



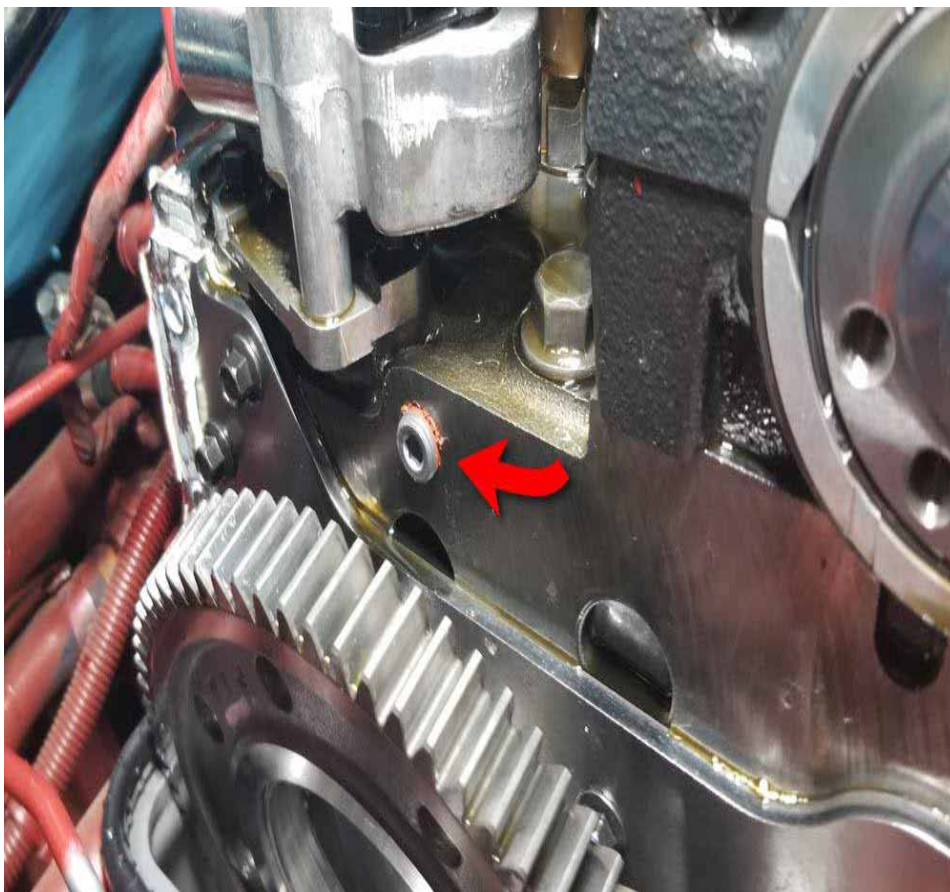
11 Liter Engines - Fuel In Oil - Vehicles Built Between October 2020 And June 2021



Vehicles built with an 11 liter engine between October 2020 and June 2021 may experience a complaint of excessive fuel in the oil. It is possible that the source of the fuel is the rear fuel galley plug in the cylinder head.

The presence of fuel in the oil may be accompanied by report of hard start, which would indicate a loss of pressure in the fuel system when the engine is not running.

The location of the plug can be seen in the image below:

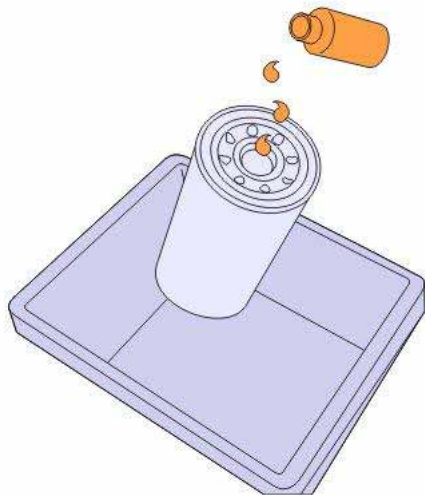
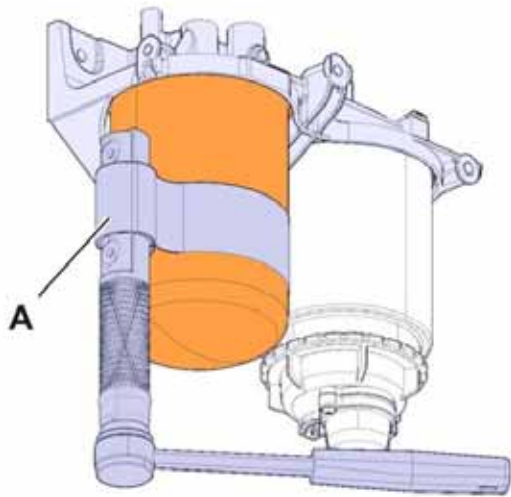


Diagnose

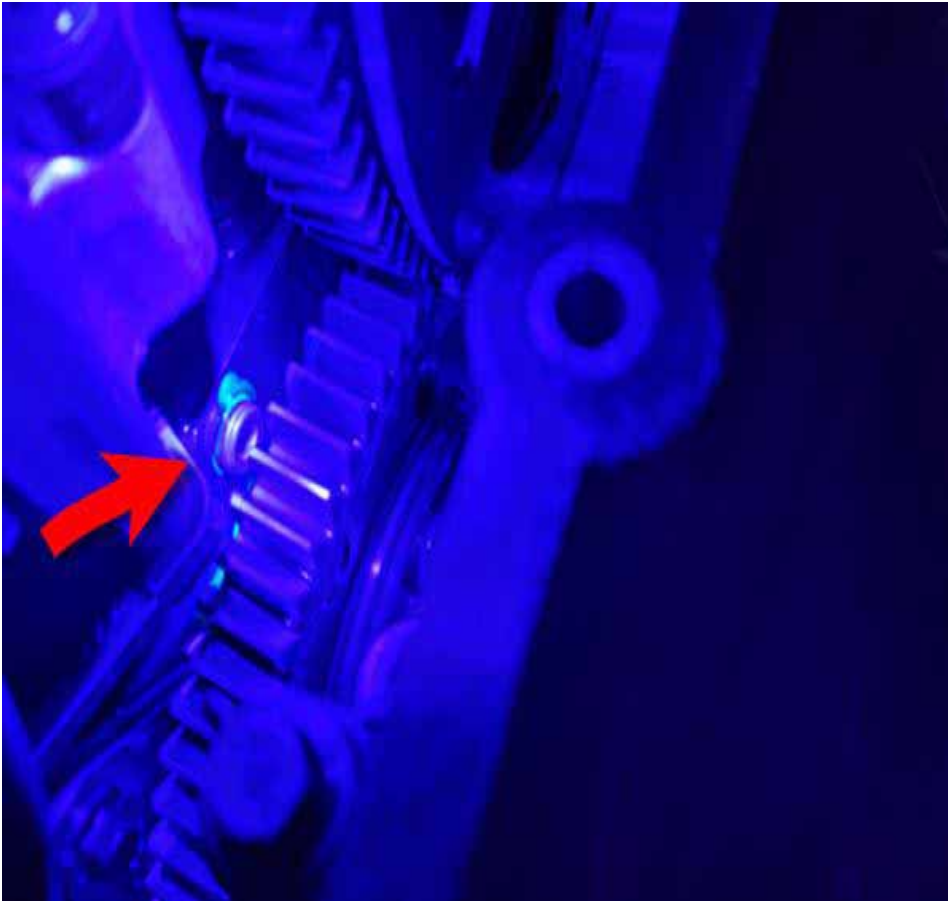


.. Remove the valve cover.

2. Add appropriate UV reactive dye to the secondary fuel filter by removing, then reinstalling the filter.



3. Use the hand primer to pressurize the system.
4. Check the fuel plug location shown in the pictures above and below for evidence of fuel leakage.



Repair

1. Ensure engine is on TDC (Cam and Crank) before major disassembly.
2. Drain fuel galley.
3. Follow Impact ID/Operation [2154-03-02-01 Camshaft, Replacement](#) and STOP at step 84.
 - DO NOT REMOVE the camshaft or camshaft bearing caps.
4. With the rocker shaft, upper timing cover, and cam gear removed, remove the fasteners for the adjustable idler gear and slide the gear toward the rear of the truck.
 - NOTE: Timing gear plate fasteners will not allow for complete removal of adjustable idler gear.
5. Remove the leaking fuel galley plug.

 Live UI fy the fuel galley plug threads in the cylinder head are clean and free from damage.

7. Install a NEW fuel galley plug and torque to 30 Nm or 22 lbf-ft.
8. Using the hand primer, prime fuel system and verify there are no fuel leaks around the newly installed plug.
9. Slide the adjustable idler back into original position and loosely install the 5 fasteners.
 - NOTE: Use new fasteners.
10. Reassemble using Impact ID/Operation [2154-03-02-01 Camshaft, Replacement](#) starting at step 102.
 - NOTE: Gear train backlash WILL have to be adjusted, follow Impact ID/Operation [2154-05-03-02](#).
11. If not done already, change engine oil and filters.
12. Start the engine and verify proper operation and no leaks are observed.
13. Release the unit.



Tags

[fuel in oil](#)[mack](#)[volvo](#)[galley plug](#)

Related links and attachments

No links or attachments available



Feedback

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to help improve the content of this article

21522-2 Camshaft, Replacement



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



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](#)



WARNING

Risk of serious personal injury.

Using the wrong technique when rotating the crankshaft can cause serious personal injury.

- Use the recommended engine barring techniques for manually rotating the crankshaft. Do not rotate the engine by pulling or prying the fan.



CAUTION

Risk of material damage.

Risk of impurities being introduced into the fuel system.

- Ensure conditions of maximum cleanliness when carrying out any work on the fuel system.



CAUTION

Risk of skin injury.

High fuel pressure.

- The injection system may be pressurised. When working on the injection system, remove the first part cautiously



CAUTION

Risk of material damage.

The engine may be hot.

- Make the adjustment on a cold engine.



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.

**CAUTION**

Risk of material damage.

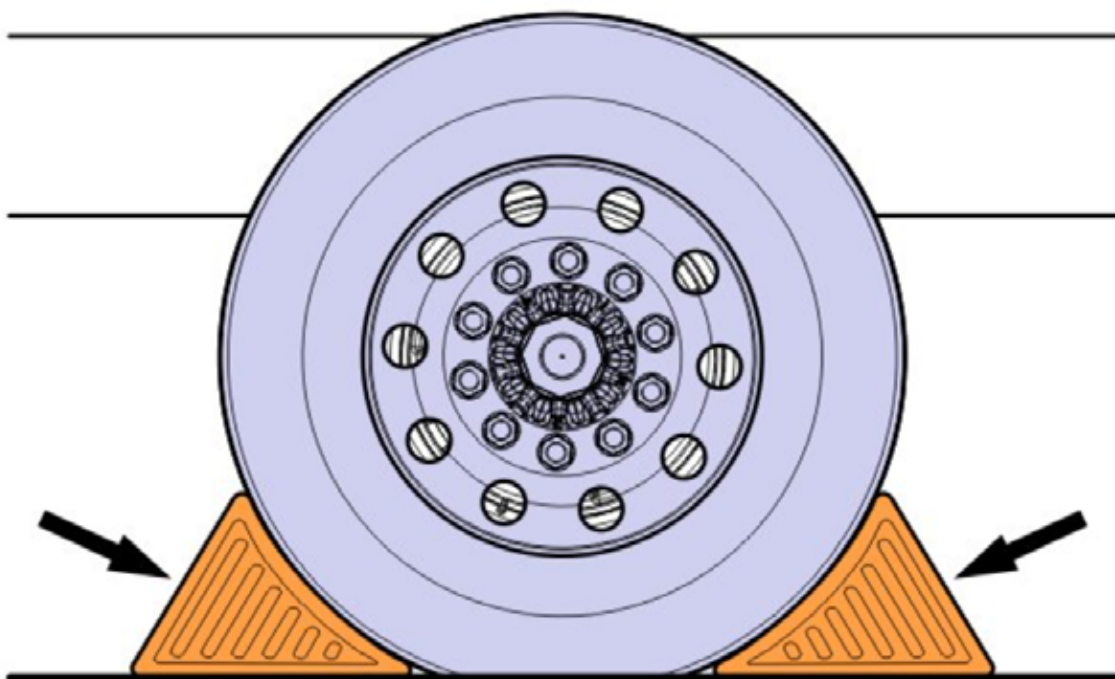
The turbocharger can be damaged if foreign particles enter the charge air system. Particles as small as 1 mm can cause damage.

- ▶ Observe maximum cleanliness when working on the charge air system. Cover or plug openings immediately.

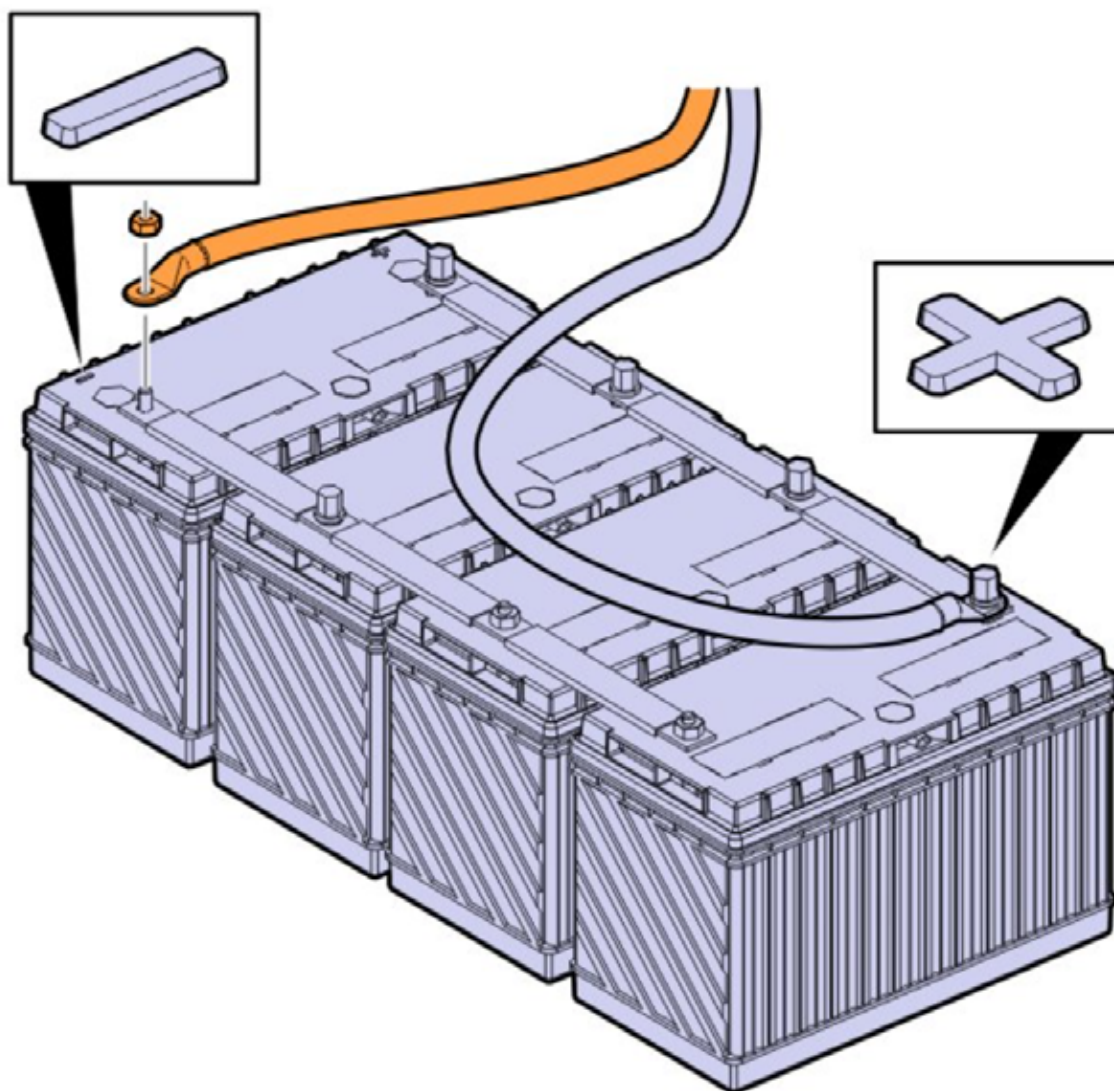
Special tools

J-42189	88800232	88800420	88840317	9992669
9996400	9998264	9999683	9999696	85109051
85109250	J-44514B			

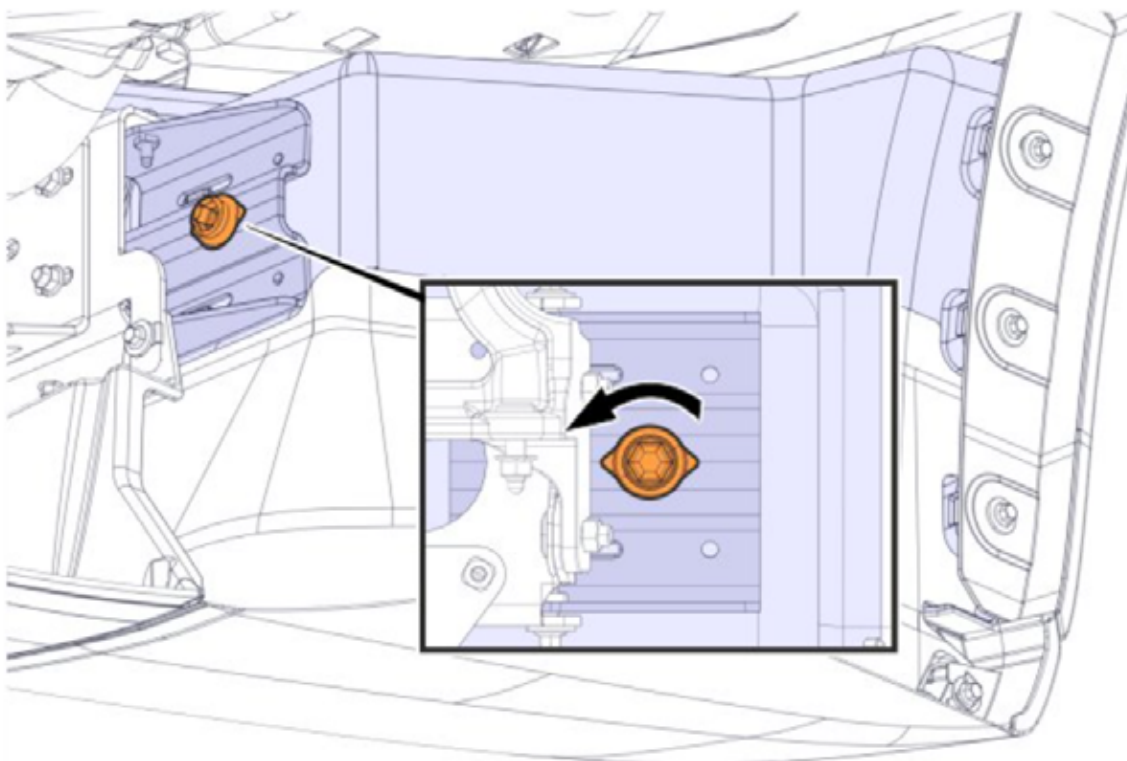
- 1 Park the vehicle on a level surface.
- 2 Apply the parking brake.
- 3 Place the gear lever in neutral.
- 4 Install the wheel chocks.



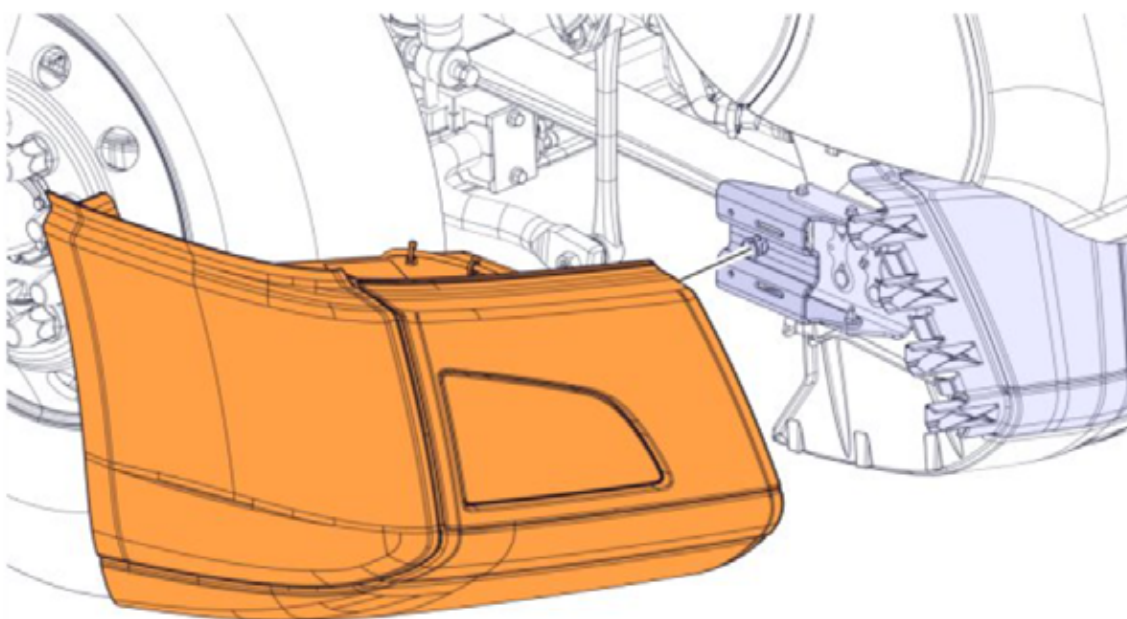
- 5 Disconnect the cable from the negative terminal.



6	Unlatch the bumper end cap.
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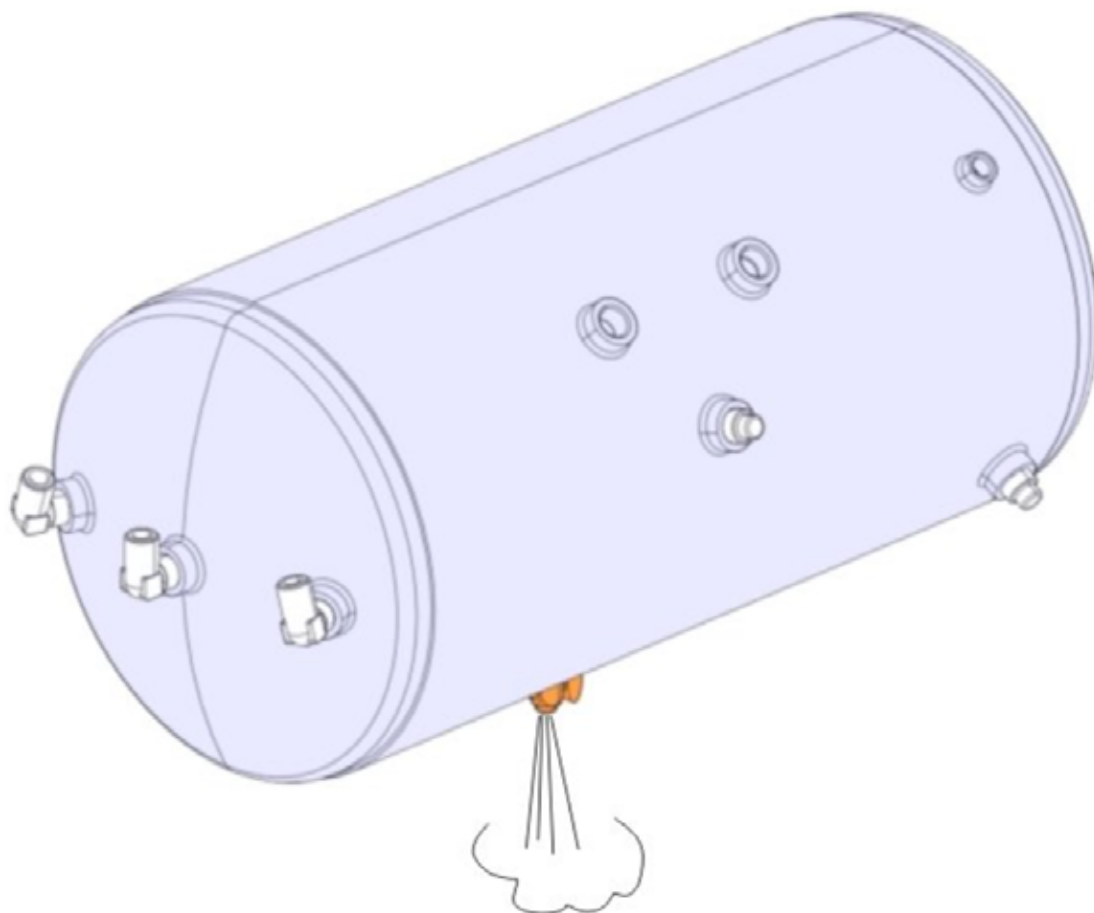


- | | |
|---|----------------------------|
| 7 | Remove the bumper end cap. |
|---|----------------------------|

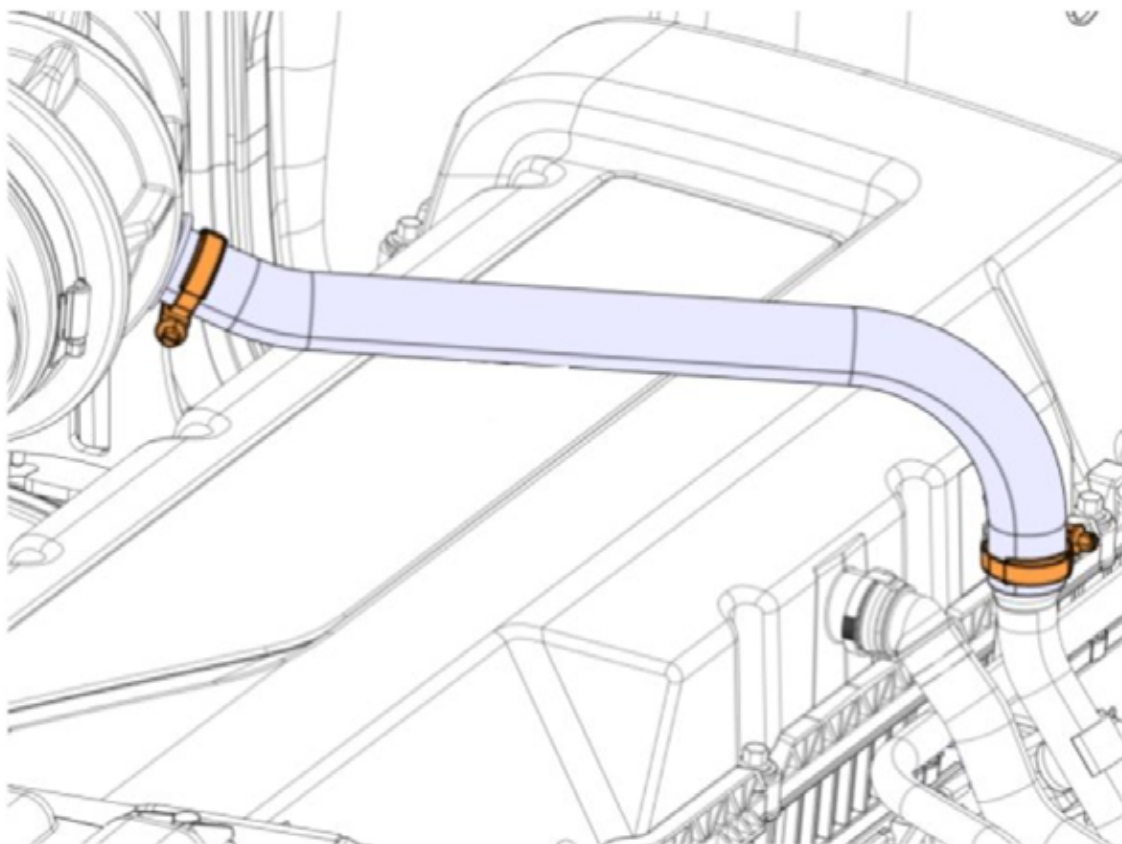


- | | |
|---|-----------------------------|
| 8 | Unlatch and raise the hood. |
|---|-----------------------------|

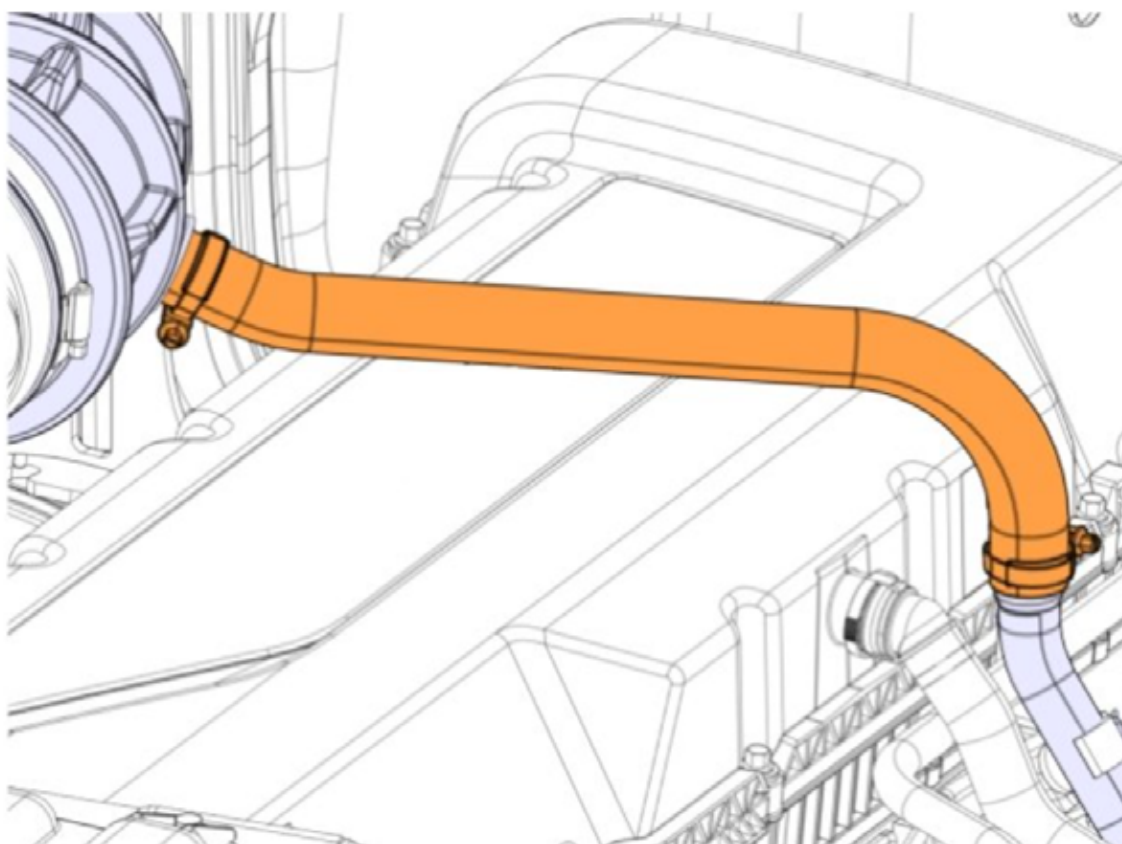
- | | |
|---|---------------------------------|
| 9 | Drain the compressed air tanks. |
|---|---------------------------------|



