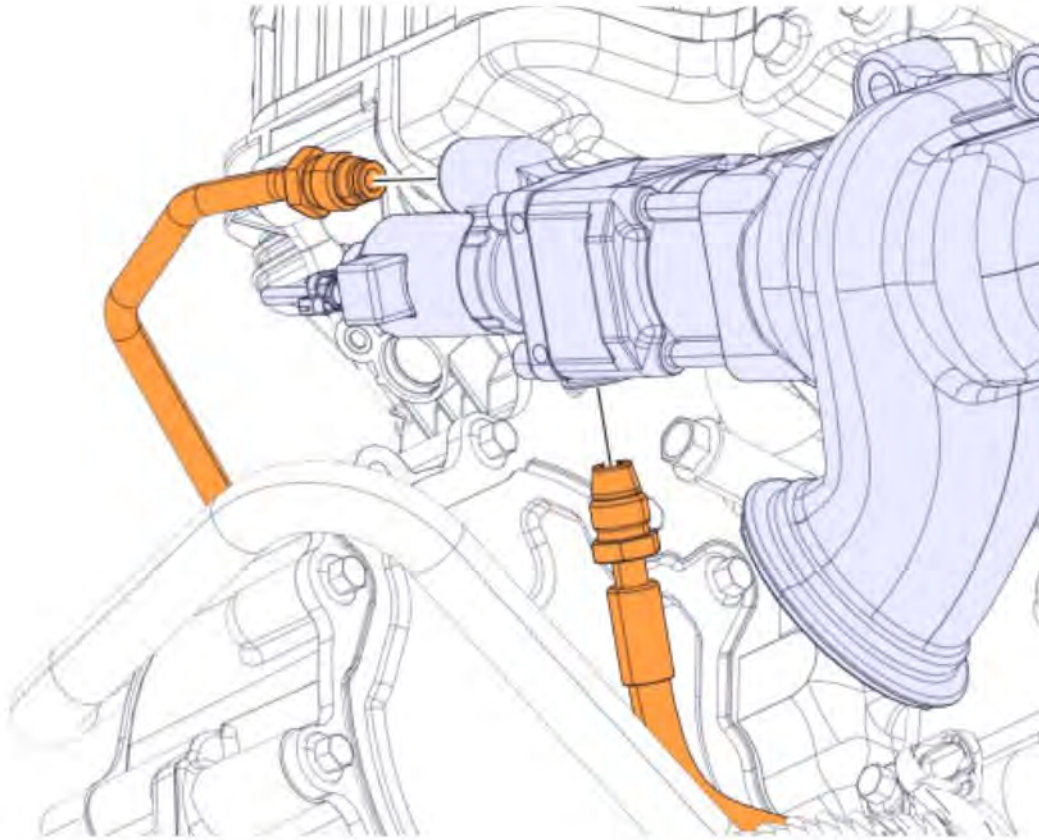


397	Clean the contact surface.
------------	----------------------------

398	Install the seal.
	Note Use a new part.



399	Install the pipes.
-----	--------------------



400 Install the gasket.



Note

Use a new part.

401 Position the valve.

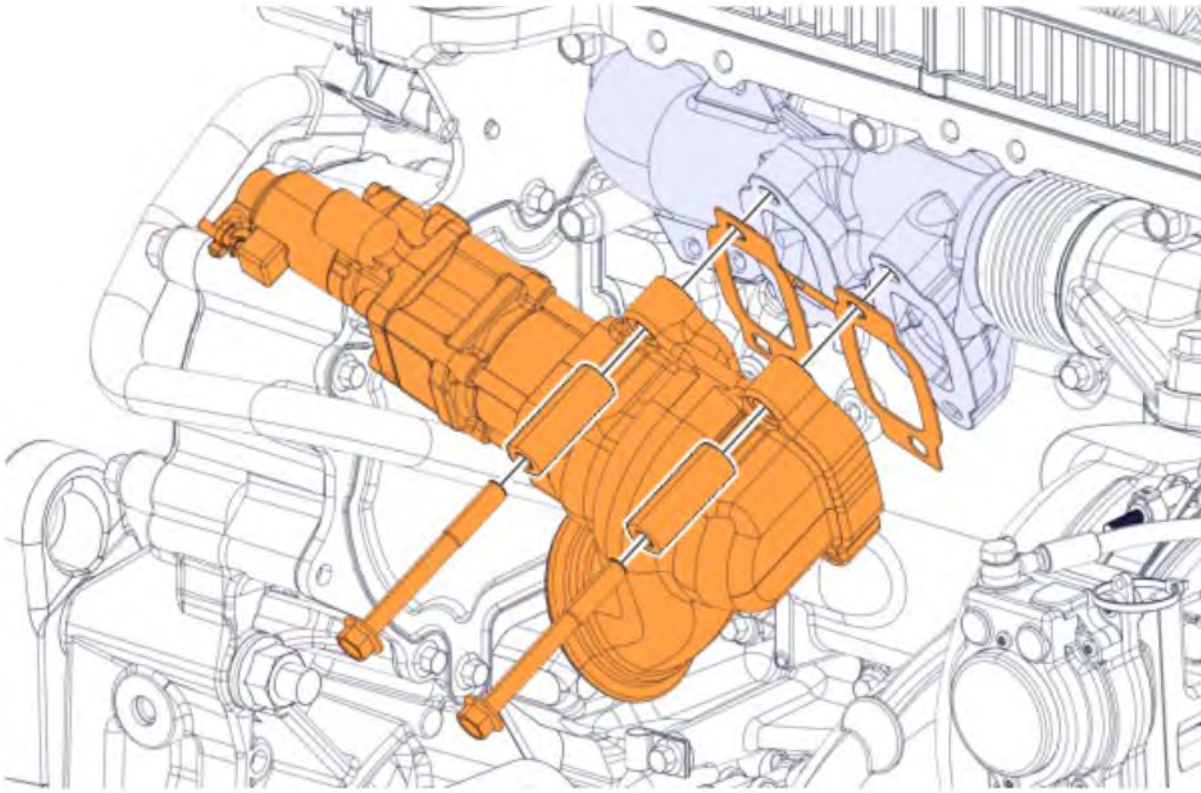
402 Install the spacers.

403 Install the screws.



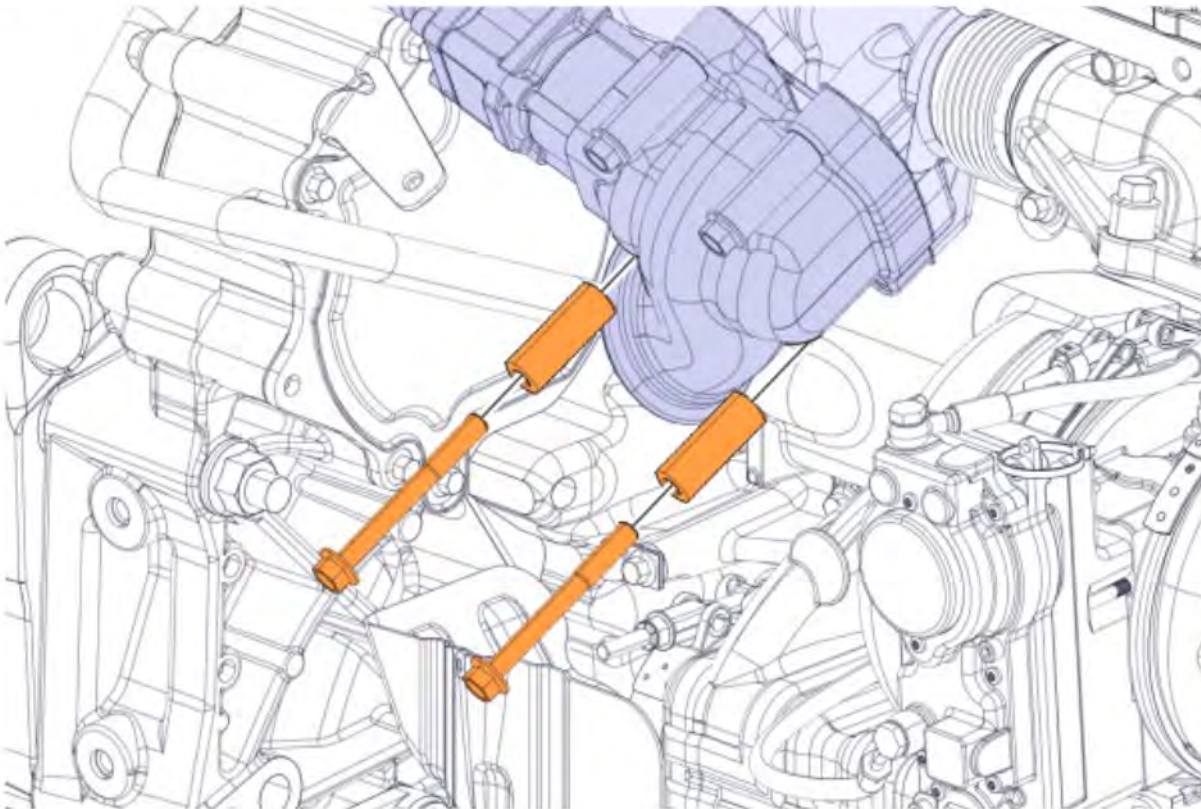
Note

Use the two upper fasteners to hold the gasket in place.



404	Install the spacers.
------------	----------------------

405	Install the screws.
------------	---------------------

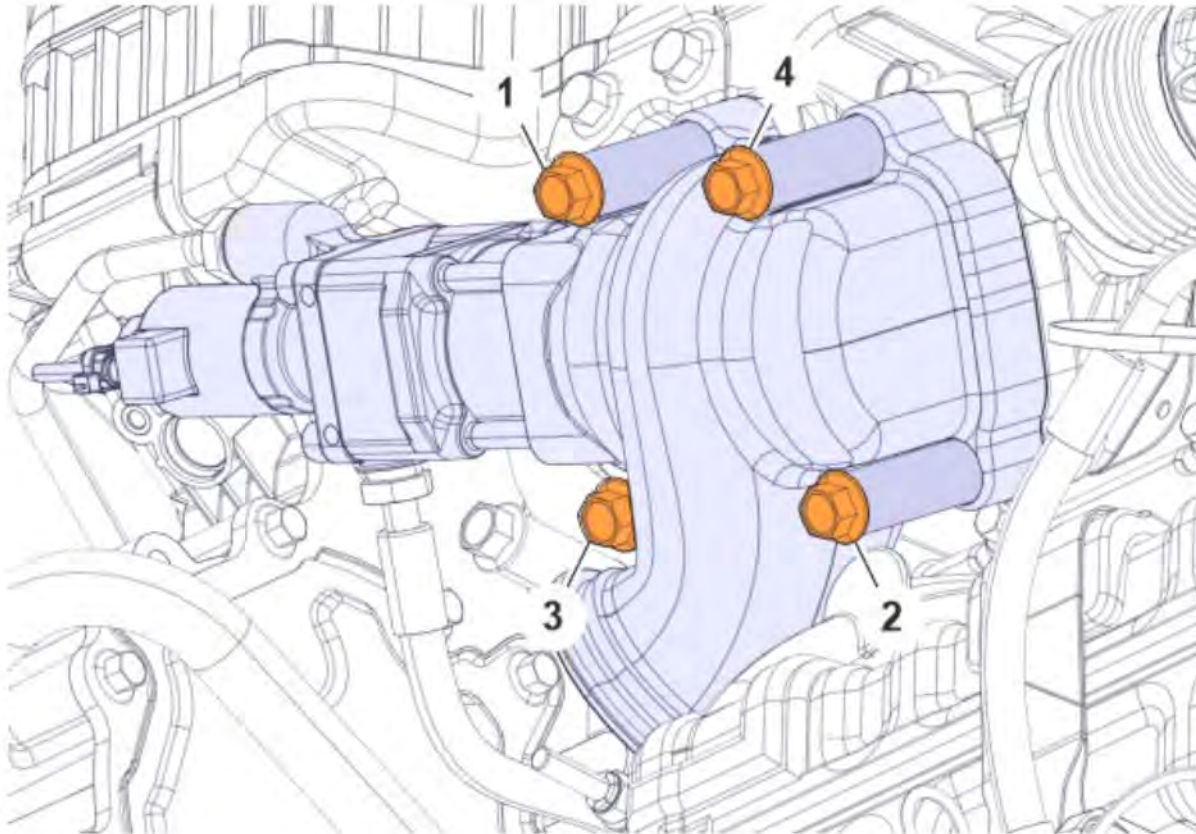


406	Torque tighten the screws.
------------	----------------------------

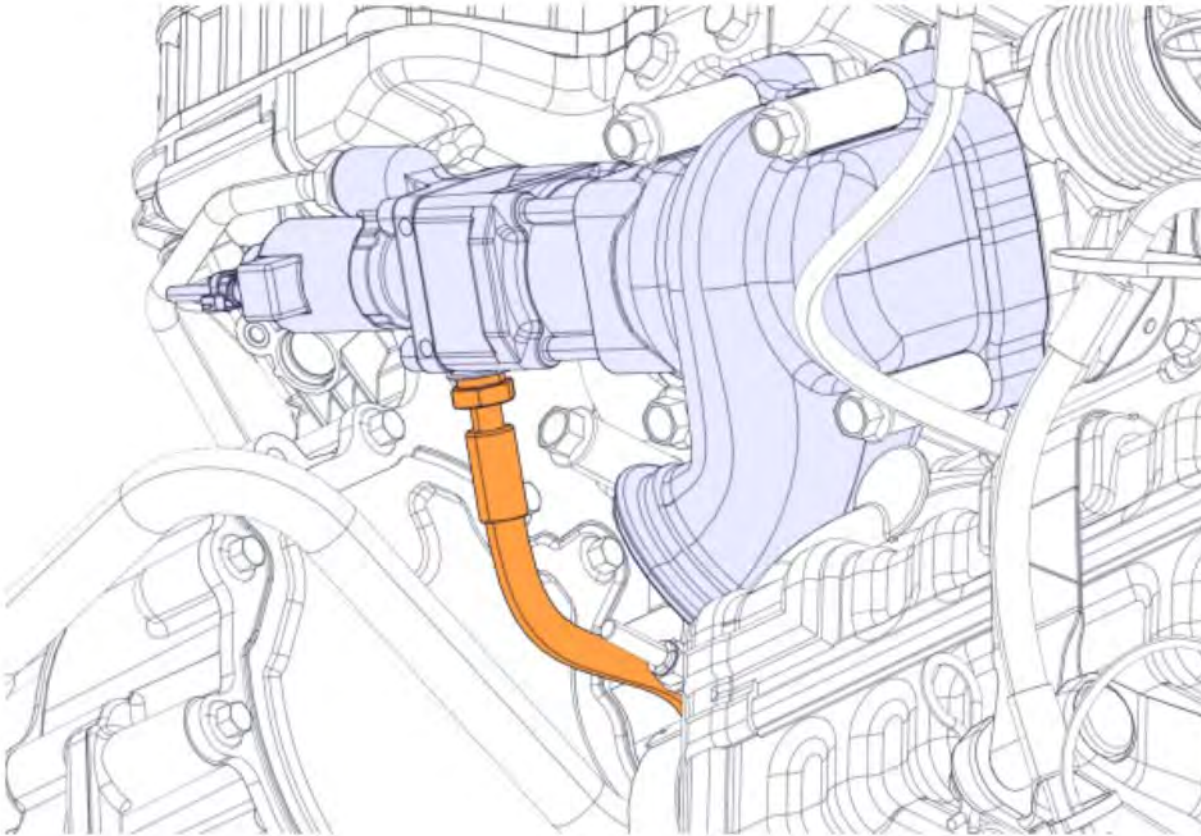
Tightening torque	
--------------------------	--

EGR valve, screw	1.	Tightening sequence: 1-4
------------------	----	--------------------------

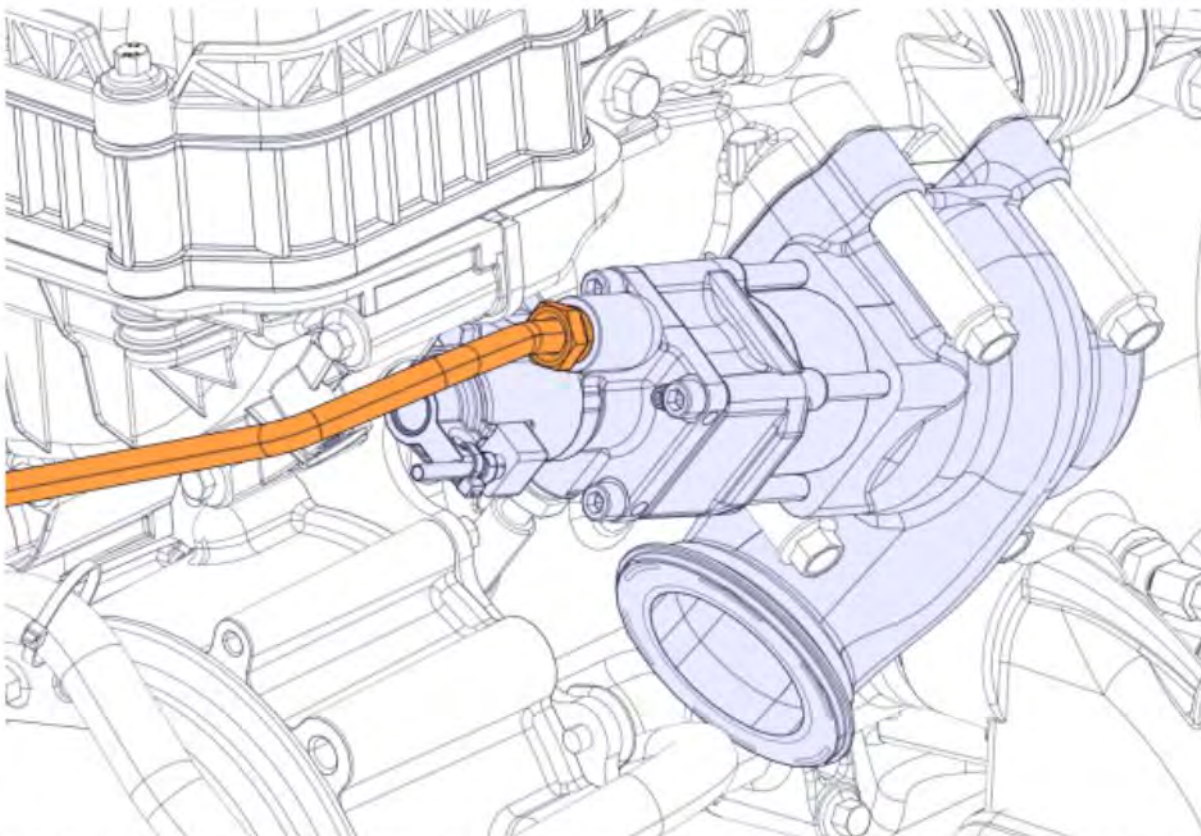
		20 ±4 Nm (15 ±3 lb _f .ft)
	2.	Tightening sequence: 1-4
		52 ±4 Nm (38 ±3 lb _f .ft)