10	Loosen the clamps.
----	--------------------



11	Remove the hose.
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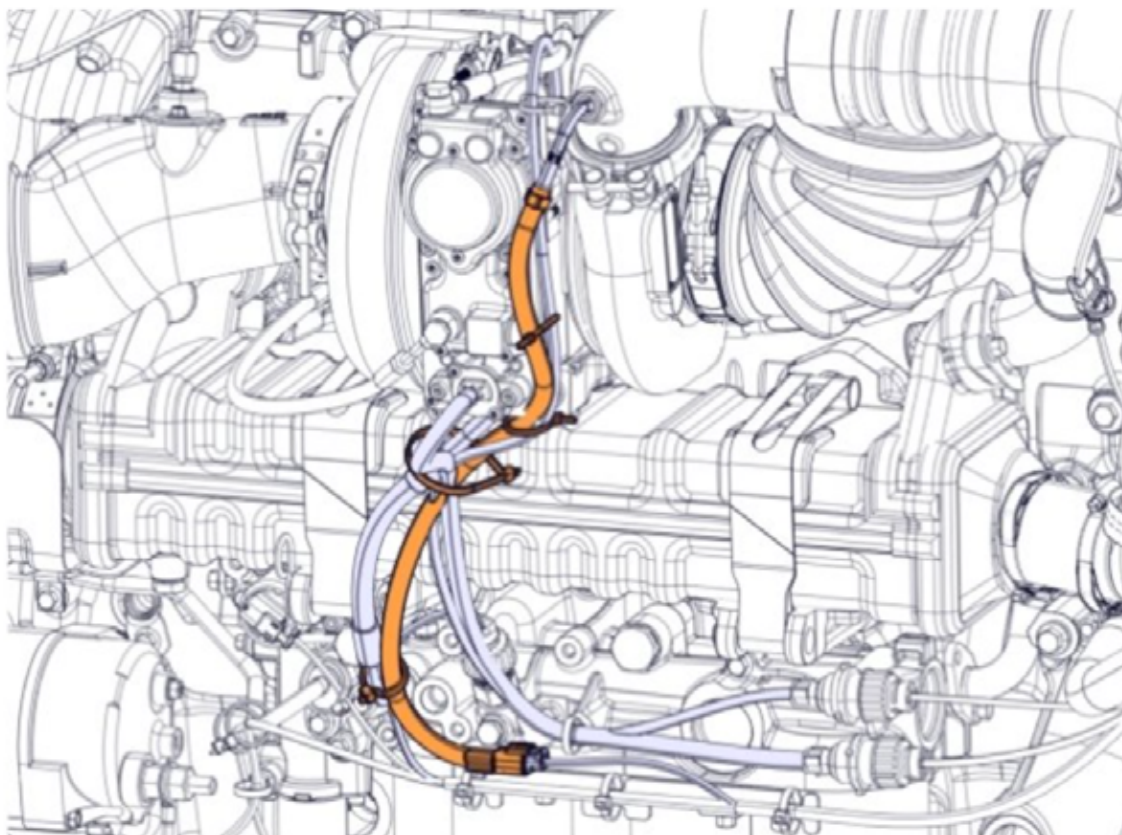


12	Remove the cable ties.
----	------------------------

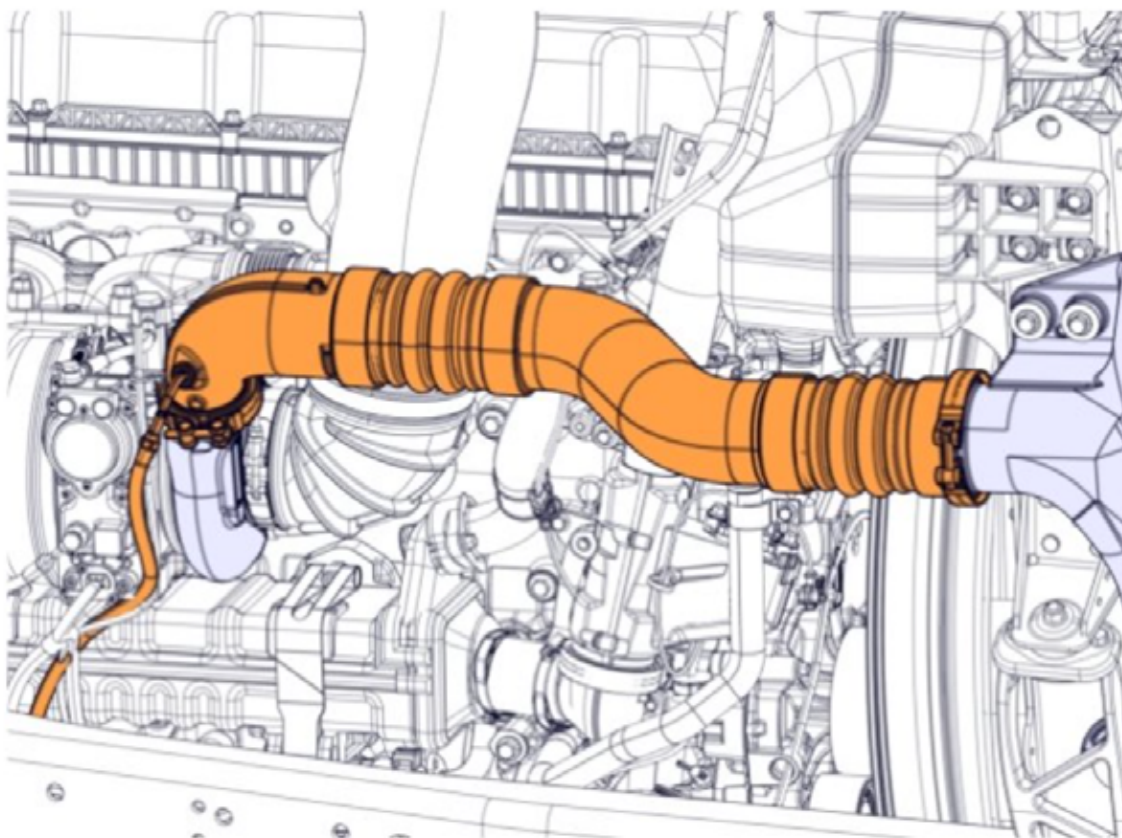
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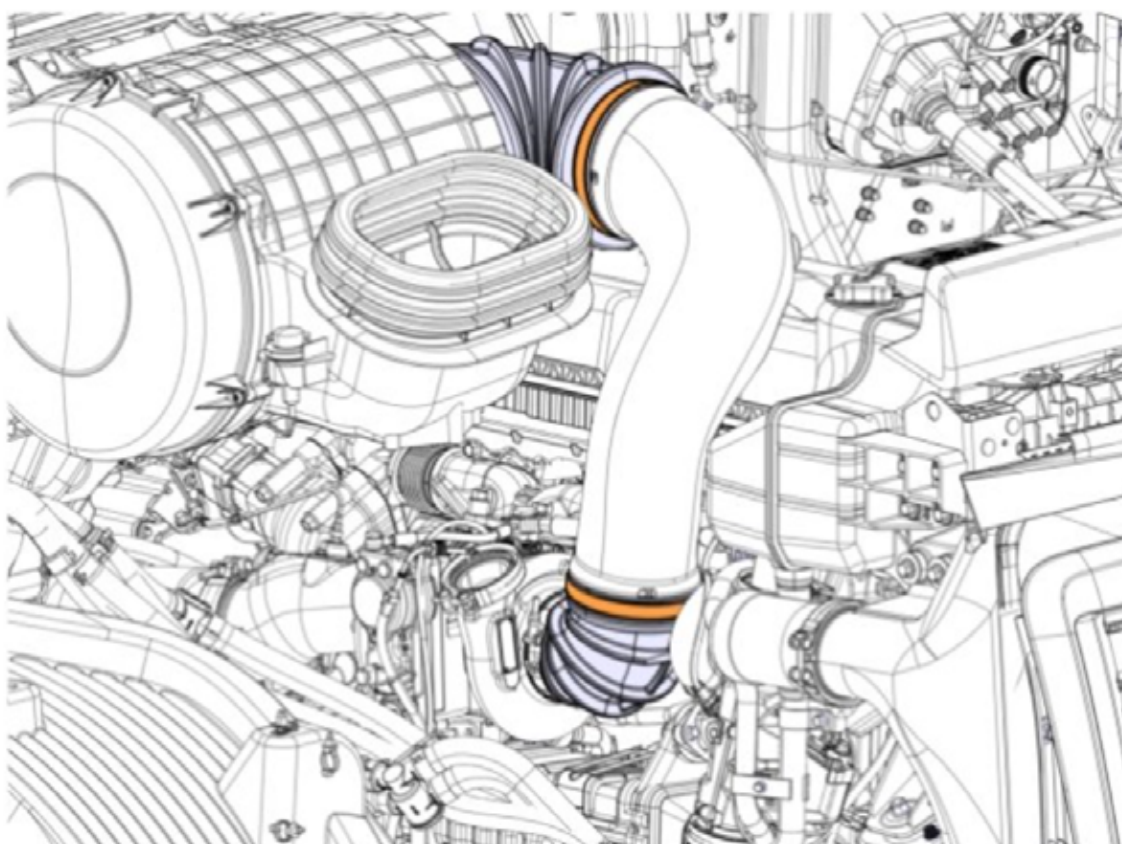
13	Disconnect the sensor connector.
	 Note To avoid damaging the sensor, do not remove from the pipe.



14	Loosen the clamps.
15	Remove the pipe assembly.



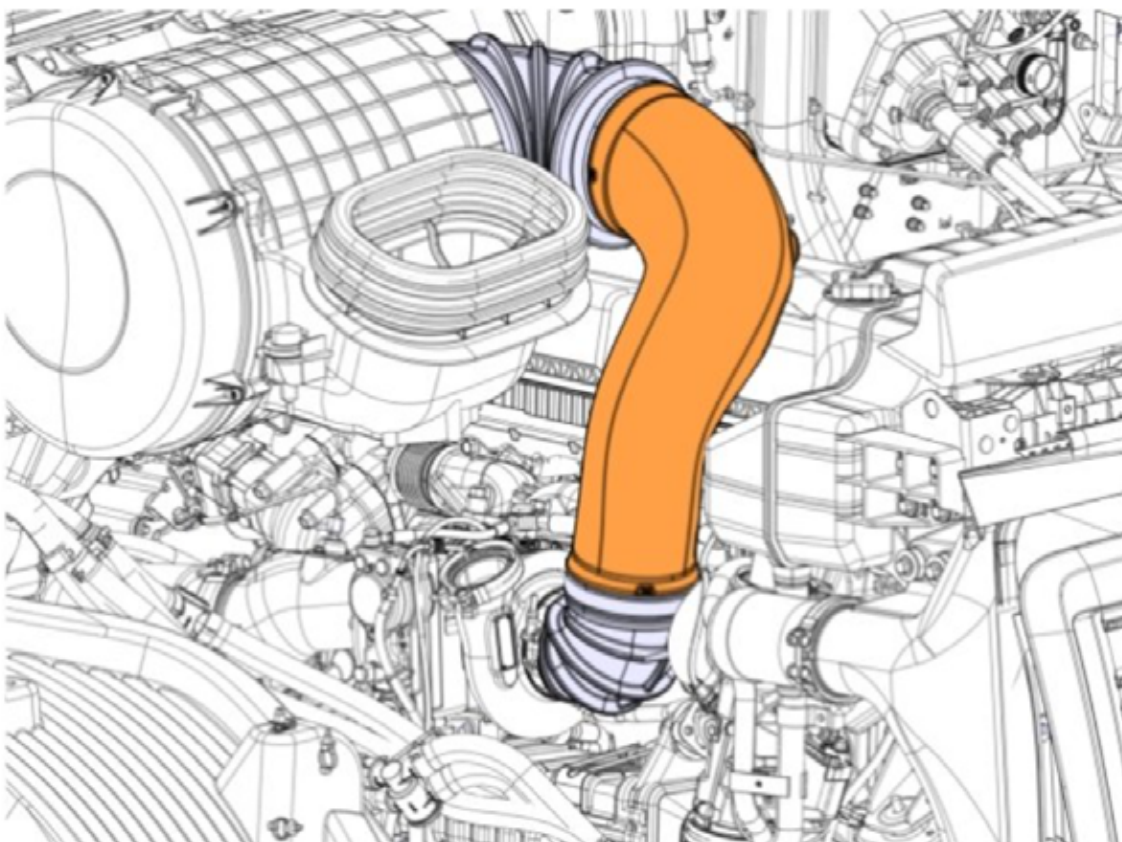
16	Loosen the clamps.
----	--------------------



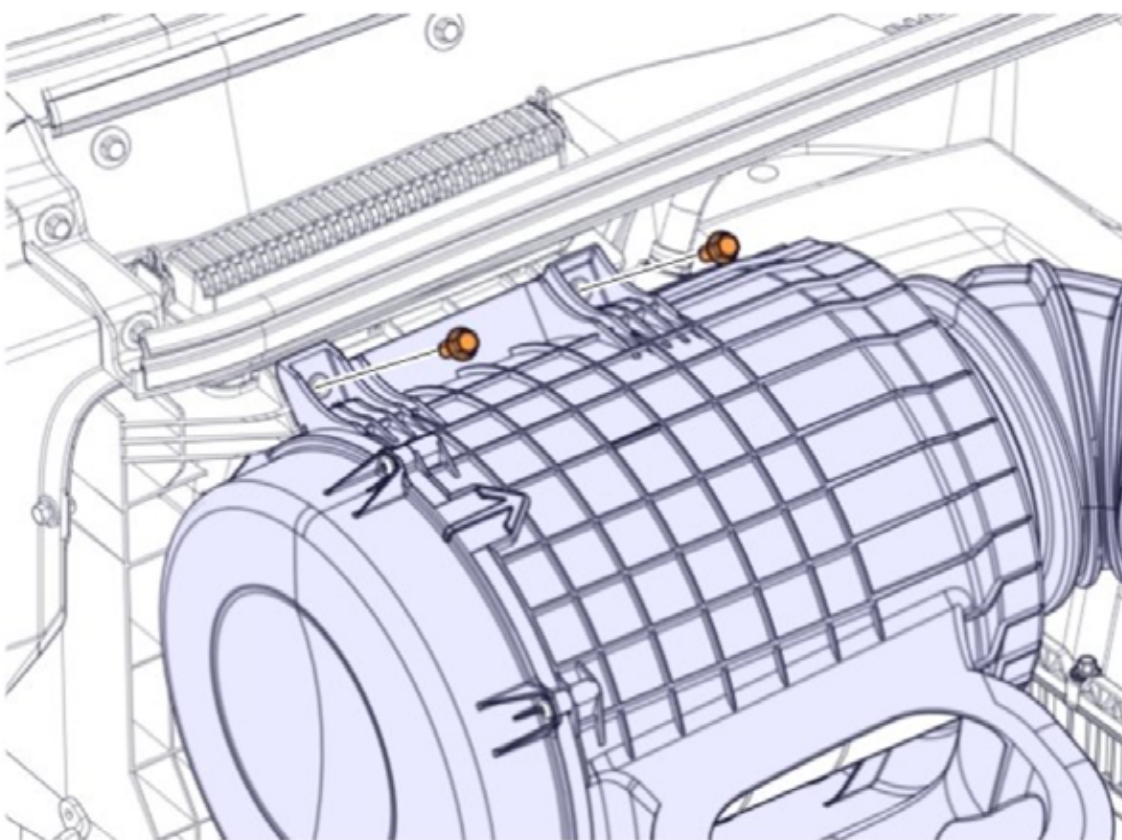
17	Remove the air duct.
----	----------------------

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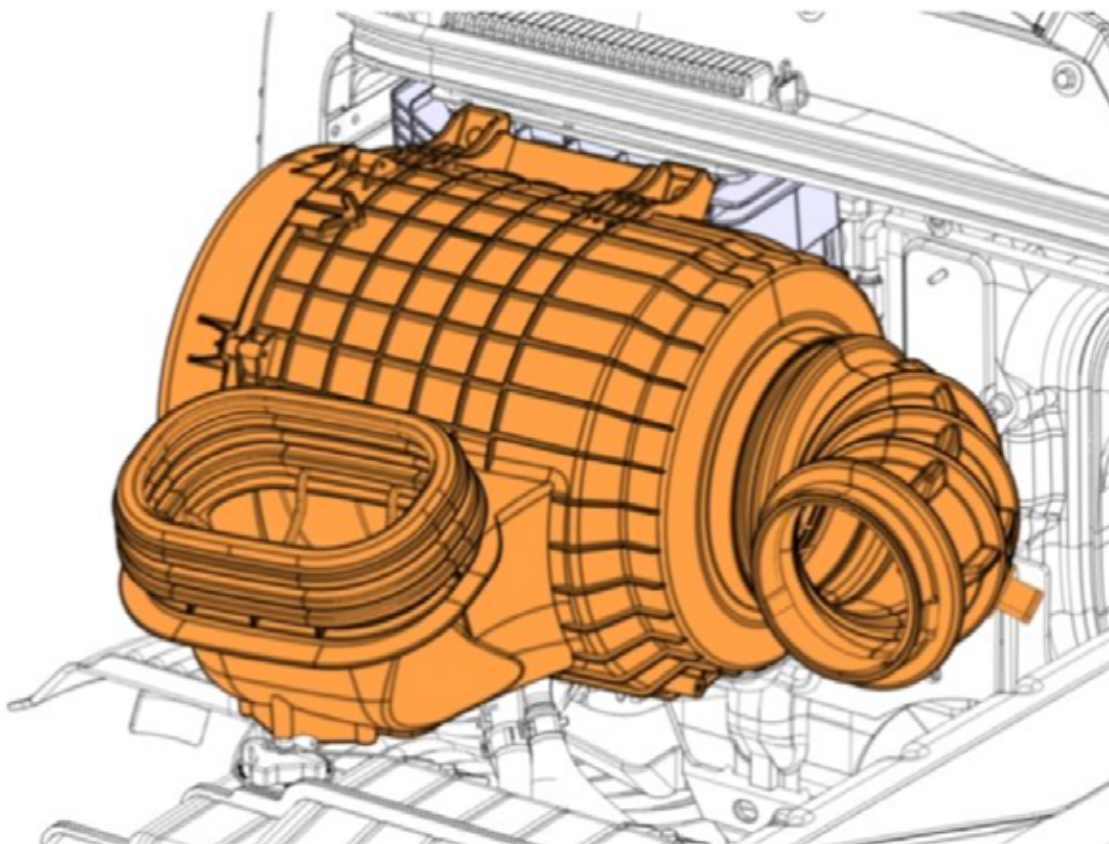
18 Remove the screws.



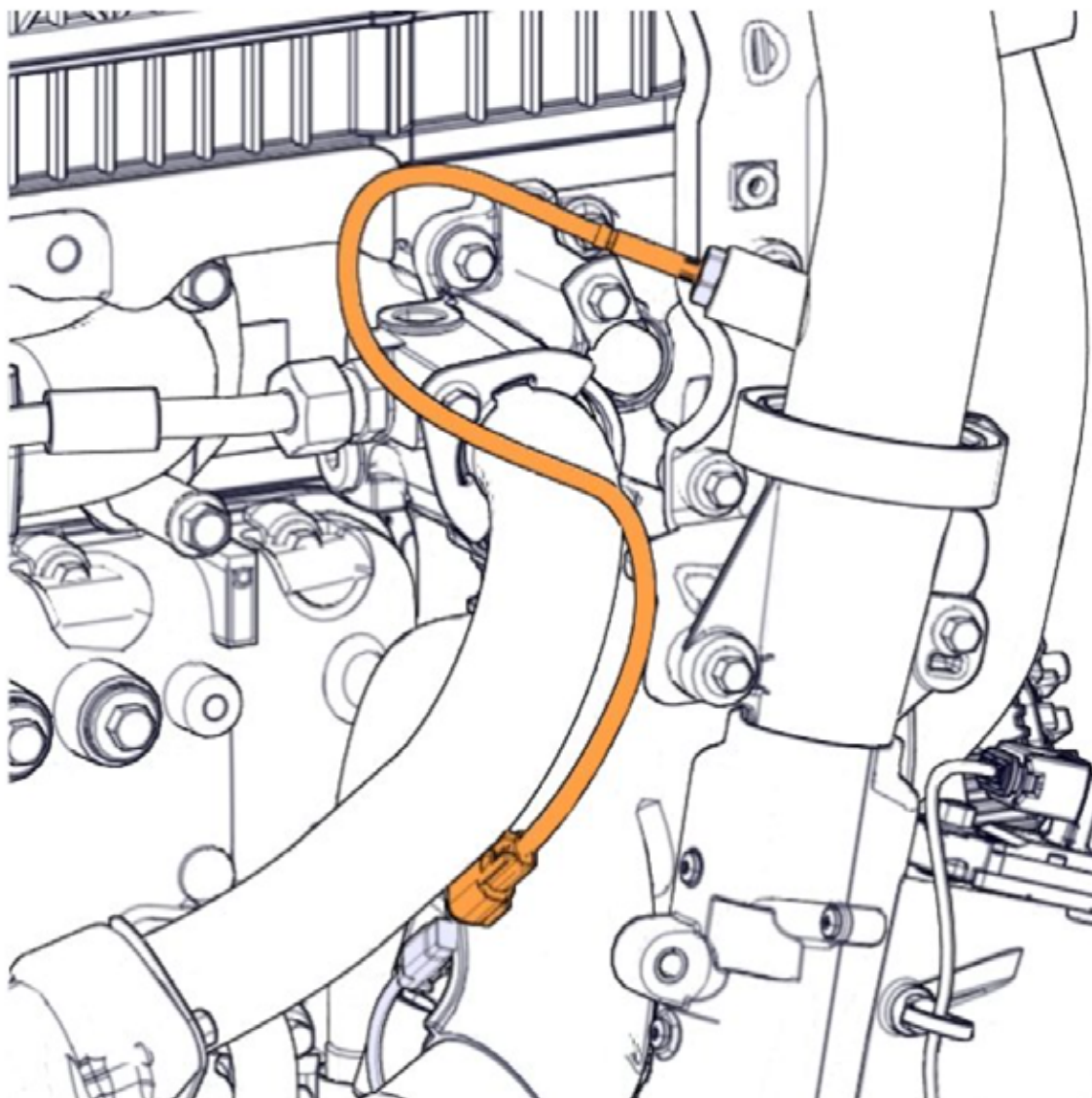
19 Remove the air filter housing.

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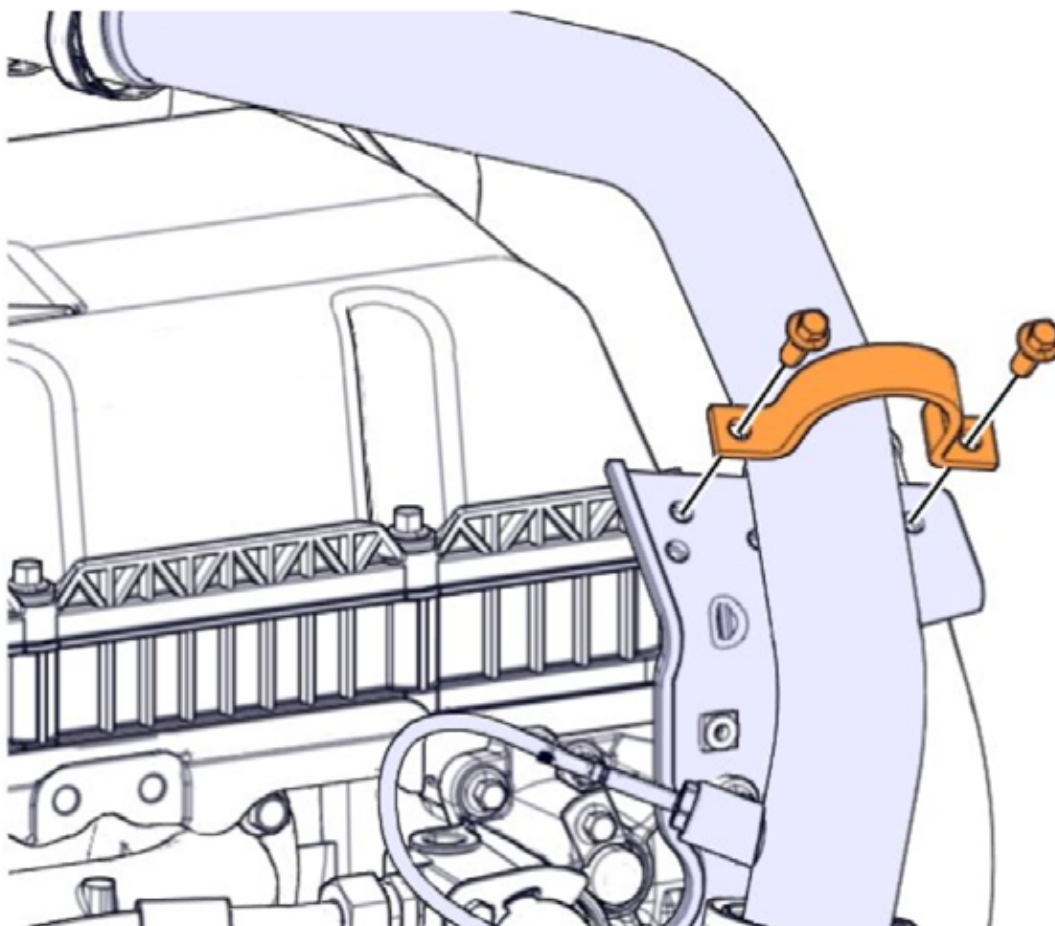
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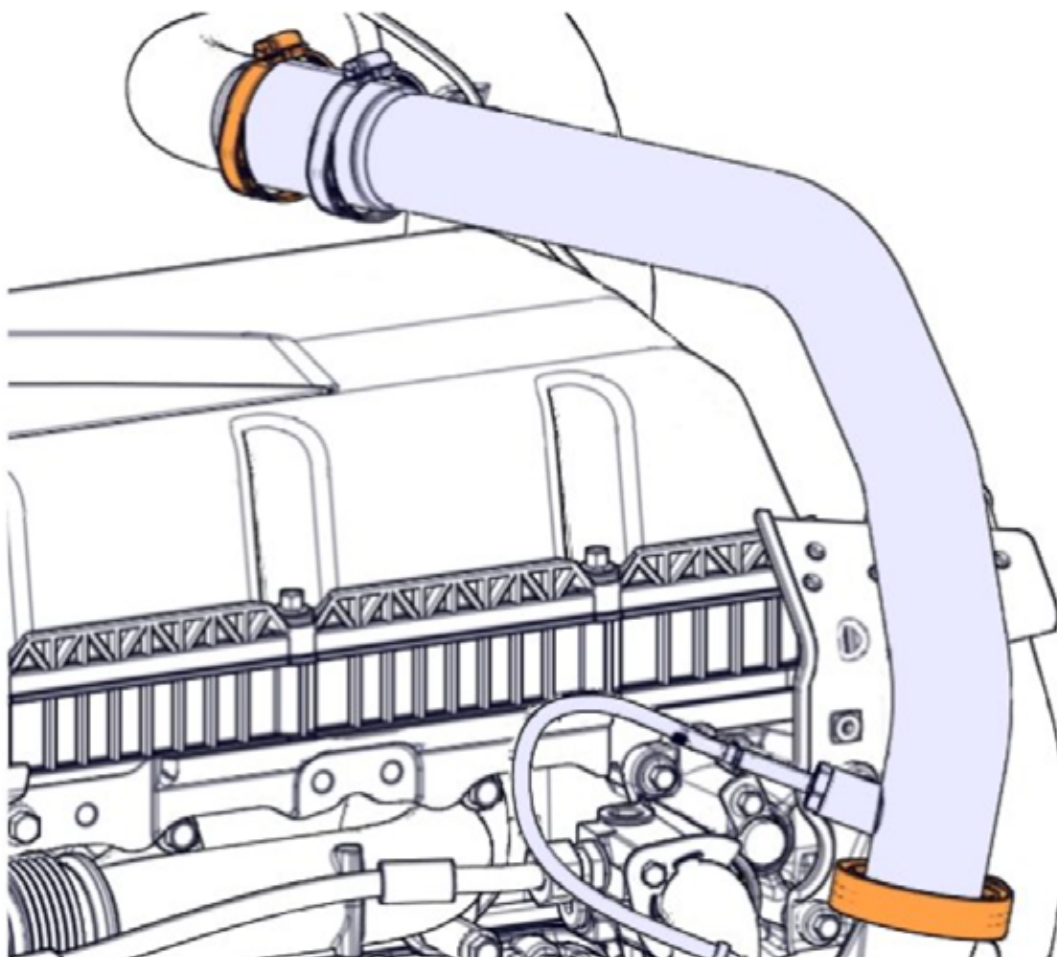
20	Disconnect the connector.
21	Remove the ties.



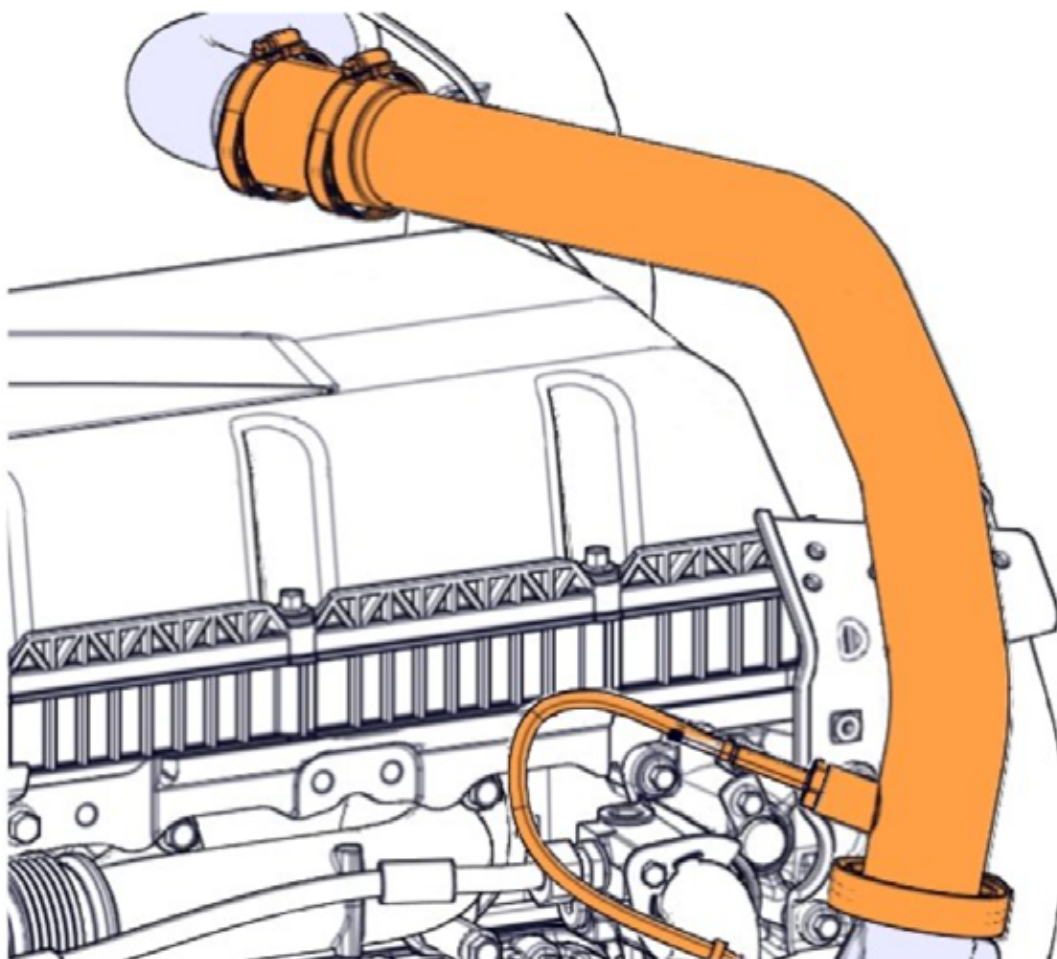
22	Remove the screws.
23	Remove the clamp.