407	Torque tighten the pipe.	
	Tightening torque	
	EGR valve, nipple	25 ±4 Nm (18 ±3 lb _f .ft)



408	Torque tighten the pipe.	
	Tightening torque	
	EGR valve, nipple	25 ±4 Nm (18 ±3 lb _f ·ft)

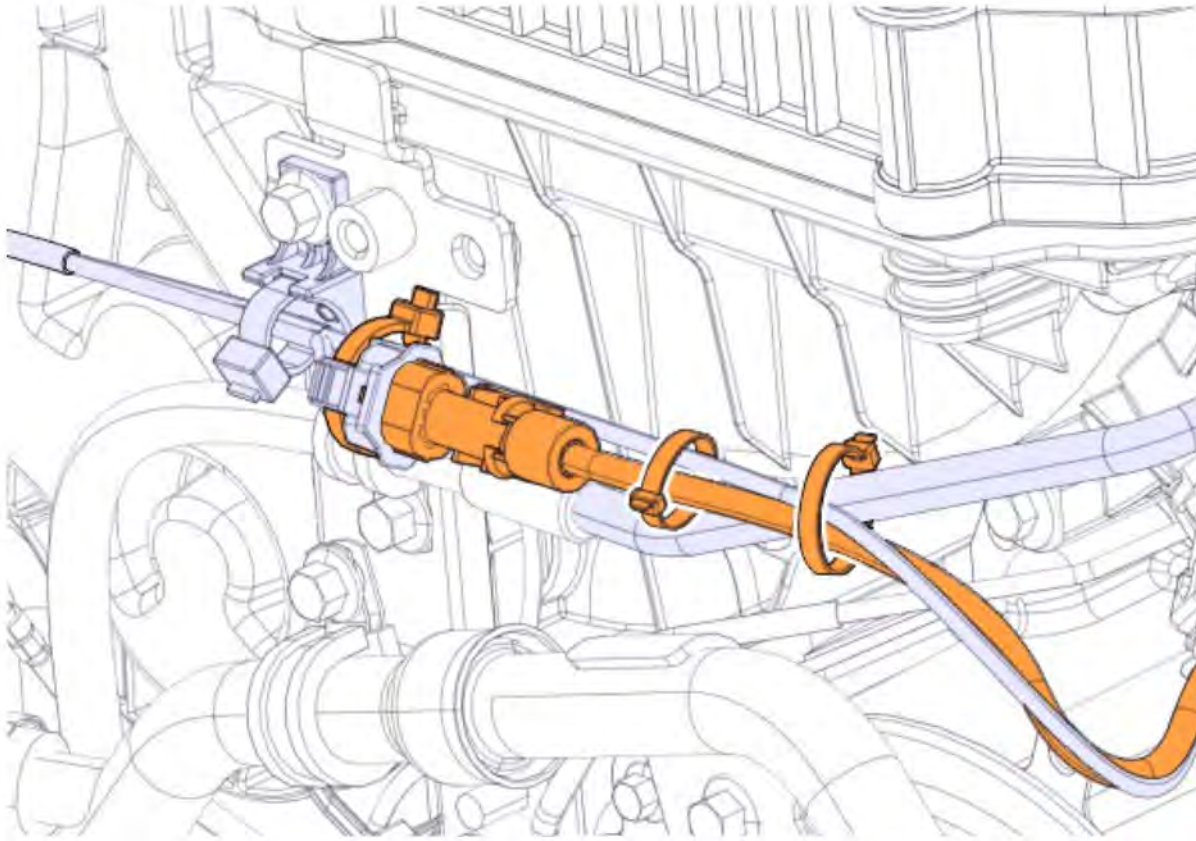


409	Position the cable.
-----	---------------------

410	Connect the connector.
-----	------------------------

411	Install the cable ties.
-----	-------------------------

i	Note Use new parts.
----------	-------------------------------

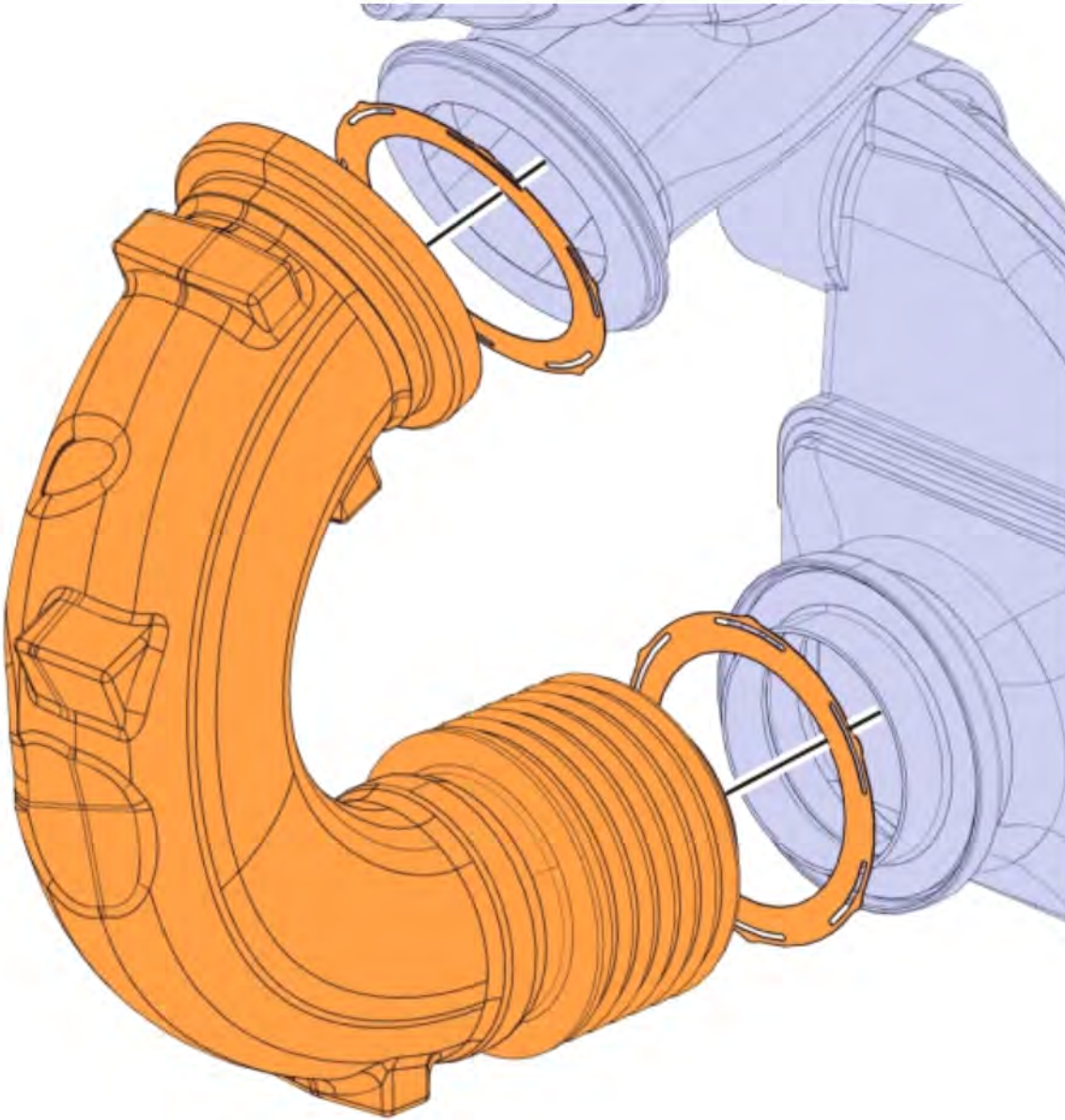


412	Clean the contact surfaces.
-----	-----------------------------

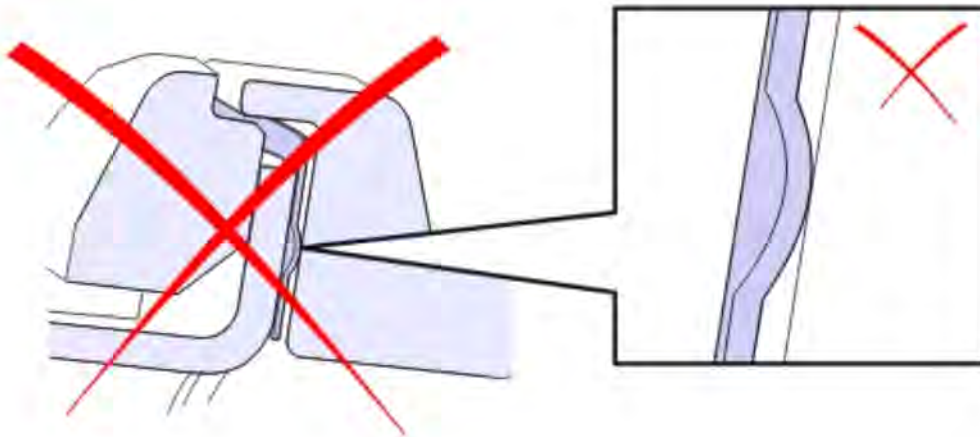
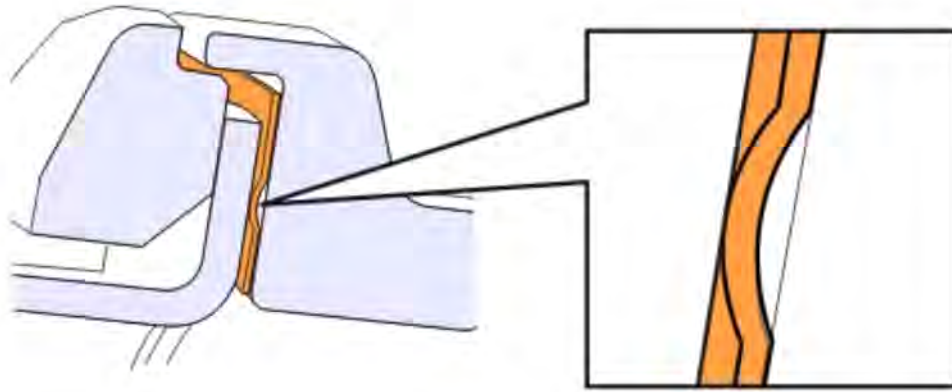
413	Install the gaskets.
-----	----------------------


i	Note Use new parts.
----------	-------------------------------

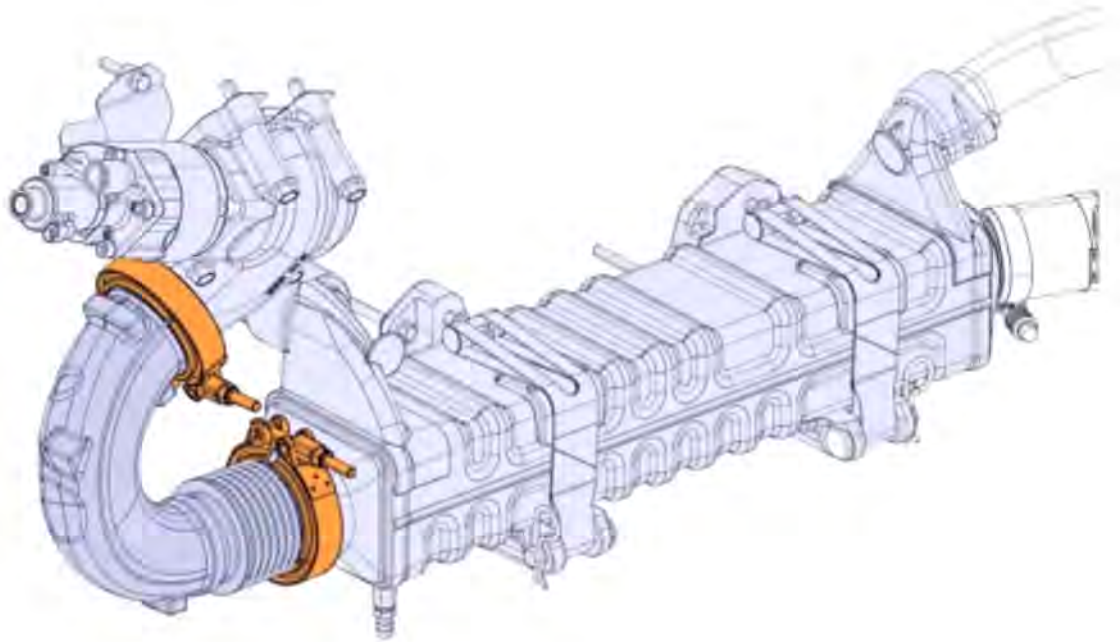
414	Install the pipe.
-----	-------------------



415	Check that the gaskets are positioned correctly.
-----	--



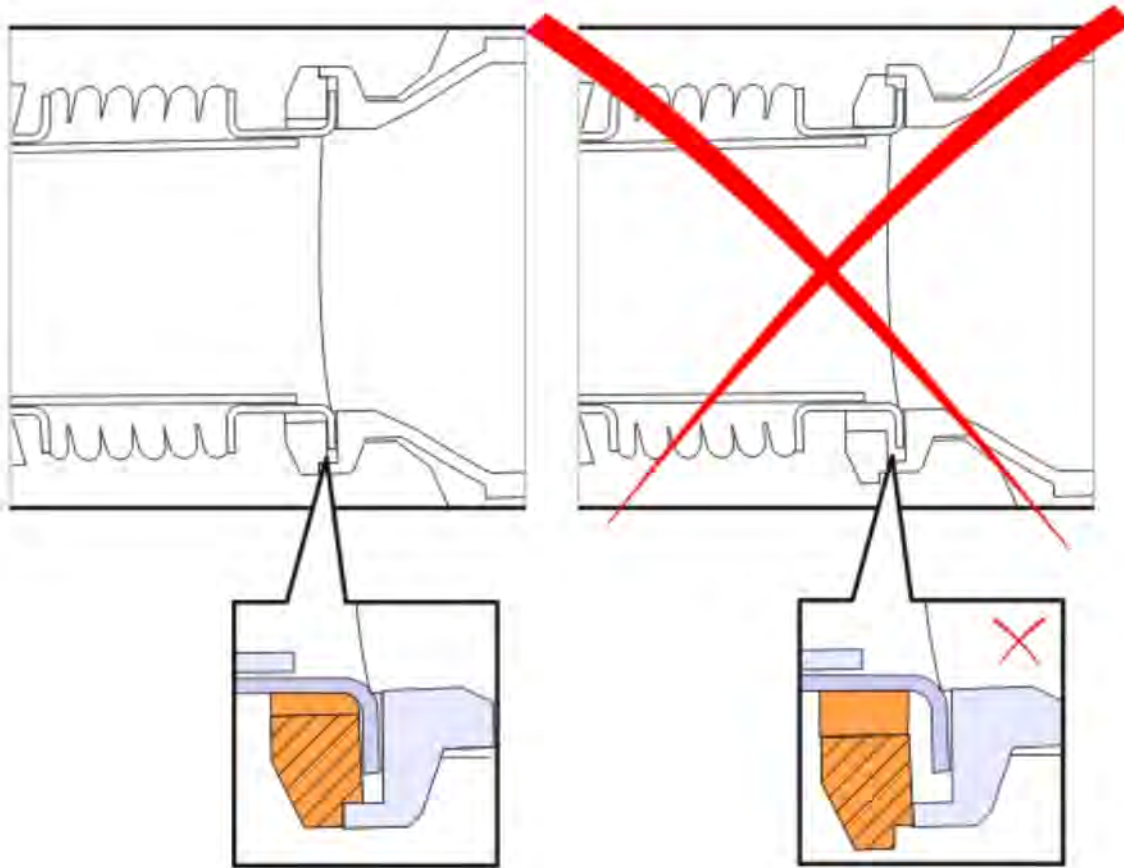
416	Install the V-clamps.
	Note Install as marked.
	Note Use new parts.

**CAUTION****Risk of material damage.**

Incorrect installation of the gasket or collar will cause exhaust leakage. The exhaust leakage could damage components in the surrounding area.

- ▶ Pay close attention to installing the inlet pipe correctly. Ensure that the gasket and collar are positioned correctly.

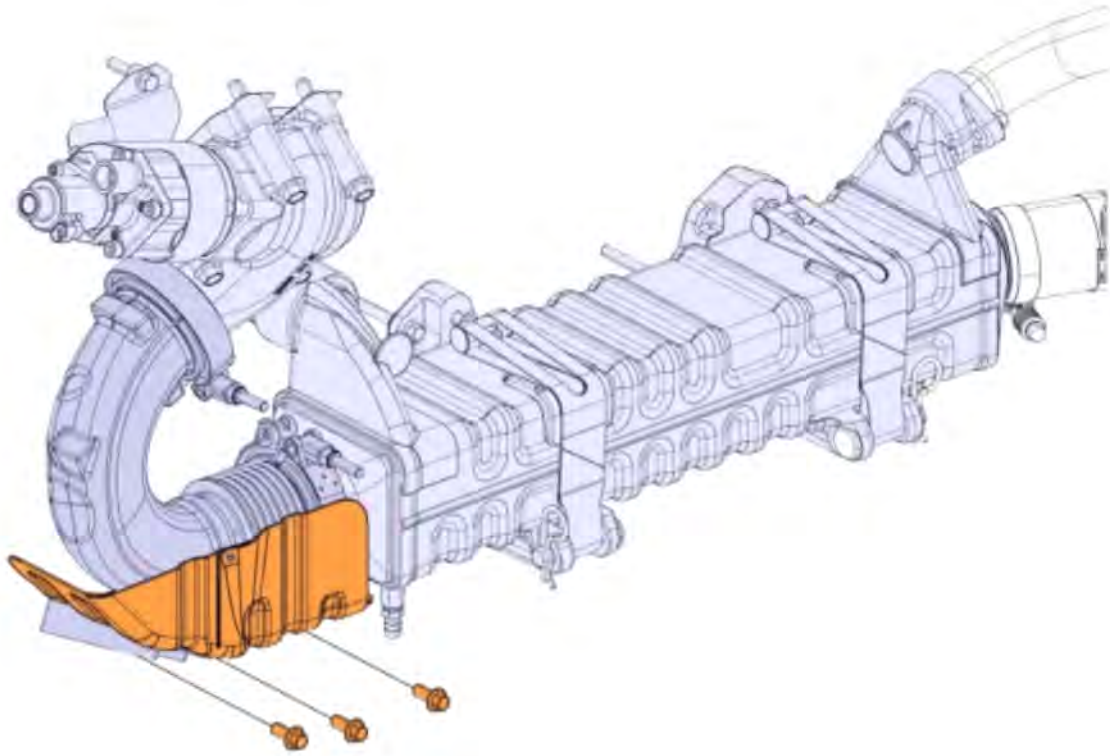
417 Check before tightening that the sliding collar is centered in the cooler flange.






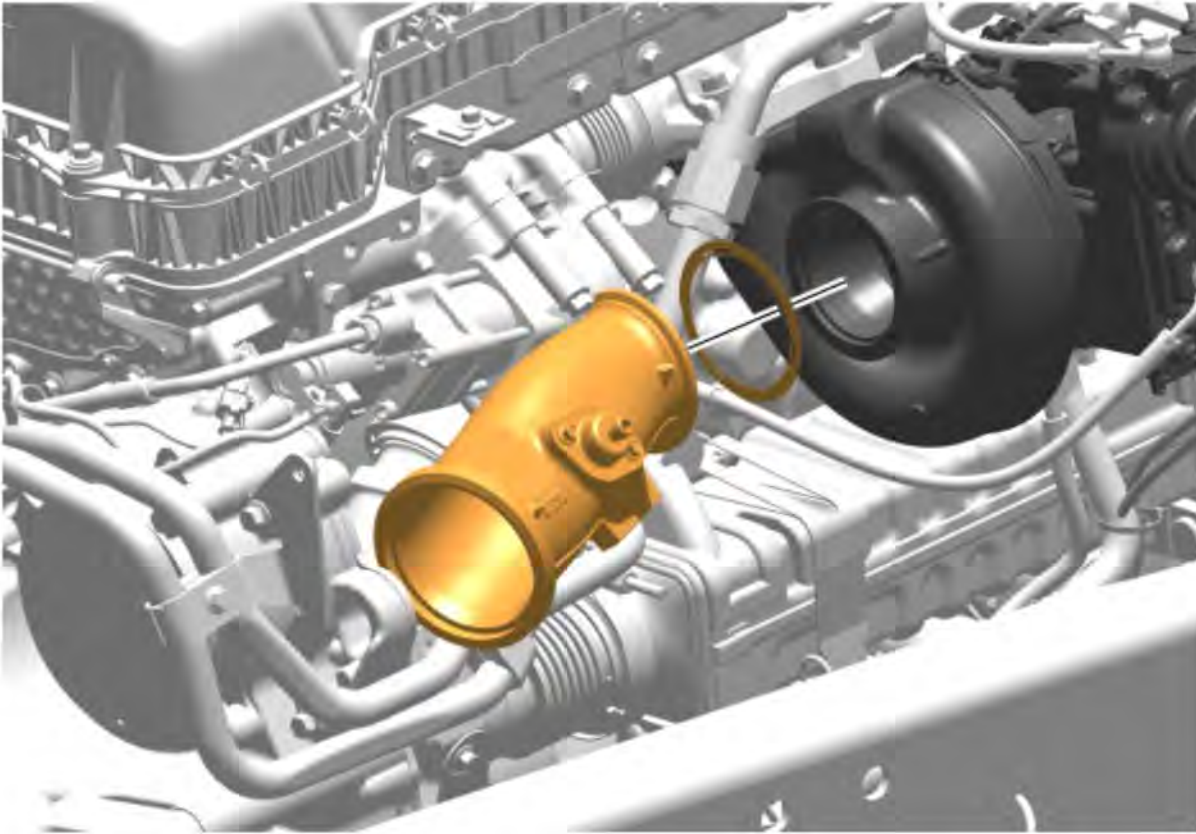
418	Torque tighten the V-clamps.			
	Tightening torque			
	V-clamp, screw	20 ±4 Nm (15 ±3 lb _f -ft)		
	<table border="1"> <tr> <td style="text-align: center;">i</td> <td>Note After tightening, check the position of the V-clamps.</td> </tr> </table>		i	Note After tightening, check the position of the V-clamps.
i	Note After tightening, check the position of the V-clamps.			

419	Install the heat shield.
------------	--------------------------

420	Install the screws.
------------	---------------------



421	Clean the mating surfaces.		
422	Install the gasket. <table border="1" data-bbox="159 1093 427 1196"><tr><td data-bbox="159 1093 236 1160"></td><td data-bbox="236 1093 427 1196">Note Use a new part.</td></tr></table>		Note Use a new part.
	Note Use a new part.		
423	Install the diffuser.		



424 Install the clamp.



Note

Use a new part.



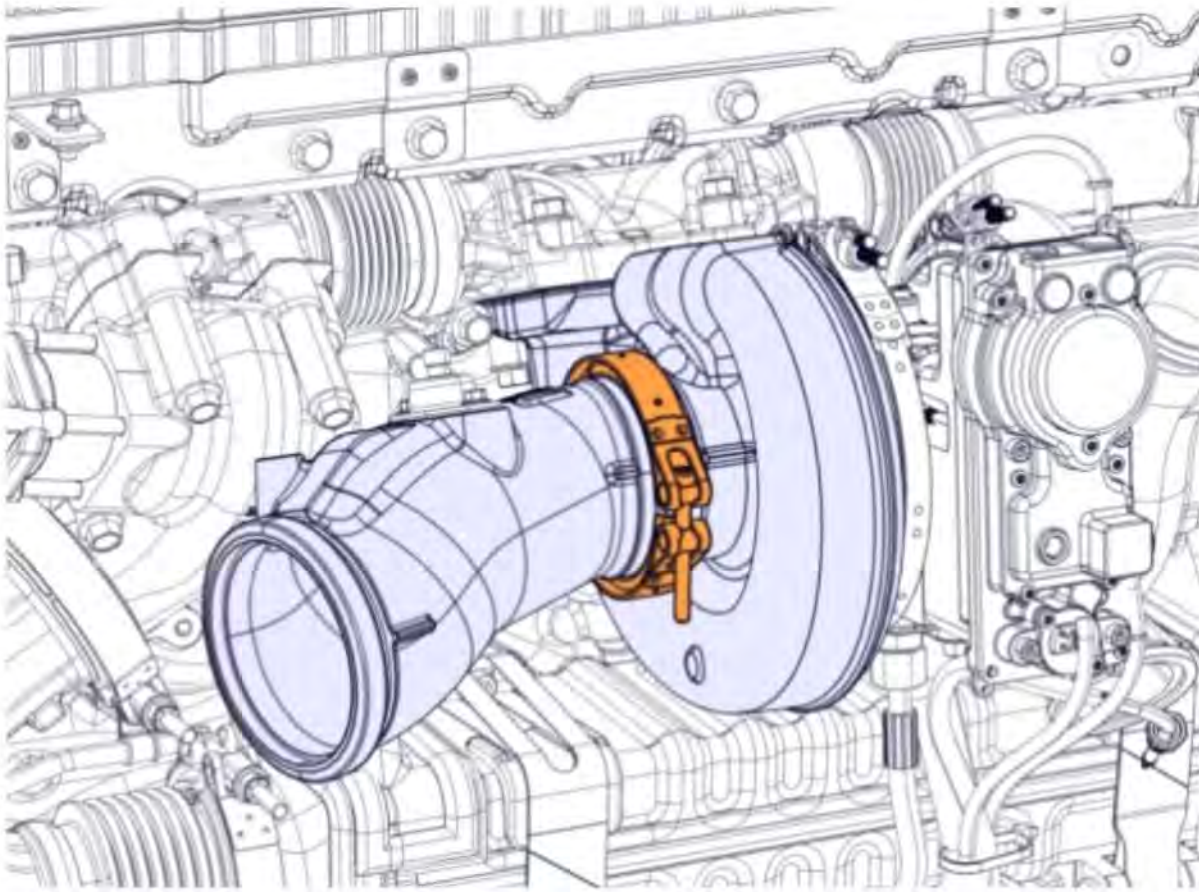
Note

Seat the clamp by tapping it into place between tightening sequences.



Note

Only use a suitable hand tool.



⚠ DANGER

Risk of material damage, serious personal injury or death.

Connections that are not tightened in accordance with specified tightening torques may cause leakage.

- ▶ Tighten connections according to service information.

425	Torque tighten the clamp in sequence.	
	Tightening torque	
	V-clamp, pre-torque	7 Nm (5 lb _f ·ft)

426	Seat the clamp by tapping it into place between tightening sequences.	
	Tightening torque	
	V-clamp, final torque	14 ±2 Nm (10 ±1 lb _f ·ft)

427 This step contains 2 alternatives.
Select one of the valid alternatives below.

Copyright to this documentation belongs to the Volvo Group. No reproduction, copying, change, amendment or other similar disposal is entitled without prior written consent by the Volvo Group

The information contained herein is current at the time of its original distribution, but is subject to change. The reader is advised that printed copies are uncontrolled.

Alternative 1 / 2**Conditions**

- If the pipe is reused
- ▶ Clean the pipe mating surfaces.
- ▶ Install the gaskets.



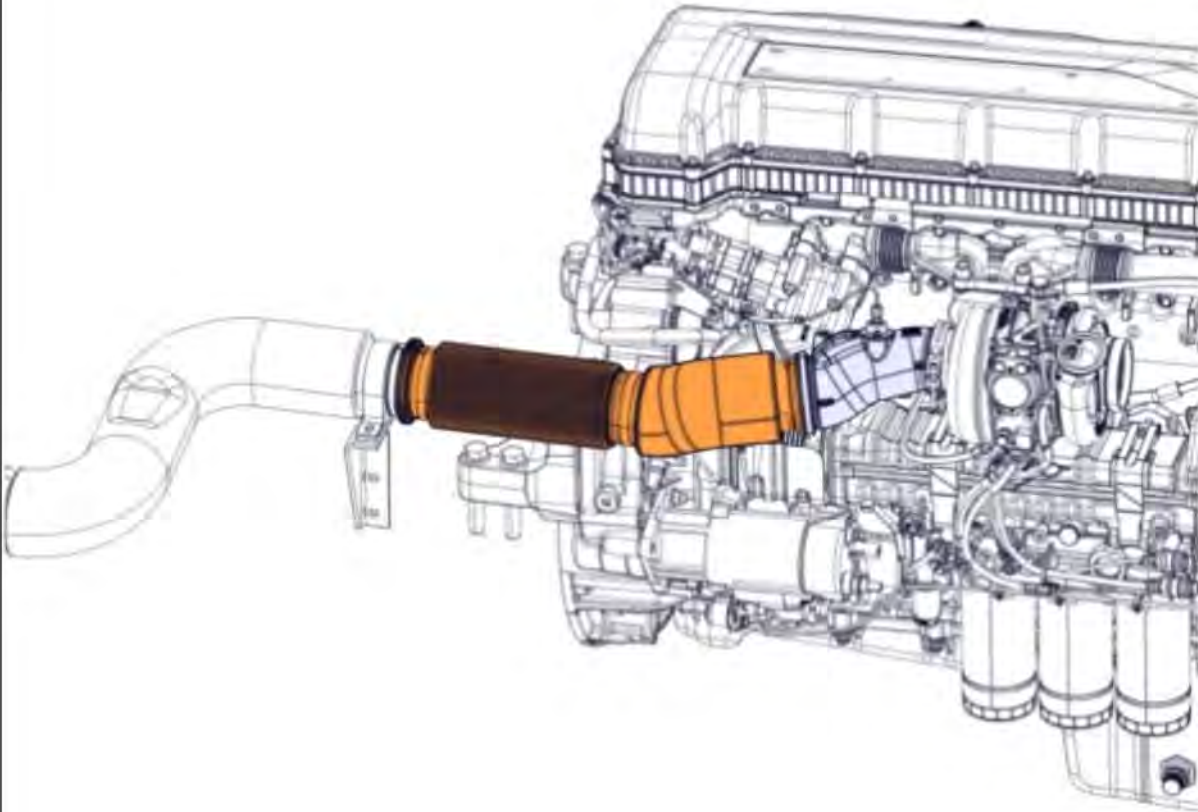
Note
Use new parts.



- ▶ Install the pipe.



Note
As noted.



▶ Install the clamps.



Note
Use new parts.



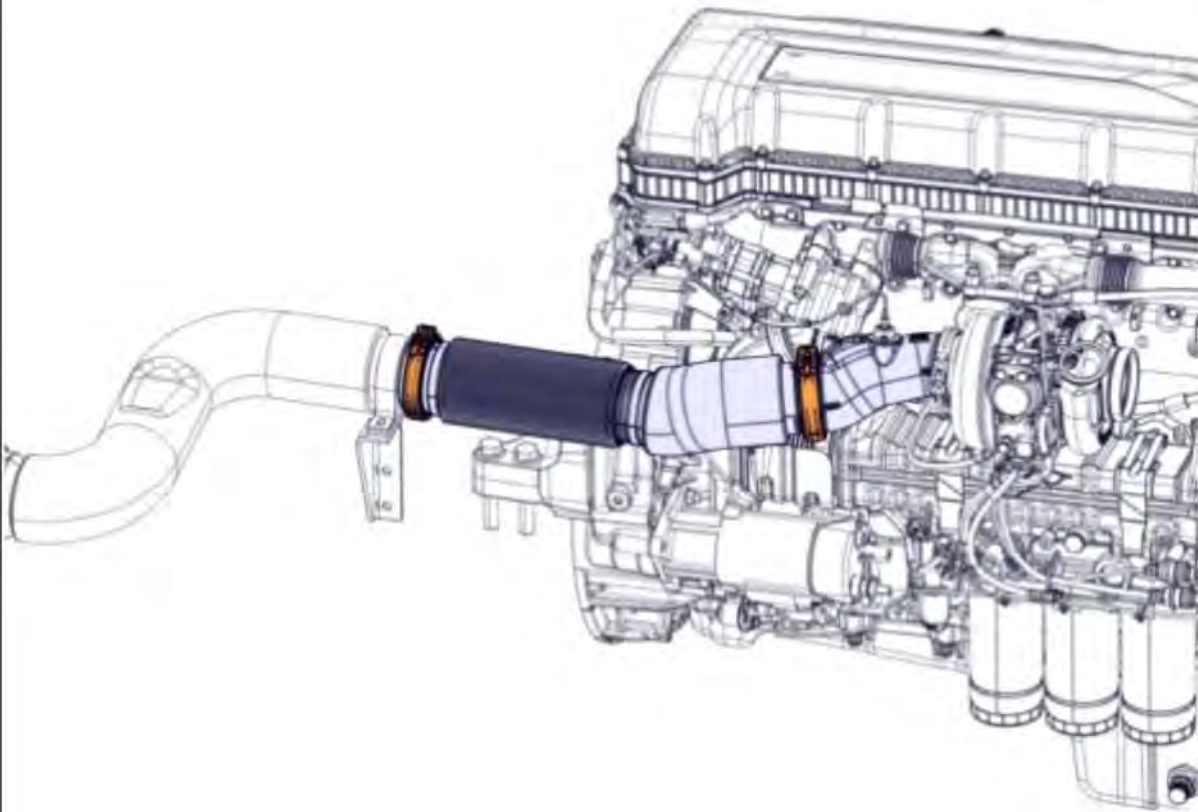
Note
As noted.

▶ Torque tighten the clamps.

Tightening torque

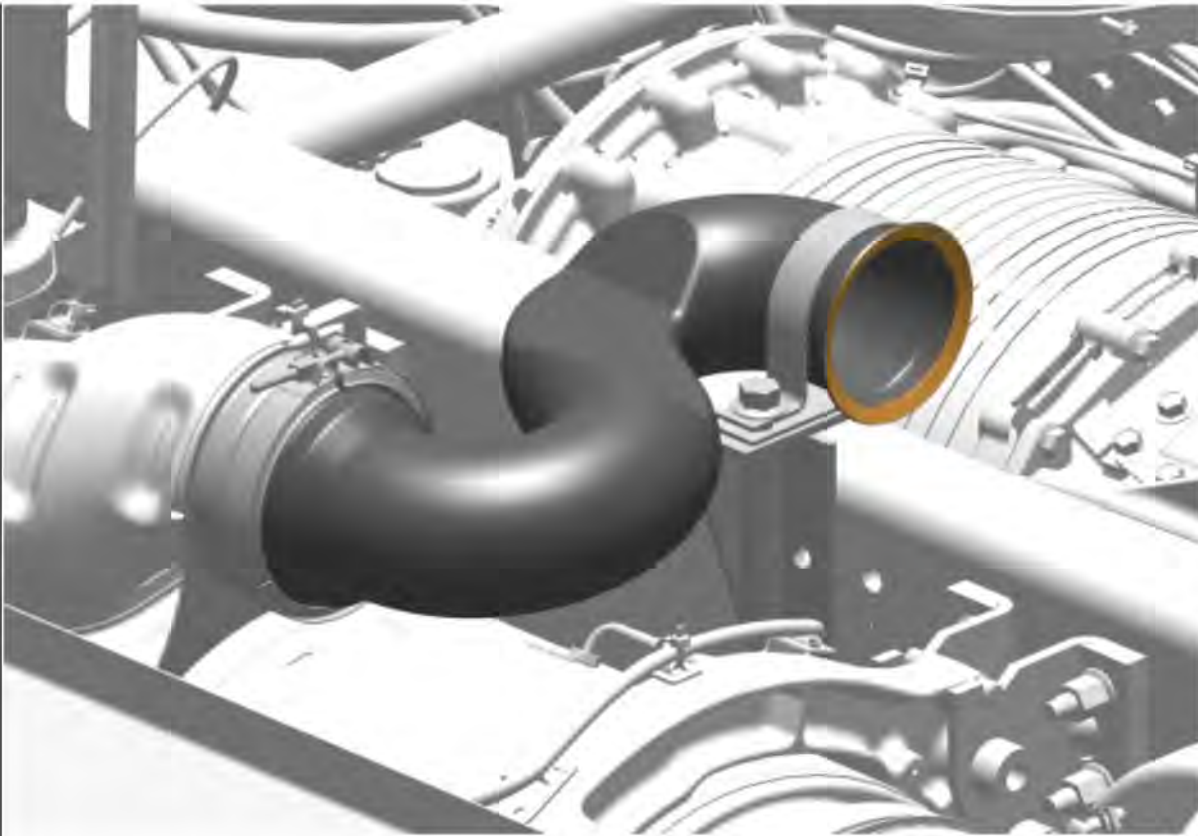
Pipe, clamp

5.6 Nm
(4 lb_f·ft)

**Alternative 2 / 2****Conditions**

- If the pipe is replaced

- ▶ Clean the surface.



- ▶ Check the length (A) of the flexible hose.

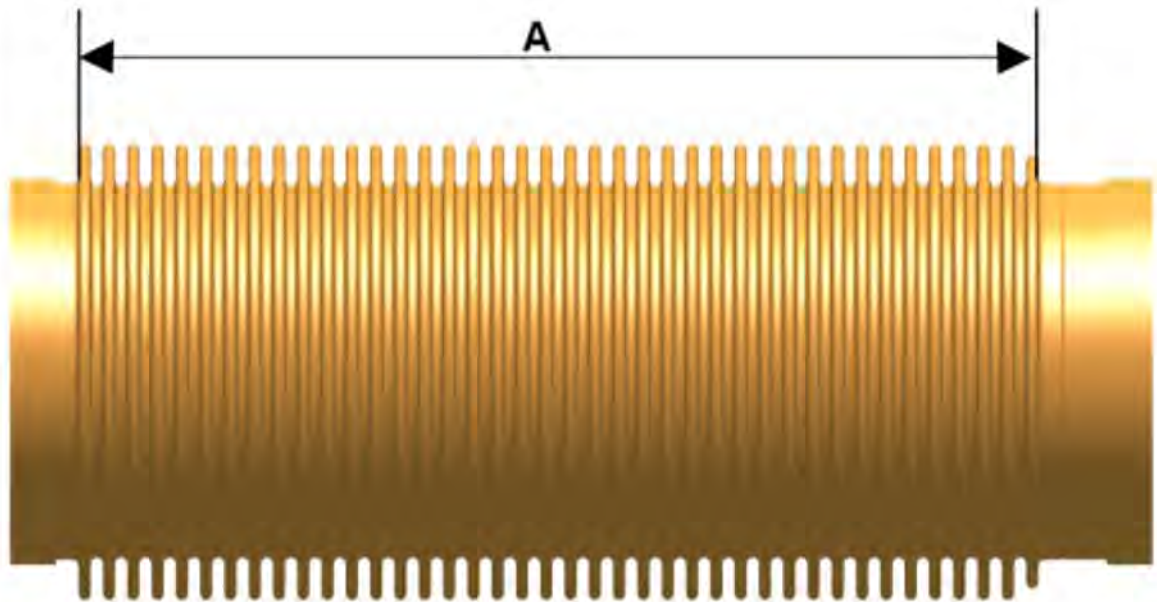
Tech data

Flexible hose, length (A)	267 ±10 mm (10.51 ±0.39 in)
---------------------------	--------------------------------



Note

Ensure that the length is according to the specification.



► Position the exhaust pipe.



Note

Use a new gasket.



Note

The markings indicate the flow direction.



Note

The exhaust pipe should be fixed as straight as possible.



Note

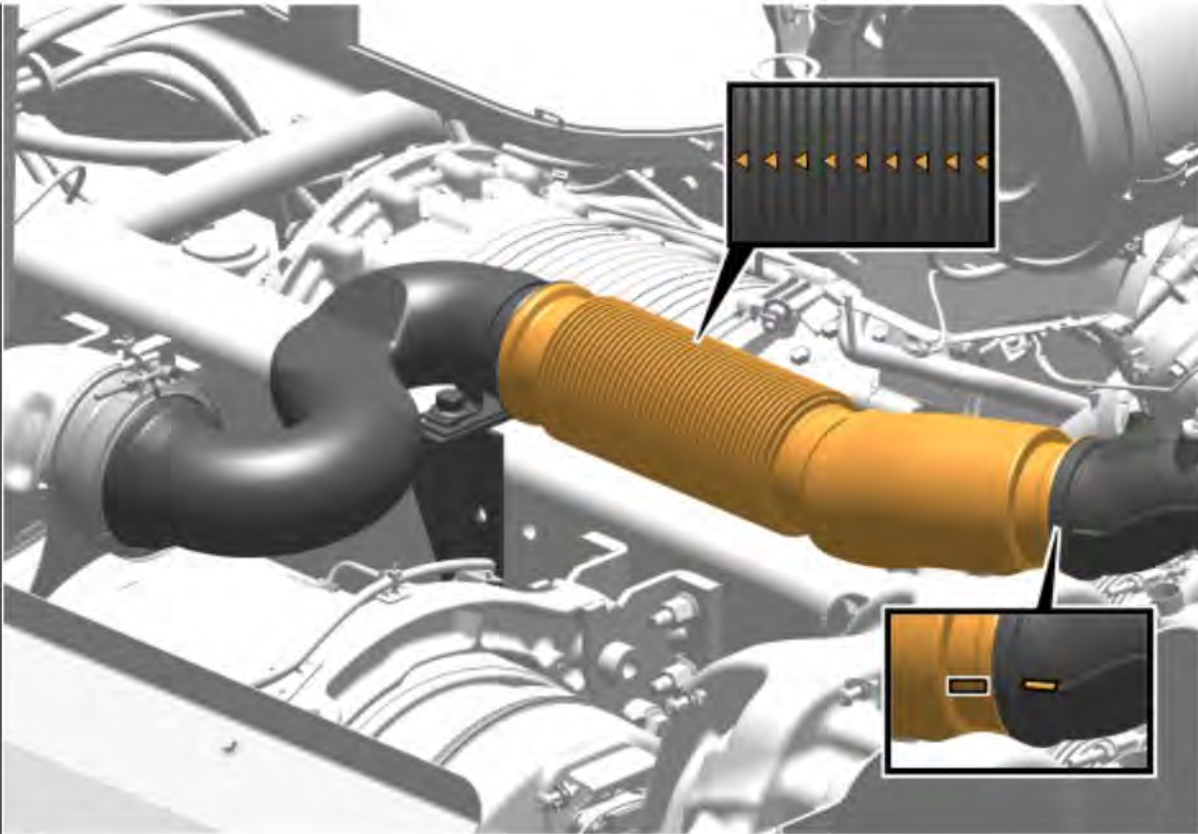
Ensure that flexible hose is not twisted or bent more than the specification.



Service hint

Ensure that 11 L engines are aligned with Red line.

Ensure that 13 L engines are aligned with Black line.

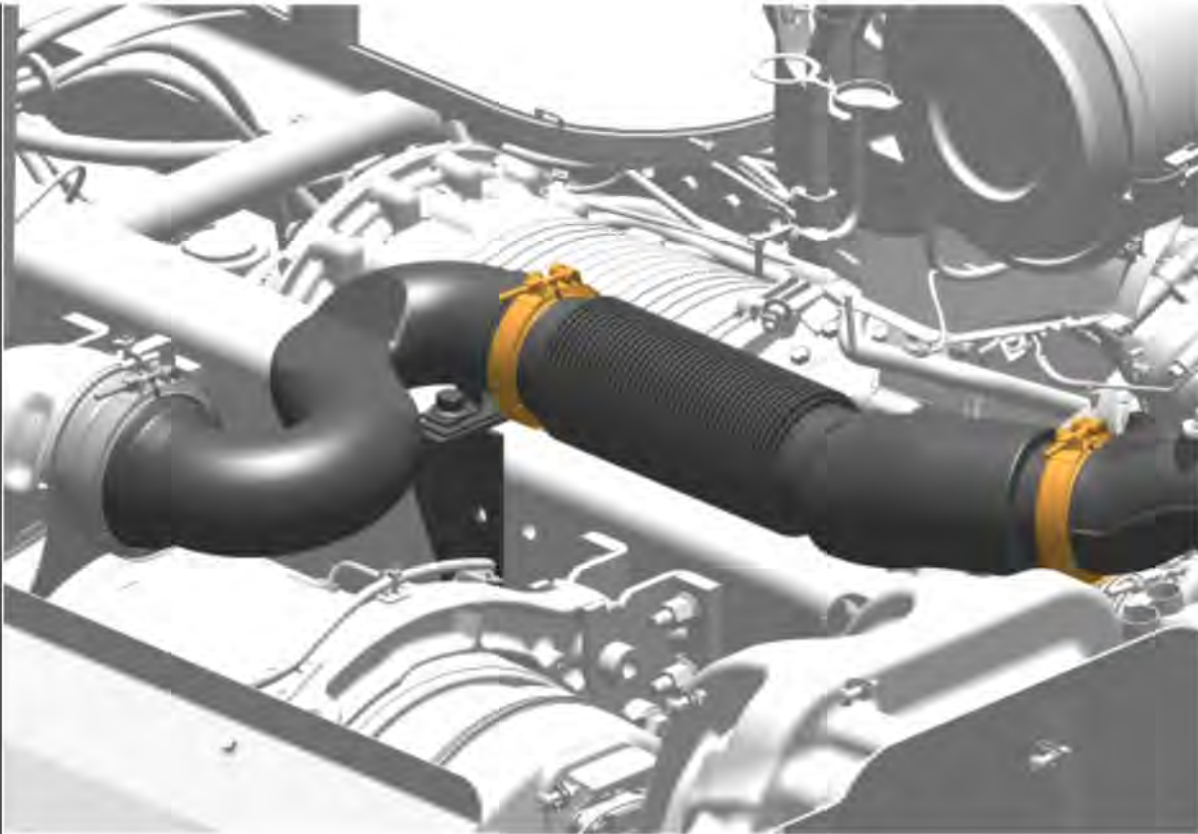


▶ Install the V-clamps.

i **Note**
Use new parts.

i **Note**
As noted.

i **Note**
Do not torque tighten the V-clamps.



- ▶ Check the alignment of the flexible hose.