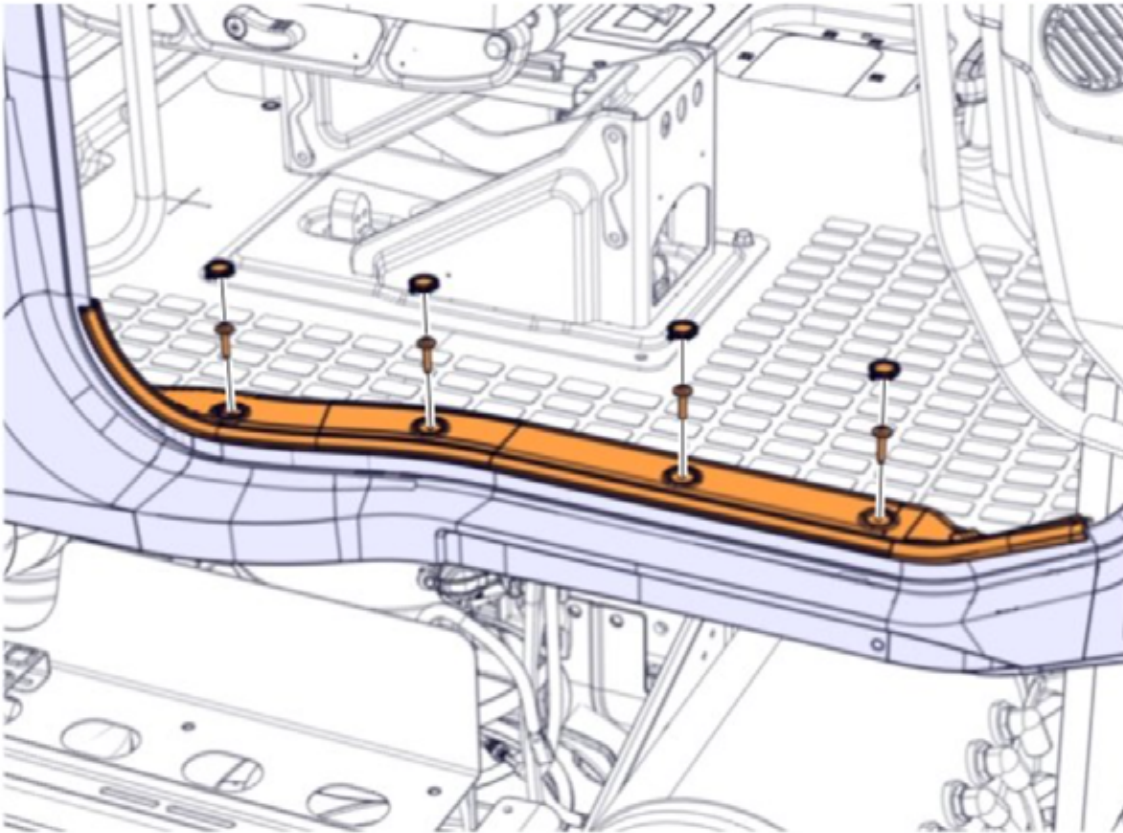
24	Loosen the clamps.
----	--------------------



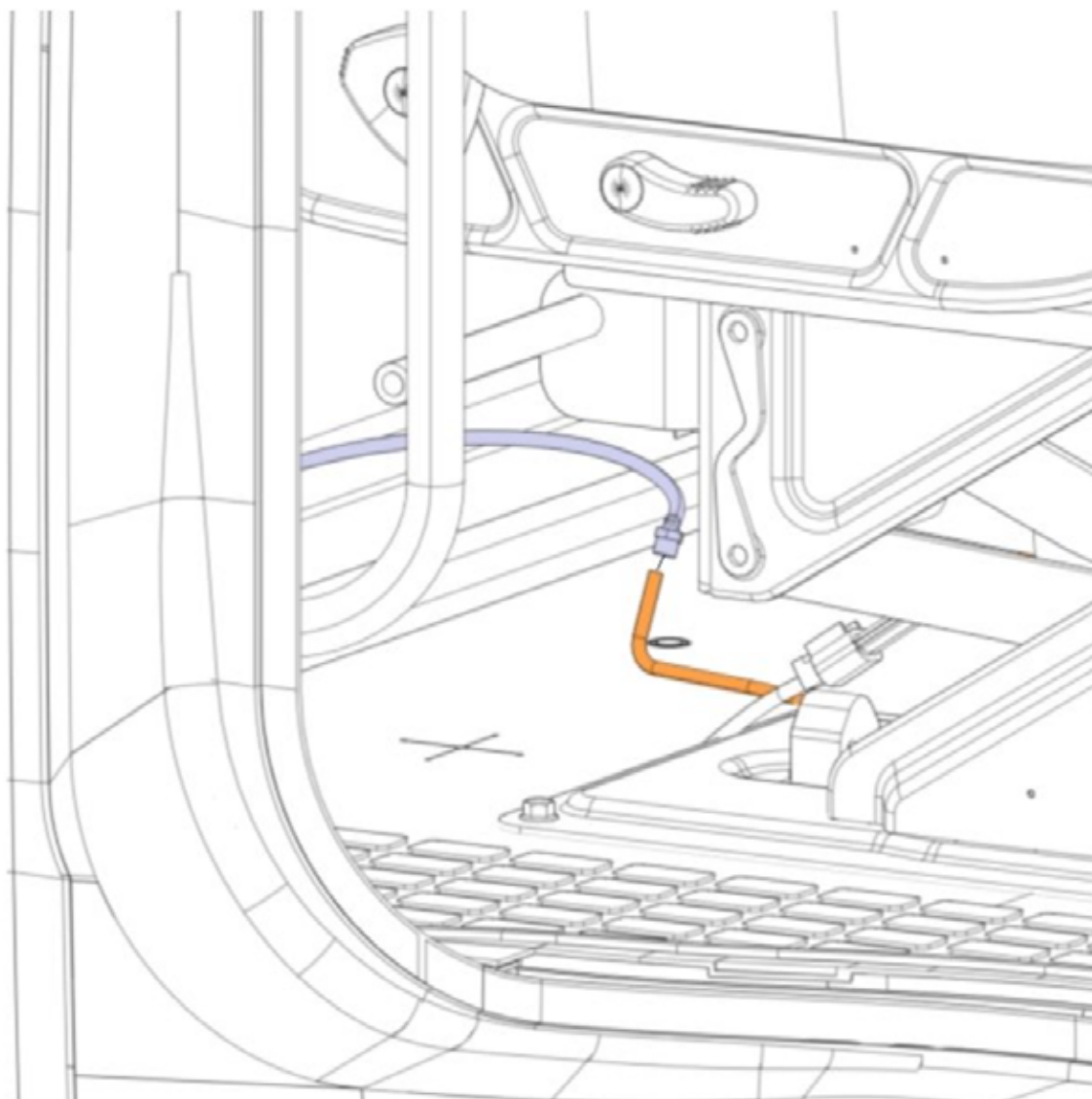
25	Remove the pipe.
----	------------------



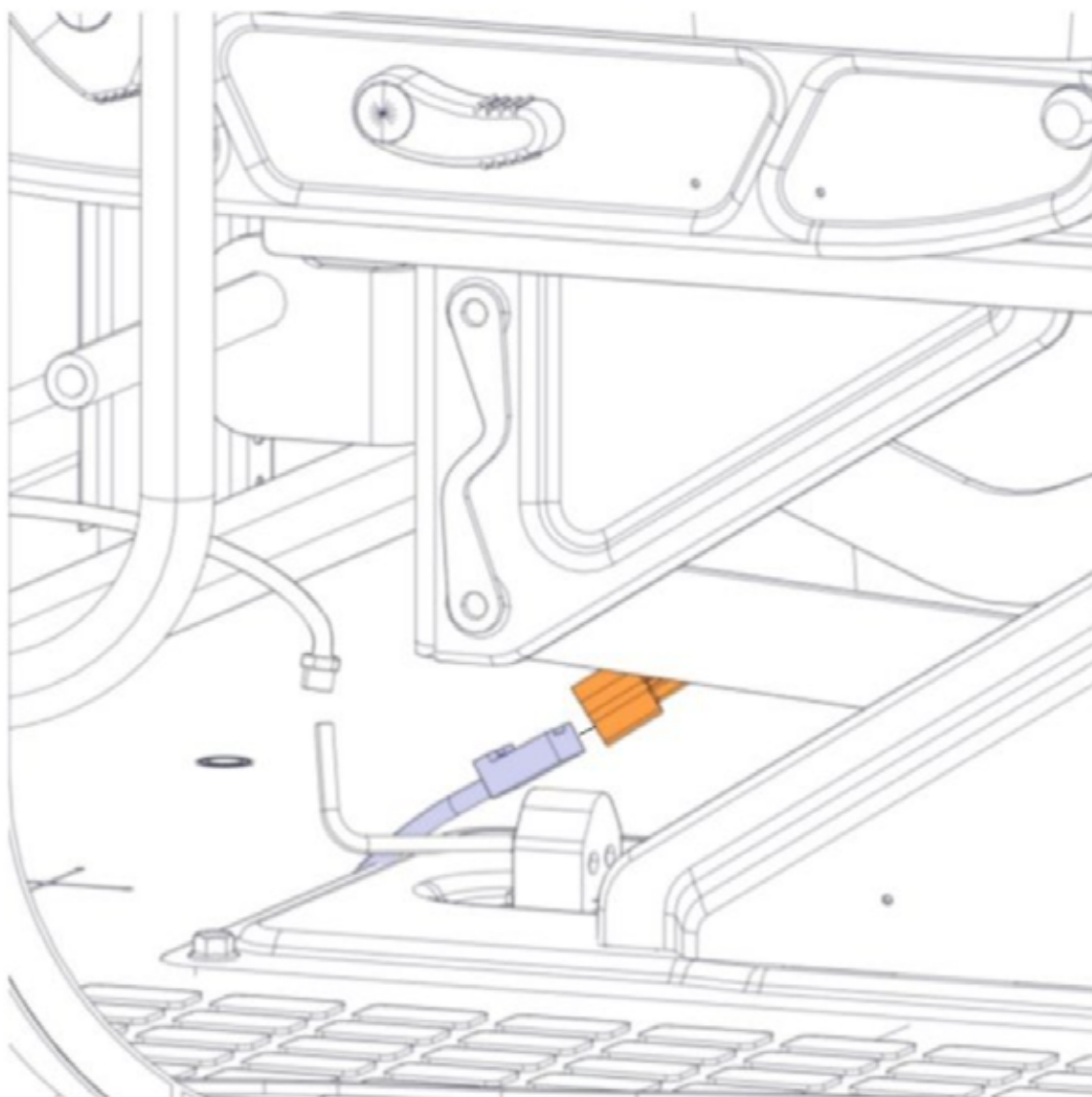
26	Remove the protecting covers.
27	Remove the screws.
28	Remove the panel.



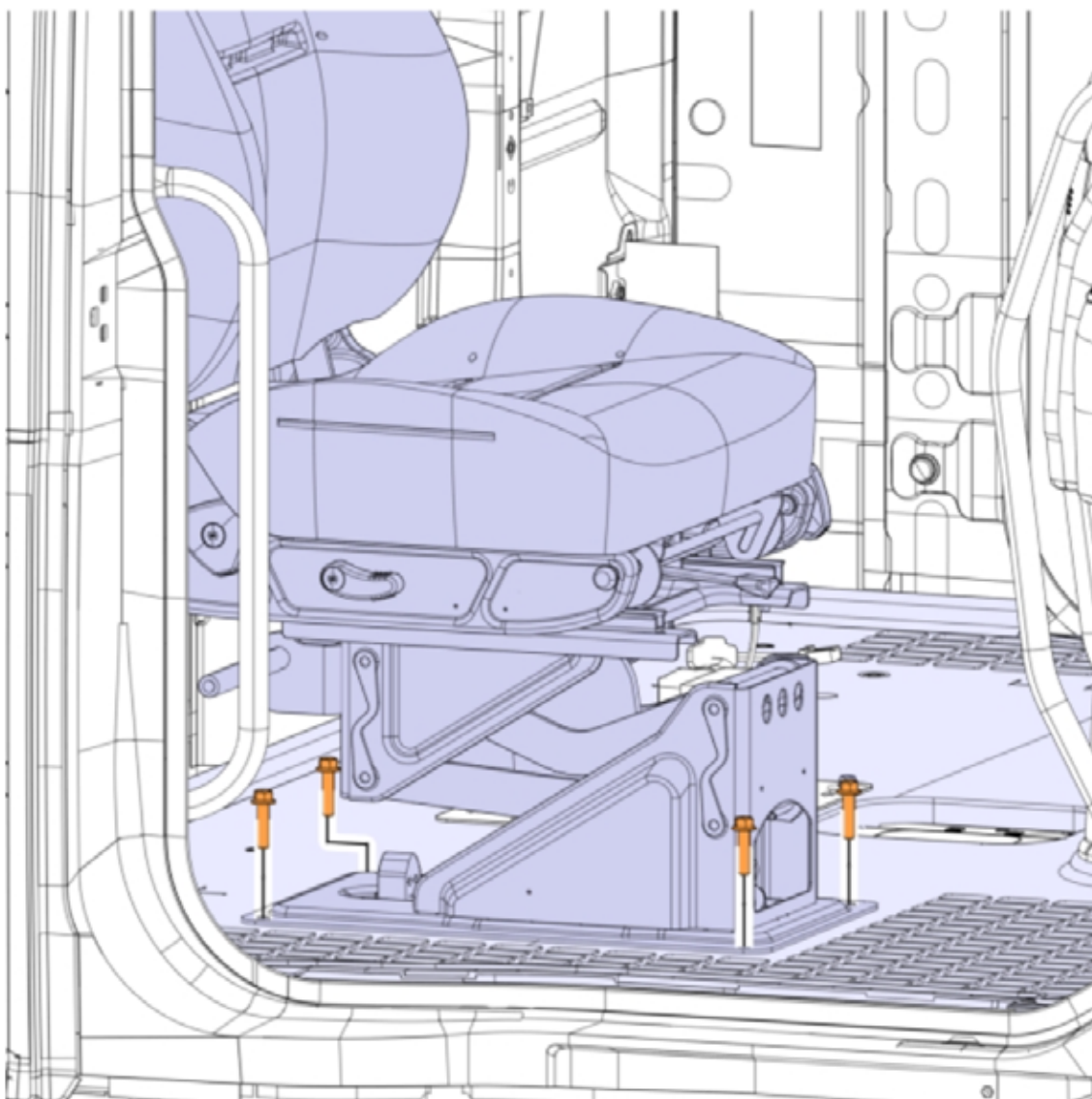
29	Remove the seat belt.
30	Disconnect the air tube.
	Required material
	DISASSEMBLY TOOL J-42189



31	Disconnect the connector.
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32	Remove the screws.
----	--------------------

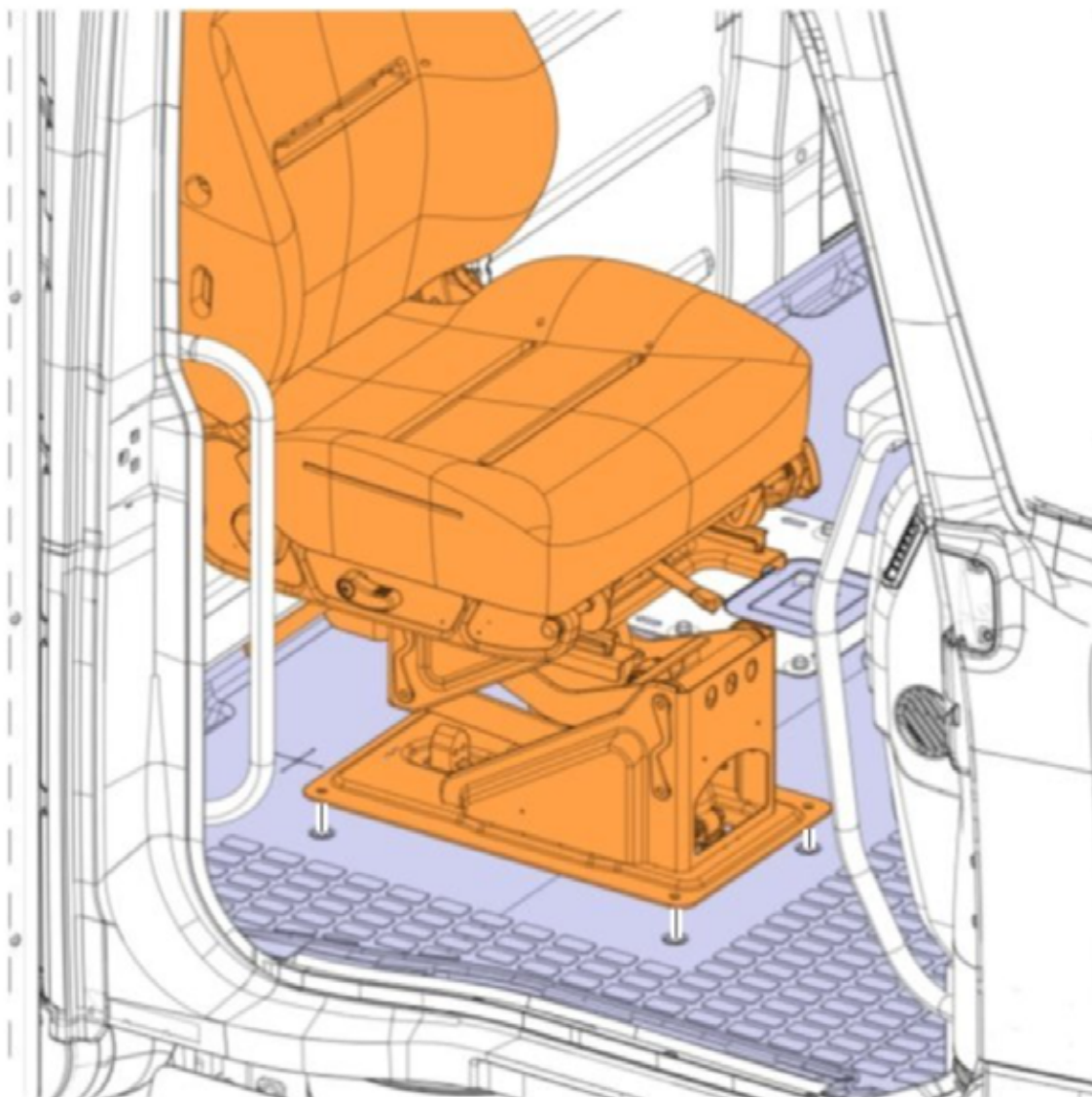
**WARNING**

Risk of serious injury.

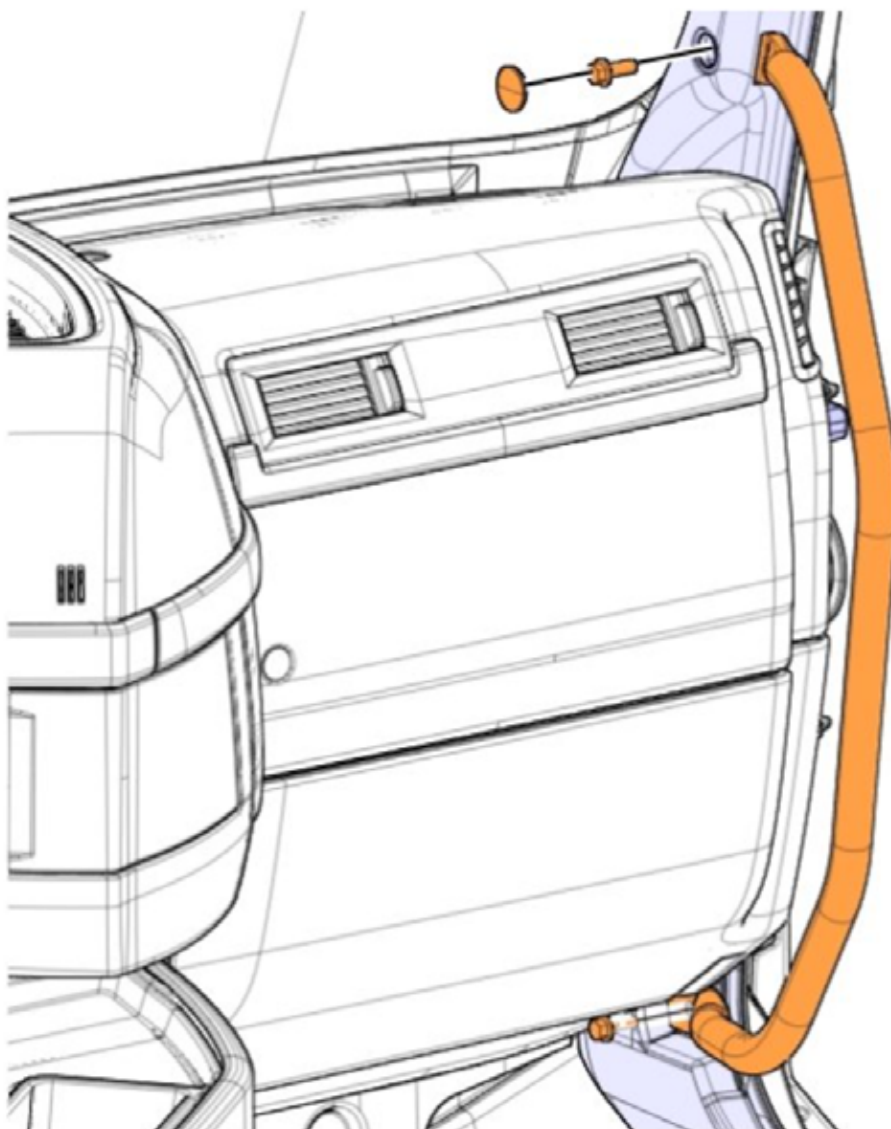
Heavy component.

- Exercise caution when moving the component. Assistance is required.

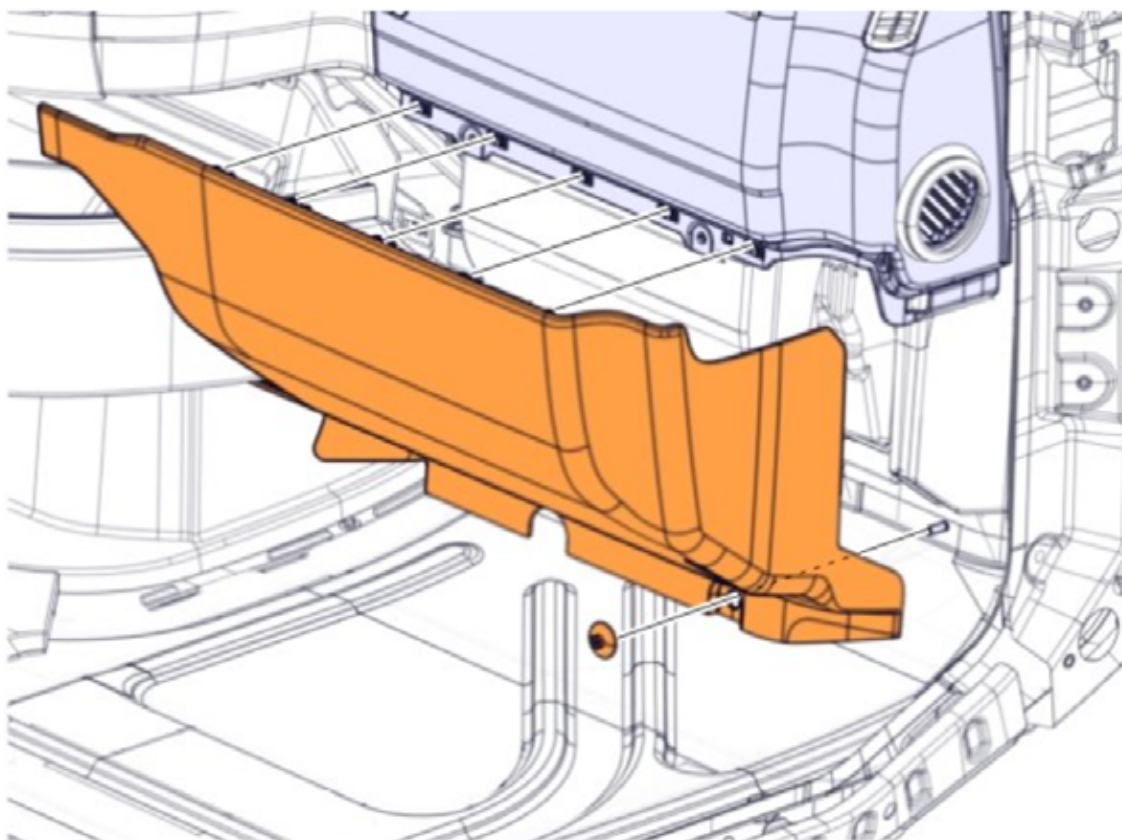
33 Remove the seat from the cab.



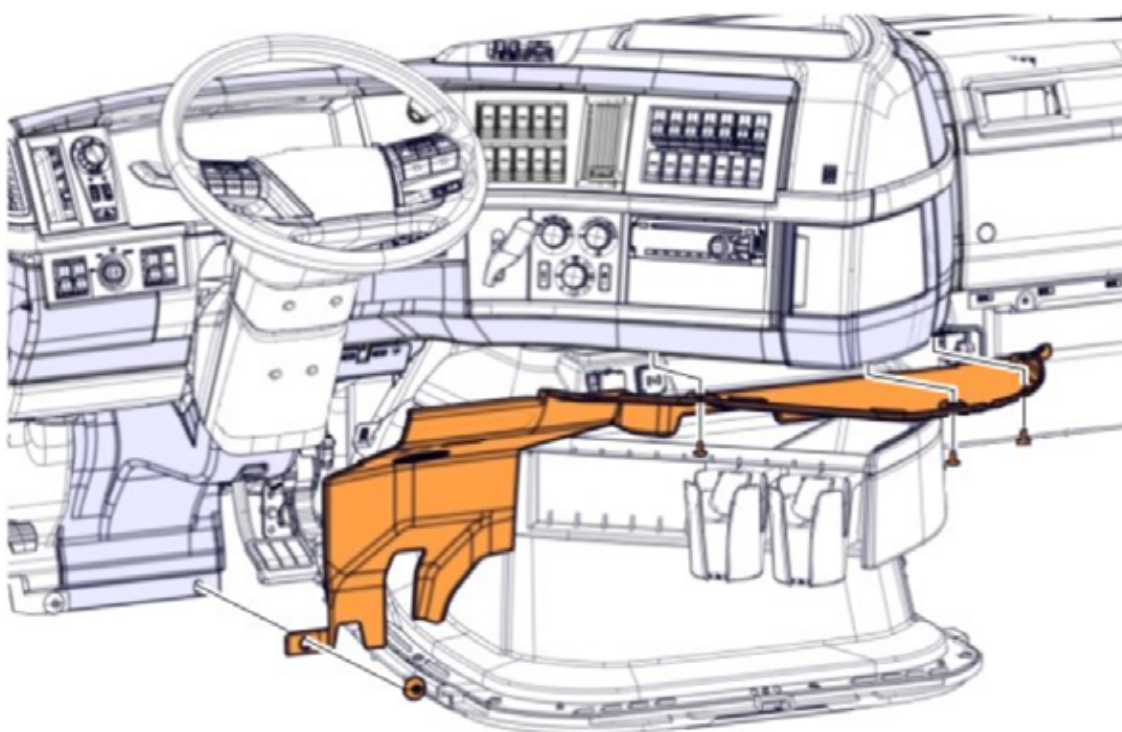
34	Remove the screw cover.
35	Remove the screws.
36	Remove the handle.



37	Remove the nut.
38	Remove the panel.



39	Remove the panel.
----	-------------------

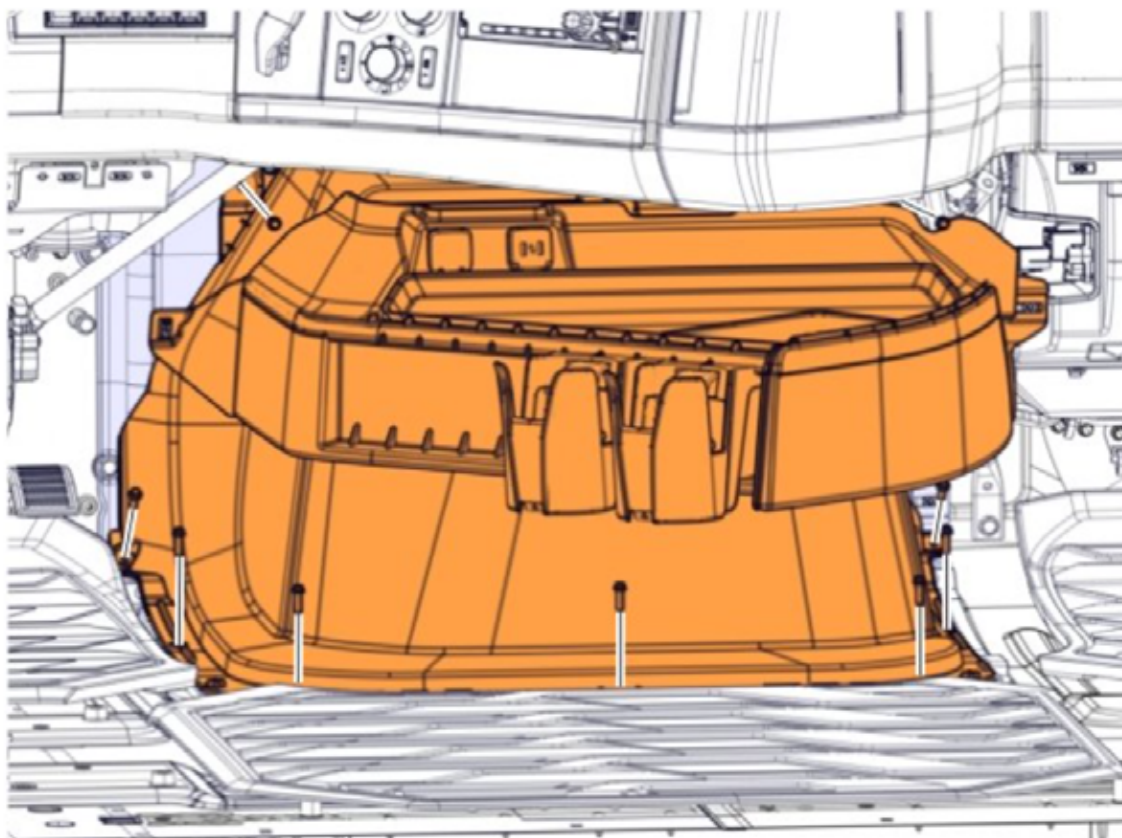


40	Move the floor cover to access the screws.
----	--

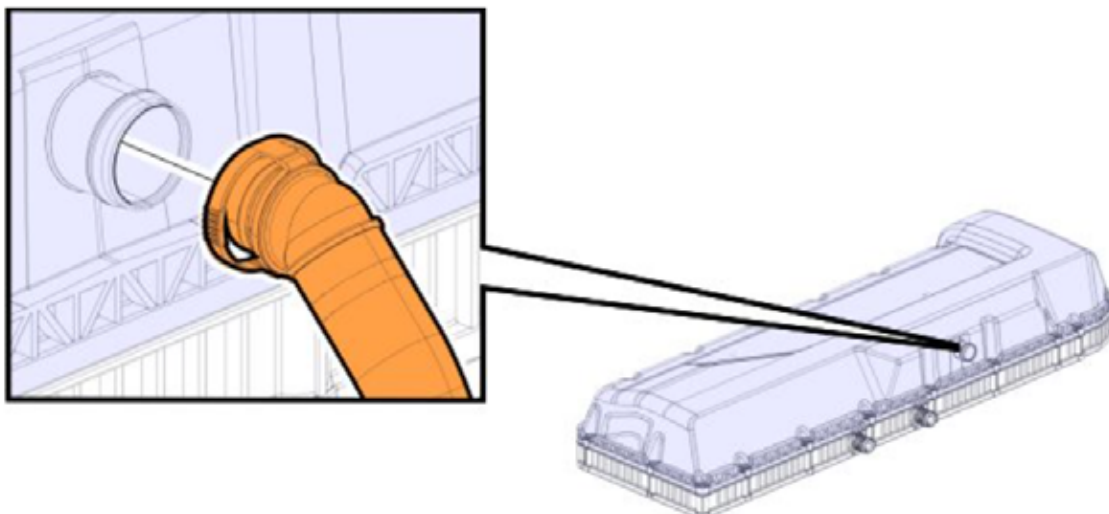
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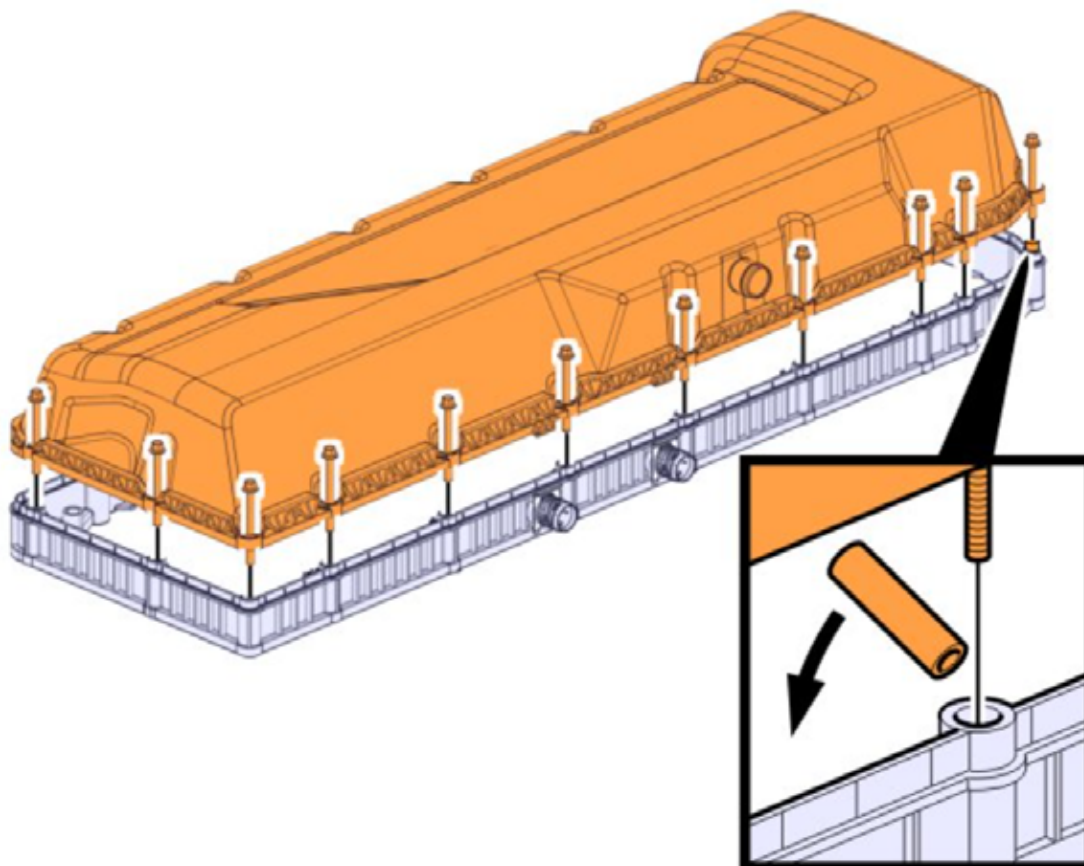
41	Remove the screws.
42	Remove the engine cover.
43	Disconnect the connector.