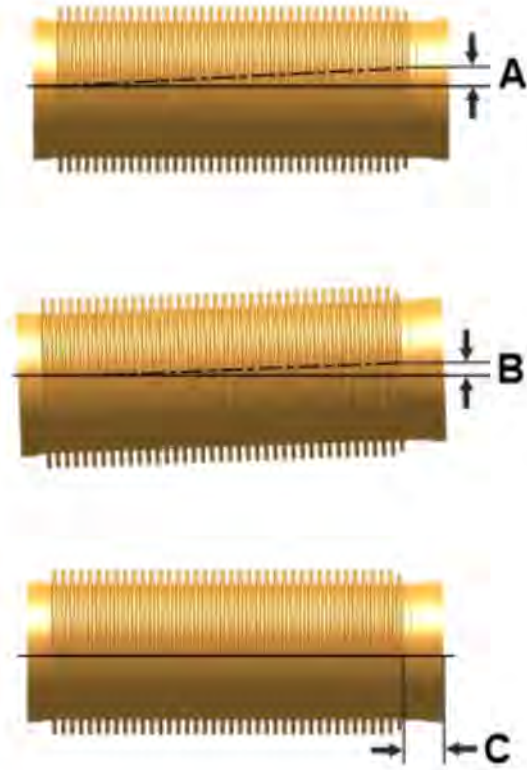
Tech data

Flexible hose, torsion displacement (A)	±2 mm (±0.08 in)
Flexible hose, parallel displacement (B)	±5 mm (±0.2 in)
Flexible hose, axial displacement (C)	±6.5 mm (±0.256 in)



Note

Ensure that the flexible hose is aligned according to specifications.



► Perform this procedure when the condition below is met.

Conditions

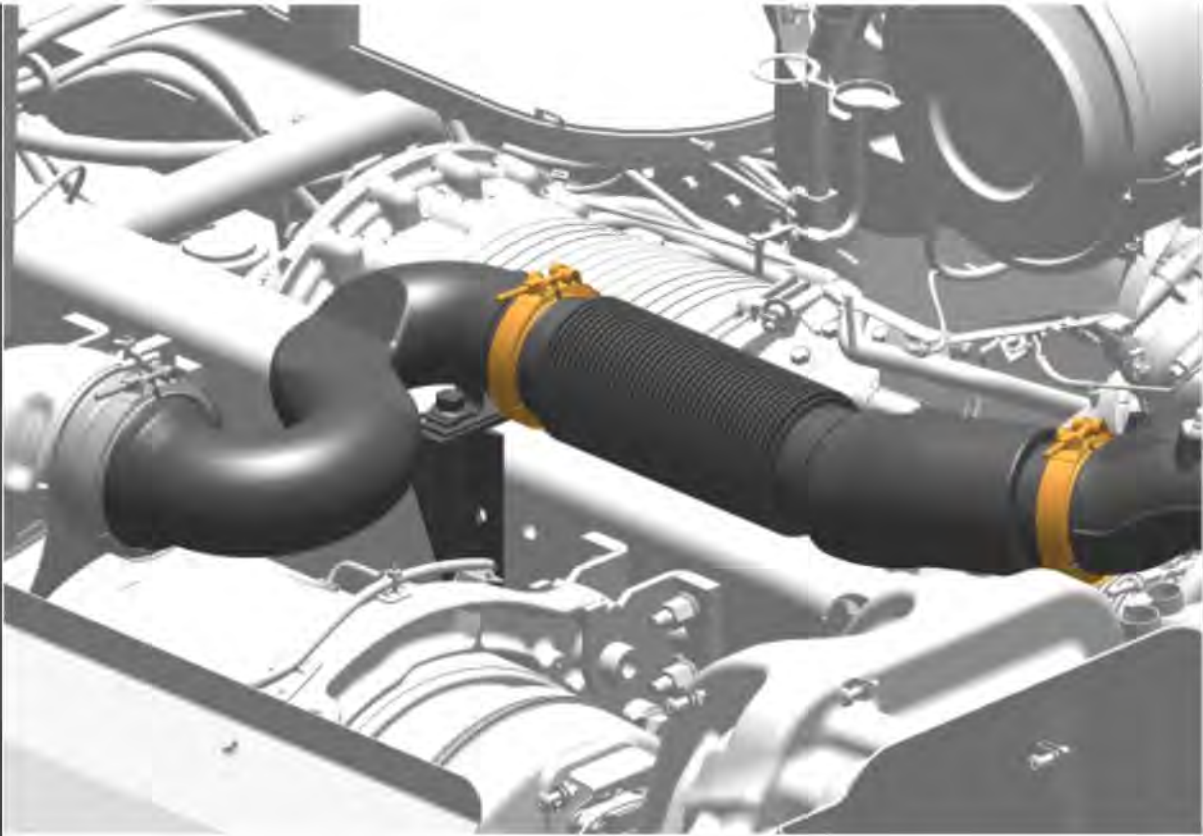
- If the flexible hose length and alignment is not according to the specification

► Loosen the exhaust pipe at the turbocharger end and align as per specifications.

► Torque tighten the V-clamps.

Tightening torque

Pipe, clamp	5.6 Nm (4 lb _f ·ft)
-------------	-----------------------------------



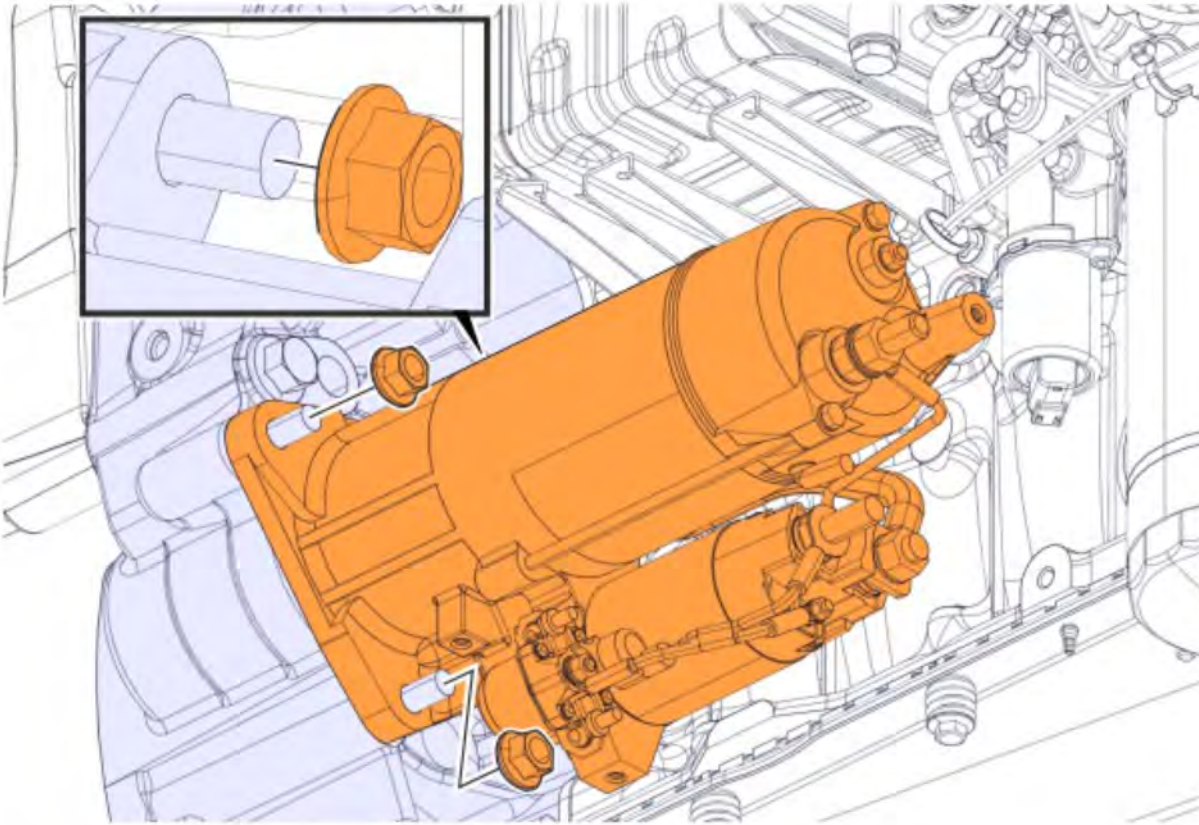
428 Install the starter motor.

429 Install the nuts.

430 Tighten the nuts to torque.

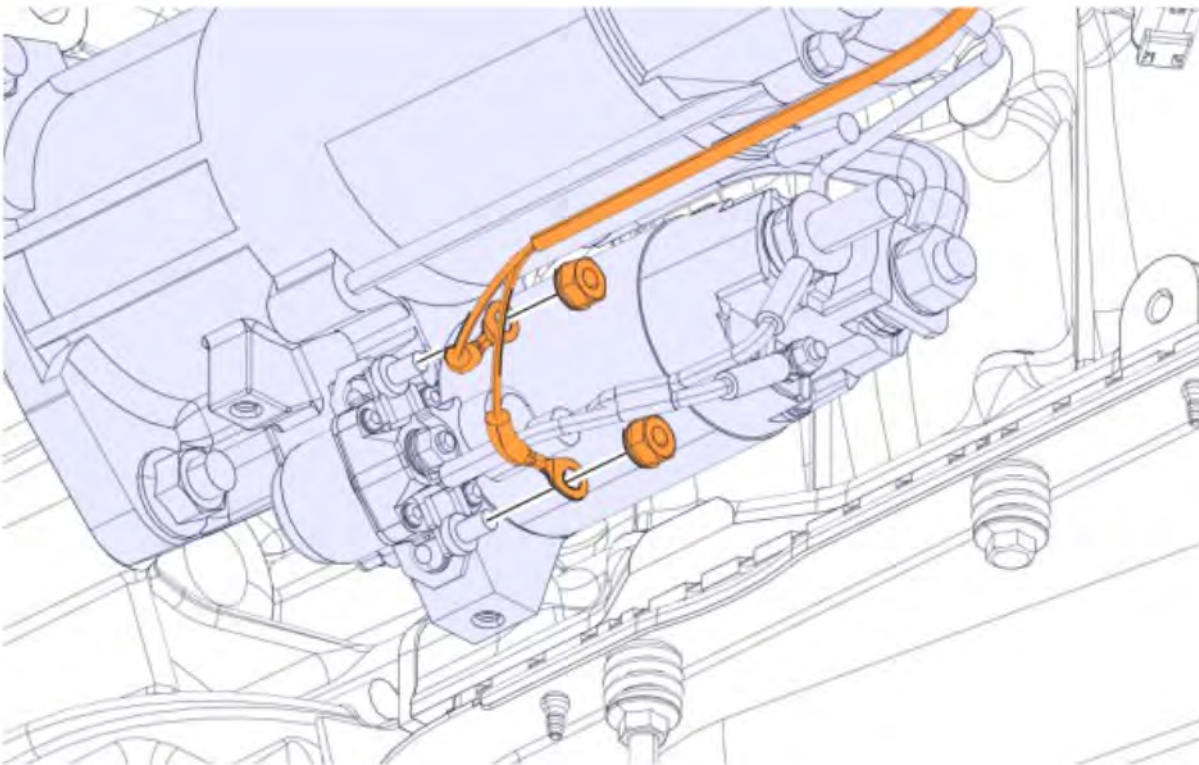
Tightening torque

Starter motor, nut	48 ±8 Nm (35 ±6 lb _f .ft)
--------------------	---



431	Install the cable terminals.
------------	------------------------------

432	Install the nuts.
------------	-------------------



433	Install the cable terminal.
------------	-----------------------------

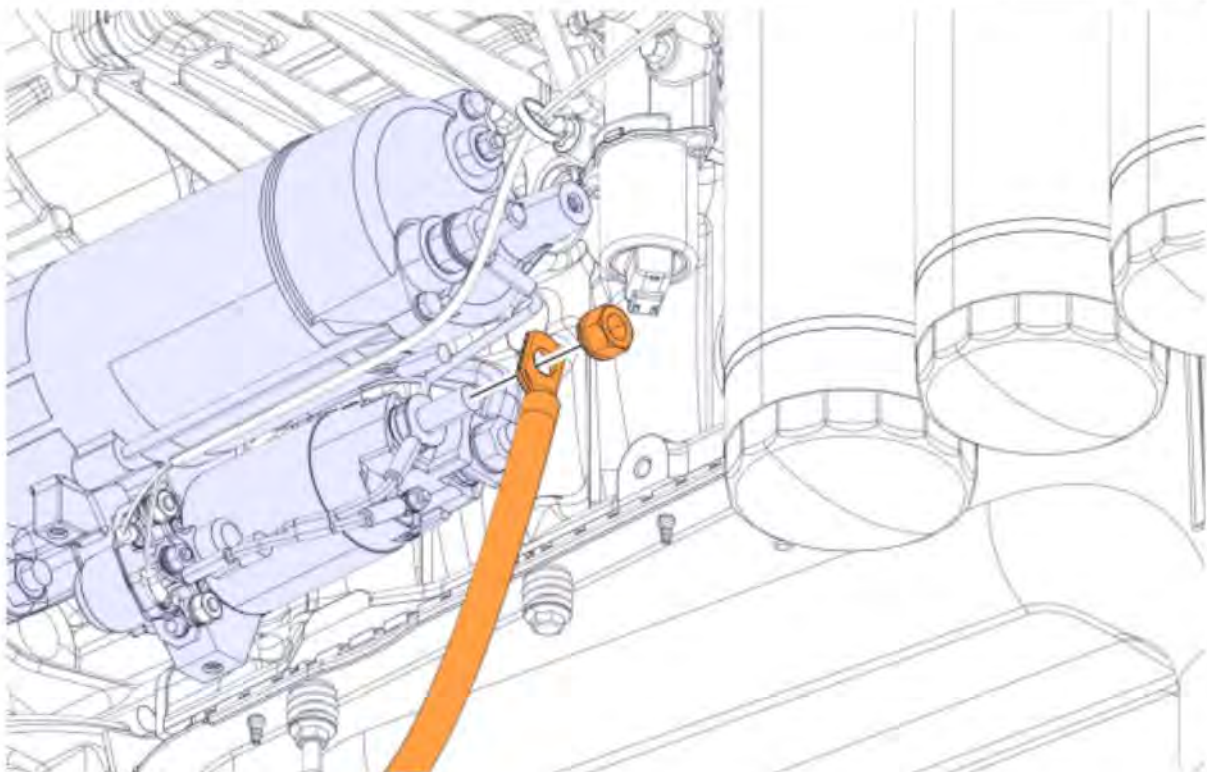
434	Install the nut.
------------	------------------

435	Torque tighten the nut.
------------	-------------------------

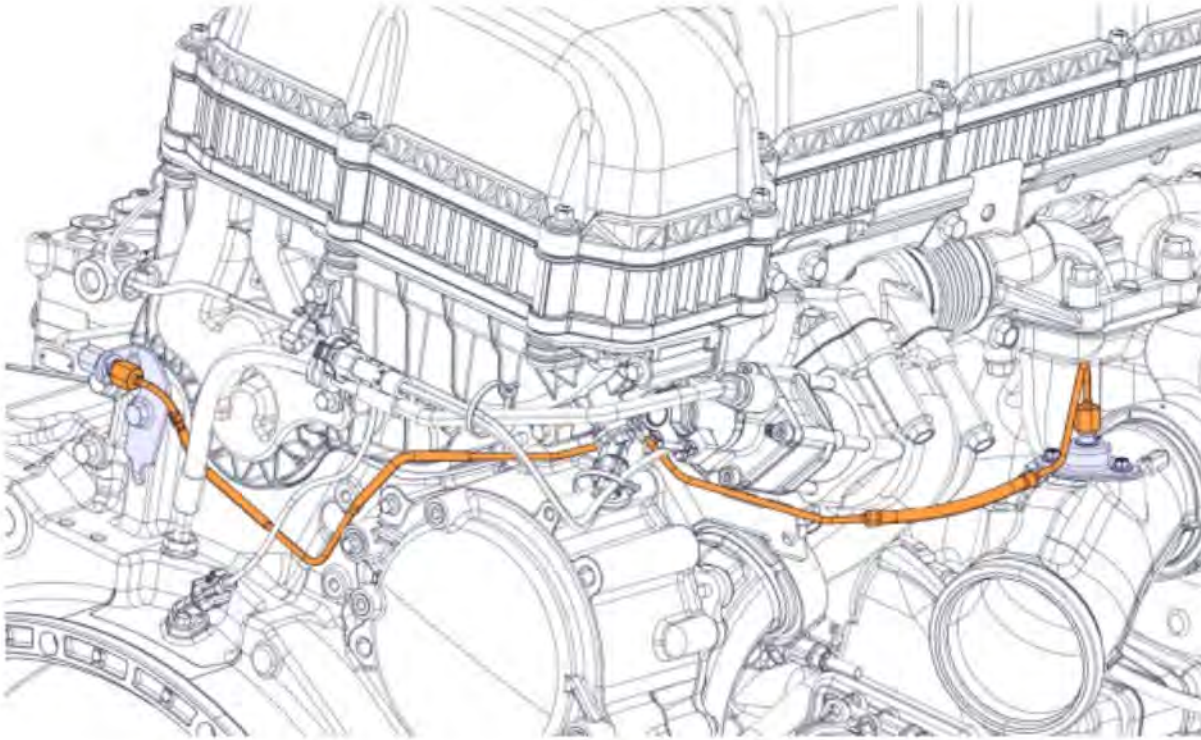
Copyright to this documentation belongs to the Volvo Group. No reproduction, copying, change, amendment or other similar disposal is entitled without prior written consent by the Volvo Group

The information contained herein is current at the time of its original distribution, but is subject to change. The reader is advised that printed copies are uncontrolled.

Tightening torque	
Starter solenoid, terminal, nut	M10
	18 ±3.6 Nm (13 ±3 lb _f .ft)
Tightening torque	
Starter solenoid, terminal, nut	M12
	25 ±5 Nm (18 ±4 lb _f .ft)

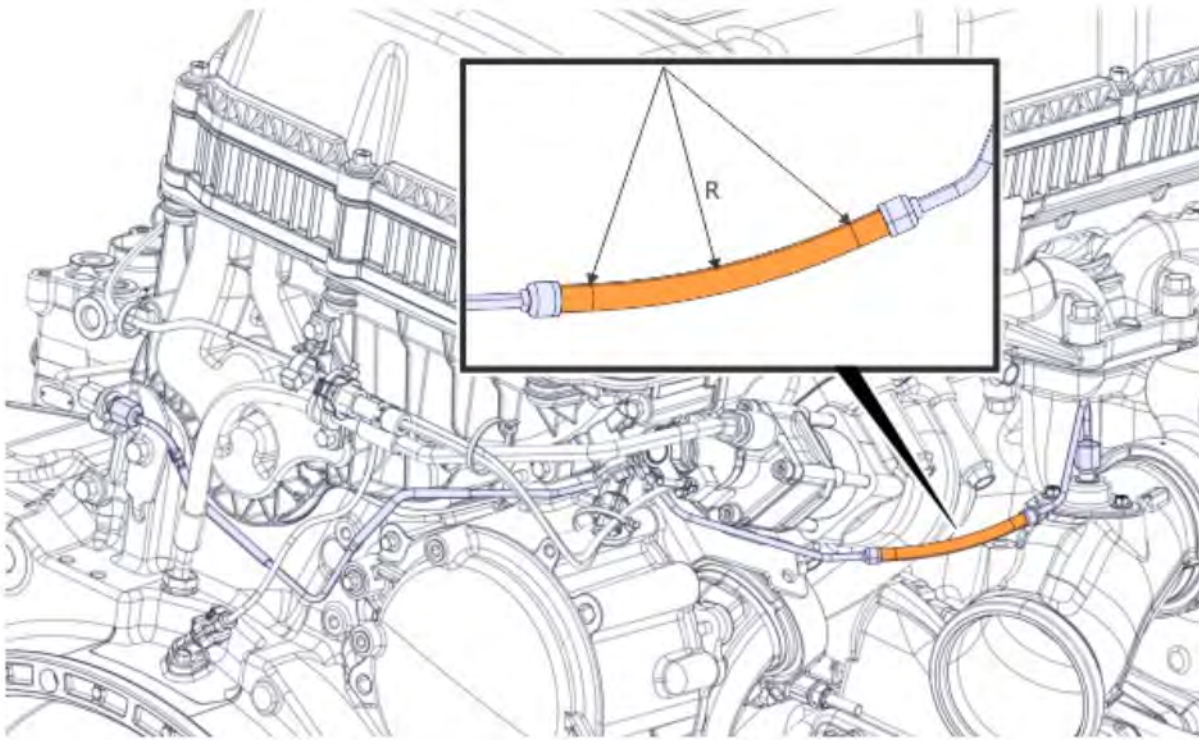


436	<p>Position the pipe.</p> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p>i Note The pipe can be reused only a limited number of times.</p> </div> <div style="border: 1px solid black; padding: 5px;"> <p>i Note If there are no clips, replace the pipe.</p> </div>
------------	--



437	Perform this procedure when the condition below is met.
	Conditions
	<ul style="list-style-type: none"> • If the pipe is reused, remove a clip.
	<ul style="list-style-type: none"> ▶ If there are no clips, replace the pipe.
	<ul style="list-style-type: none"> ▶ When installing new pipe, do not remove any clips.
	<div style="border: 1px solid black; padding: 5px;"> <p>i Note If the pipe has been disconnected on either end for service, this counts as reuse.</p> </div>

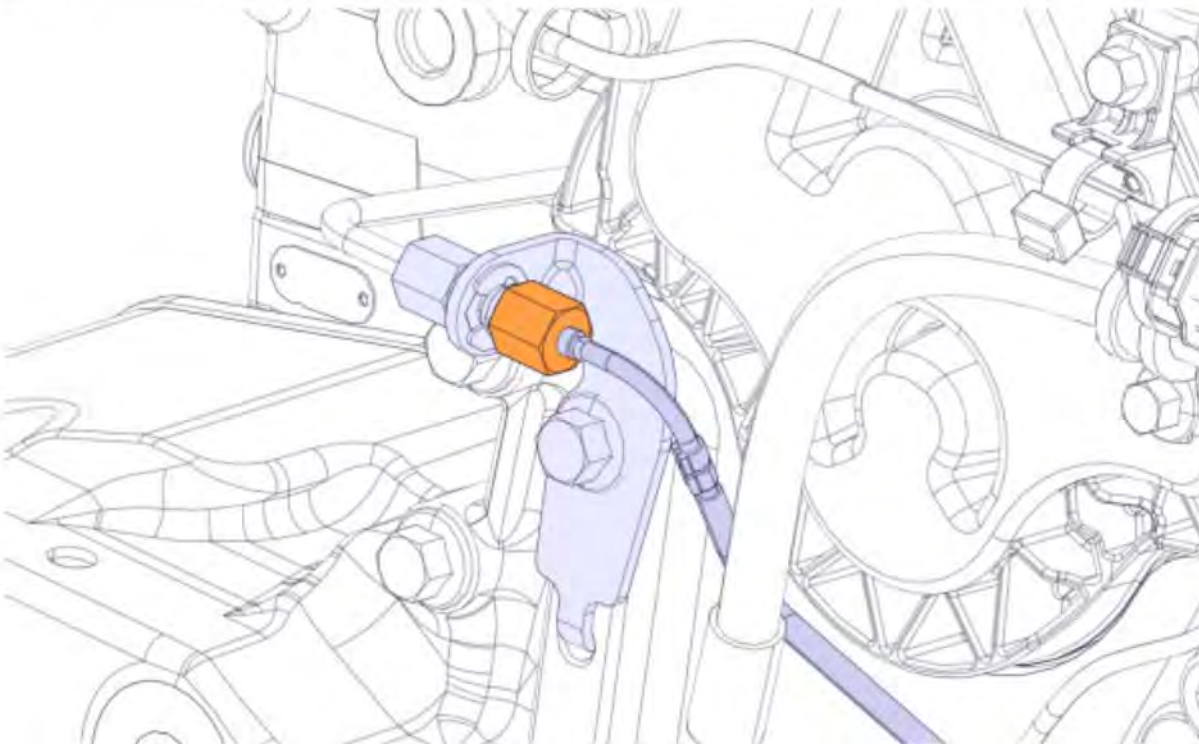
438	Ensure that the tube is not bent at the crimp.		
	Tech data		
	<table border="1" style="width: 100%;"> <tr> <td style="width: 50%;">Fuel pipe, radius (R)</td> <td style="width: 50%;">≥50 mm (≥1.97 in)</td> </tr> </table>	Fuel pipe, radius (R)	≥50 mm (≥1.97 in)
Fuel pipe, radius (R)	≥50 mm (≥1.97 in)		
	<div style="border: 1px solid black; padding: 5px;"> <p>i Note The minimum bend radius is 50 mm at the flexible line.</p> </div>		
	<div style="border: 1px solid black; padding: 5px;"> <p>i Note Do not twist the tube and crimp.</p> </div>		



439 Install the nut.

440 Torque tighten the nut.

Tightening torque	
Fuel pipe, nut	15 ±2 Nm (11 ±1 lb _f -ft)



441 Install the nut.

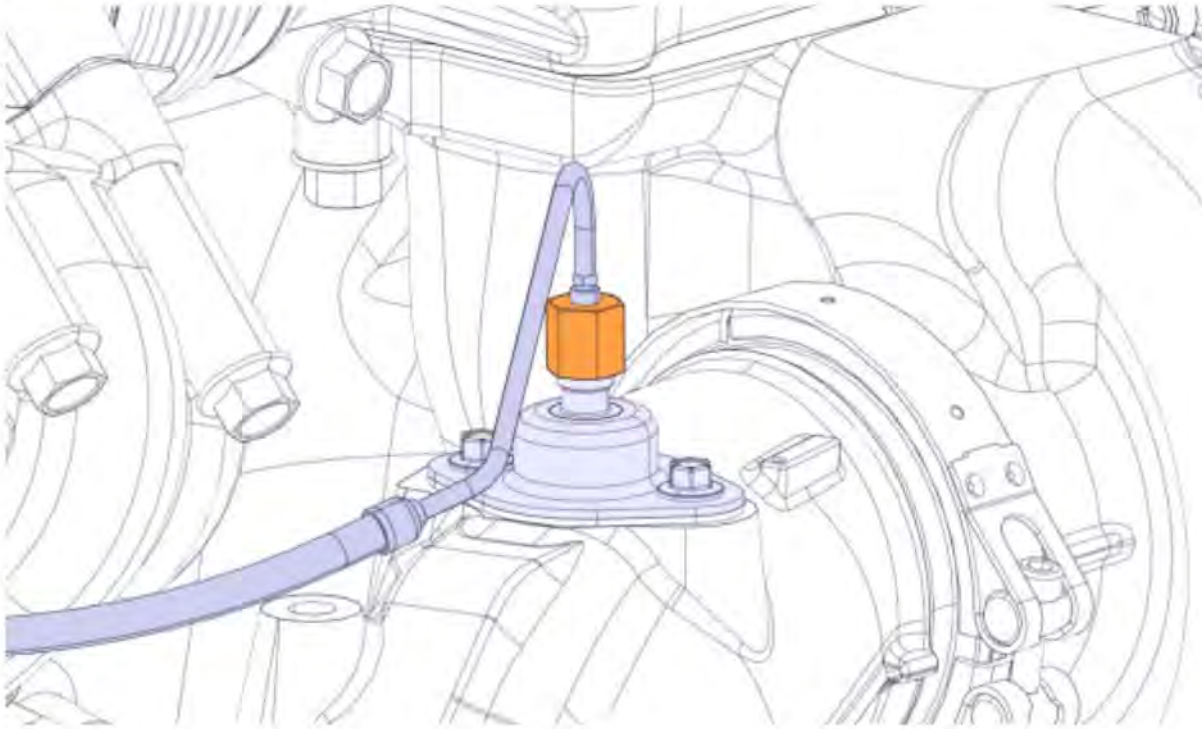
Note

Copyright to this documentation belongs to the Volvo Group. No reproduction, copying, change, amendment or other similar disposal is entitled without prior written consent by the Volvo Group

The information contained herein is current at the time of its original distribution, but is subject to change. The reader is advised that printed copies are uncontrolled.



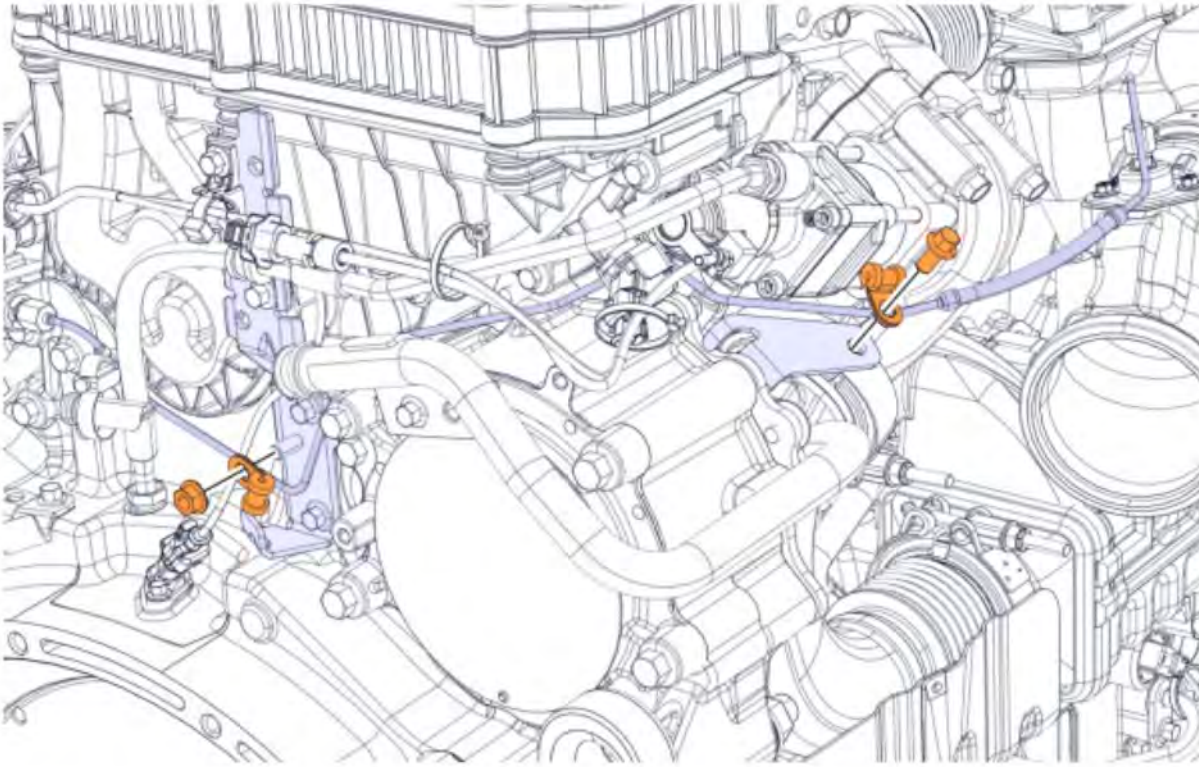
Hand tighten the nut.



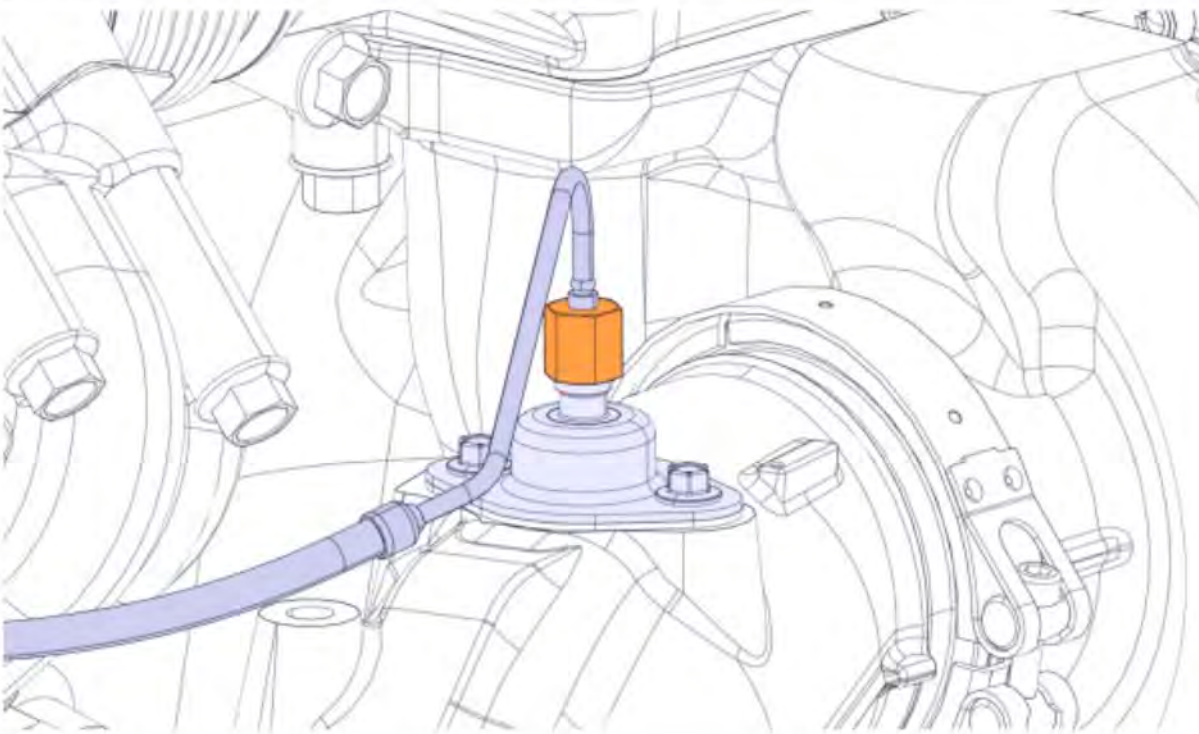
442 Install the clamp along with the screw and nut.

443	Torque tighten the screw.	
	Tightening torque	
	Fuel pipe, screw	24 ±4 Nm (18 ±3 lb _f .ft)

444	Torque tighten the nut.	
	Tightening torque	
	Fuel pipe, nut	24 ±4 Nm (18 ±3 lb _f .ft)



445	Torque tighten the nut.	
	Tightening torque	
	Injector pipe, nut	25 ±6 Nm (18 ±4 lb _f .ft)

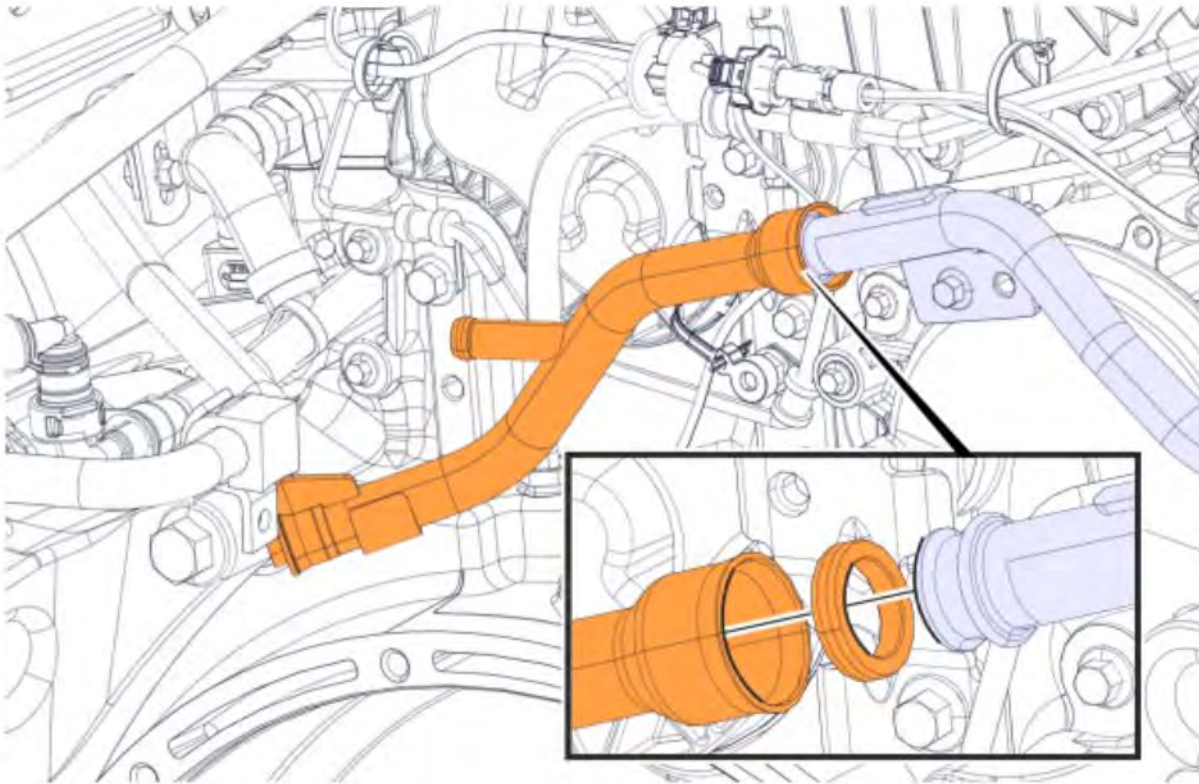


446	Install the seal.
------------	-------------------

447	Install the pipe.
------------	-------------------

Copyright to this documentation belongs to the Volvo Group. No reproduction, copying, change, amendment or other similar disposal is entitled without prior written consent by the Volvo Group

The information contained herein is current at the time of its original distribution, but is subject to change. The reader is advised that printed copies are uncontrolled.

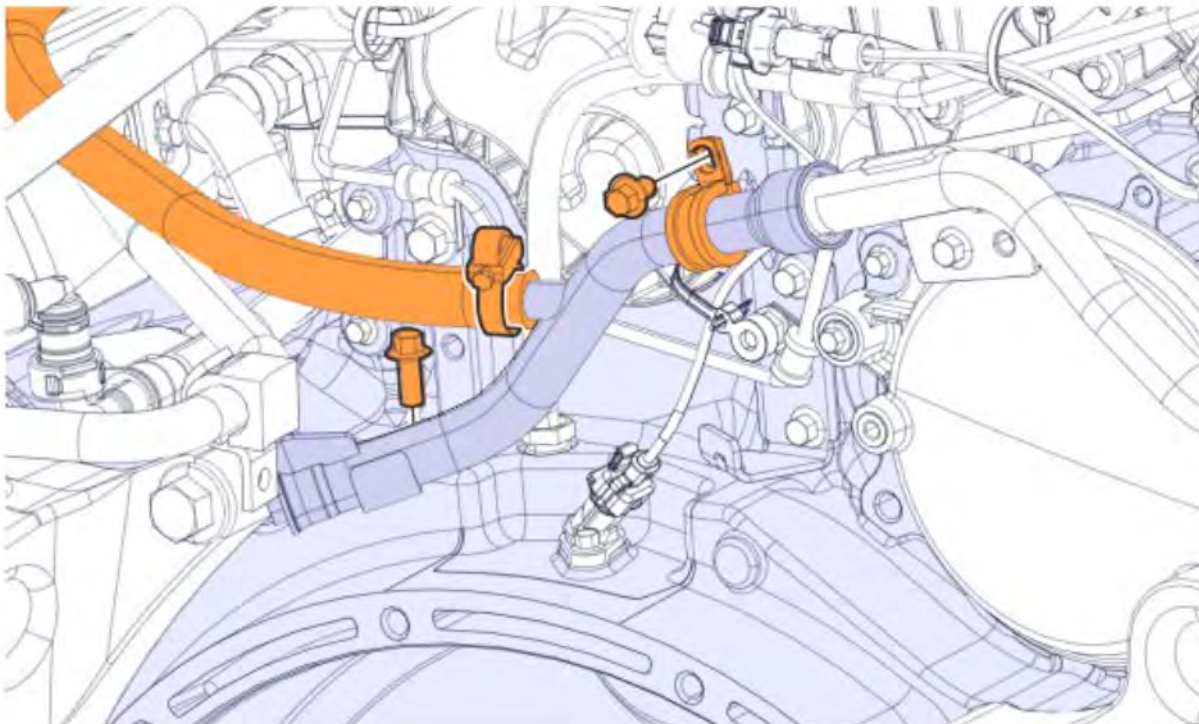


448 Install the clamp.

449 Install the screws.

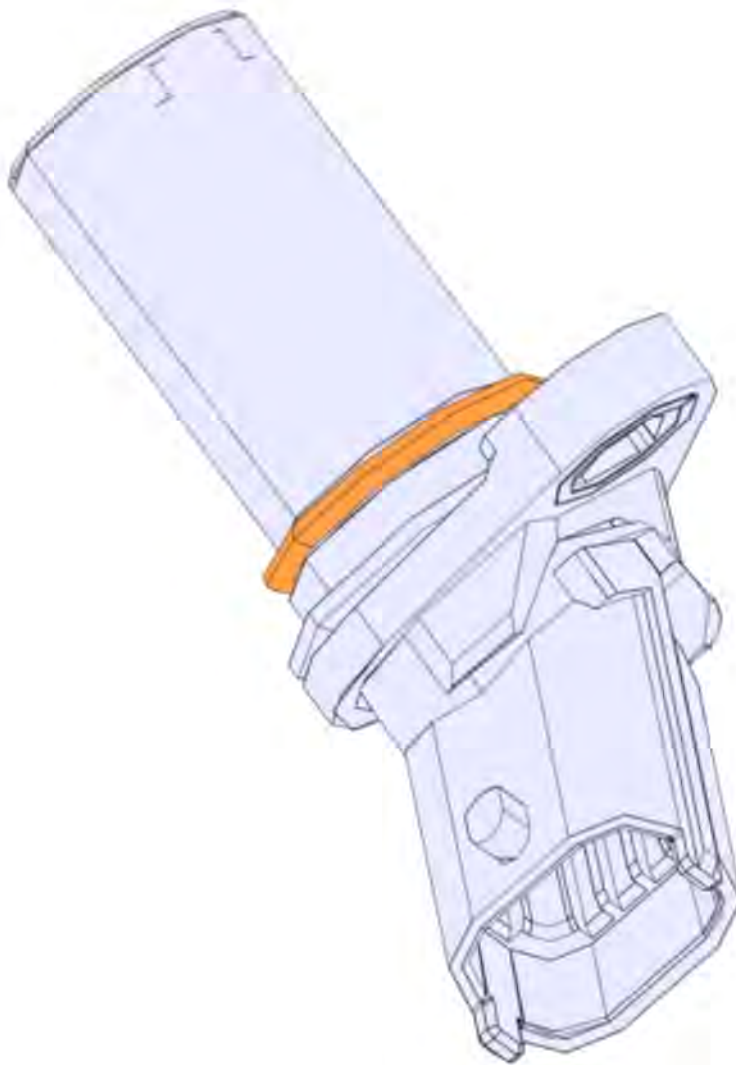
450 Install the hose.

451 Tighten the clamp.



452 Install the o-ring.

i **Note**
Use a new part.