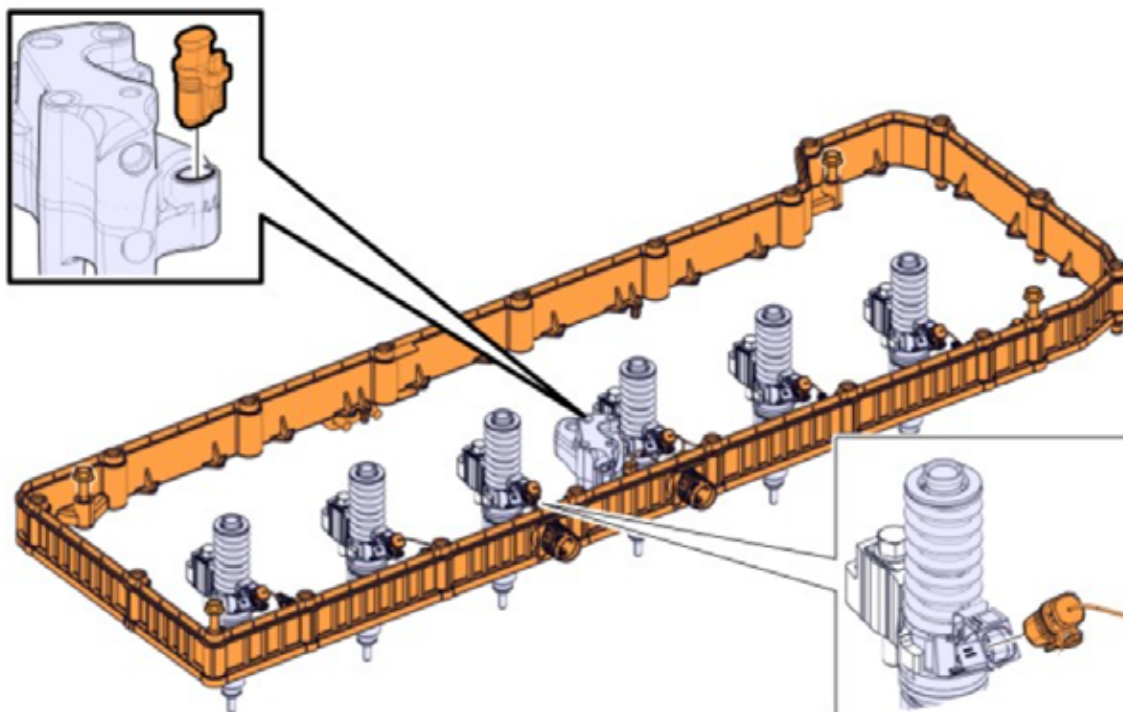
44	Remove the pipe.
	 Note If not previously removed.



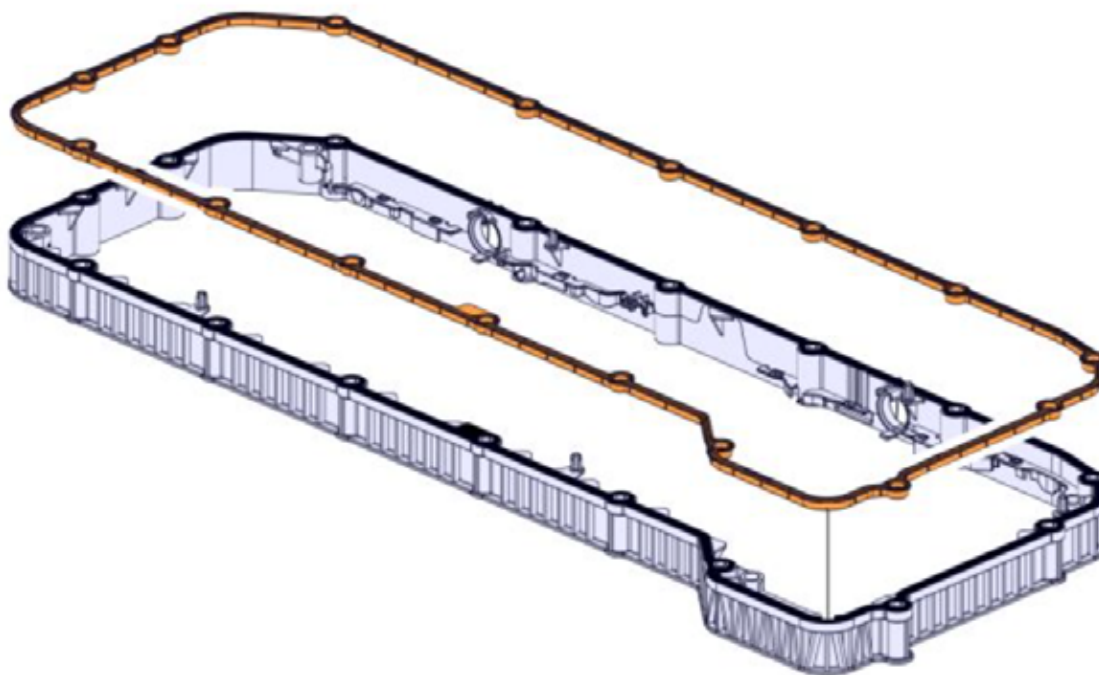
45	Loosen the screws.
46	Remove the valve cover.
	Service hint It is possible, when removing a valve cover screw, that the crush sleeve is drawn out with it. Take care to prevent the sleeve from falling into the gear train as this could result in engine damage.



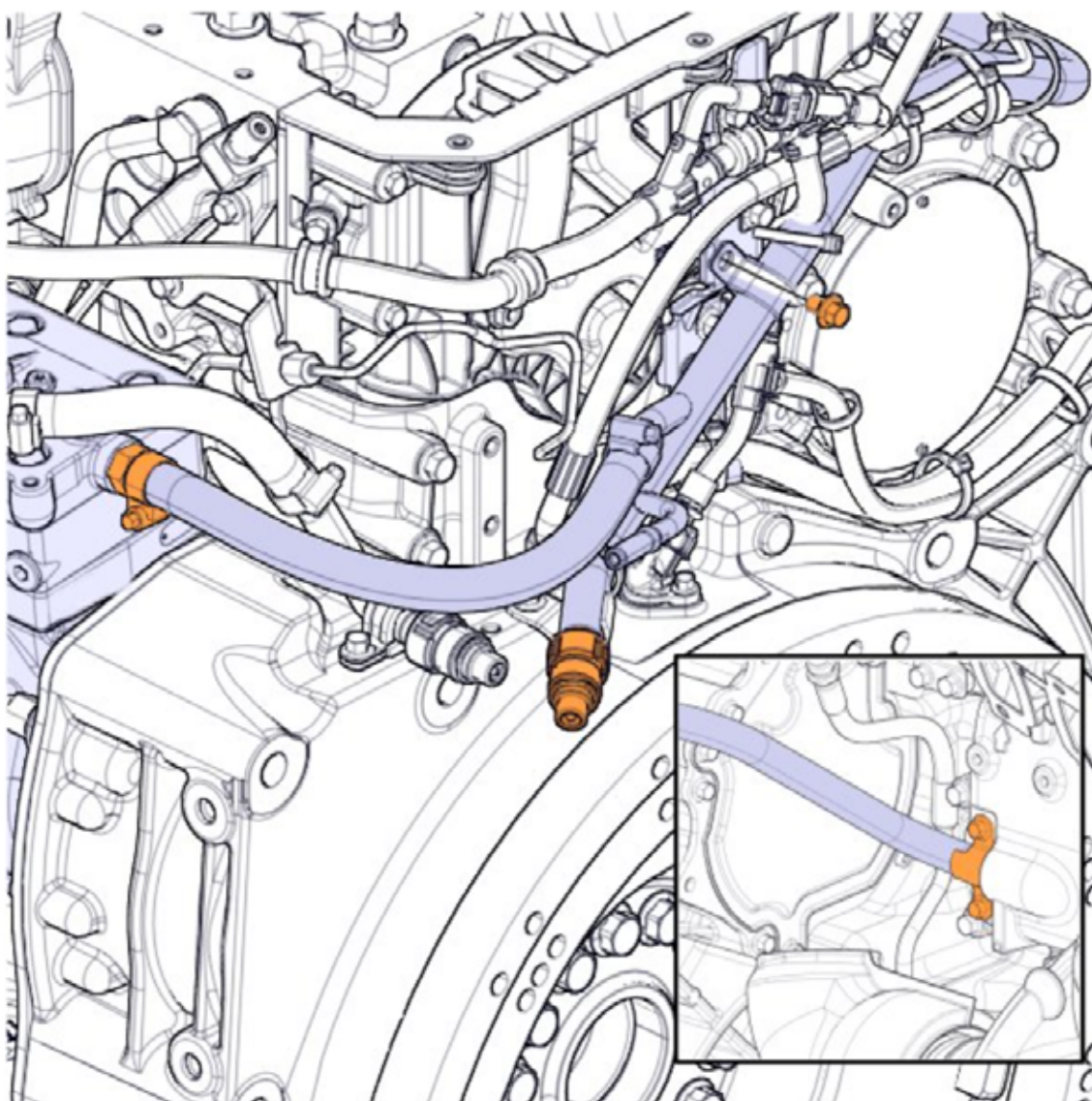
47	Disconnect the connectors.
48	Loosen the screws.
49	Remove the frame.



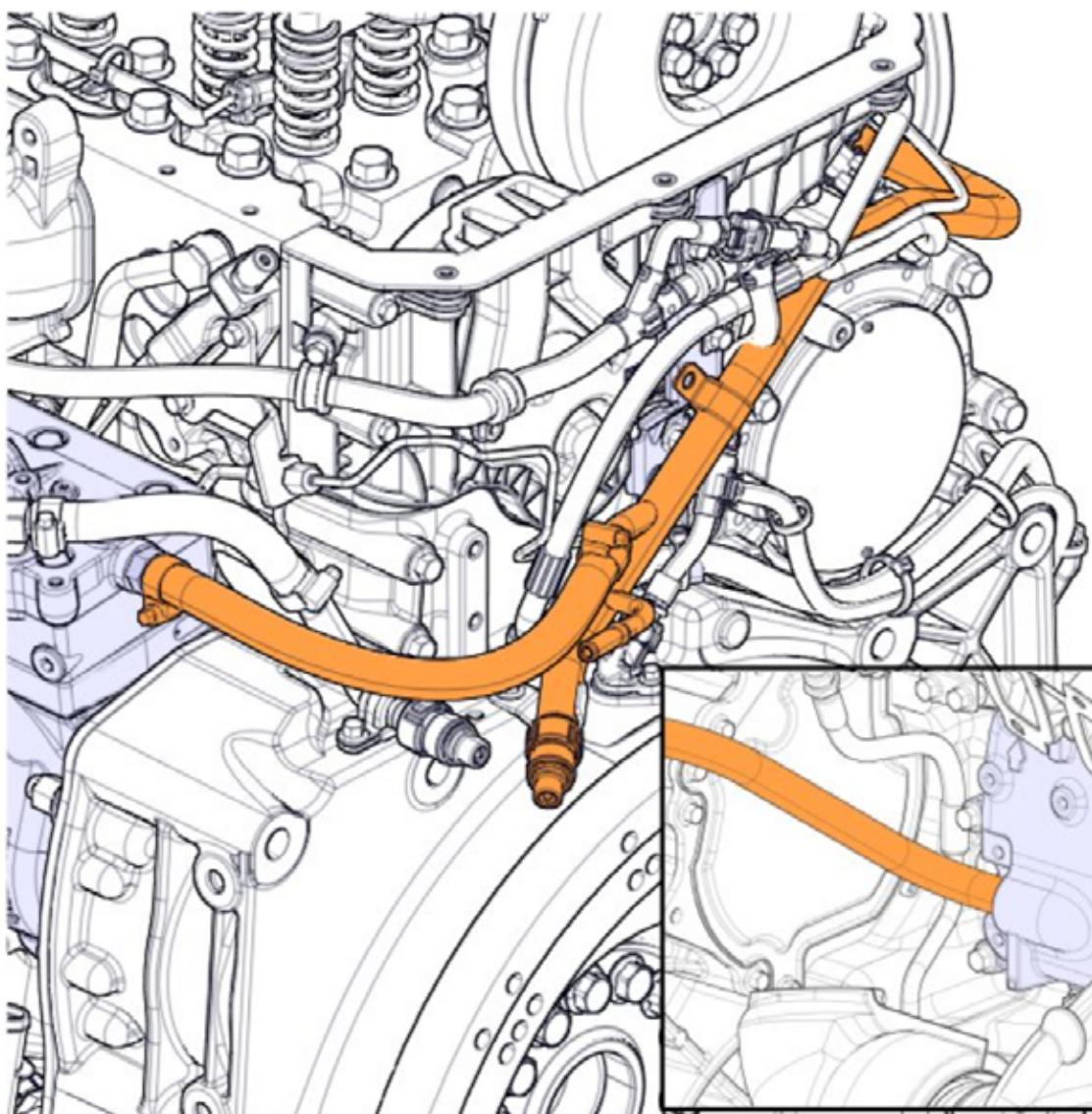
50	Remove the gasket.
----	--------------------



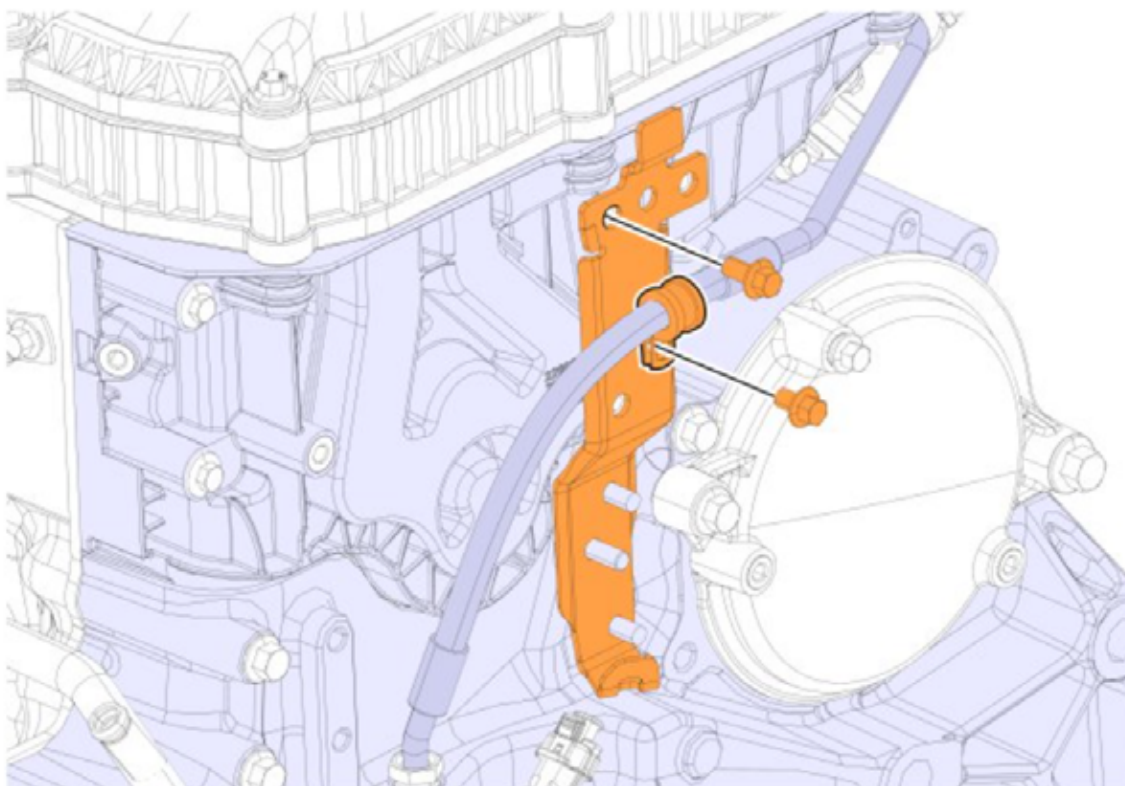
51	Remove the screws.
----	--------------------



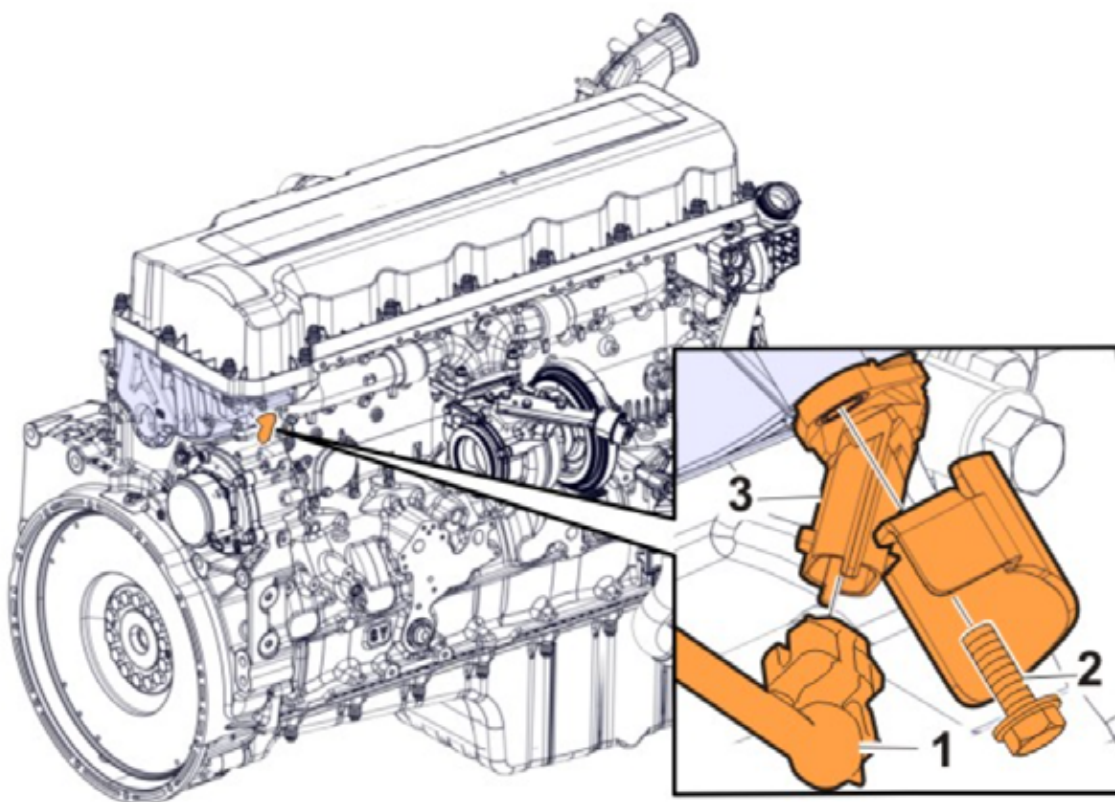
52	Remove the pipe.
----	------------------



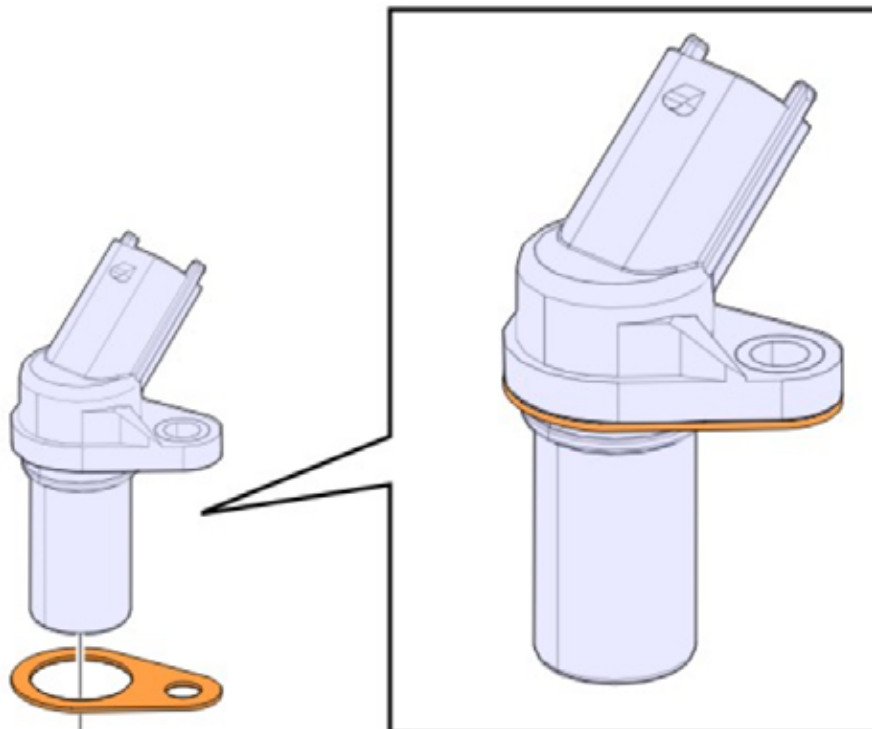
53	Remove the screws.
54	Remove the clamp.
55	Remove the bracket.



56	Disconnect the connector (1).
57	Remove the screw (2).
58	Remove the sensor and the heat shield. (3).



59	Be aware of possible shims.
----	-----------------------------



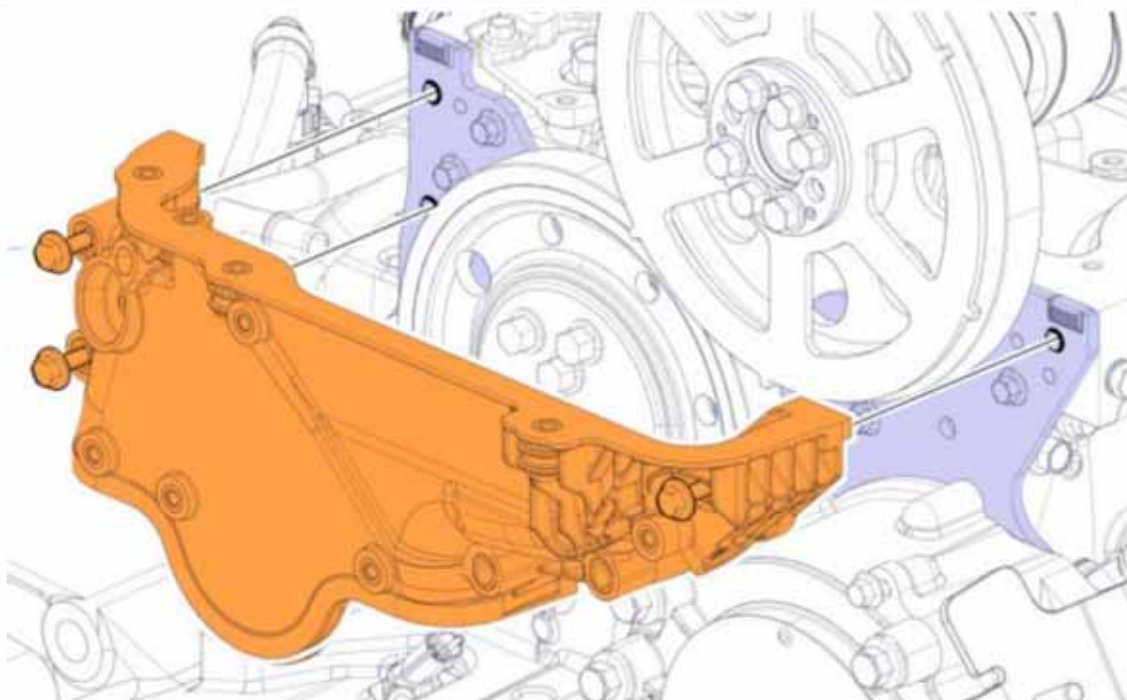
60	Disconnect the connector.
----	---------------------------

61	Remove the screws.
----	--------------------

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62	Remove the cover.
----	-------------------



63	Perform this procedure when the condition below is met. Conditions • If not previously removed. ▶ Disconnect the connector.
----	--

64	Clean around the sensor.
65	Remove the sensor.

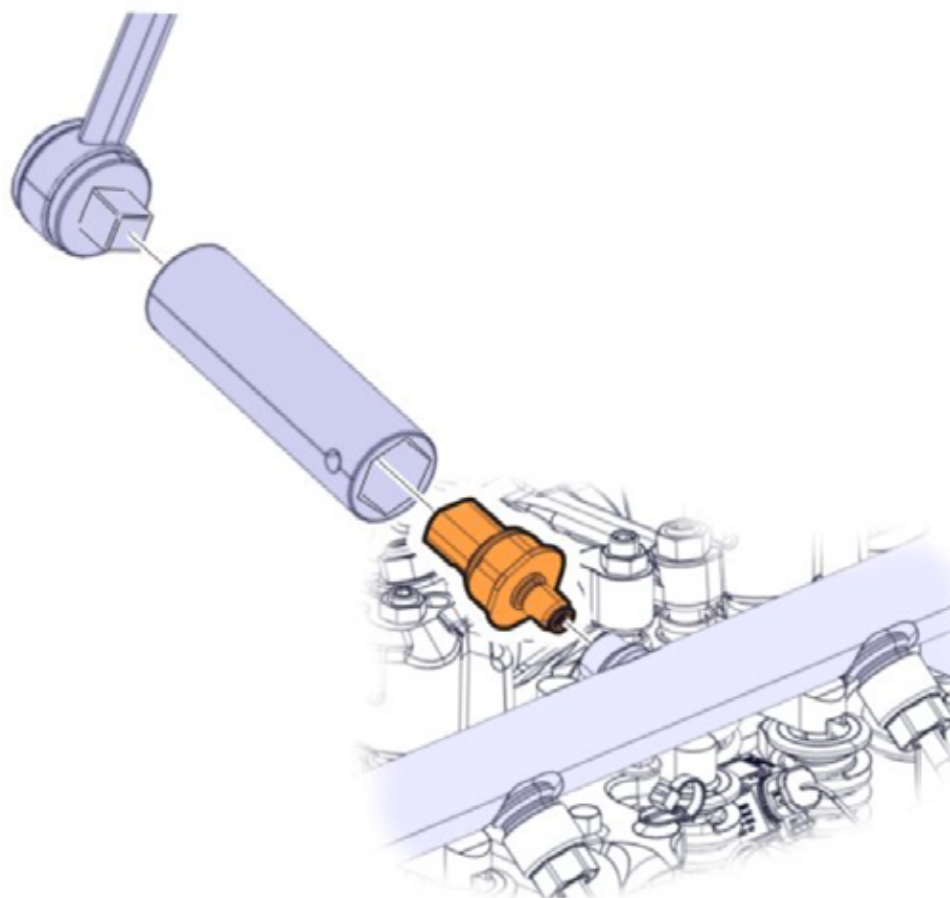
**CAUTION**

Risk of material damage.

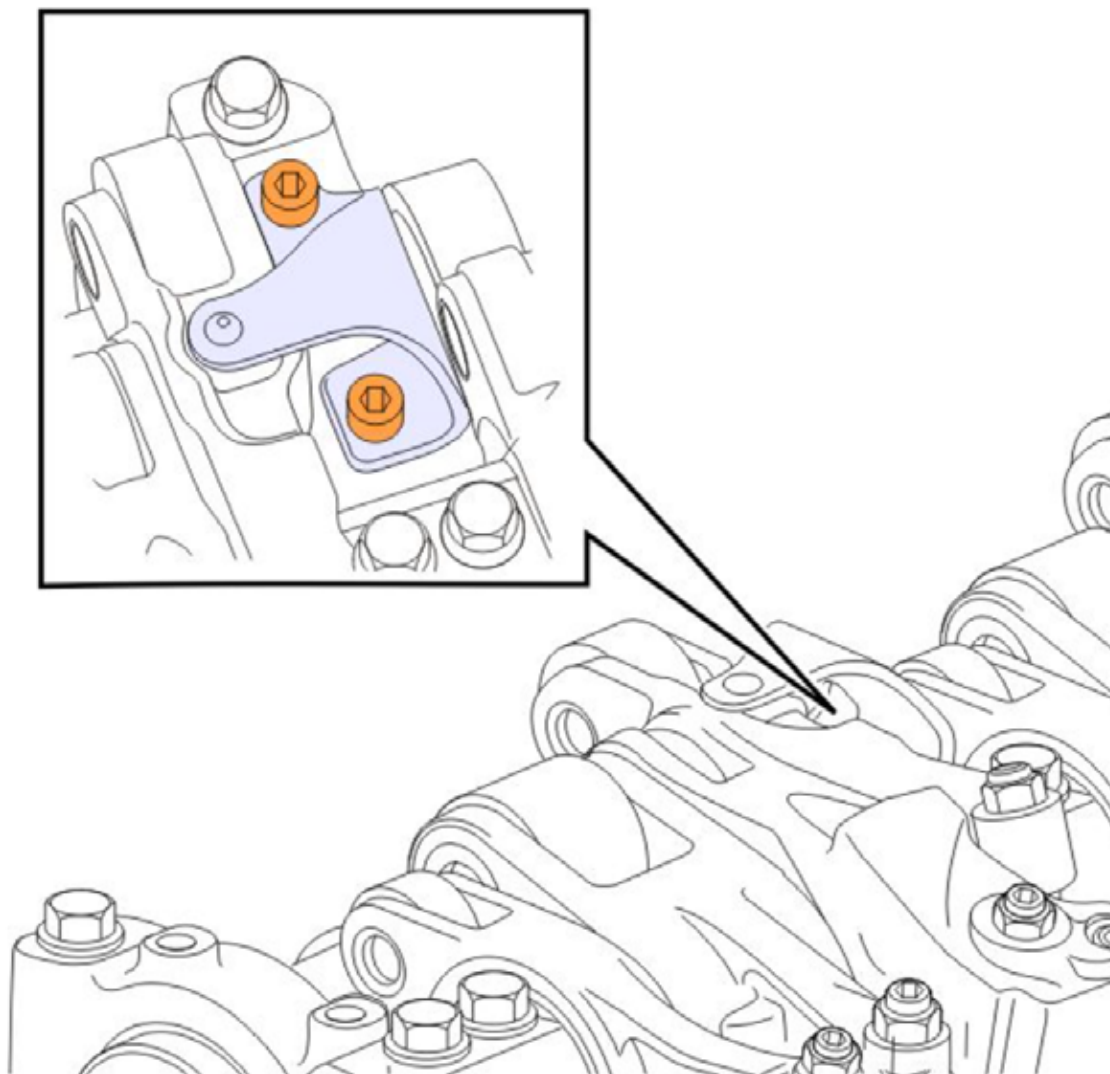
Component damage could occur if debris enters.

- Cover openings to prevent debris from entering.