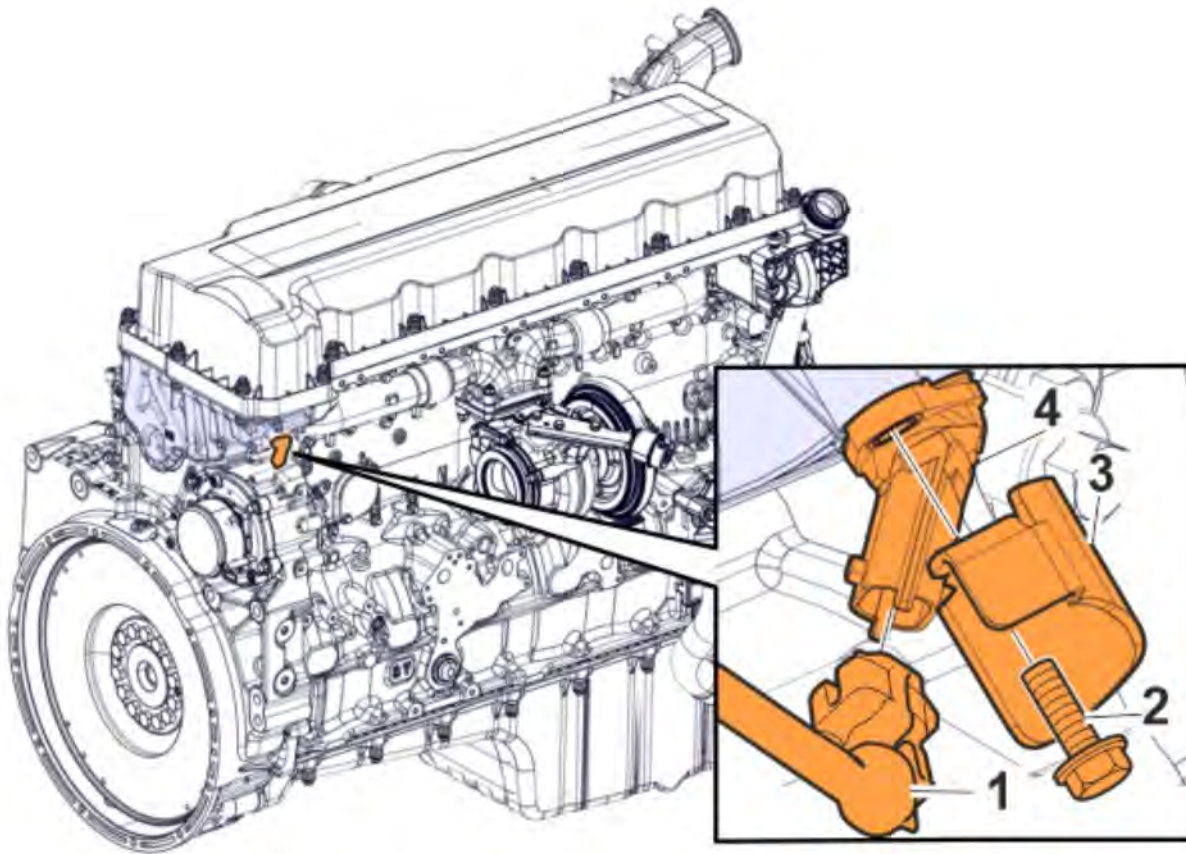
453	Install the sensor (4).		
	<table border="1" style="width: 100%;"> <tr> <td style="width: 10%;"></td> <td>Service hint Install the sensor and shims previously recorded.</td> </tr> </table>		Service hint Install the sensor and shims previously recorded.
	Service hint Install the sensor and shims previously recorded.		

454	Install the heat shield (3).
------------	------------------------------

455	Install the screw (2).
------------	------------------------

456	Tighten the screw to torque.		
	Tightening torque		
	<table border="1" style="width: 100%;"> <tr> <td style="width: 50%;">Camshaft speed sensor, screw</td> <td style="width: 50%;">8 ±2 Nm (6 ±1 lb_f-ft)</td> </tr> </table>	Camshaft speed sensor, screw	8 ±2 Nm (6 ±1 lb _f -ft)
Camshaft speed sensor, screw	8 ±2 Nm (6 ±1 lb _f -ft)		

457	Connect the connector (1).
------------	----------------------------

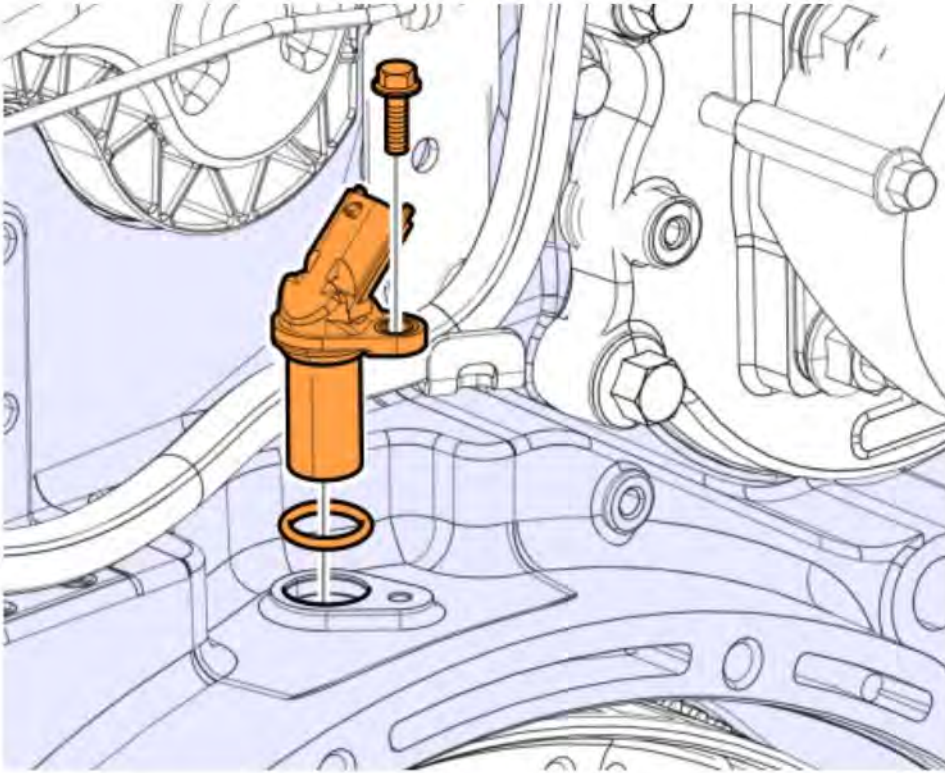


458	Install the o-ring.		
	<table border="1" style="width: 100%;"> <tr> <td style="width: 20px; text-align: center;">i</td> <td>Note Use a new part.</td> </tr> </table>	i	Note Use a new part.
i	Note Use a new part.		

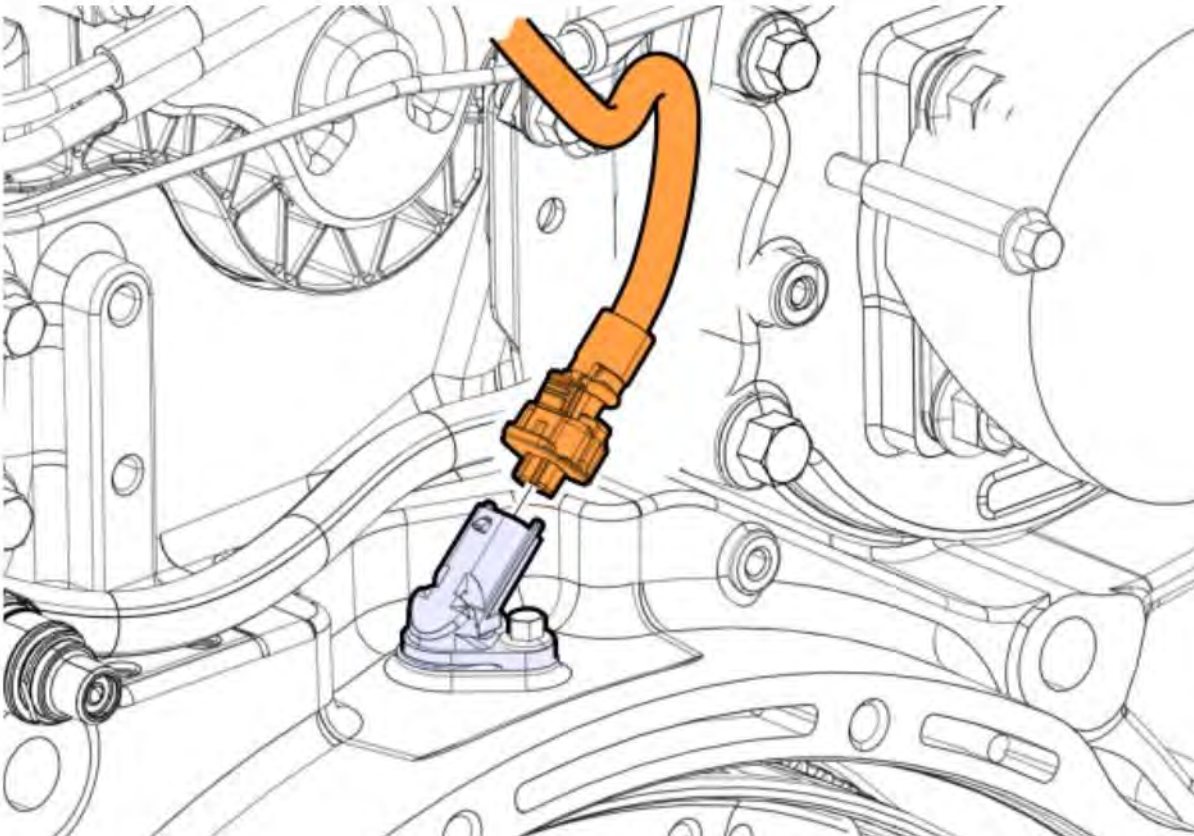
459	Install the sensor.
-----	---------------------

460	Install the screw.
-----	--------------------

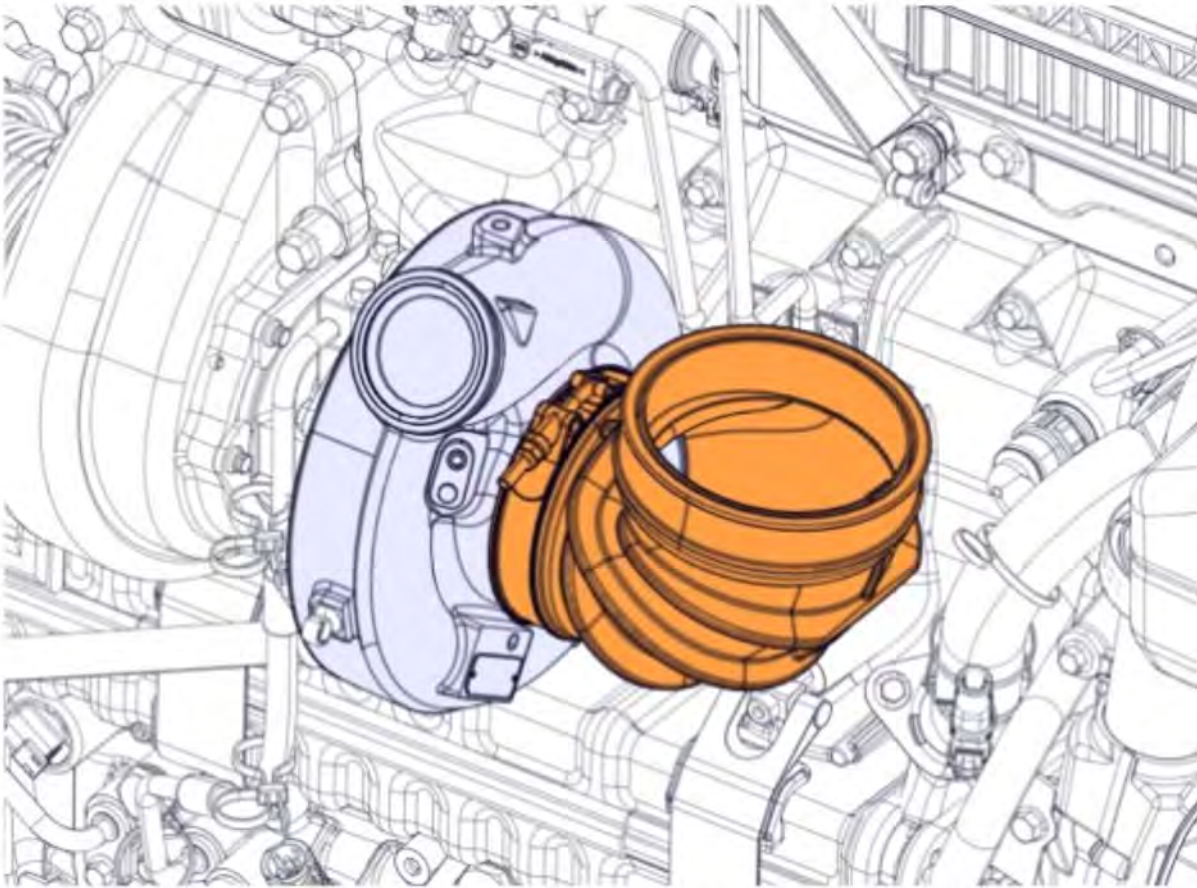
461	Tighten the screw to torque.		
	Tightening torque		
	<table border="1" style="width: 100%;"> <tr> <td style="width: 50%;">Camshaft speed sensor, screw</td> <td style="text-align: center;"> $8 \pm 2 \text{ Nm}$ $(6 \pm 1 \text{ lb}_f\text{-ft})$ </td> </tr> </table>	Camshaft speed sensor, screw	$8 \pm 2 \text{ Nm}$ $(6 \pm 1 \text{ lb}_f\text{-ft})$
Camshaft speed sensor, screw	$8 \pm 2 \text{ Nm}$ $(6 \pm 1 \text{ lb}_f\text{-ft})$		



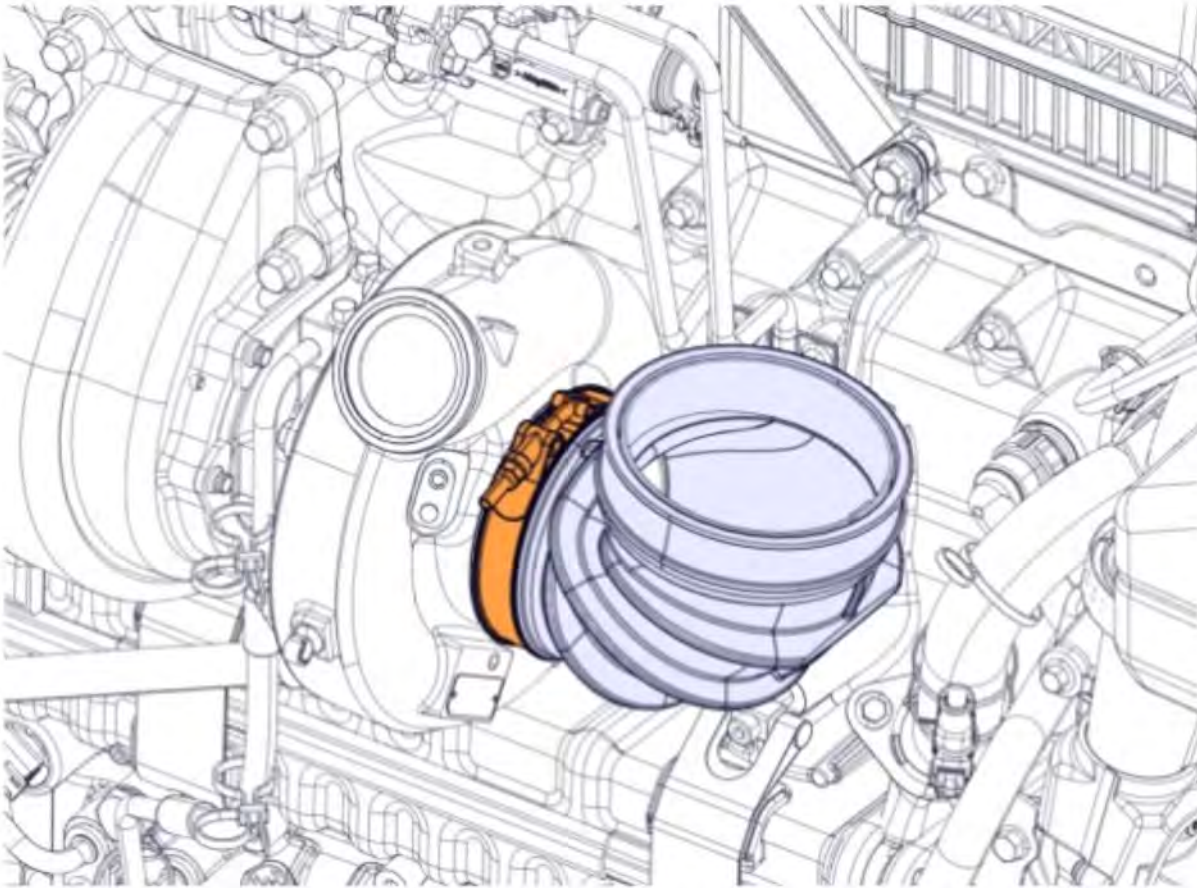
462 Connect the connector.



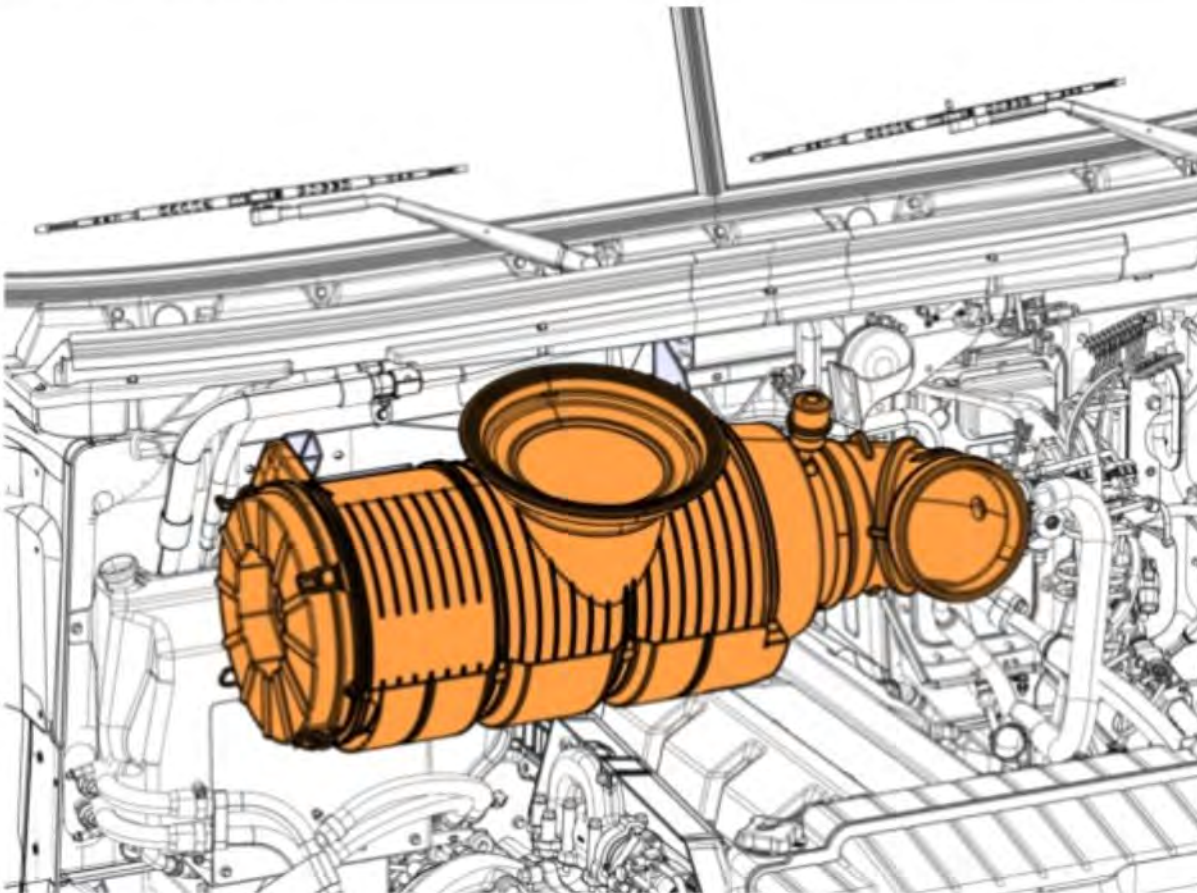
463 Install the duct.



464	Torque-tighten the clamp.	
	Tightening torque	
	Air duct, clamp	$9 \pm 1 \text{ Nm}$ $(80 \pm 9 \text{ lb}_f\text{-in})$



465 Position the housing.

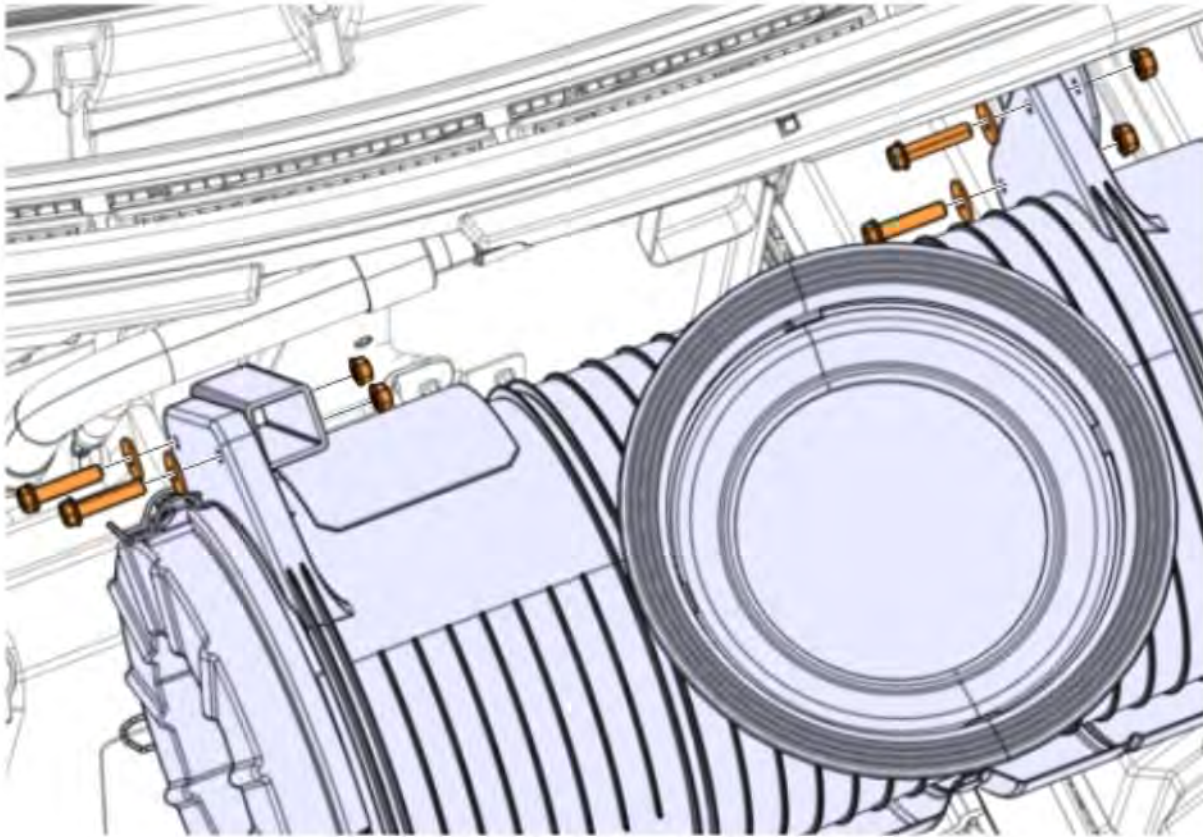


466 Install the screws, washers and the nuts.

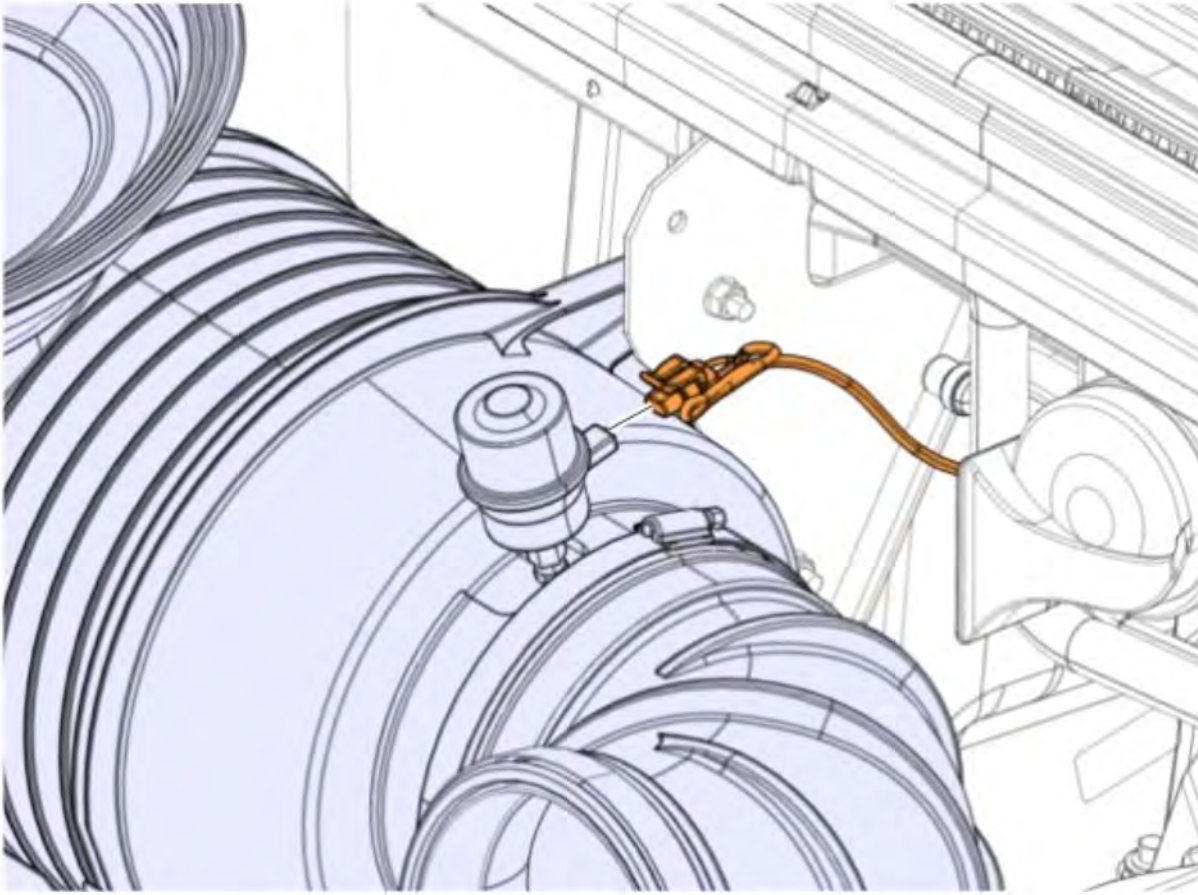
Copyright to this documentation belongs to the Volvo Group. No reproduction, copying, change, amendment or other similar disposal is entitled without prior written consent by the Volvo Group

The information contained herein is current at the time of its original distribution, but is subject to change. The reader is advised that printed copies are uncontrolled.

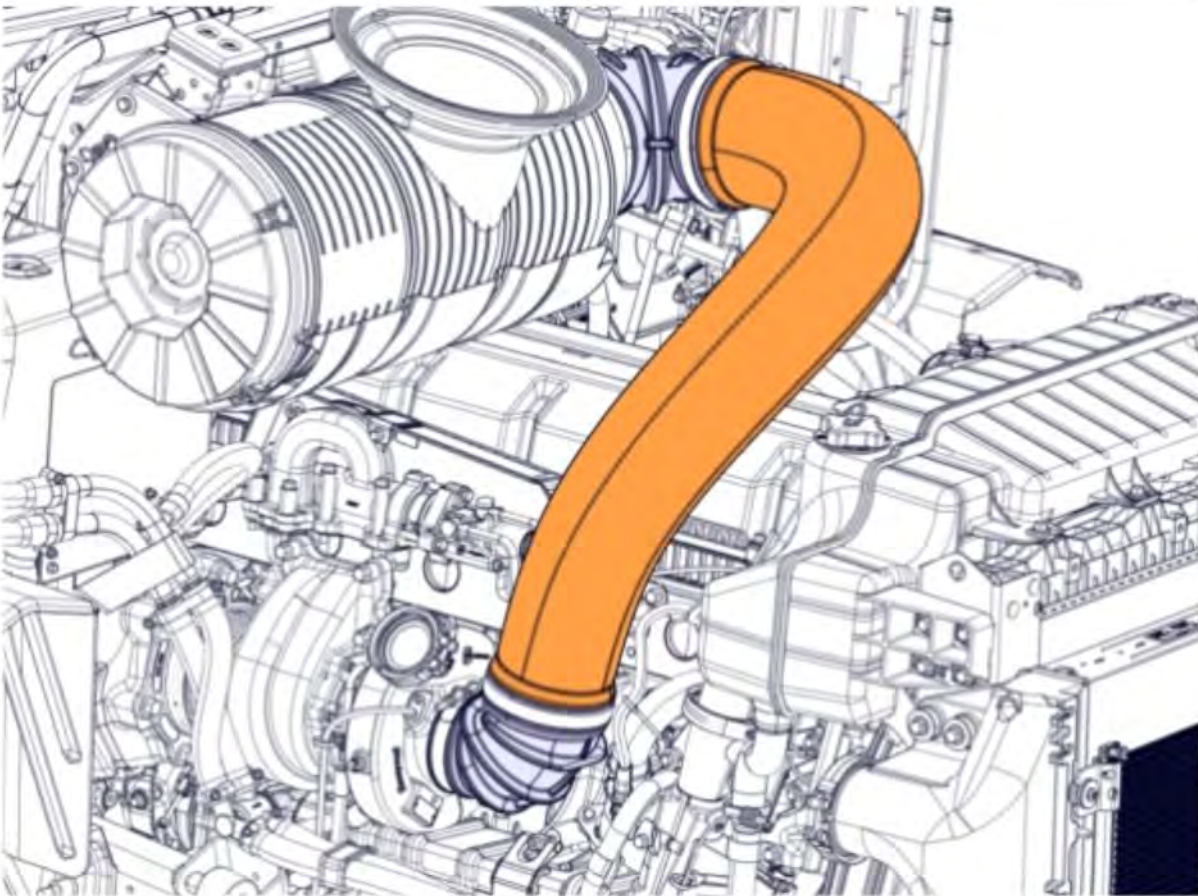
467	Torque tighten the screws.	
Tightening torque		
	Air filter housing, screw	M8
		5.6 ±0.6 Nm
		(50 ±5 lb _f ·in)



468	Connect the connector.	
-----	------------------------	--



469 Install the air duct.

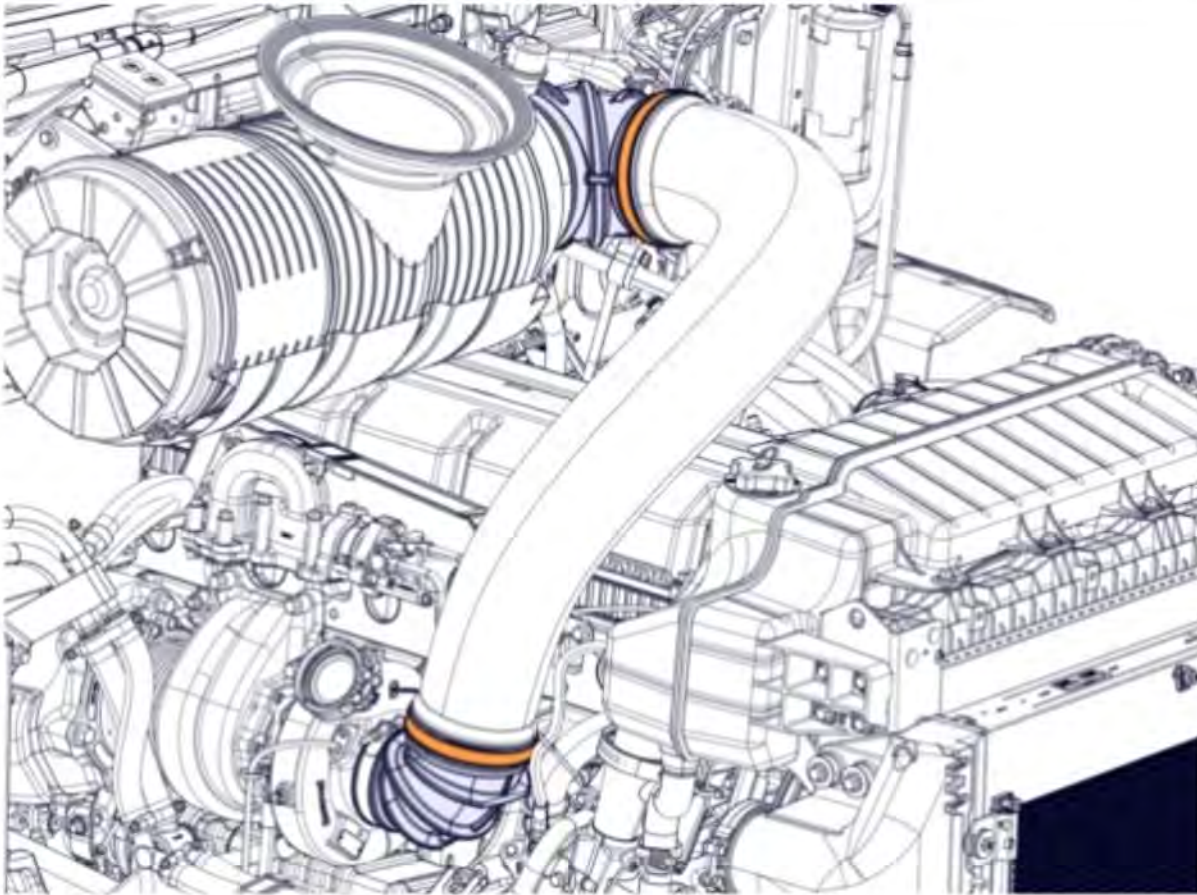


470 Tighten the clamps to torque.

Copyright to this documentation belongs to the Volvo Group. No reproduction, copying, change, amendment or other similar disposal is entitled without prior written consent by the Volvo Group

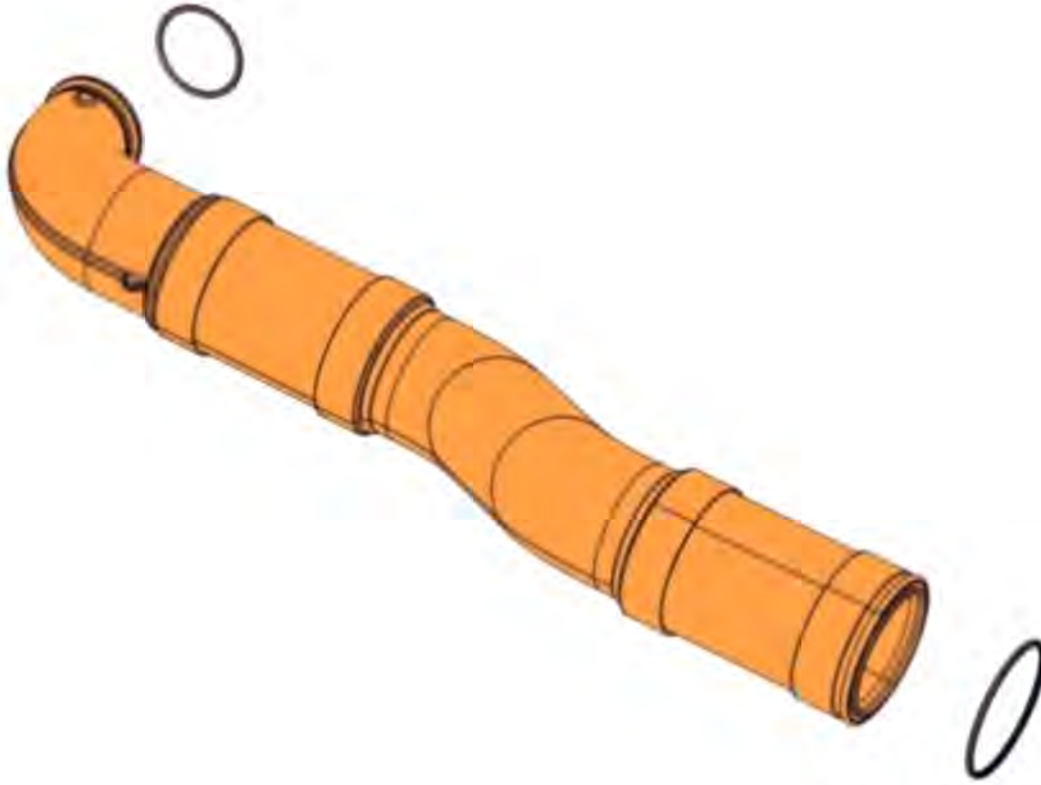
The information contained herein is current at the time of its original distribution, but is subject to change. The reader is advised that printed copies are uncontrolled.

Tightening torque			
Air duct, clamp	$9 \pm 1 \text{ Nm}$ $(80 \pm 9 \text{ lb}_f\text{-in})$		
<table border="1"> <tr> <td>i</td> <td>Note As noted.</td> </tr> </table>		i	Note As noted.
i	Note As noted.		



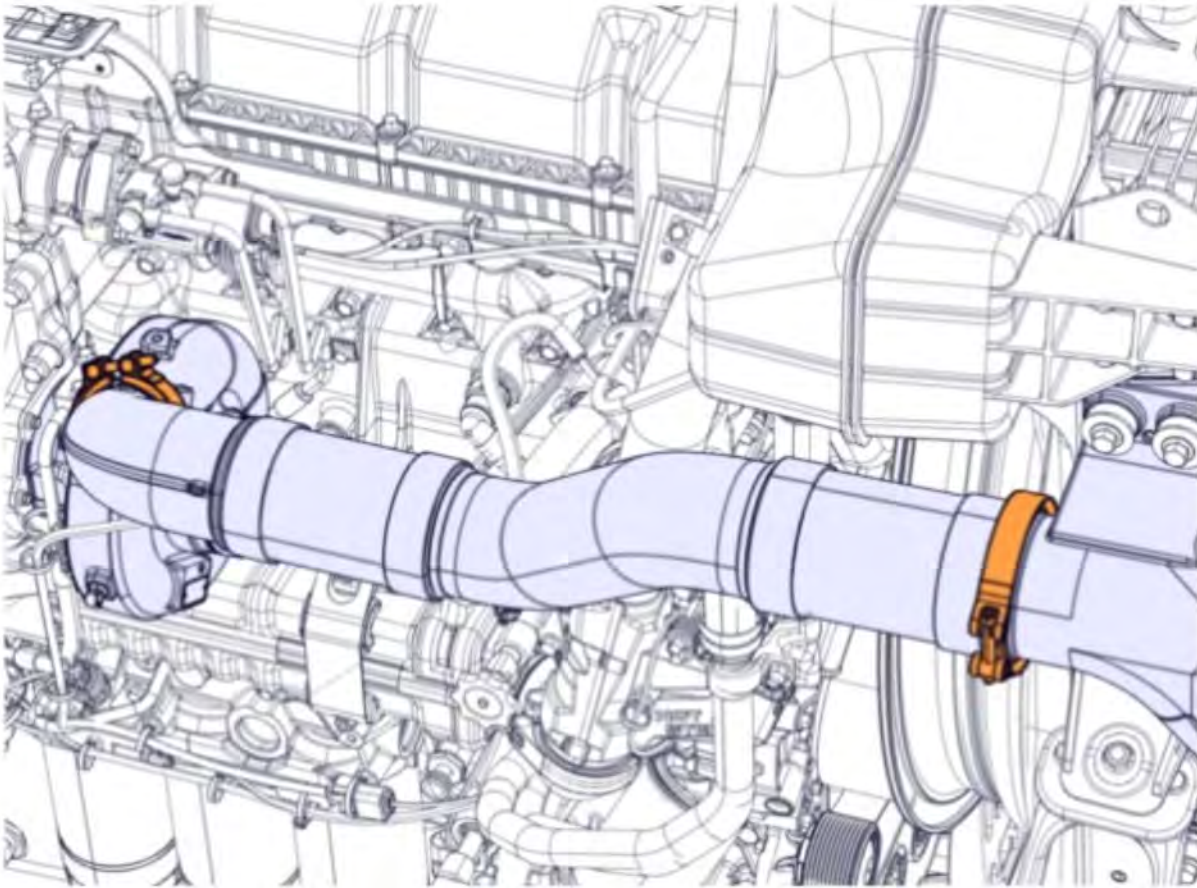
471	Install the seals.		
<table border="1"> <tr> <td>i</td> <td>Note Inspect the seals, replace as needed.</td> </tr> </table>		i	Note Inspect the seals, replace as needed.
i	Note Inspect the seals, replace as needed.		

472	Install the charge air pipe.
-----	------------------------------

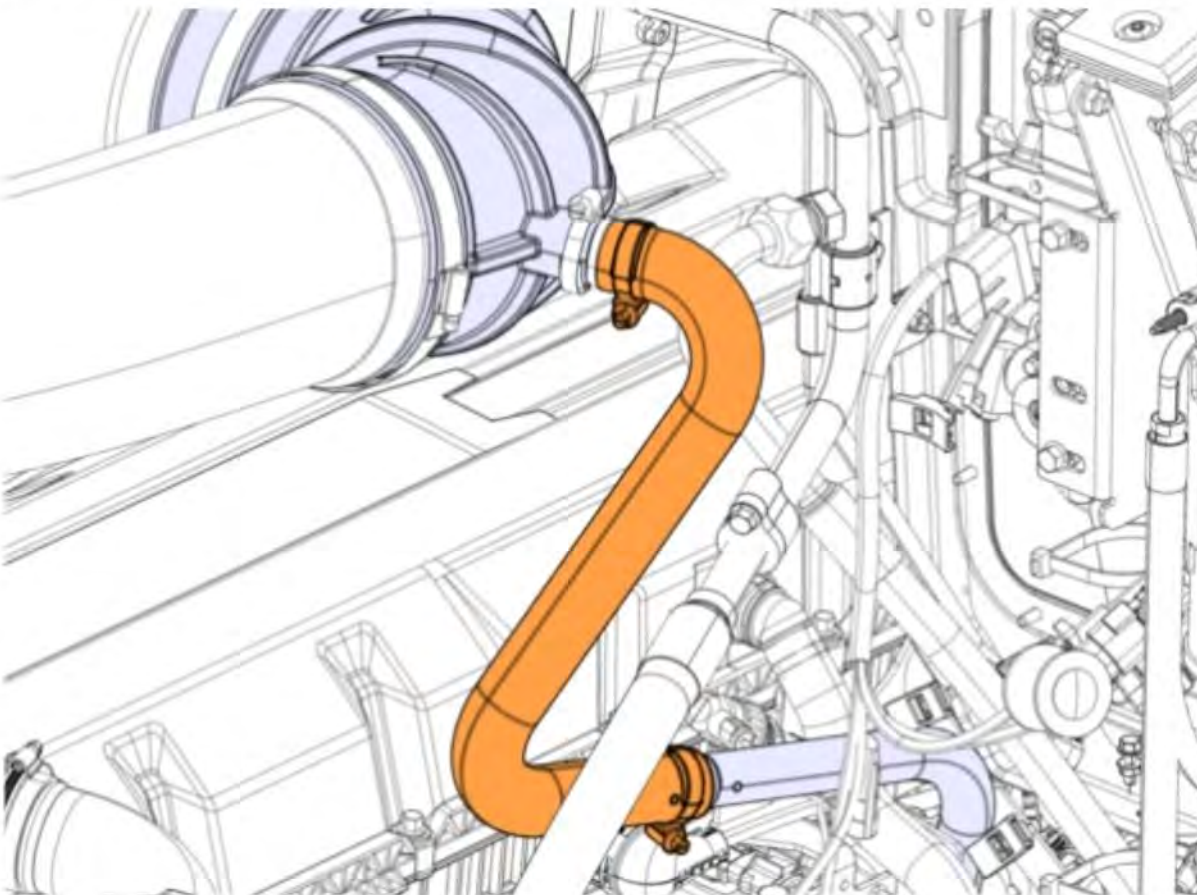


473	Install the V-clamps.		
	<table border="1" style="width: 100%;"> <tr> <td style="width: 20px; text-align: center;">i</td> <td>Note Note the orientation.</td> </tr> </table>	i	Note Note the orientation.
i	Note Note the orientation.		