66	Cover or plug openings immediately.
----	-------------------------------------



67	Remove the screws and leaf springs.
----	-------------------------------------

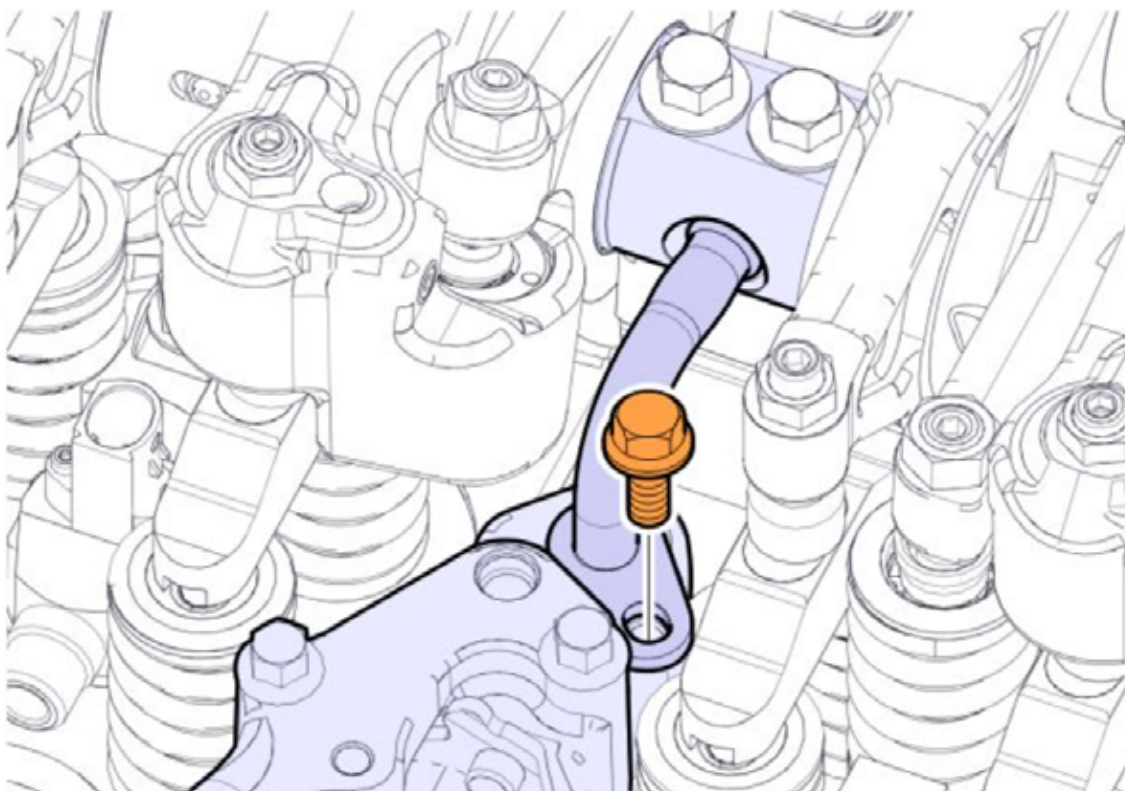


68 Remove the screw.

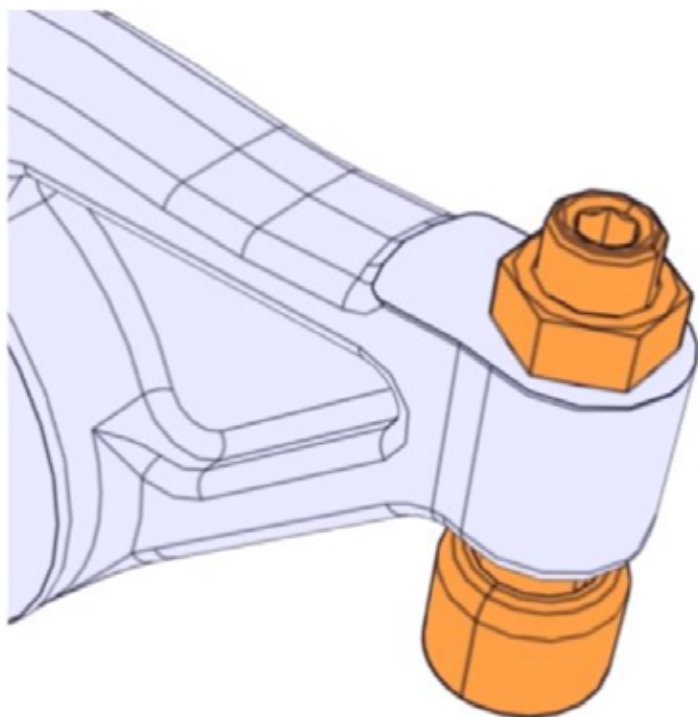


Note

The pipe is removed at a later stage along with the rocker arm shaft.

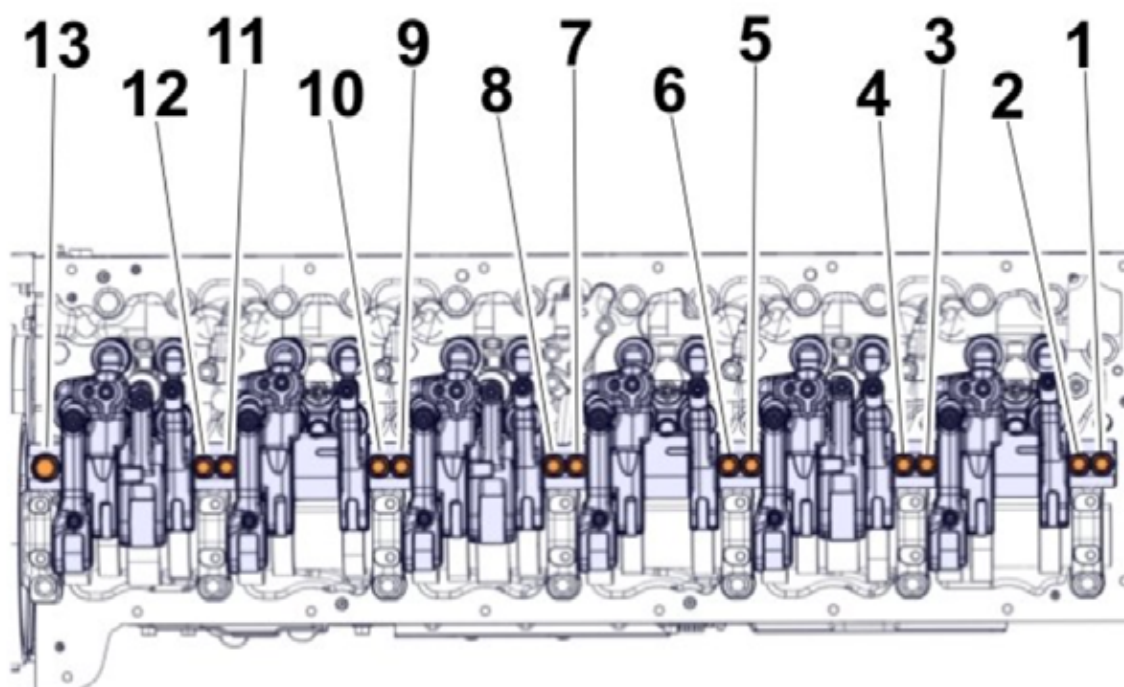


69	Loosen the adjustment screws.
----	-------------------------------

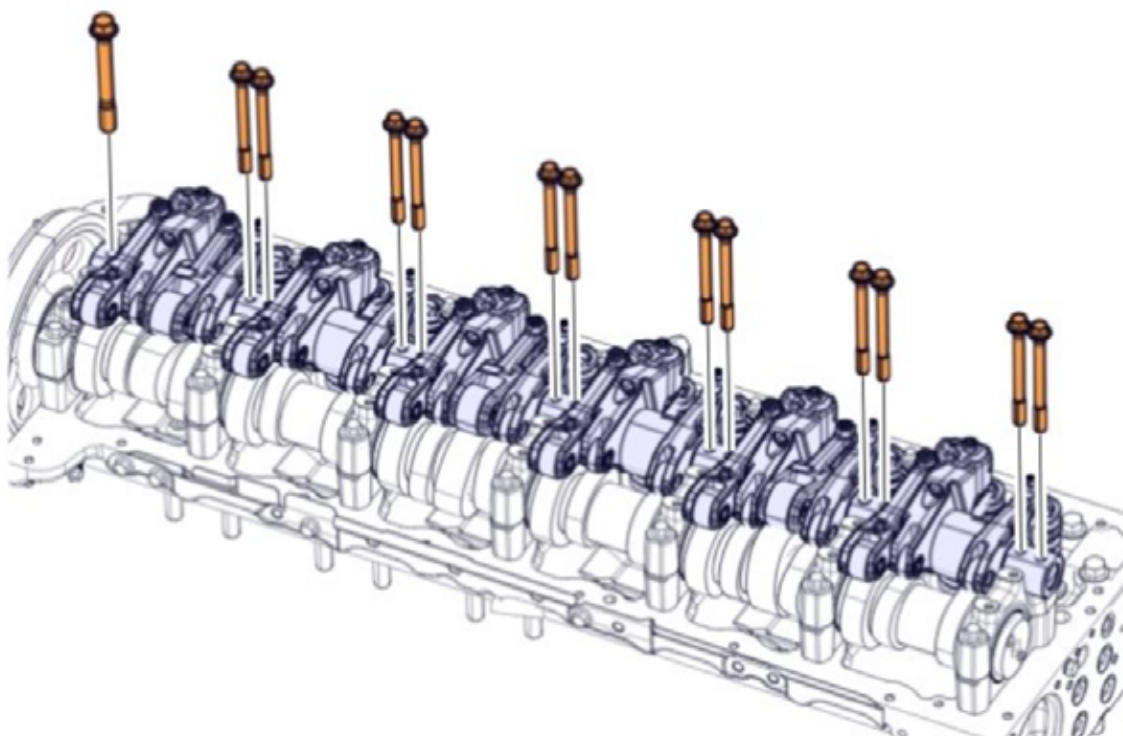


70	Loosen the screws.
----	--------------------

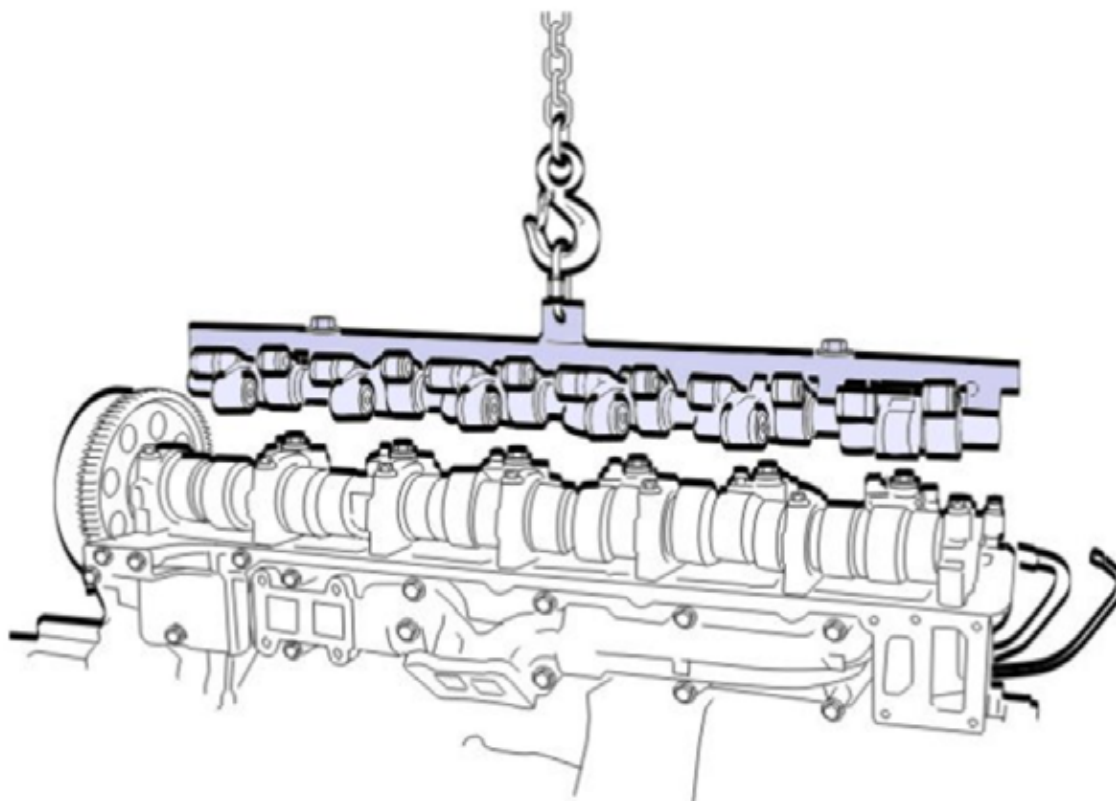
Tightening torque		
Rocker arm shaft, screw	1.	Remove screws: 1-3-5-7-9-11
		6 pcs
	2.	Remove screws: 13-2-12-4-10-6-8
		7 pcs



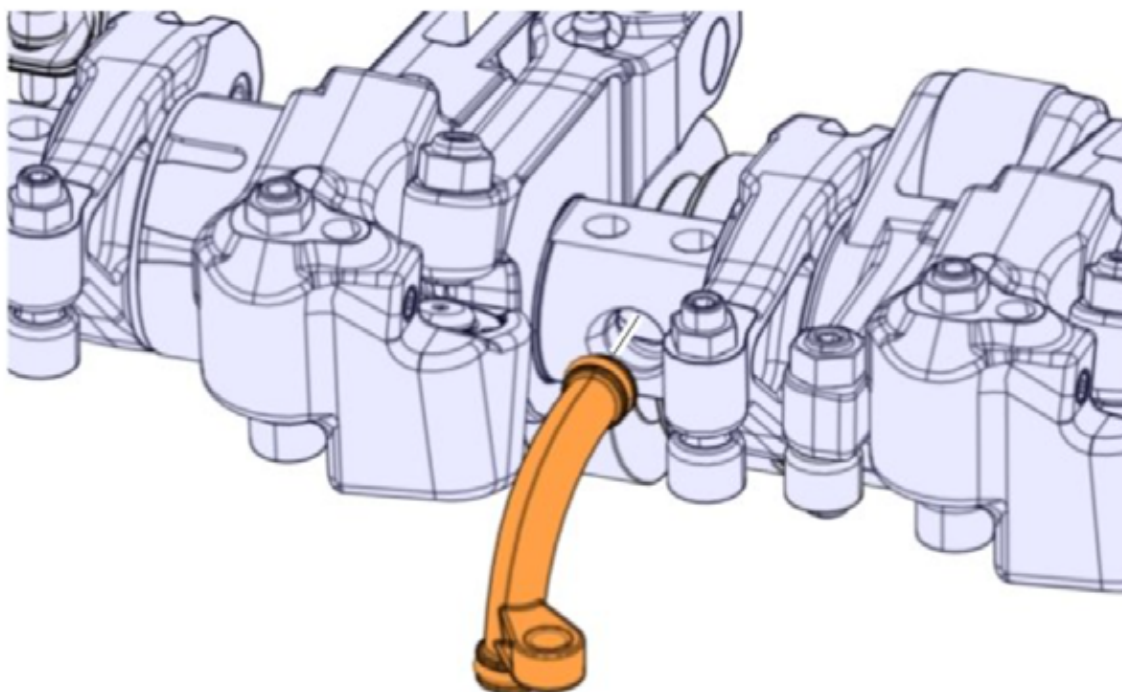
	 Note Loosen gradually in the sequence indicated.	
71	Remove the screws.	



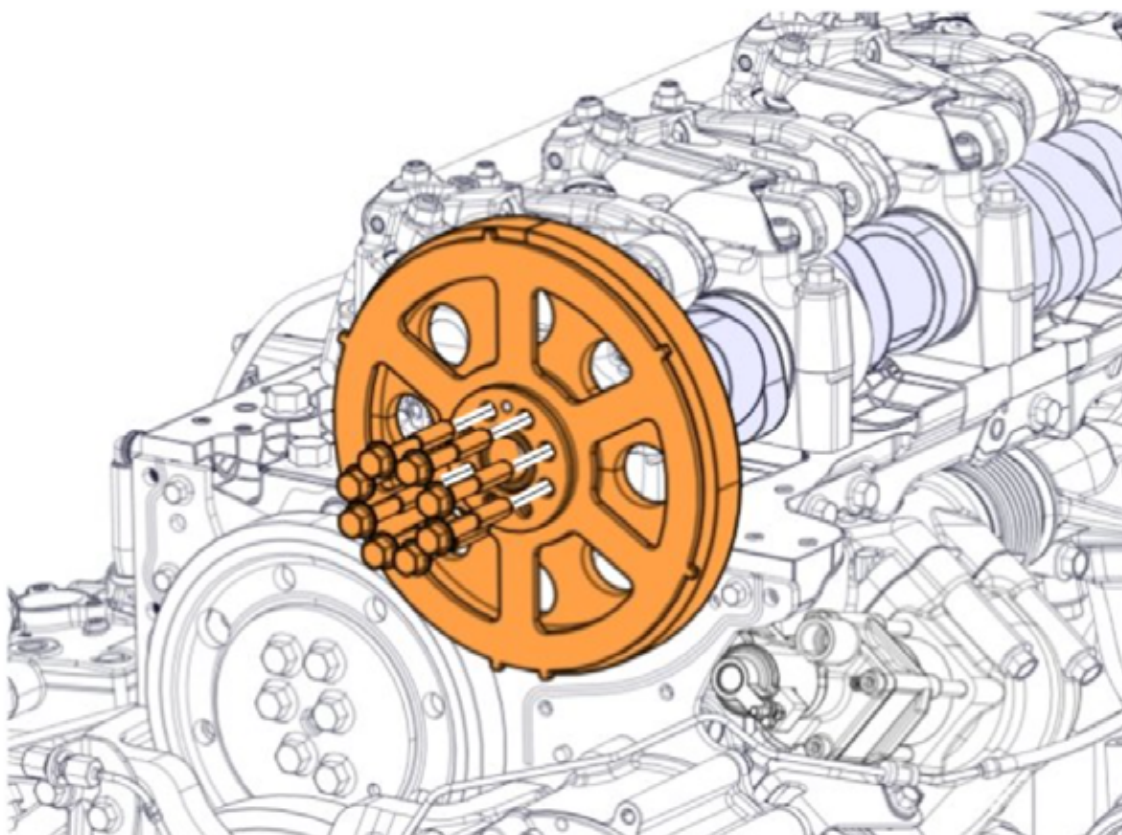
72	Secure the pistons. i Note Use cable ties.				
73	Install the lifting tool. <table border="1" data-bbox="224 1291 1268 1396"> <tr> <th colspan="2" data-bbox="224 1291 1268 1339">Required material</th></tr> <tr> <td data-bbox="224 1339 748 1396">LIFTING TOOL</td><td data-bbox="748 1339 1268 1396">85109250</td></tr> </table>	Required material		LIFTING TOOL	85109250
Required material					
LIFTING TOOL	85109250				



74	Remove the rocker arm shaft.
75	Remove the pipe. Note Discard the pipe. Do not reuse.

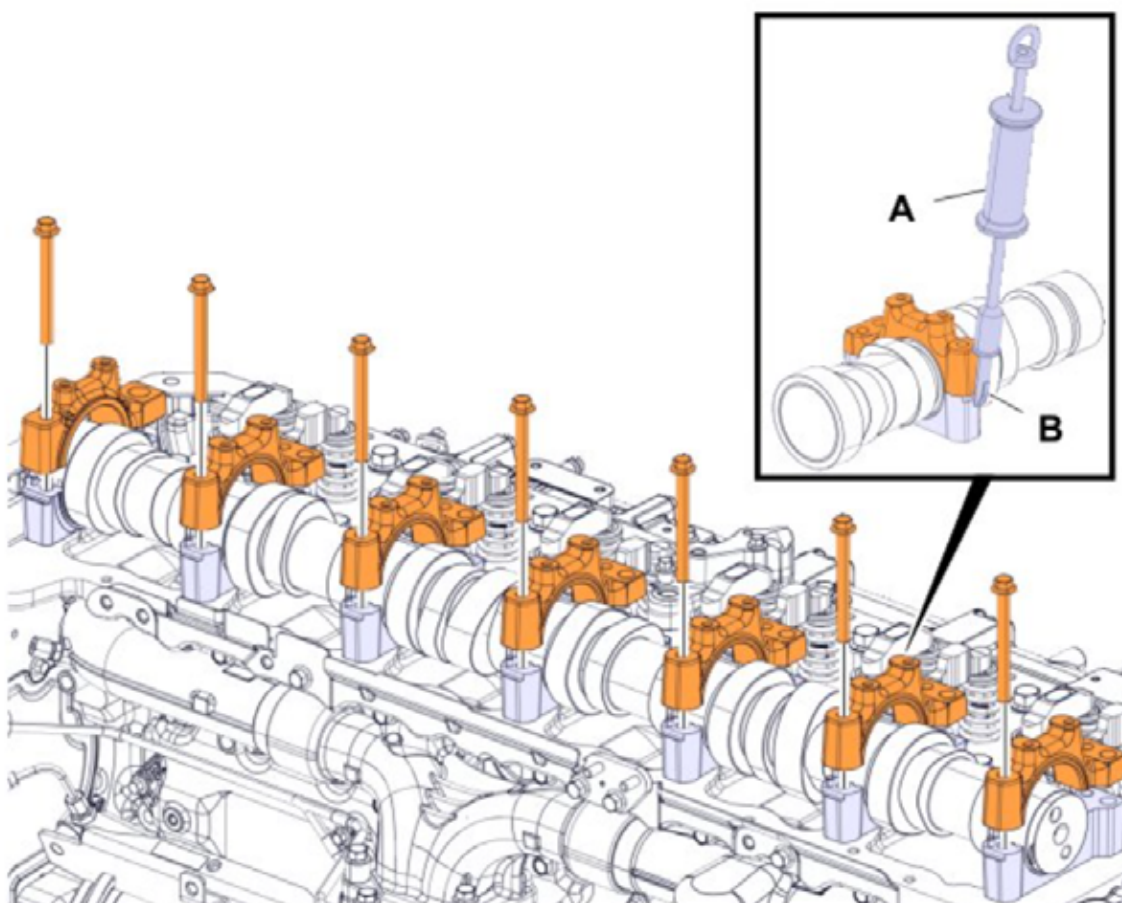


76	Remove the screws.
77	Remove the gear and sensor wheel.

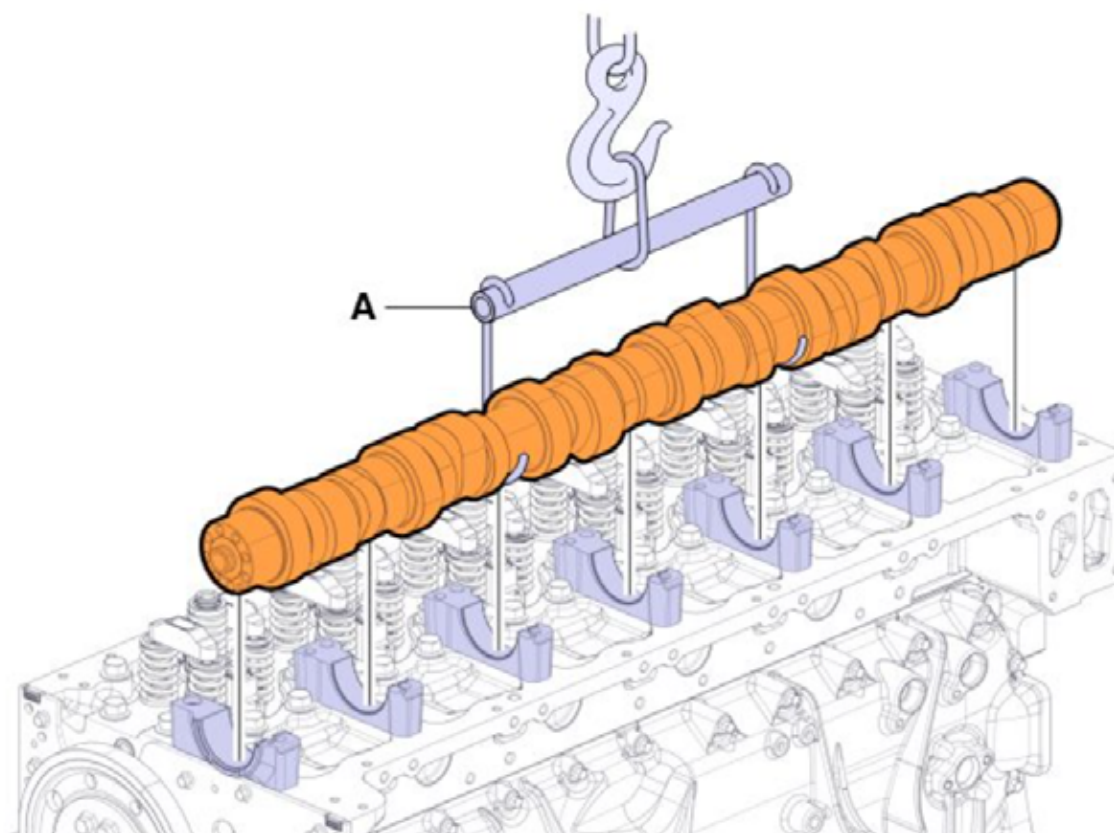


78	Remove the screws. i Note Check that the camshaft caps are marked up.
----	---

79	Remove the caps.		
	Required material		
	A	IMPACT WRENCH	9996400
	B	EXTRACTOR	88800420



80	Install the tool (A). <table data-bbox="224 1646 1268 1751"> <tr> <th colspan="2" data-bbox="224 1646 1268 1698">Required material</th></tr> <tr> <td data-bbox="224 1698 748 1751">LIFTING TOOL</td><td data-bbox="748 1698 1268 1751">9998264</td></tr> </table>	Required material		LIFTING TOOL	9998264
Required material					
LIFTING TOOL	9998264				
81	Remove the camshaft.				



82	Remove the bearing shells.
83	Check the bearing shells, brackets and caps for damage.

**CAUTION**

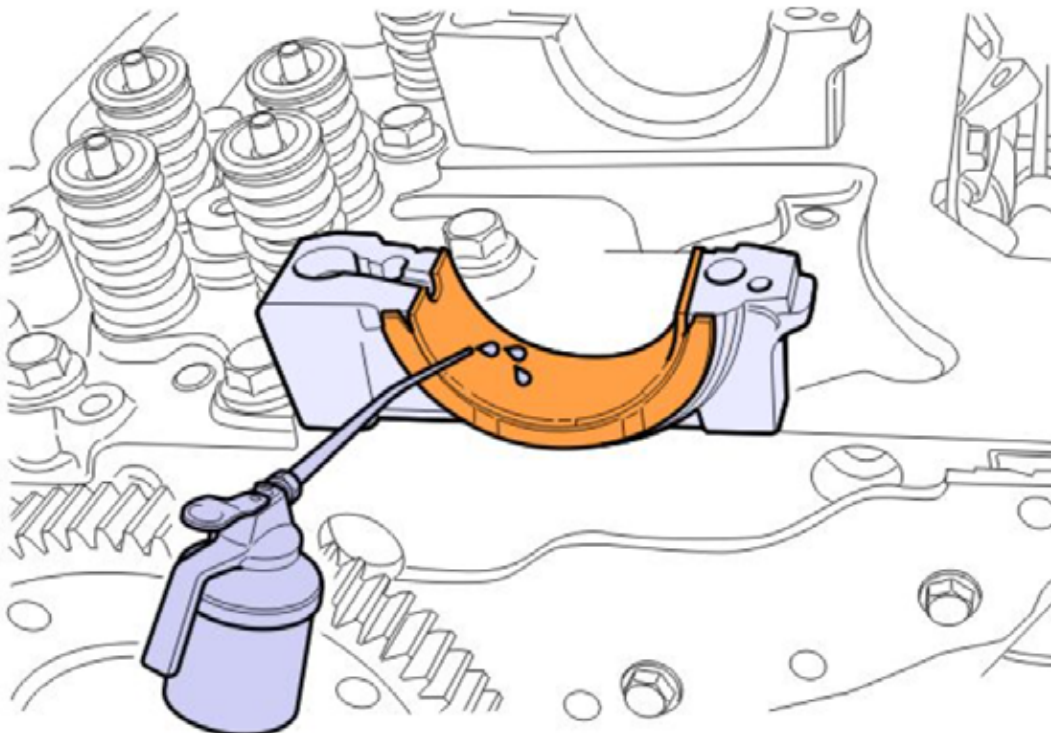
Risk of material damage.

Dirt and foreign bodies can damage the lubrication system.

- ▶ Ensure that the work area is clean.
- ▶ Cover or plug openings immediately. If work on removed parts is disrupted, cover the parts.
- ▶ Ensure that tools, gloves, and protective clothes are as clean as possible.

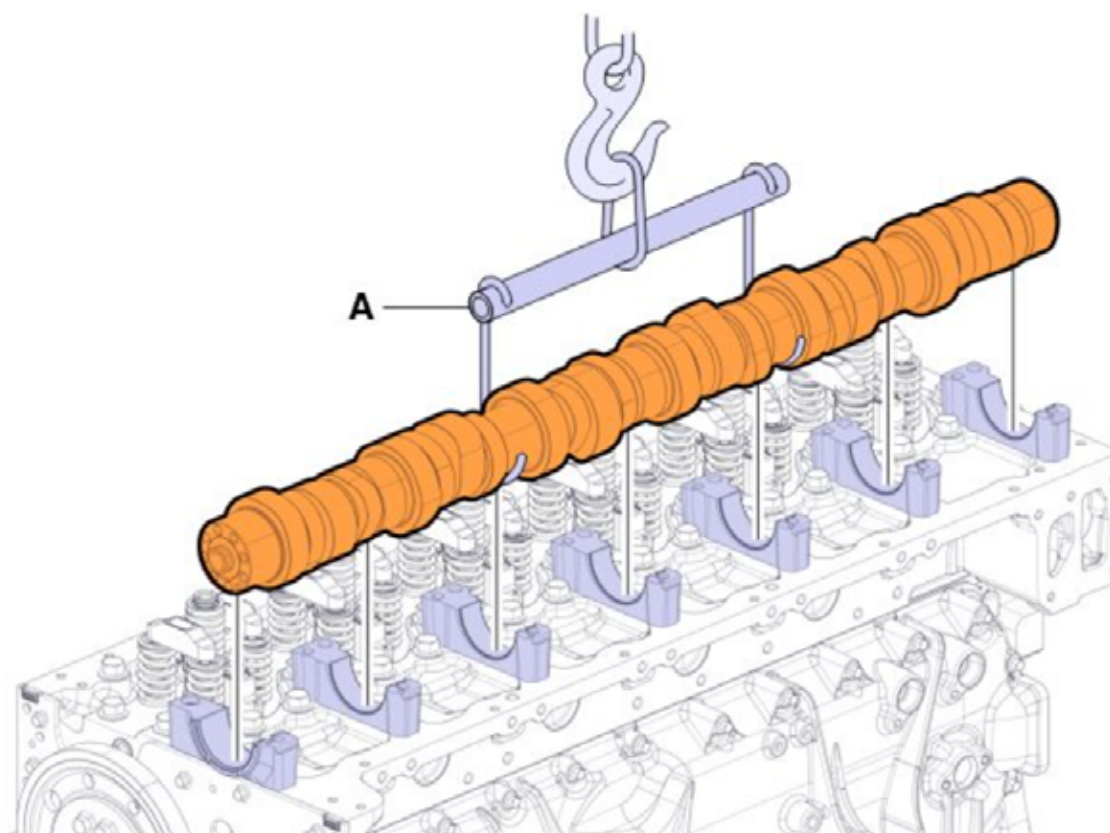
84	Install the bearing shells.
	i Note Use new parts. i Note The surface between the bearing shells and bearing housings must be free of oil.