474	Tighten the V-clamps to torque.	
	Tightening torque	
	V-clamp, screw	$7 \pm 1 \text{ Nm}$ $(5 \pm 1 \text{ lb}_f\text{-ft})$



475 Install the hose.



476 Position the clamps.

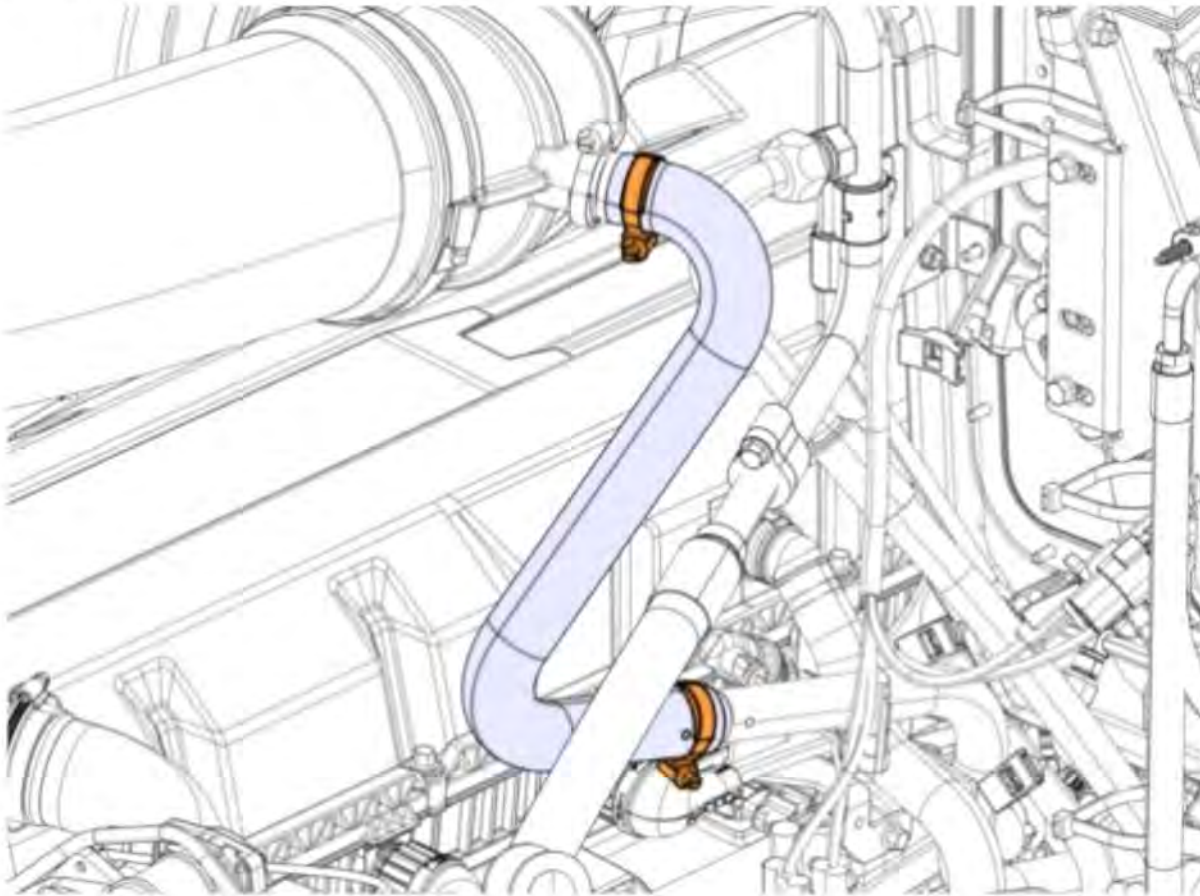


Note
As noted.

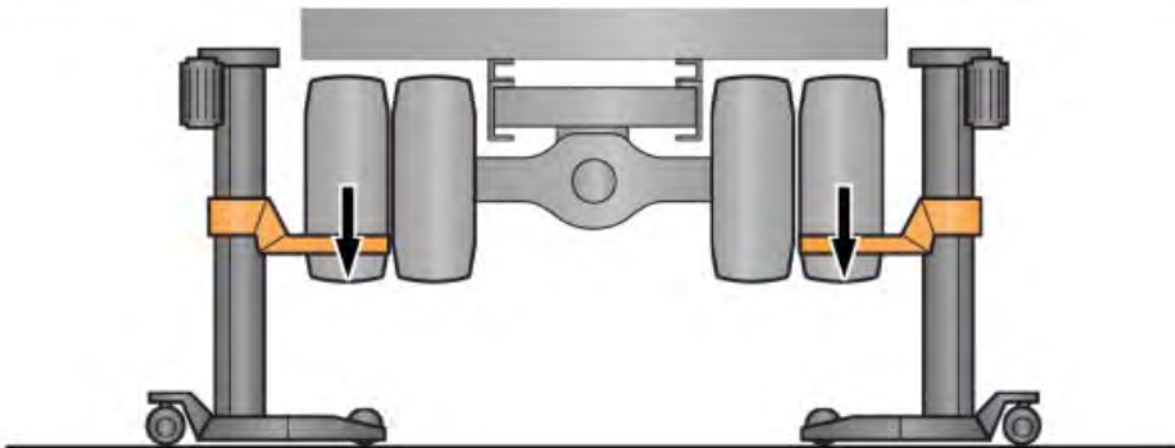
477 Tighten the clamps to torque.

Tightening torque

Clamp, screw	3.95 ±0.6 Nm (35.0 ±5 lb _f ·in)
--------------	---



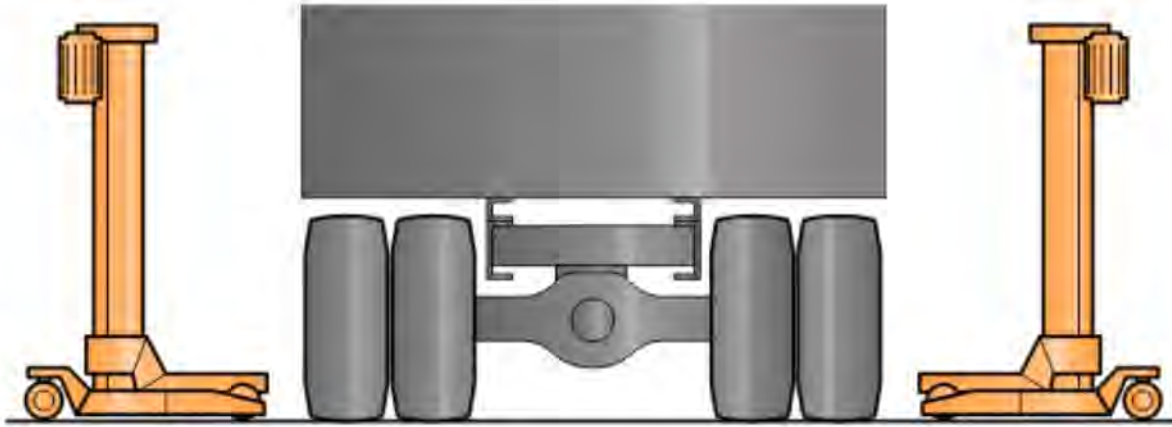
478 Lower the vehicle.



479 Remove the column lifts.

Copyright to this documentation belongs to the Volvo Group. No reproduction, copying, change, amendment or other similar disposal is entitled without prior written consent by the Volvo Group

The information contained herein is current at the time of its original distribution, but is subject to change. The reader is advised that printed copies are uncontrolled.



480 Perform this procedure when the condition below is met.

Conditions

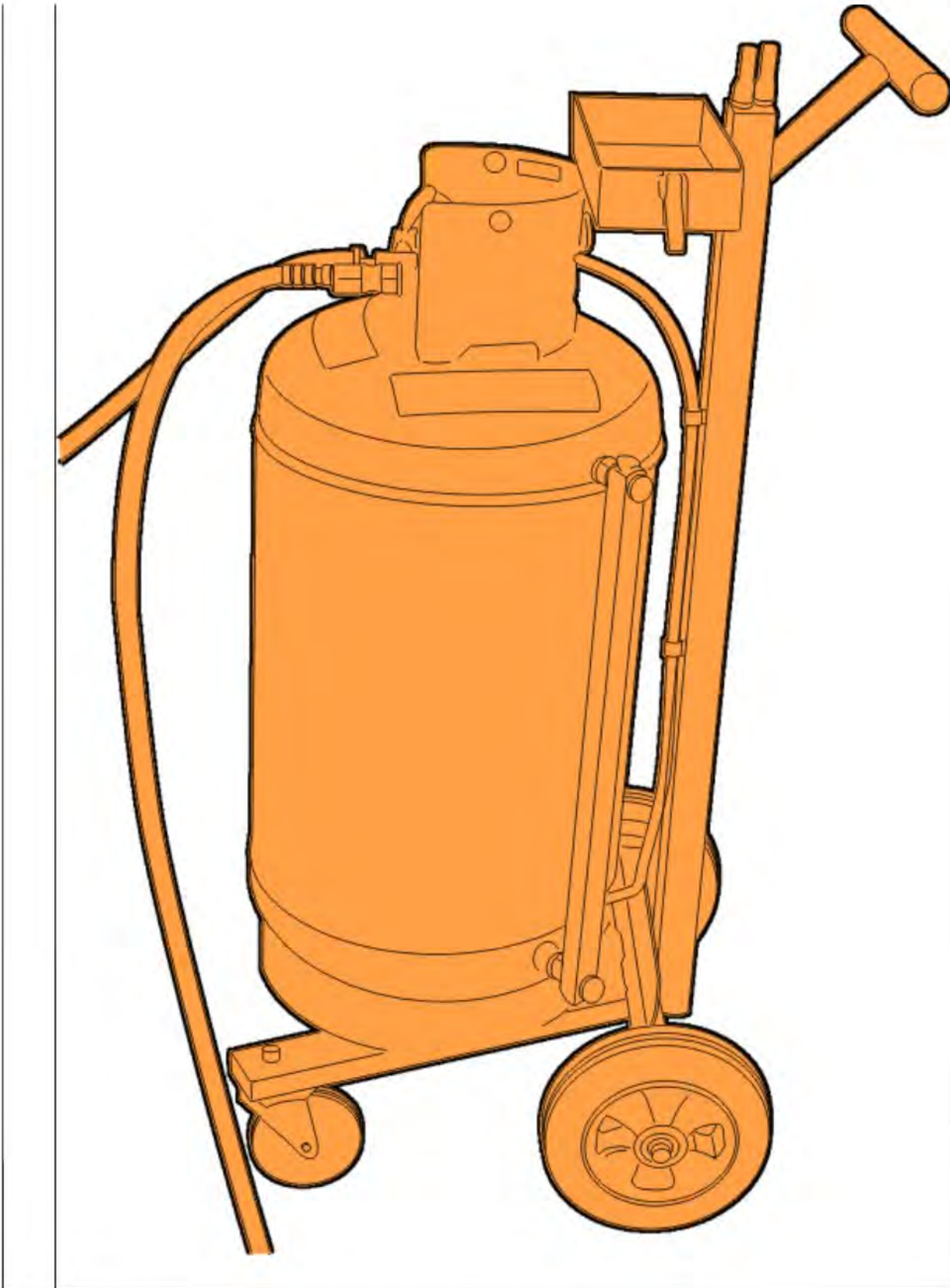
- If all of the coolant connections have been made, fill the coolant system.

► Fill the cooling system.



Note

Use approved coolant.



481 Perform this procedure when the condition below is met.

Conditions

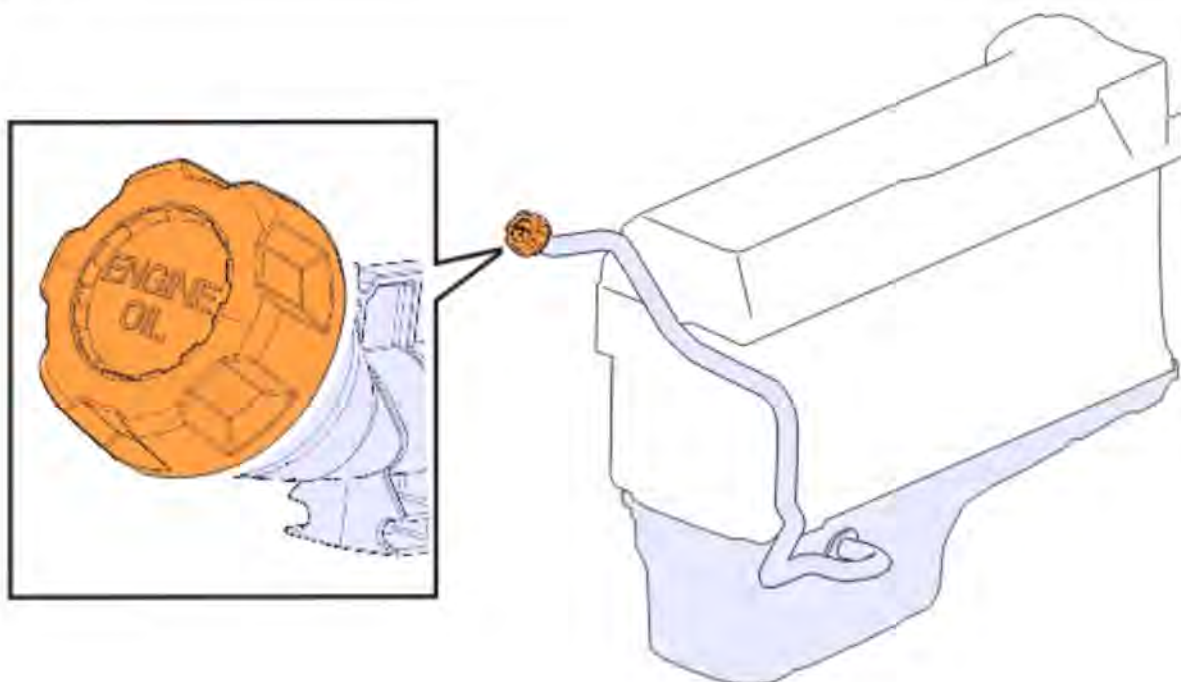
- If the end cap is removed
- ▶ Install the end cap.

482 Fill with engine oil.

Copyright to this documentation belongs to the Volvo Group. No reproduction, copying, change, amendment or other similar disposal is entitled without prior written consent by the Volvo Group

The information contained herein is current at the time of its original distribution, but is subject to change. The reader is advised that printed copies are uncontrolled.

i	Note Use recommended oil.
----------	-------------------------------------



483	Perform this procedure when the condition below is met.
	Conditions
	<ul style="list-style-type: none"> • If the engine cover was removed for service
	<ul style="list-style-type: none"> ▶ Install the engine cover.

484	Install the lower left side splash shield.
------------	--

485	Install the lower right side splash shield.
------------	---

486	Lower the hood.		
	<table border="1"> <tr> <td style="text-align: center; vertical-align: middle;">i</td> <td>Note Ensure that the hood is latched.</td> </tr> </table>	i	Note Ensure that the hood is latched.
i	Note Ensure that the hood is latched.		

Recommended Engine Oils

V-183-001A

(Aug 2022)

Valid for

All Volvo Powered Vehicles

Case description

This is to inform all North American and Canadian Dealers to utilize the below recommended VDS 4.5 10w30 Oil List if Volvo Genuine oil is not available.

This list is being put together to help guide towards other VDS 4.5 10w30 oils that provide the best optimum performance with Volvo D11 & D13 engines. This list will be continually reviewed and updated as future formulations are evaluated.

Brand	Label	Viscosity	Volvo
Shell	ROTELLA® T4	10w30	VDS 4.5
Chevron	Delo 400 SDE SAE	10w30	VDS 4.5
Chevron	Delo® 400 XLE SAE	10w30	VDS 4.5
ExxonMobil	Delvac™ 1300 Super	10w30	VDS 4.5
ExxonMobil	Delvac™ HDEO	10w30	VDS 4.5
ExxonMobil	Delvac Extreme	10w30	VDS 4.5
Valvoline	Premium Blue One Gen2	10w30	VDS 4.5
Valvoline	All-Terrain	10w30	VDS 4.5
Petro-Canada	Duron SHP	10w30	VDS 4.5
Phillips 66	Guardol Fleet EC	10w30	VDS 4.5

Issued by

Technical Service



Special Tools Bulletin

To: Service Managers
Parts Managers
Technicians

Region: U.S.
 CAN

Bulletin:
Date: December 21, 2022
Valid to: December 31, 2023
Action Required? Yes No

From: Tyler Griffin – Proprietary Systems & Components Specialist.
Subject: Volvo Essential Tool Shipment

The tools listed below will be shipped **automatically** to all Volvo dealers (full-line, parts & service, and satellite locations) from the PDC. Each dealer will be invoiced on **ET1201V**. **This tool is used to hold the Turbo Compound in place while performing Timing Gear Plate repairs. Repair instructions and videos are below.**

Part Number	Description	Quantity
88800826	13 L Turbo Compound Support Bracket	1

Please advise your parts department staff to expect these Essential Tools for the Service Department.

You may order additional Essential Tools; pricing is available on the Parts System.

Contact Information

If you have questions, please contact your Technical Service Manager.

Essential Special Tool 88800826

**Turbo Compound Support – *while performing
TGP (Timing Gear Plate) oil leak repairs***





Instructions:

1. Remove the starter.
2. Remove the Turbo Compound oil feed line.
3. Remove the EGR heat shield.
4. Remove top V-band clamp for the EGR cooler's hot pipe.
5. Remove bottom V-band clamp for the EGR cooler's hot pipe.
6. Remove the EGR cooler's hot pipe.
 - A. Make sure to remove the EGR cooler rear seal.
7. Disconnect and set aside the following line sets:
 - A. Aftertreatment Hydrocarbon Injector
 - B. Exhaust gas pressure line
 - C. Engine brake
 - D. Turbo compound buffer supply
8. – Unplug camshaft sensor harness.
9. – **IMPORTANT:** There is a key fastener/bolt that threads in the timing gear plate. This fastener/bolt is hidden and must be removed prior to installing the Turbo compound tool.
10. – Here you see the Turbo compound tool and its mounting hardware.
 - A. 2-3 fasteners depending on EM level.
11. – First you will remove the 2-exhaust heat shield mounting bolts, and Turbo Compound lifting eye bolt.
 - A. 2-3 fasteners depending on EM level.
12. – Next secure the Turbo Compound tool bracket to the cylinder head, utilizing the bolt holes from the previously removed exhaust heat shield bolts.
13. – At this point you will need to prep the threaded rod with one of the nuts from the hardware kit. You will thread one of the nuts about $\frac{1}{4}$ of the way up on the threaded rod.
14. – Securing the Turbo Compound tool mounting bracket to the Turbo Compound housing.
 - A. Slide the supplied threaded rod through the slotted hole in the Turbo Compound tool mounting bracket.
 - B. Thread the rod in the bolt hole from the previously removed Turbo Compound lifting eye bolt, thread the rod until it bottoms out.
 - C. Secure the rod to the Turbo Compound housing by running the previously installed nut flush with the housing, and slightly tighten.
 - D. Install the second nut above on the threaded rod above the Turbo Compound tool mounting bracket. Thread nut down flush with the mounting bracket and slightly tighten.
- 15– Tool Removal:
 - A. Loosen both nuts on the threaded rod.
 - B. Unthread rod from the Turbo Compound lifting eye bolt hole. You do not have to fully remove the threaded rod from the mounting bracket.
 - C. Remove both Turbo Compound tool mounting bracket bolts at cylinder head.

VOLVO TRUCKS UPTIME



Please see attached training video that can also be found in TDP under training videos.

[TC Bracket Volvo 1 - YouTube](#)

Warranty Operations Manual

Canada, United States, Latin America

Put your search topic here...



News

Index

◀ Back

- TIMING GEAR PLATE - Clean Claim Template



Warranty Approval

The timing gear plate follows the major component coverage.

Resources & References

For further information on timing gear plate repairs & documentation, please reference the following in IMPACT and/or CBR:


- Technical Service Bulletin 212-003 - Timing Gear Plate, Inspection
- Detailed repair procedure instructions - 2152-03-03-05 Timing Gear Plate, Replacement

Claim Filing Instructions

- Claim Type: Vehicle Warranty
- Main Labor Operations:
 - 2152-03-02-04 Timing Gear Plate, Replacement
 - Note: SRT includes labor for R/R of the transmission, clutch, flywheel, flywheel housing, etc.
 - 1700-16-03-01 Diagnostic Time
 - Standard Diagnostic Time for this repair is 2 hours.
- Causal Part:
 - Use applicable causal part from Impact referencing the VIN and Function Group 215 – Timing Gears
- Remarks Tab:
 - Fill in the complaint, cause and correction sections describing the details of the failure.
- Attachments Tab:
 - Warranty requires 3 pictures be attached to the claim
 - See attachment - Timing Gear Plate for examples

Exclusions & Limitations

Documents

 Timing Gear Plate

Failure to attach quality pictures to the claim that clearly illustrate the issue may result in claim denial.

Warranty will only cover timing gear plate claims on active leaks. To verify if you have an active leak reference TSB 212-003 Timing Gear Plate, Inspection.

Comeback repairs due to improper plate installation are non-warrantable.

Effective with R.O. Open April 26th:

Upgrading from a wet plate to an integrated seal is not covered, replacement part should be like for like.

Flywheel housings replaced for reasons other than an out of round condition, uneven sealing surface or 3 or more damaged bolt holes are not covered.

Timing gear plate repair kits are required, failure to use the kit will risk claim adjustment to reflect the price of the kits. (13L VGT Engine P/N 24459407 or 13L TC Engine P/N 24459389)

All information for internal use only