85	Lubricate all the bearing shells.
----	-----------------------------------



86	Install the camshaft.
----	-----------------------

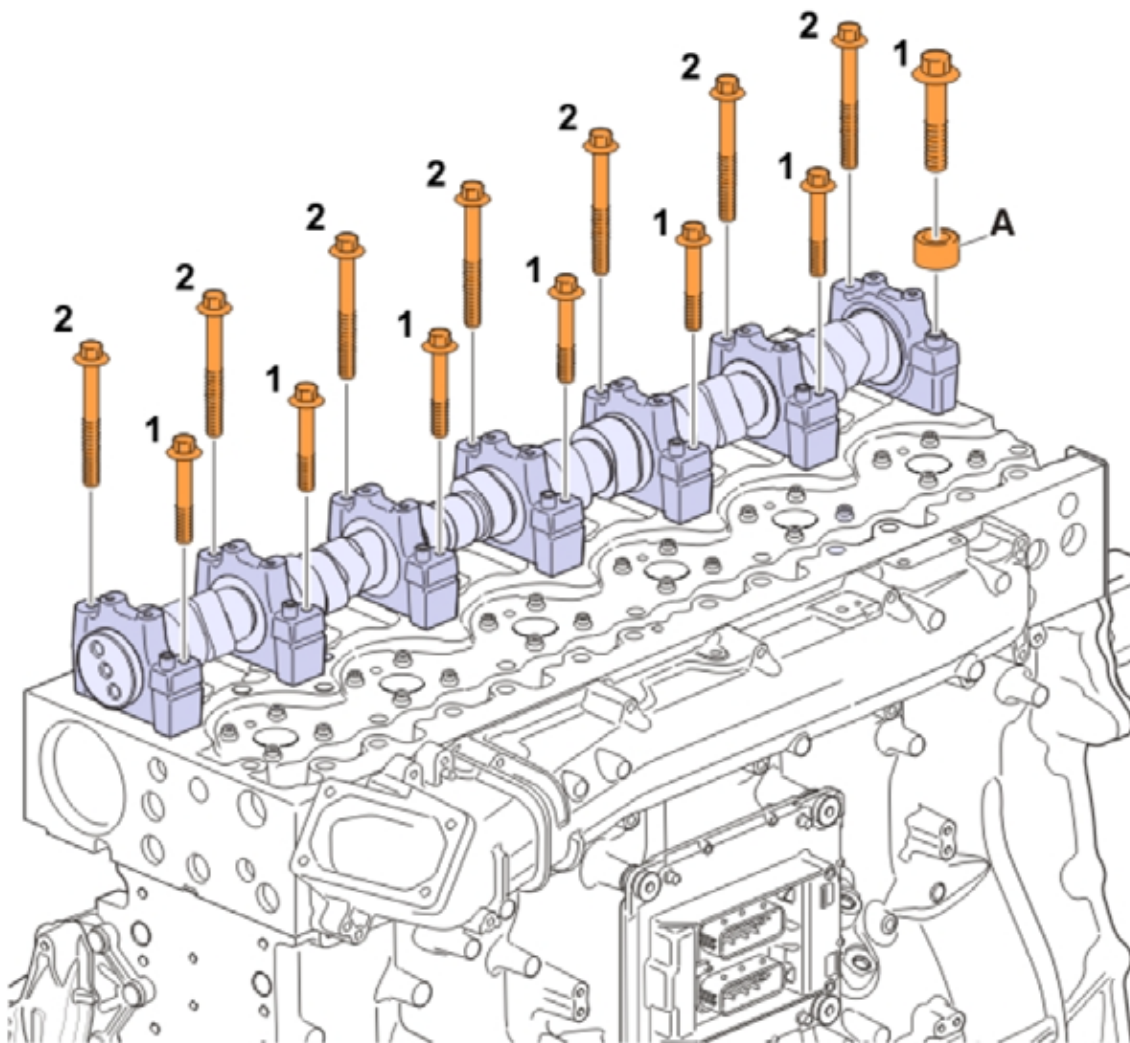
87	Remove tool (A).
----	------------------



88	Install the caps.
	 Note Check the markings.
	 Service hint Carefully knock down the caps using a plastic mallet.
89	Install the sleeve (A) on bearing cap 7 to protect the guide sleeve.
	Required material
	MANDREL 9992669
90	Install the temporary screws (1).
91	Install the permanent screws (2).
92	Tighten the screws.
93	Torque tighten the screws.

**Note**

Check that the camshaft rotates easily after torque tightening each bearing cap.



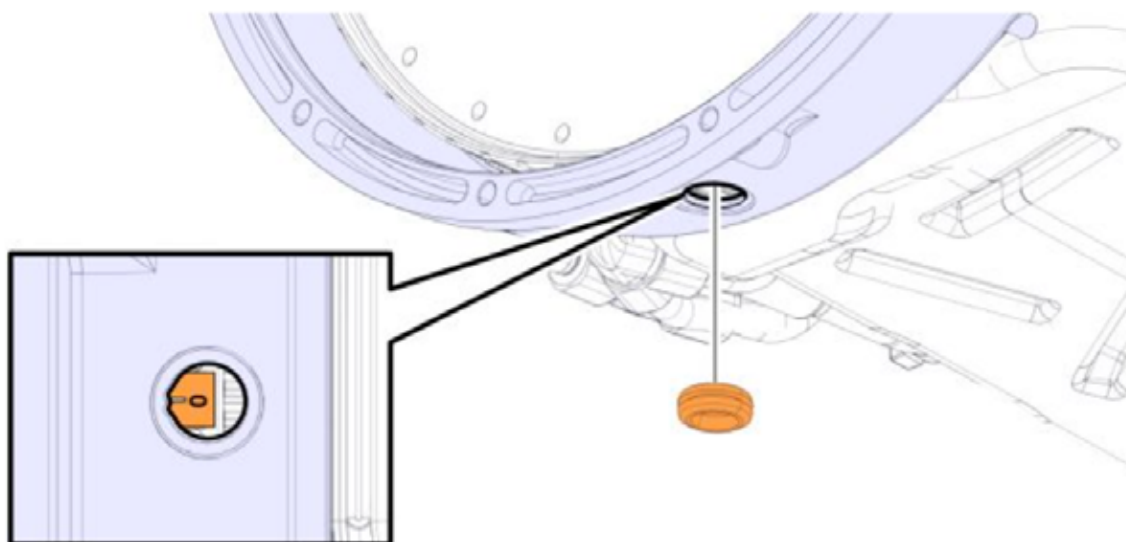
94 Torque tighten the screws.

**Note**

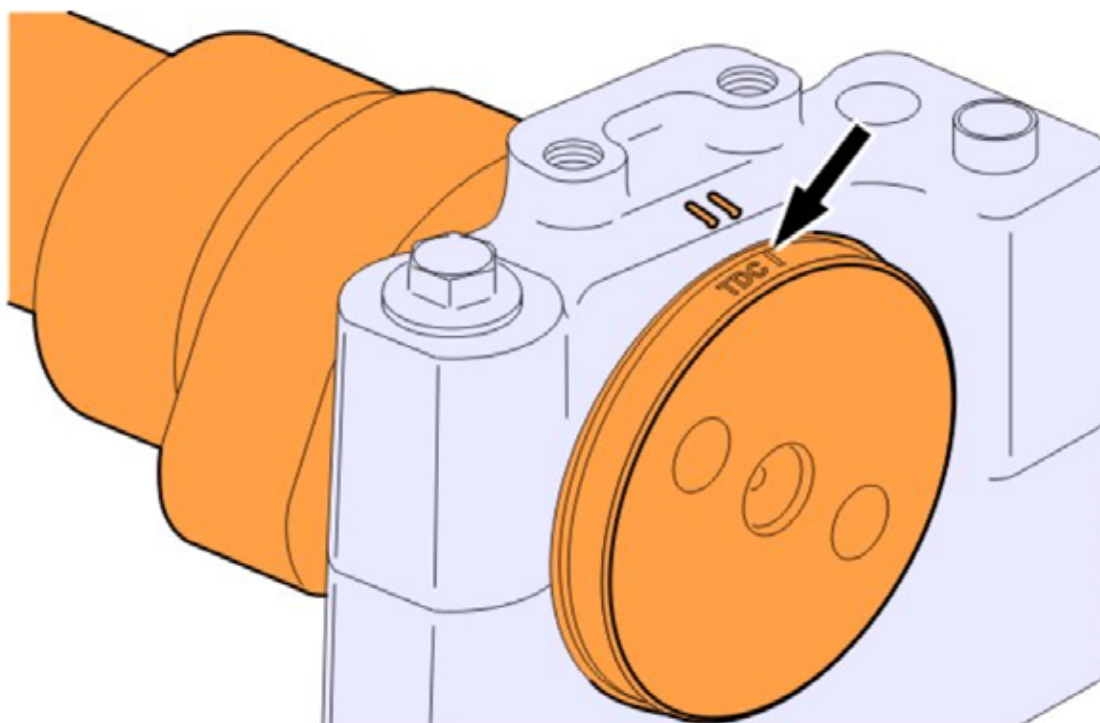
Check that the camshaft can be rotated after the screws are torque tightened.

95 Remove the temporary screws and sleeves.

96 Ensure that the marking (0) is in the correct position.



- | | |
|----|--|
| 97 | Turn the camshaft until the (TDC) mark aligns with the cap mark. |
|----|--|



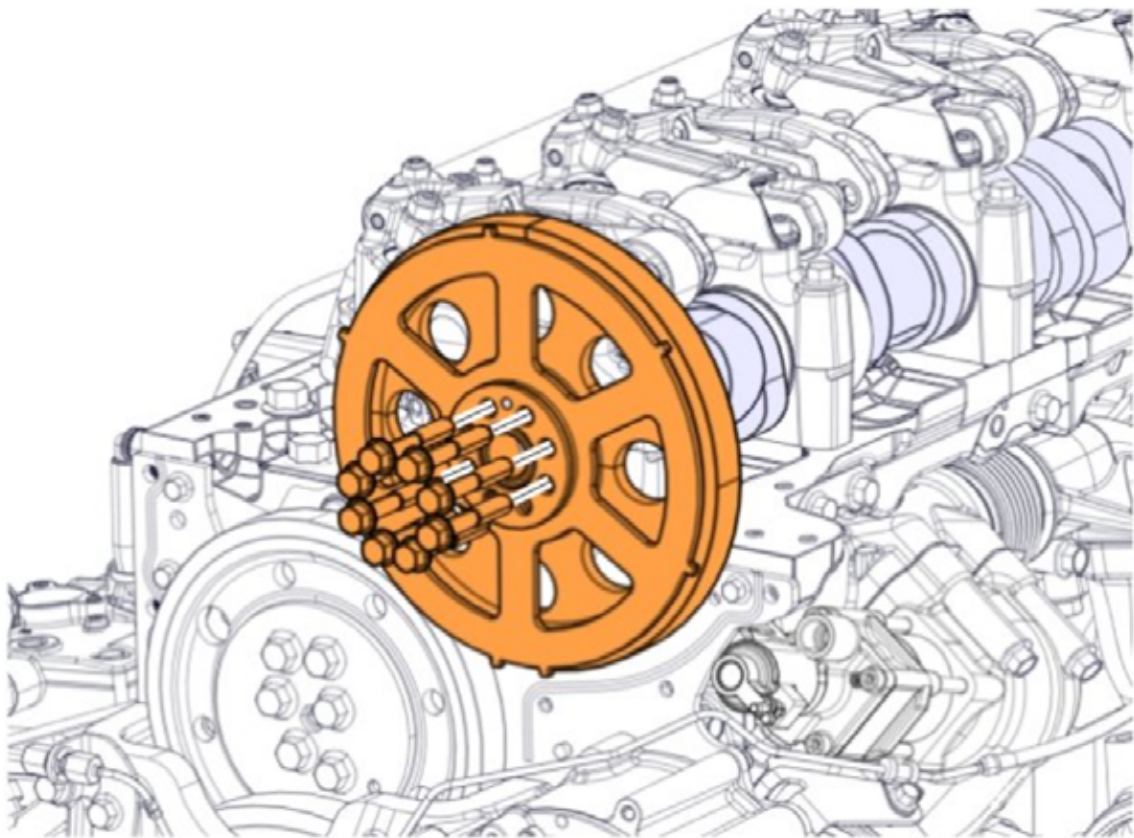
- | | |
|----|------------------------------------|
| 98 | Install the gear and sensor wheel. |
|----|------------------------------------|

- | | |
|----|---------------------|
| 99 | Install the screws. |
|----|---------------------|

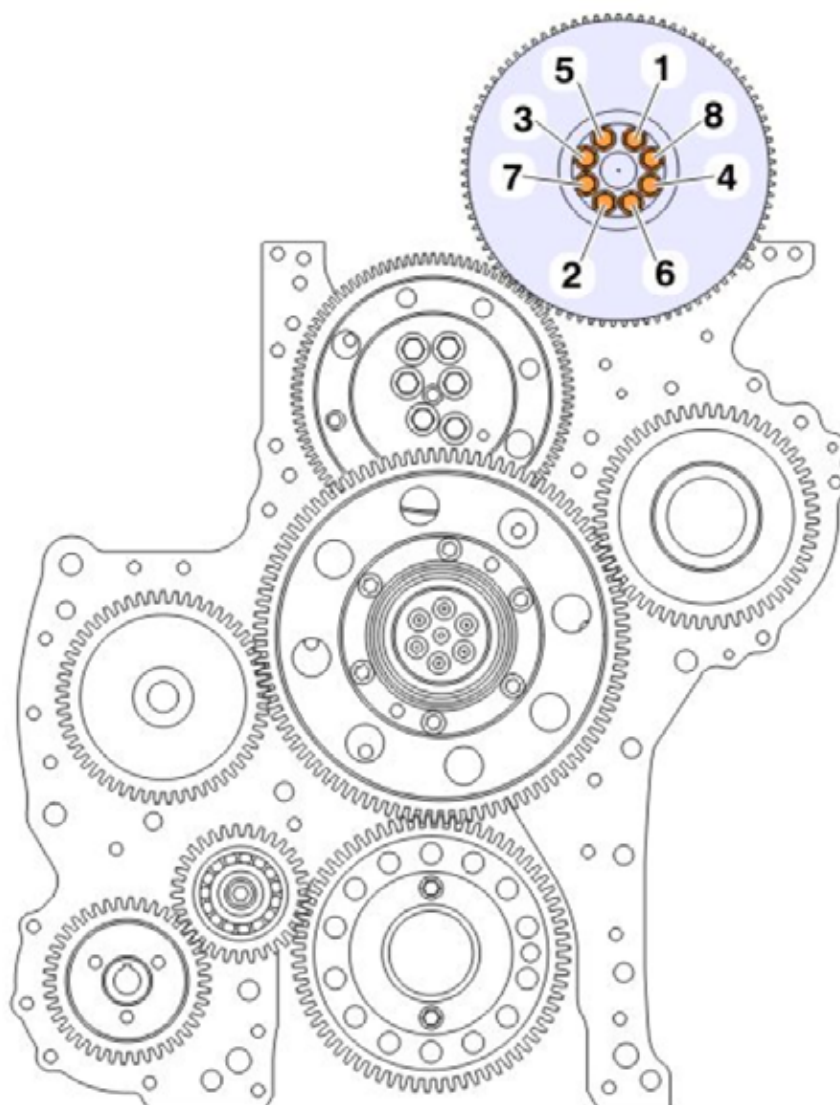
**Note**

Use new screws.

- | | |
|-----|----------------------------|
| 100 | Torque tighten the screws. |
|-----|----------------------------|



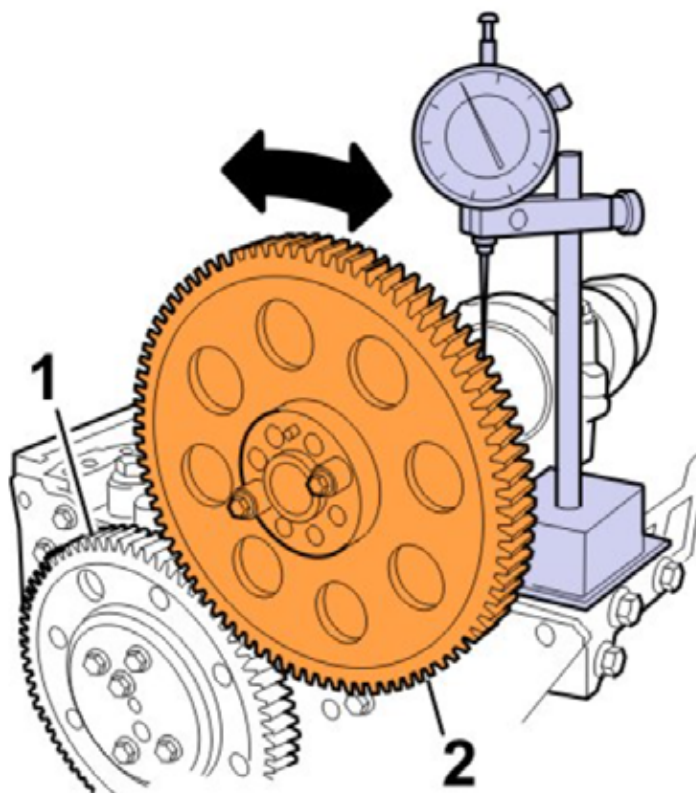
Tightening torque		
Gear, screw	1.	Tightening sequence: 1–8
		45 ±5 Nm (33 ±4 lb _f ·ft)
	2.	Tightening sequence: 1–8
		90 ±5°



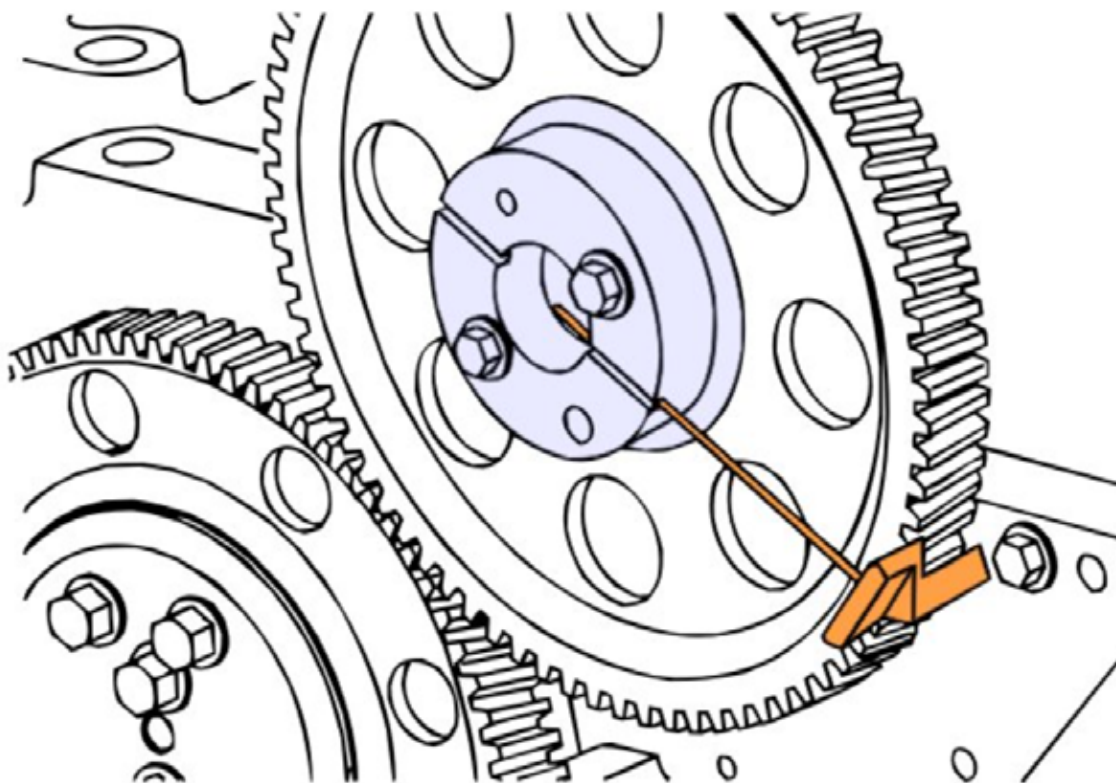
101	Measure the backlash between gears (1) and (2) using the tools.	
Tech data		
Backlash clearance		0.1 ±0.05 mm (0.004 ±0.002 in)
Required material		
ROCKER_INDICATOR	9999683	
MAGNETIC STAND	9999696	
KIT	J-44514B	
 Note Hold the idler gear (1) in place using a suitable tool to correctly check the backlash.		

**Note**

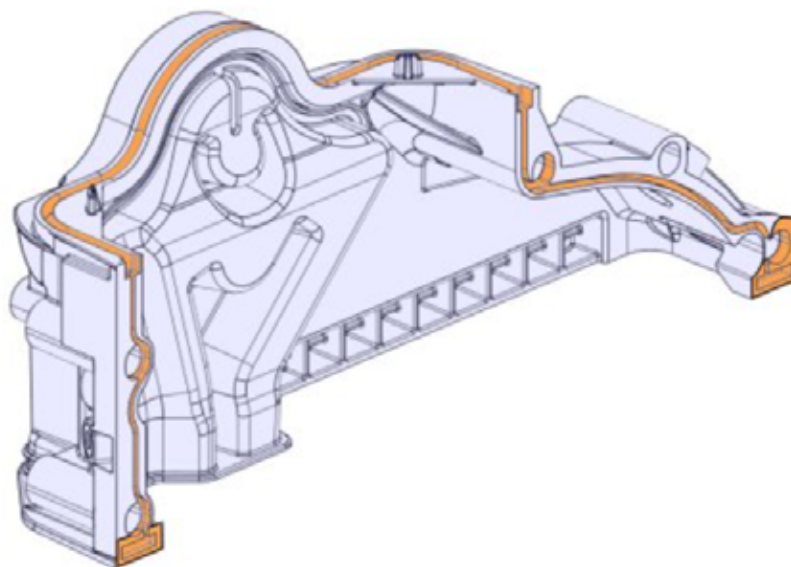
If backlash is out of specification, adjust idler gear (1).



102	Check the timing mark.
103	Remove the tools.



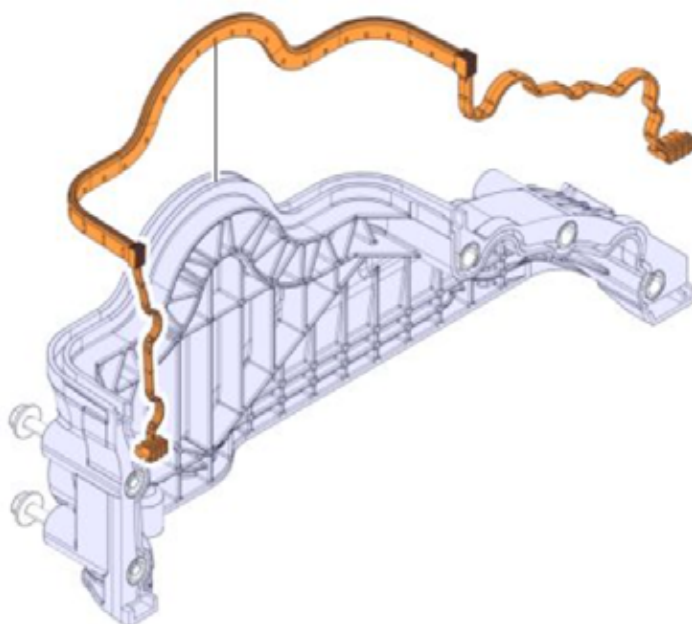
104	Clean the contact surfaces.
-----	-----------------------------



105	Install the gasket.
-----	---------------------



Note
Use a new part.

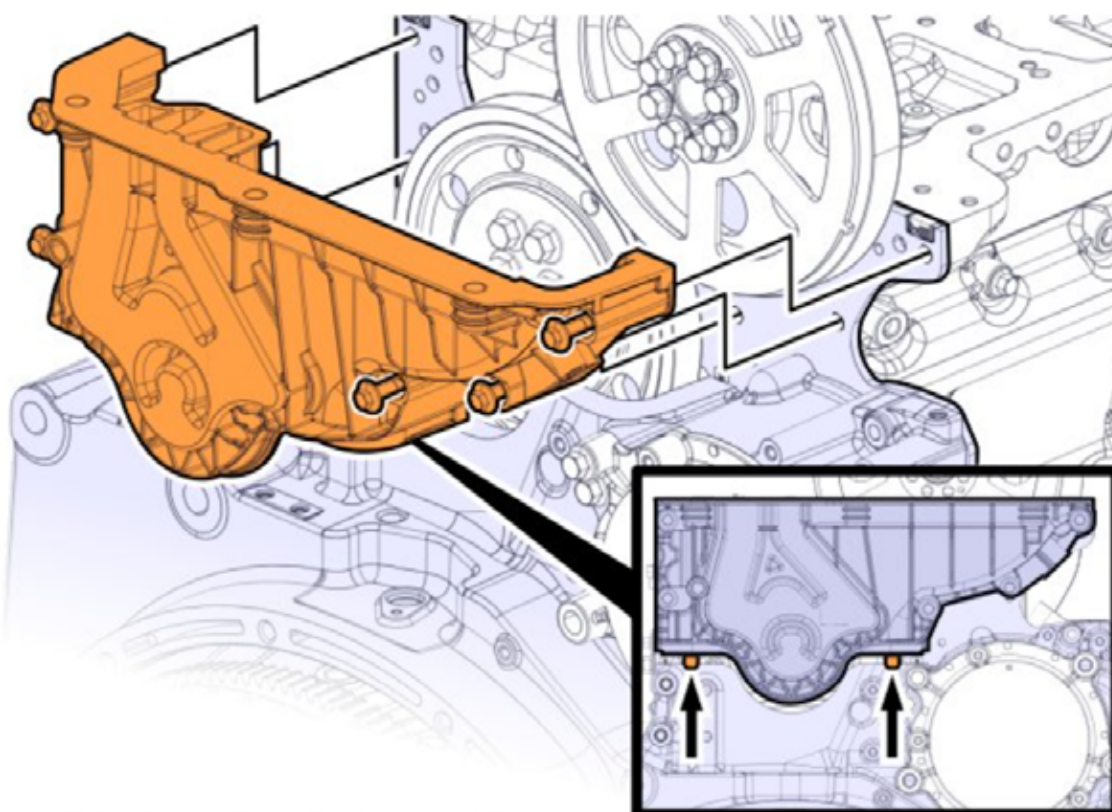


106 Install the timing gear cover.



Note

The dowels on the timing gear cover act as guides to avoid damaging the sealing strip during installation.

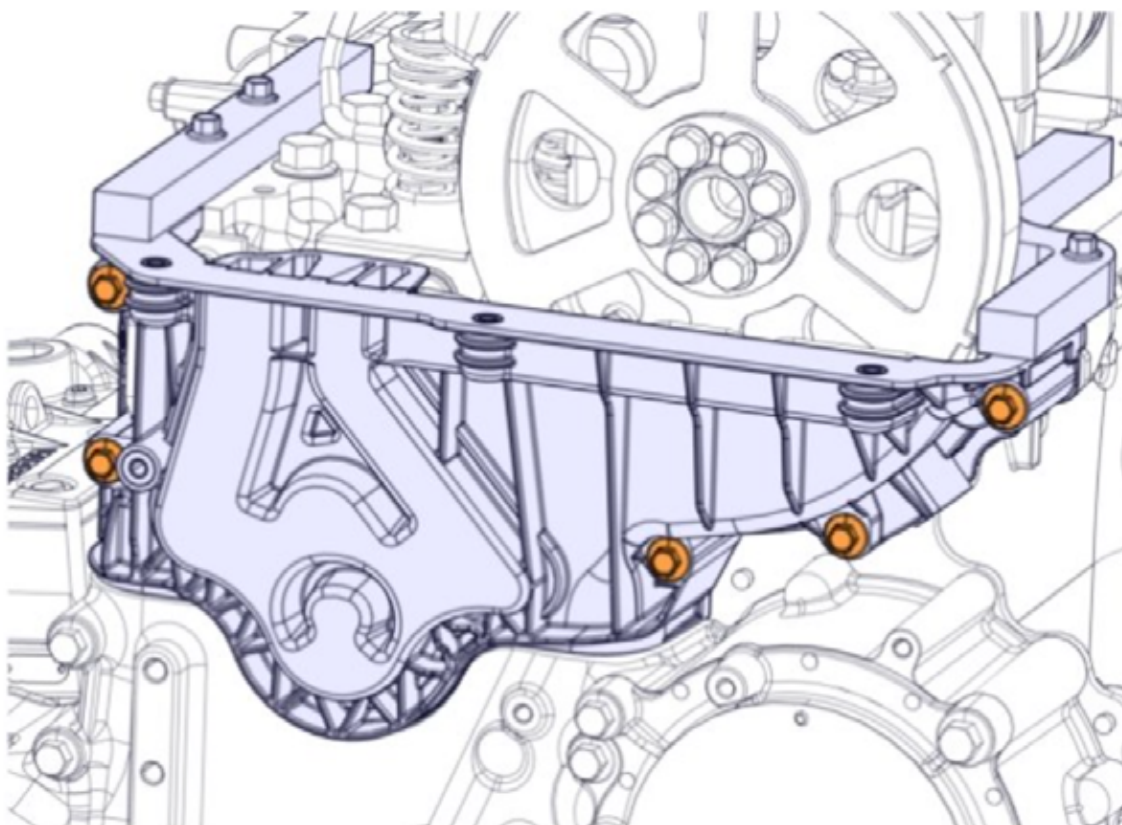


107 Lightly tighten the two timing gear cover screws.



Note

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



108 Install the tools.

Required material

ASSEMBLY TOOL

[85109051](#)

2 pcs

109 Press down the timing gear cover with the required force.

Tightening torque

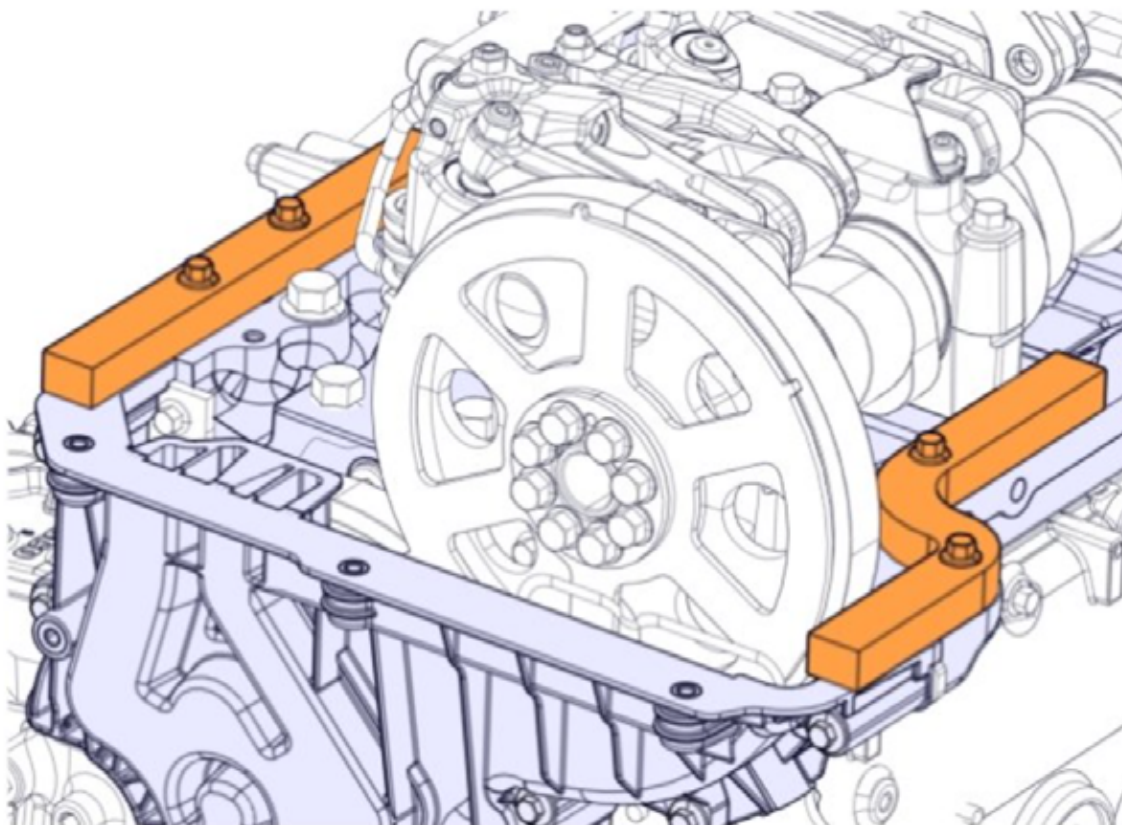
Tool, adjusting screw

27 ±3 Nm
(20 ±2 lb_f·ft)



Note

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



110 Torque tighten the screws.

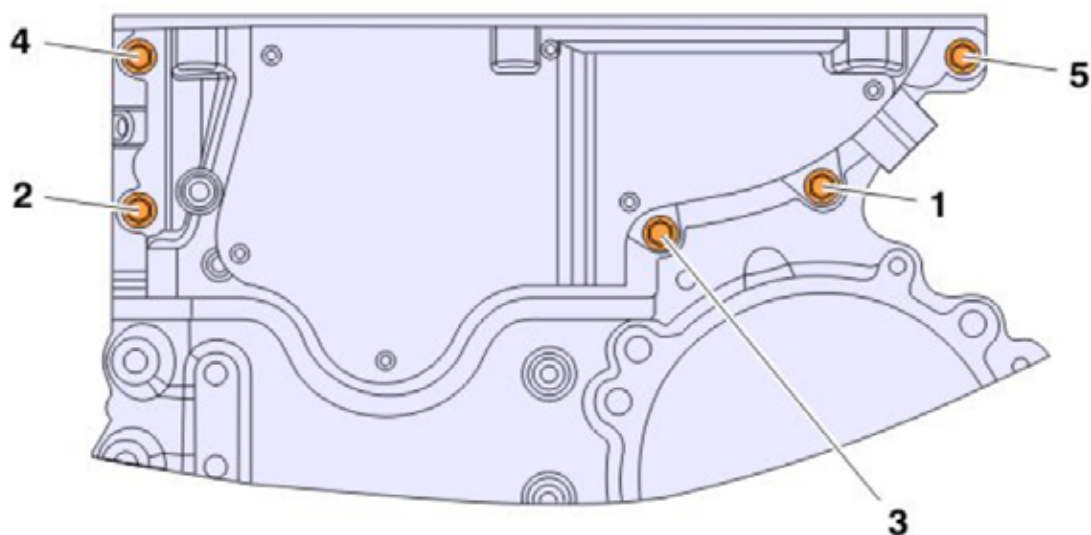
Tightening torque

Upper timing gear casing, screw

Tightening sequence: 1-5

27 ±3 Nm

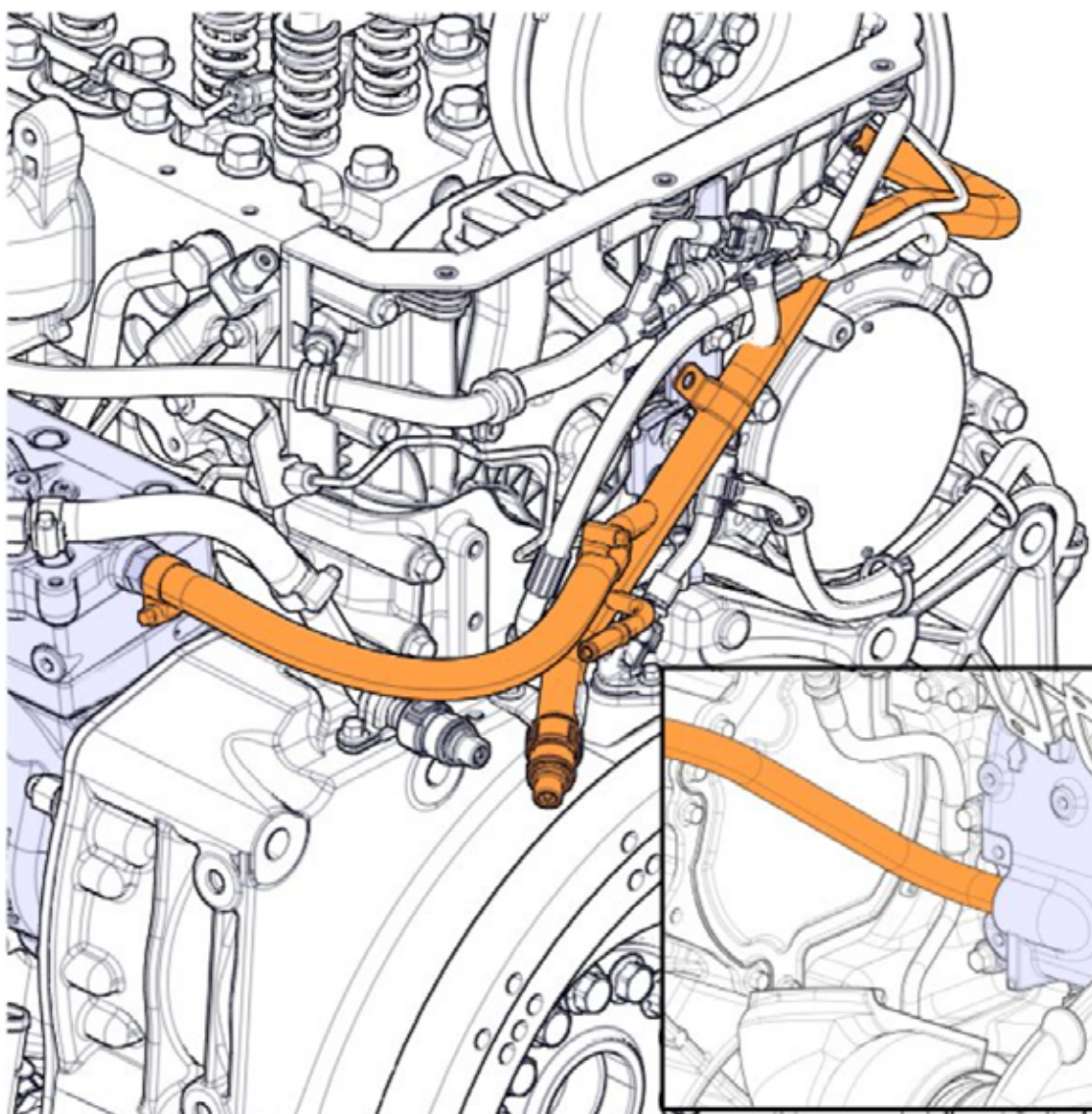
(20 ±2 lb_f-ft)



111	Remove the tools.				
112	Install the bracket.				
113	Install the clamp.				
114	Install the screws.				
115	Tightening torque <table> <tr> <td>Screw</td><td>M8</td></tr> <tr> <td></td><td>24 ±4 Nm (18 ±3 lb_f-ft)</td></tr> </table>	Screw	M8		24 ±4 Nm (18 ±3 lb _f -ft)
Screw	M8				
	24 ±4 Nm (18 ±3 lb _f -ft)				



116	Install the pipes.				
	Tightening torque <table> <tr> <td>Screw</td><td>M8</td></tr> <tr> <td></td><td>24 ±4 Nm (18 ±3 lb_f-ft)</td></tr> </table>	Screw	M8		24 ±4 Nm (18 ±3 lb _f -ft)
Screw	M8				
	24 ±4 Nm (18 ±3 lb _f -ft)				



117 Lubricate the seals.

Required material

[Diesel Engine](#)



Note

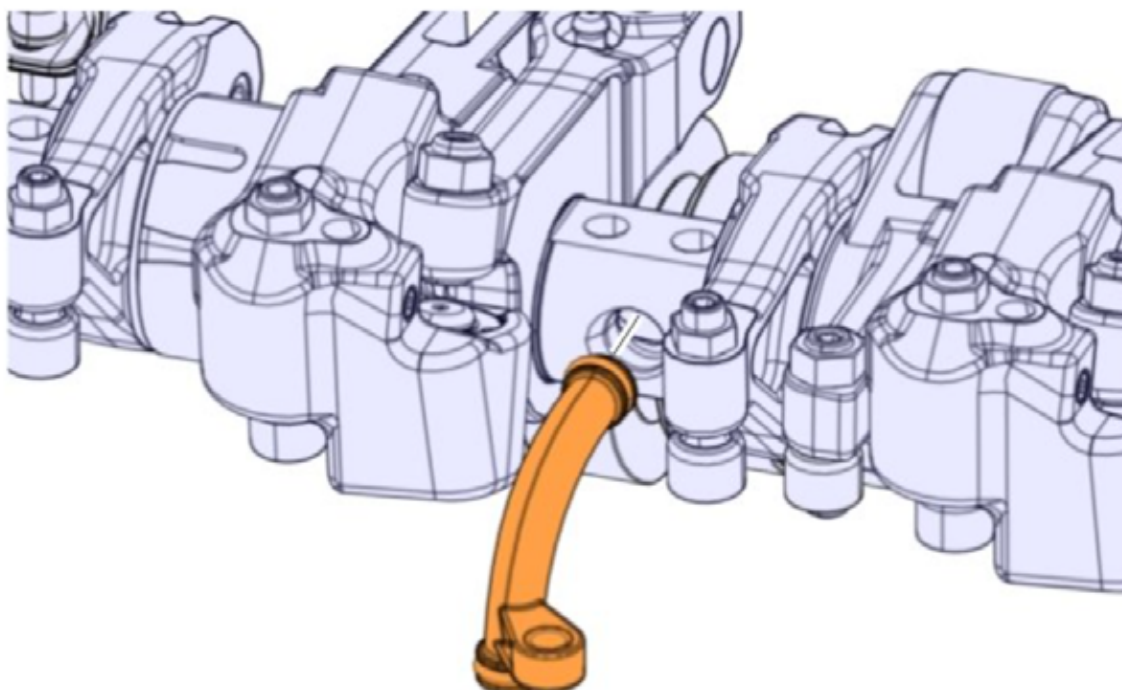
Use new parts.

118 Install the pipe.

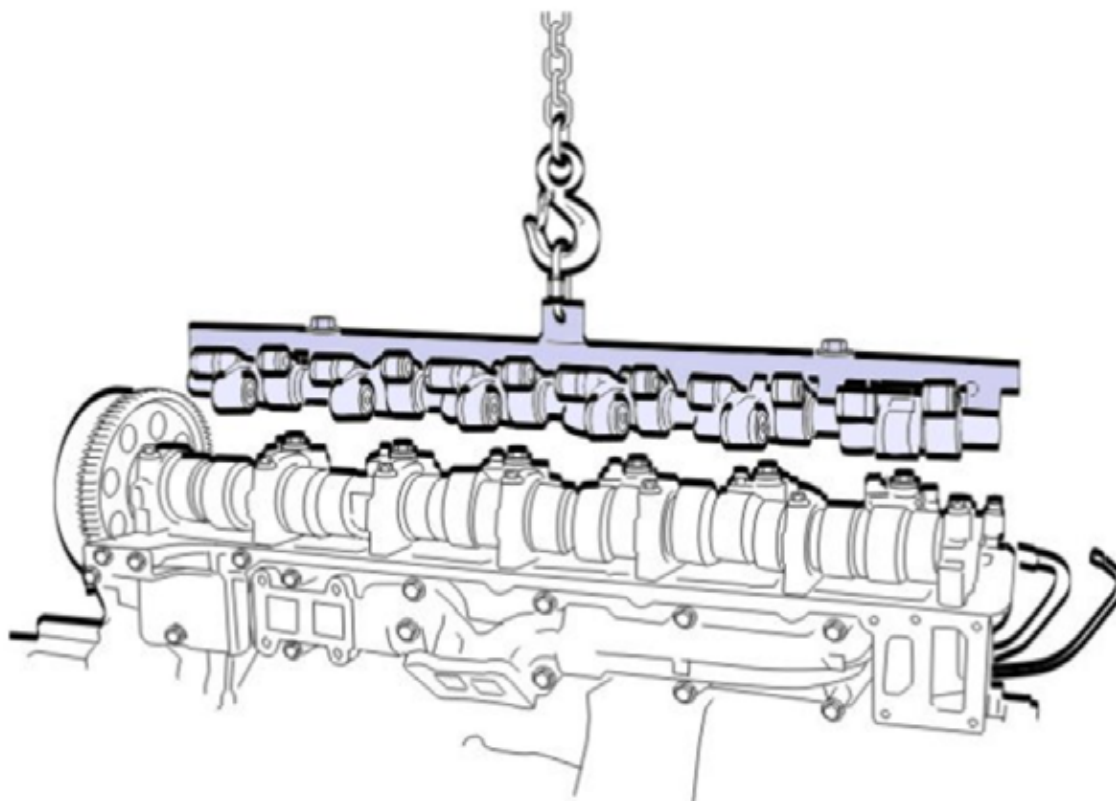


Note

Use a new part.



119	Install the lifting tool.				
<table border="1"> <tr> <th colspan="2" data-bbox="215 989 1276 1020">Required material</th></tr> <tr> <td data-bbox="215 1020 748 1125">LIFTING TOOL</td><td data-bbox="748 1020 1276 1125">85109250</td></tr> </table>		Required material		LIFTING TOOL	85109250
Required material					
LIFTING TOOL	85109250				
120	Install the rocker arm shaft. <table border="1"> <tr> <td data-bbox="215 1245 297 1308"></td><td data-bbox="297 1245 719 1308">Note</td></tr> <tr> <td data-bbox="215 1308 297 1346"></td><td data-bbox="297 1308 719 1346">Take care not to damage the oil pipe.</td></tr> </table>		Note		Take care not to damage the oil pipe.
	Note				
	Take care not to damage the oil pipe.				
121	Remove the cable ties.				
122	Remove the lifting tool.				



123 Install the screws.



Note

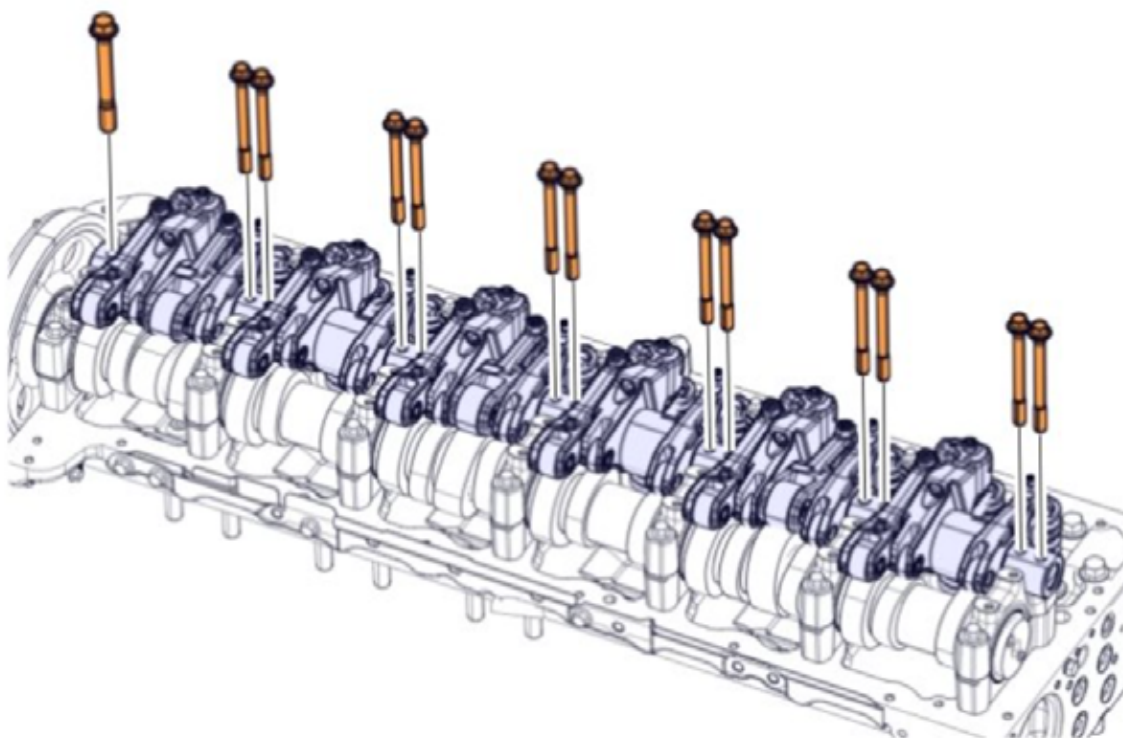
Note any marks on the screw heads.



Note

Each mark on the screw head indicates the amount of times the screw has been torqued.

The screws may be torqued for maximum of three times.



124 Tighten the screws to torque.

Tightening torque

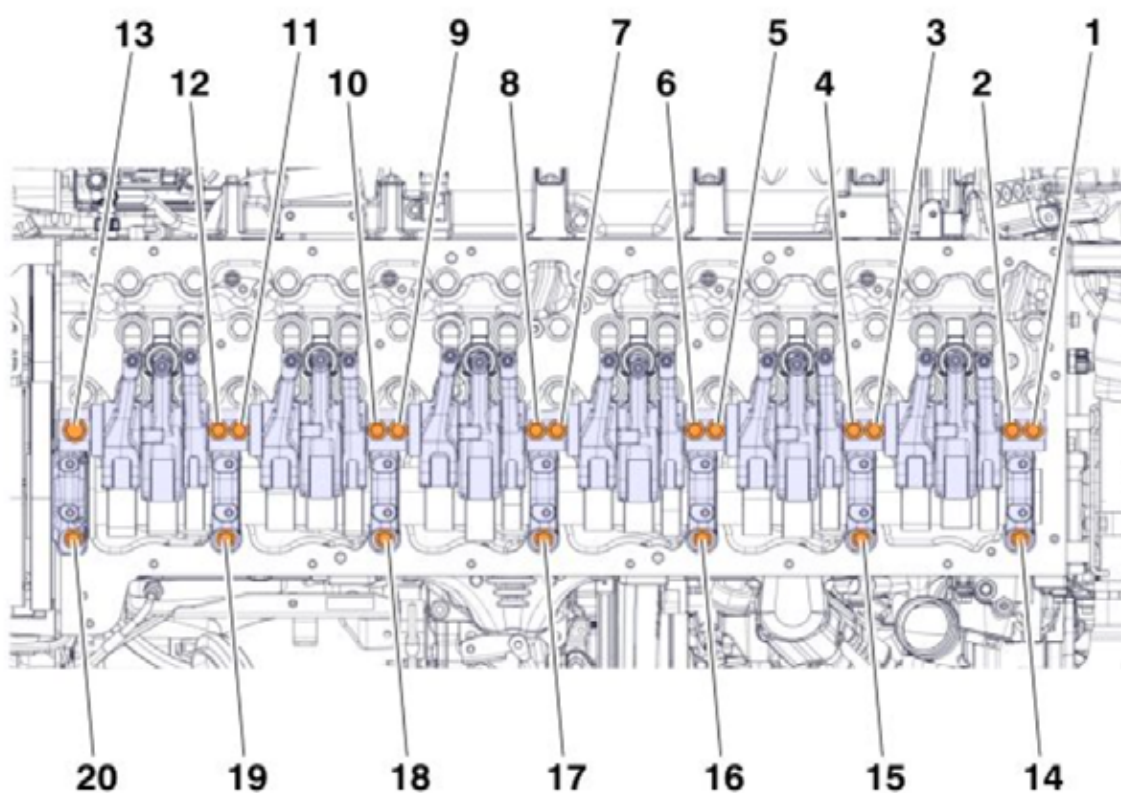
Camshaft bearing cap, screw

- | | |
|----|---|
| 1. | <p>Tightening sequence:
14-15-16-17-18-19-20</p> <p>40 $\pm$3 Nm
(30 $\pm$2 lb_f-ft)</p> |
| 2. | <p>Repeat the tightening sequence until the rocker arm bridge contacts the bearing housings.</p> <p>Tightening sequence: 8-6-10-4-12-2-13</p> <p>60 $\pm$5 Nm
(44 $\pm$4 lb_f-ft)</p> |
| 3. | <p>Tightening sequence:
14-15-16-17-18-19-20</p> <p>90 $\pm$5°</p> |
| 4. | <p>Tightening sequence: 1-3-5-7-9-11</p> <p>40 $\pm$3 Nm
(30 $\pm$2 lb_f-ft)</p> |
| 5. | <p>Tightening sequence: 1-3-5-7-9-11</p> |

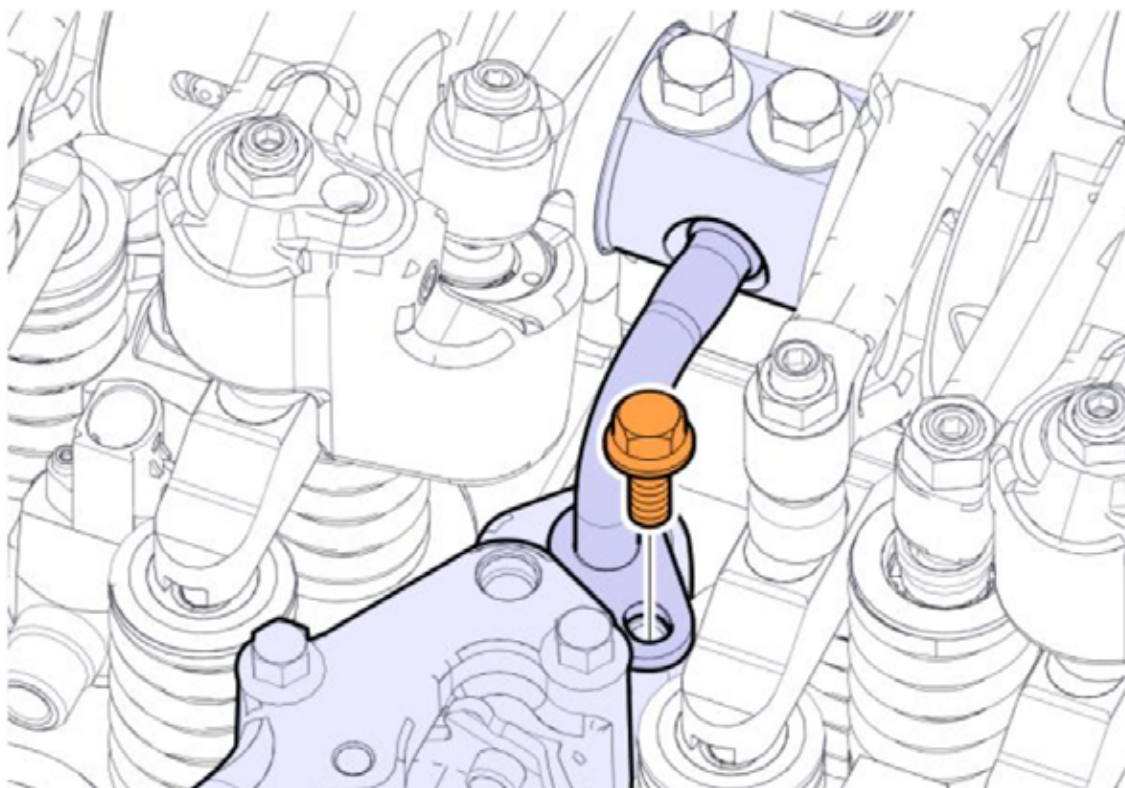
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		120 $\pm$ 5°
6.	Loosen the screws: 2-4-6-8-10-12	
	6 pcs	
7.	Tightening sequence: 2-4-6-8-10-12	
	40 $\pm$ 3 Nm (30 $\pm$ 2 lb _f -ft)	
8.	Tightening sequence: 2-4-6-8-10-12-13	
	120 $\pm$ 5°	



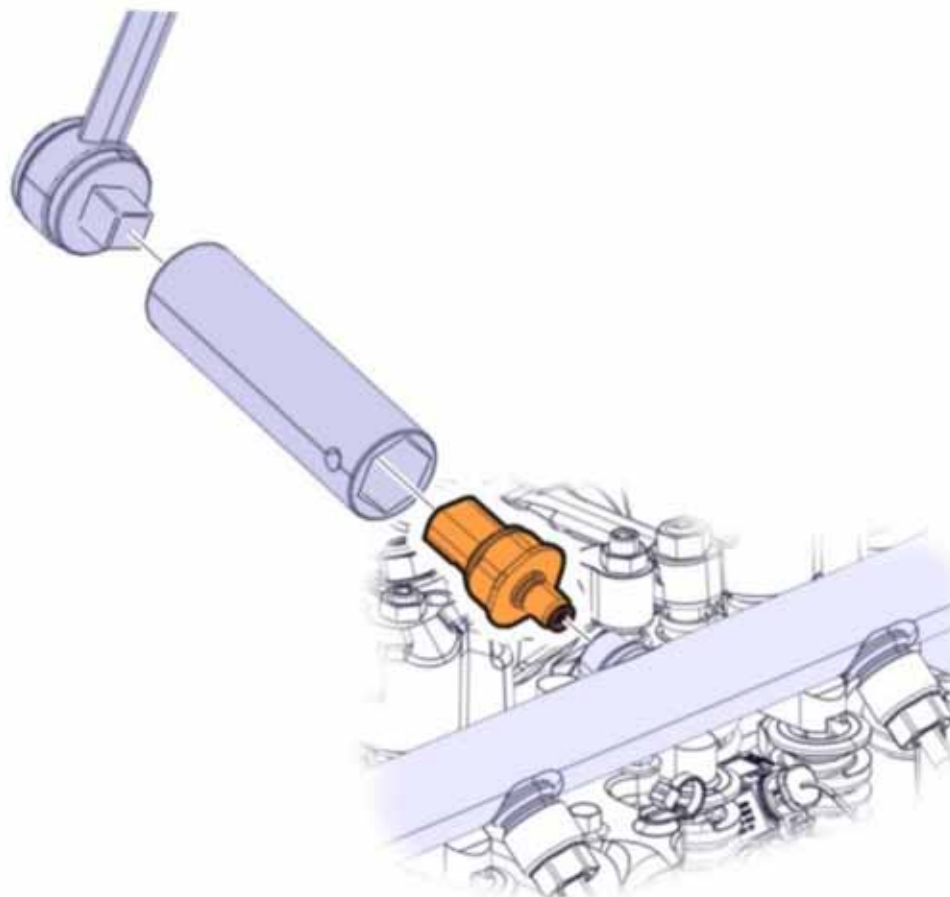
125	Mark the screws.
126	Install the screw.
127	Torque tighten the screw.
	Tightening torque
	Oil pipe, screw
	M8
	24 $\pm$ 4 Nm (18 $\pm$ 3 lb _f -ft)



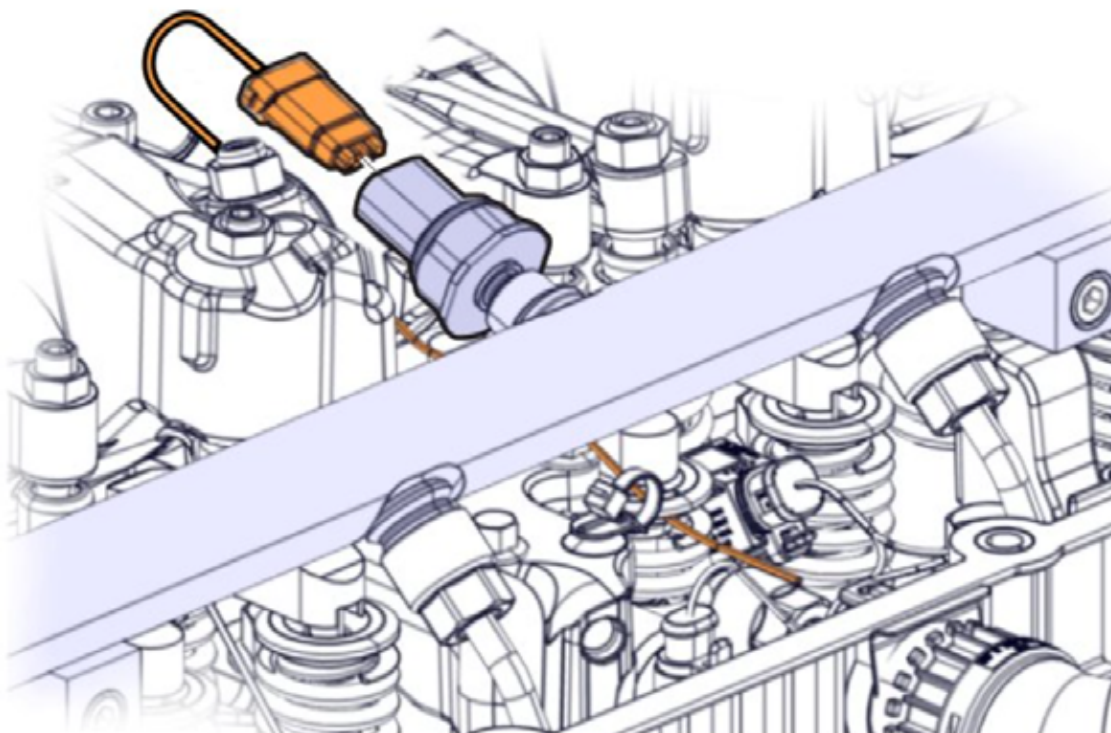
128	Remove the protecting cover and plug.
-----	---------------------------------------

129	Install the sensor. i Note No sealant or thread locker should be used.
-----	--

130	Torque tighten the sensor.	
	Tightening torque	
	Pressure sensor, common rail	$40 \pm 5 \text{ Nm}$ $(30 \pm 4 \text{ lb}_f\text{ft})$



131	Perform this procedure when the condition below is met.
	Conditions
	• If not previously installed
	► Connect the connector.

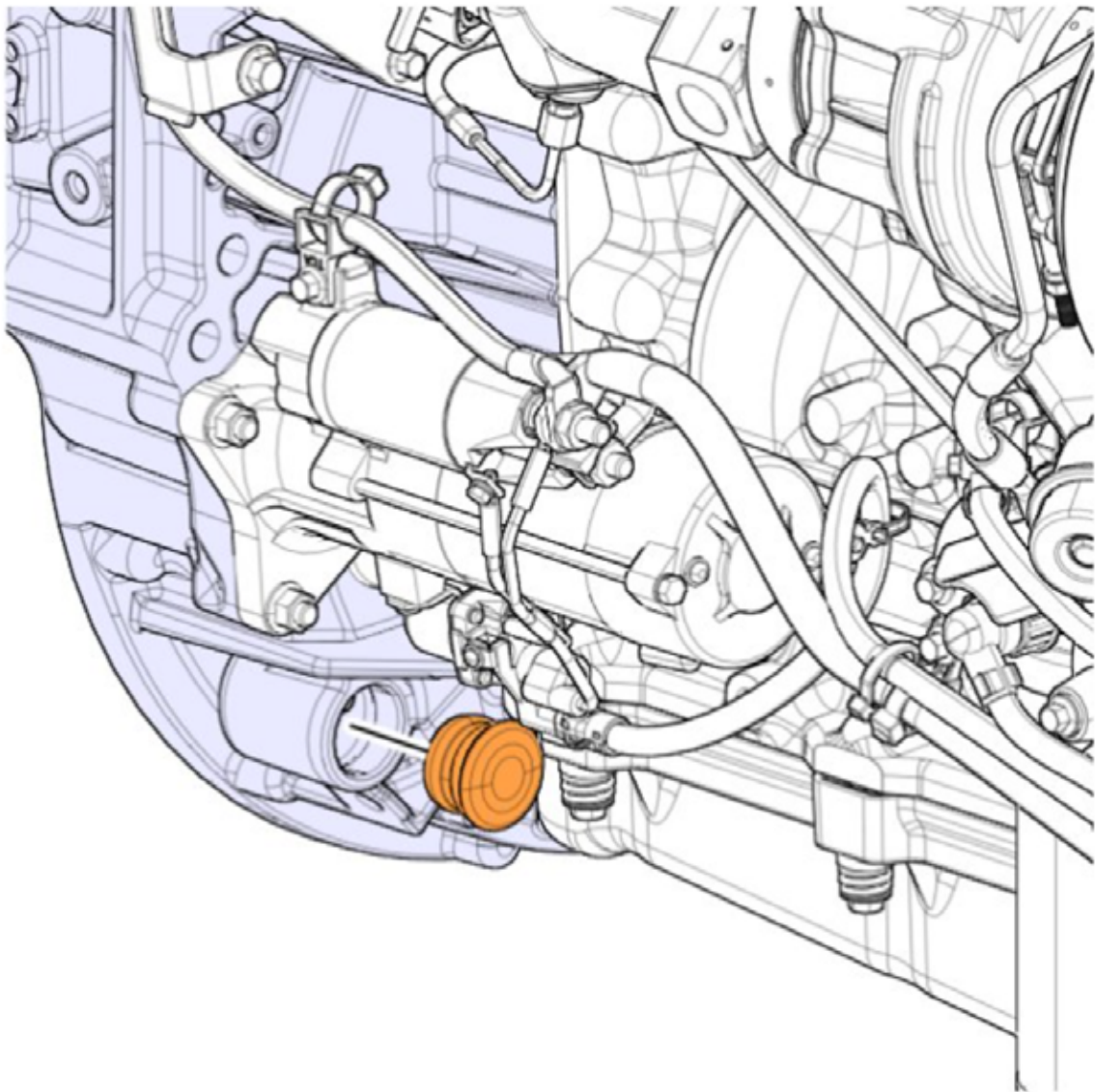


132 Perform this procedure when the condition below is met.

Conditions

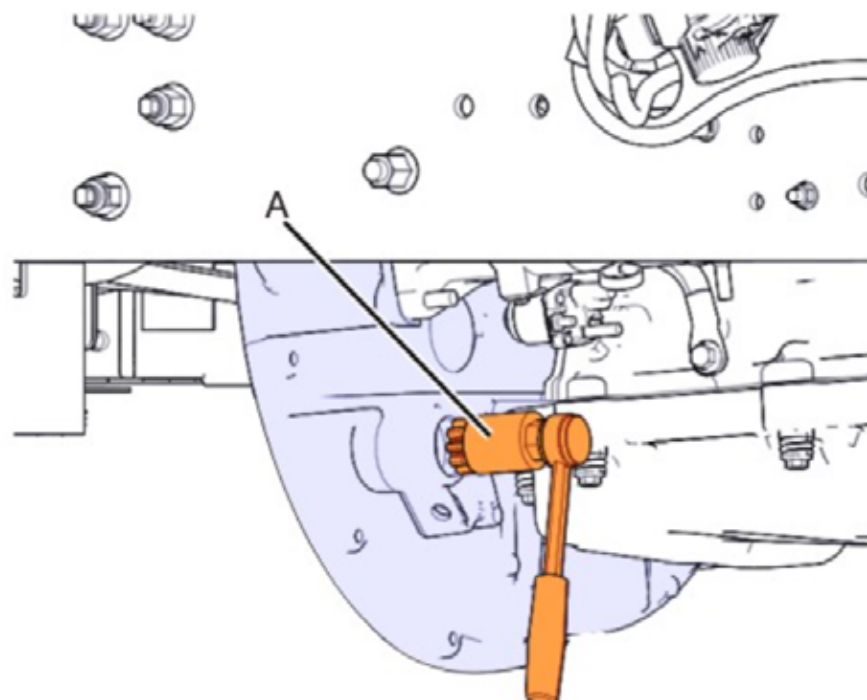
- If not previously installed.

- Remove the plug.



- Install the cranking tool (A).

Required material	
CRANKING TOOL	88840317



133 Note the camshaft marking.



Note

The marking can be for the adjustment of multiple cylinders.



Note

When checking or adjusting, the mark must be centered between the lines on the camshaft cap.

134 Adjust the rocker arms according to the chart.

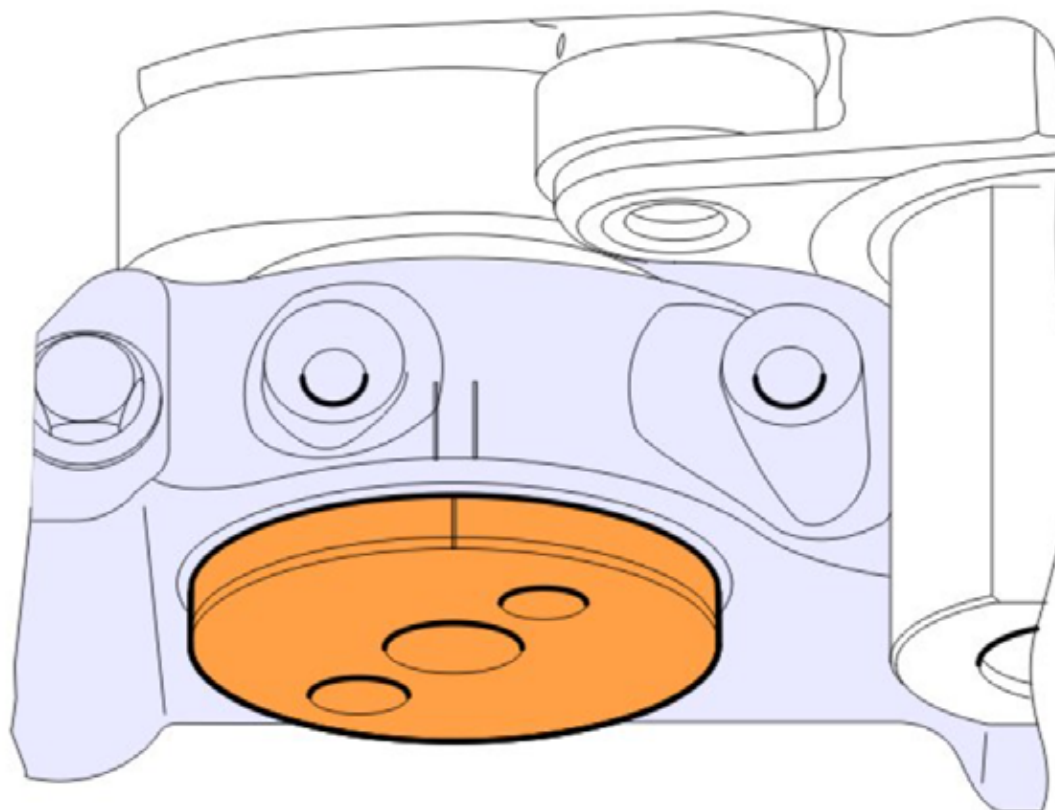
Camshaft marking

CAM POSITION	INLET	INJECTOR / PUMP	EXHAUST
5/PE6	Cylinder 5	Pump 6	Cylinder 6
3/PE2	Cylinder 3	Pump 2	Cylinder 2
6/PE4	Cylinder 6	Pump 4	Cylinder 4
2/E1	Cylinder 2	–	Cylinder 1
4/E5	Cylinder 4	–	Cylinder 5

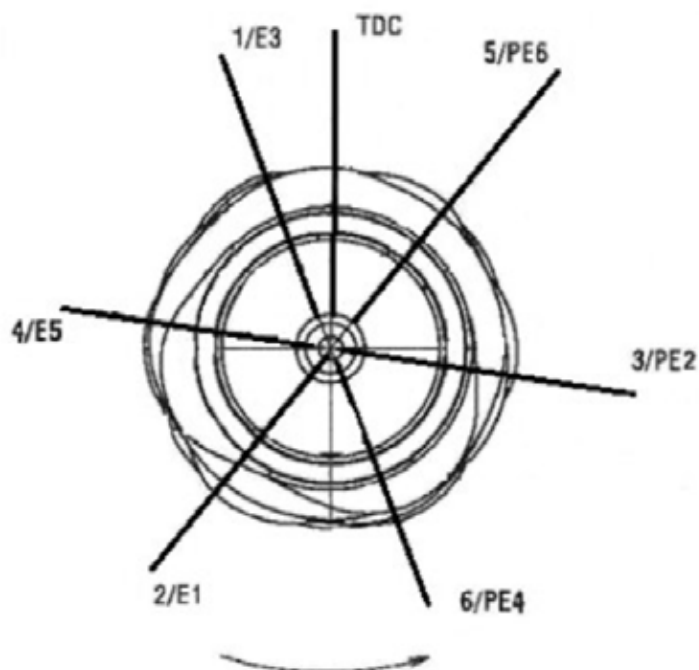
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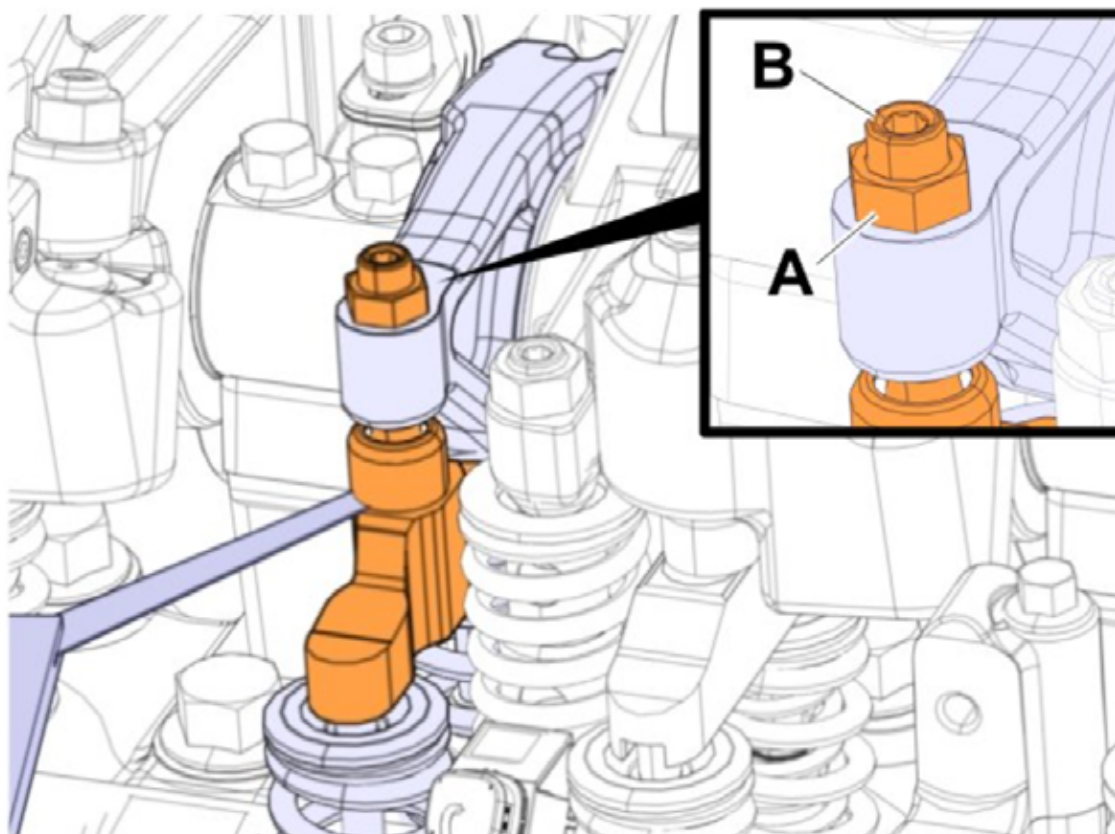
	1/E3	Cylinder 1	-	Cylinder 3
--	------	------------	---	------------



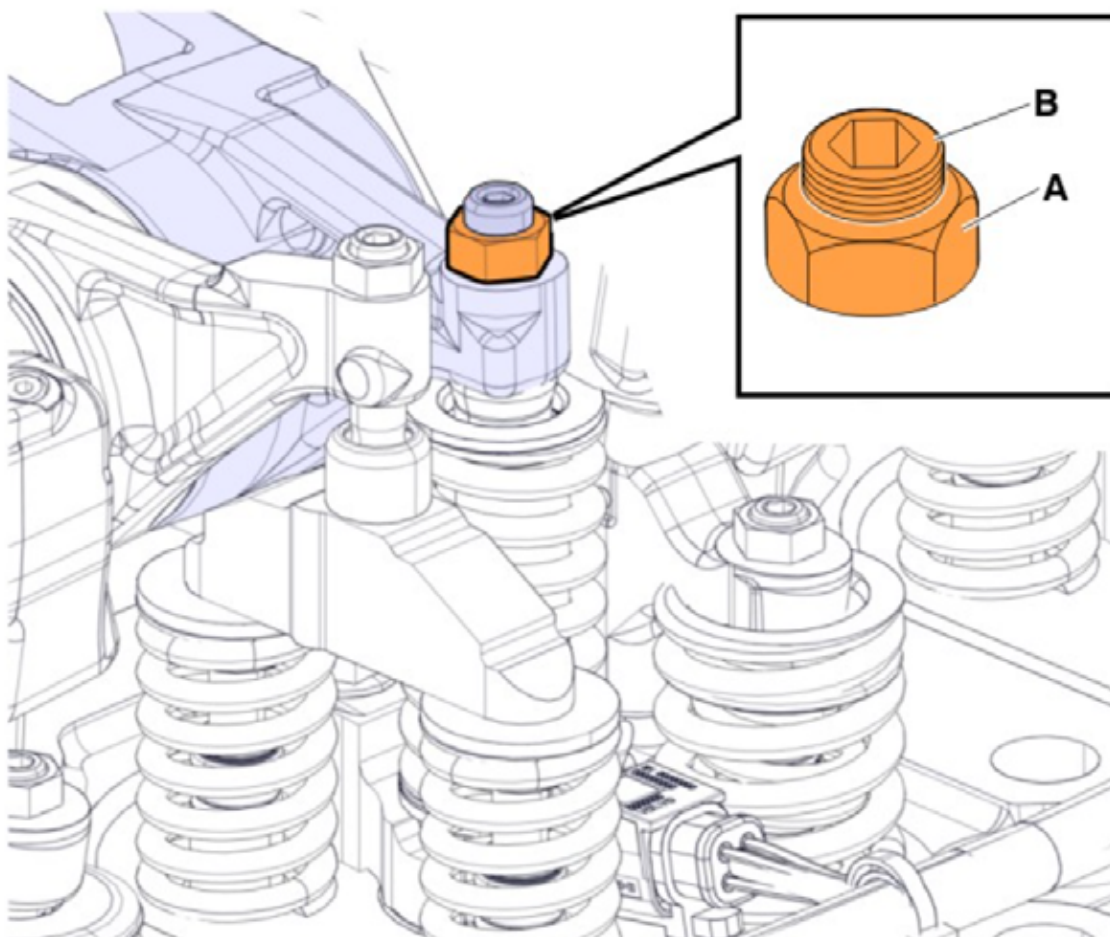
135	Rotate the crankshaft to the next timing mark on the camshaft.  Note Rotate the crankshaft in the normal engine rotation direction. Ask for assistance.
-----	--



136	Check the inlet valve rocker arm clearance.	
	Tech data	
	Inlet valve, rocker arm, clearance	0.2 ±0.05 mm (0.008 ±0.002 in)



137	Perform this procedure when the condition below is met.	
	Conditions	
	If the valve clearance is not correct.	
	Loosen the nut (A).	
	Adjust the screw (B) until the feeler blade can be moved but there is some resistance.	
	Prevent the screw from turning (B), and tighten the nut (A) to torque.	
	Tightening torque	
	Rocker arm, nut	38 ±4 Nm
		(28 ±3 lb _f -ft)
138	Loosen the nut (A).	
139	Adjust the screw (B) until there is no clearance between the adjustment screw and the injector ball socket.	

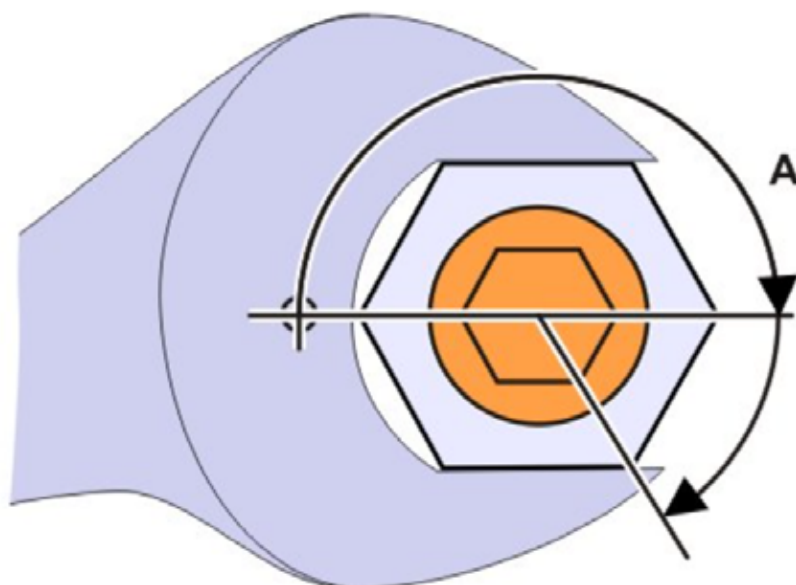


140 Angle tighten the screw (B).

Tech data

Injector, adjusting screw

240 ±20°

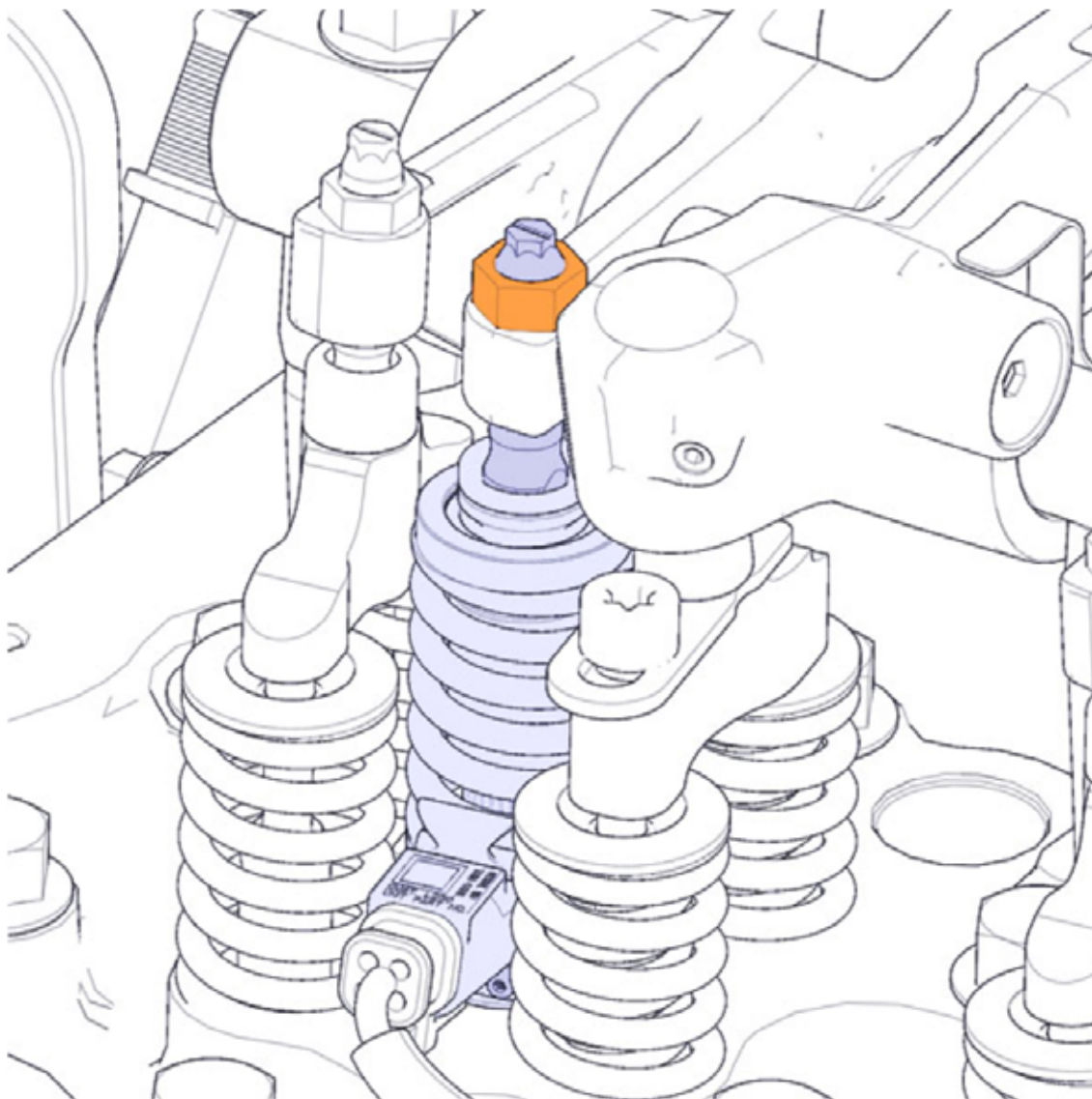


141 Prevent the screw (B) from turning and torque-tighten the nut (A).

Tightening torque

Injector, rocker arm, nut

52 ± 4 Nm
(38 ± 3 lb_f-ft)

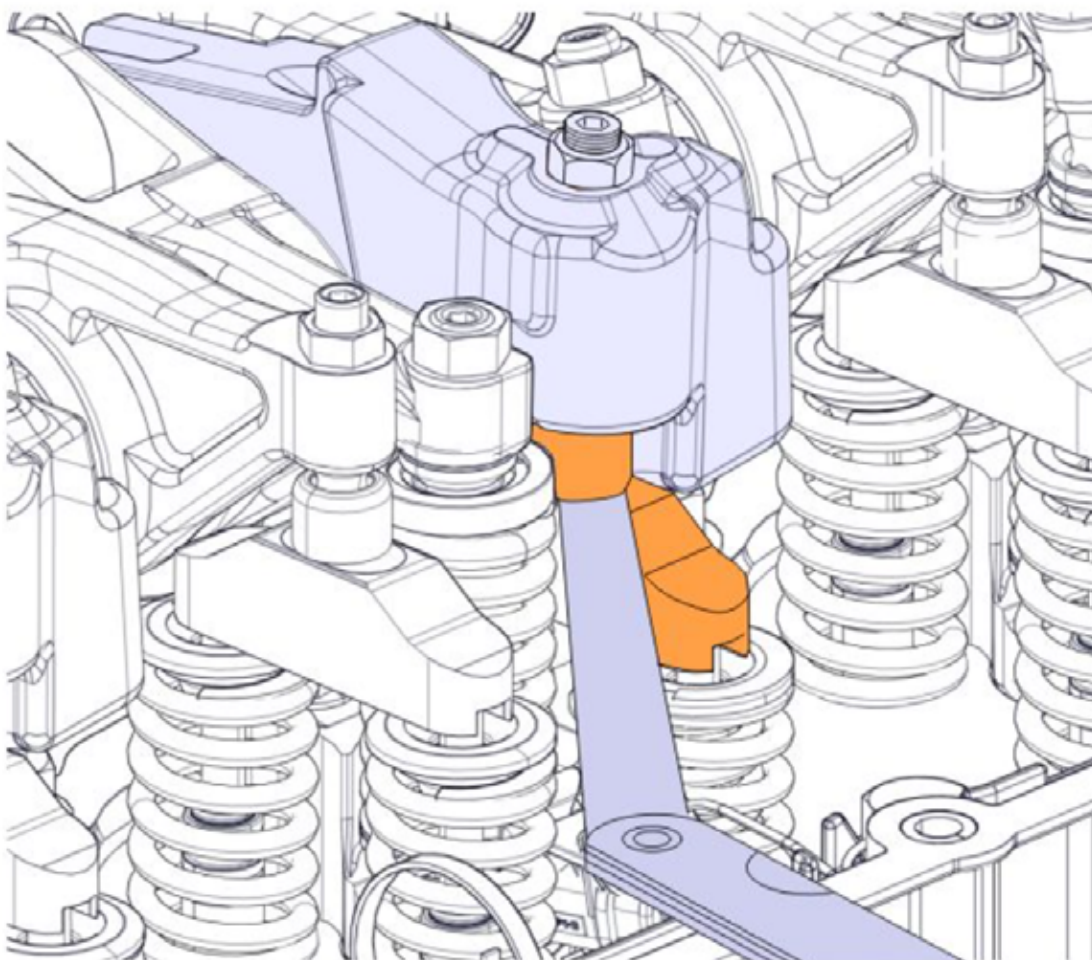


142 Check the clearance.

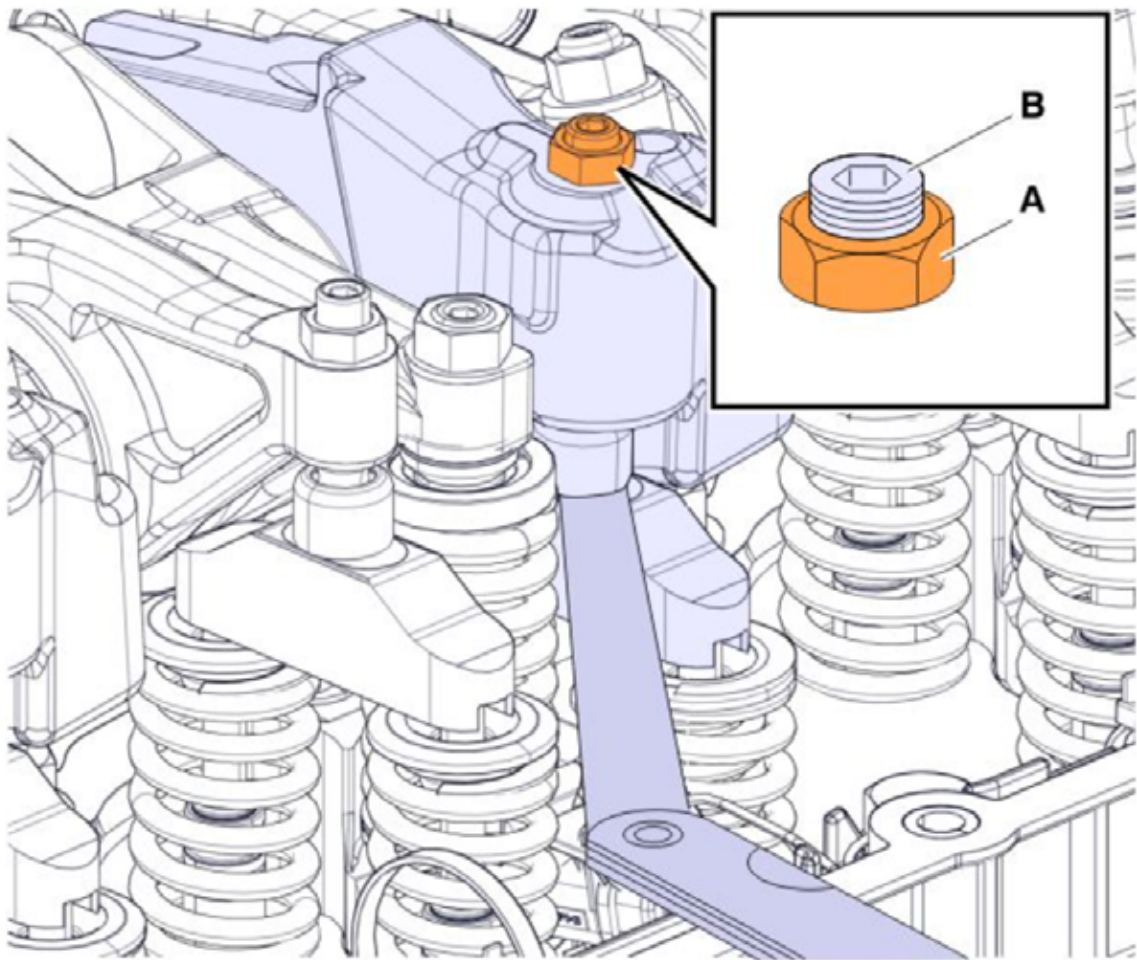
Tech data

Exhaust brake, rocker arm, setting gauge

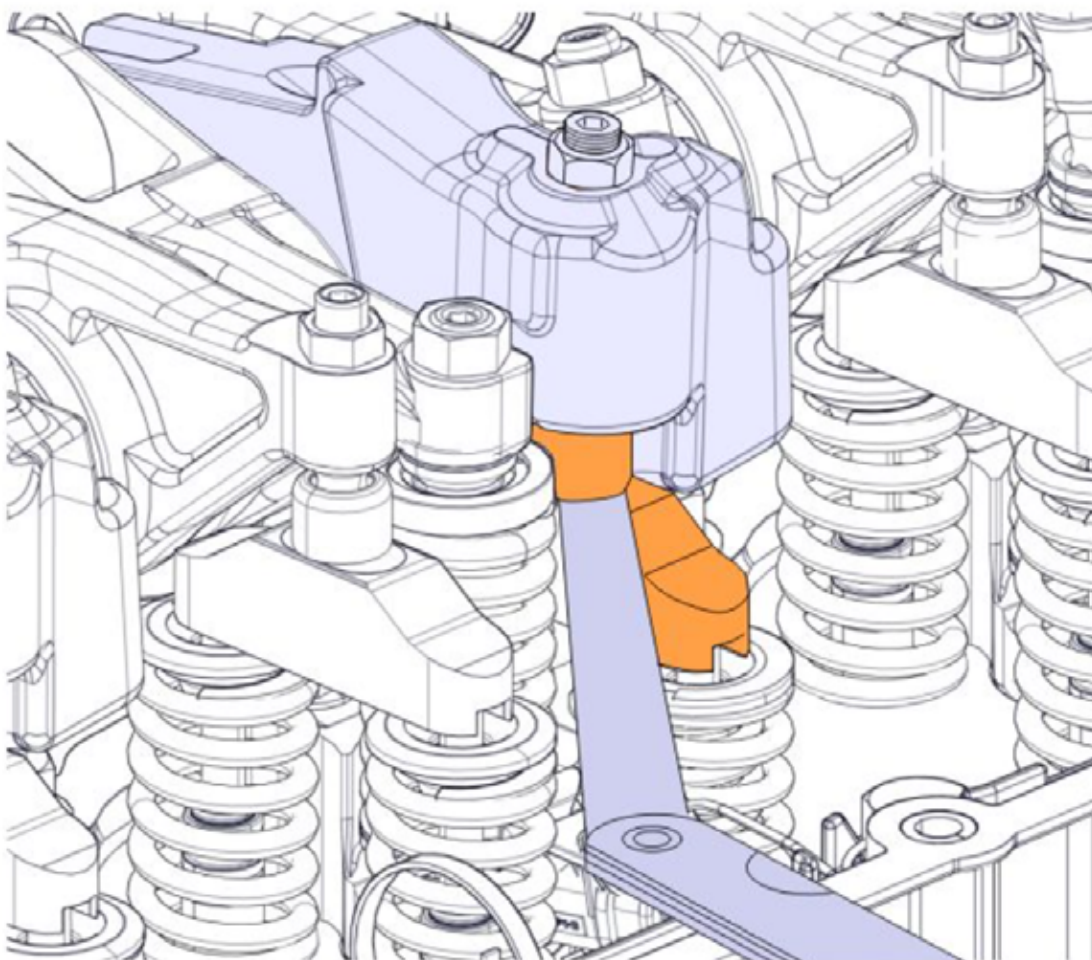
1.00 ± 0.07 mm
(0.0394 ± 0.0028 in)



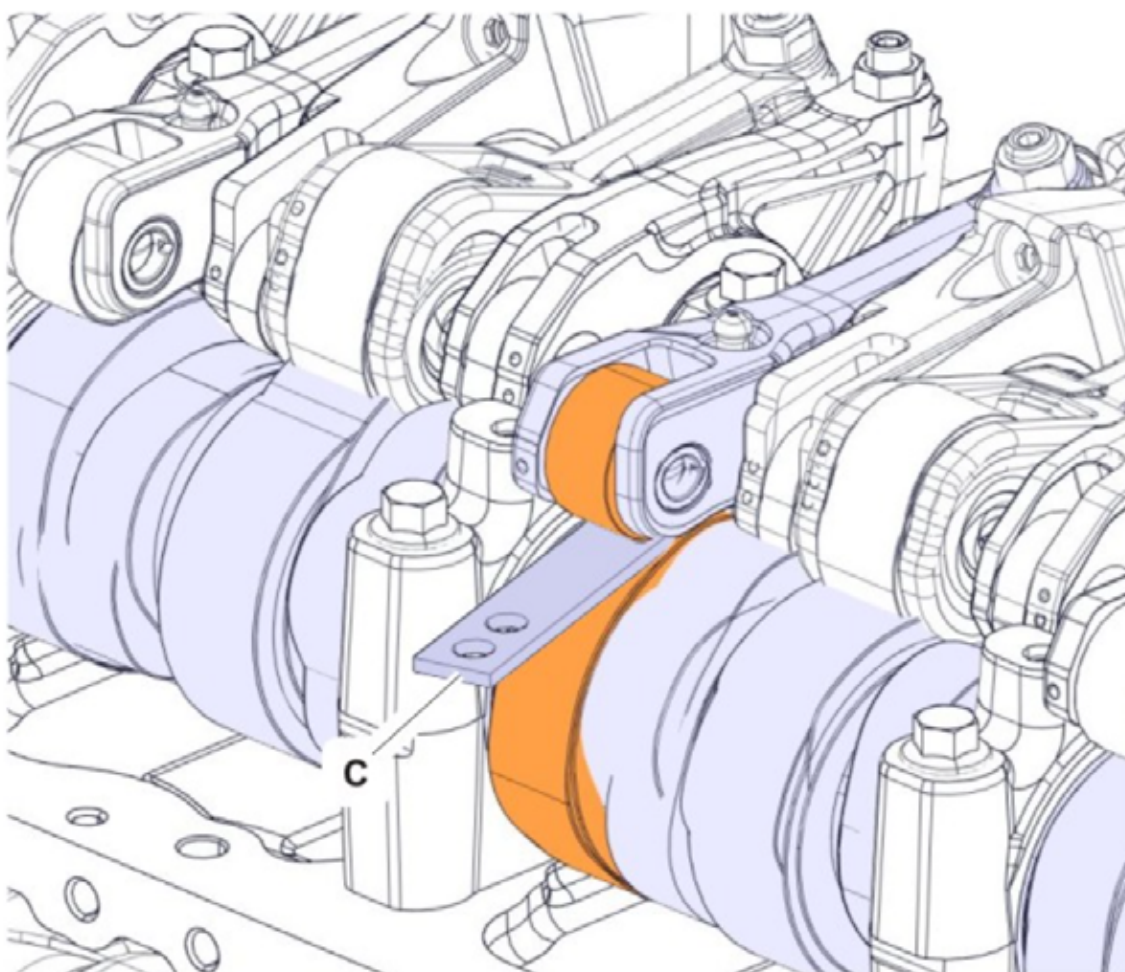
143	Perform this procedure when the condition below is met.	
	Conditions	
	• If the clearance is not in specification.	
	▶ Adjust the rocker screw.	
	▶ Loosen the nut (A) and screw (B).	
	▶ Adjust the rocker arm to specification.	
	▶ Prevent the screw from turning (B), and torque-tighten the nut (A).	
	Tightening torque	
	Rocker arm, nut	38 ±4 Nm
		(28 ±3 lb _f ·ft)



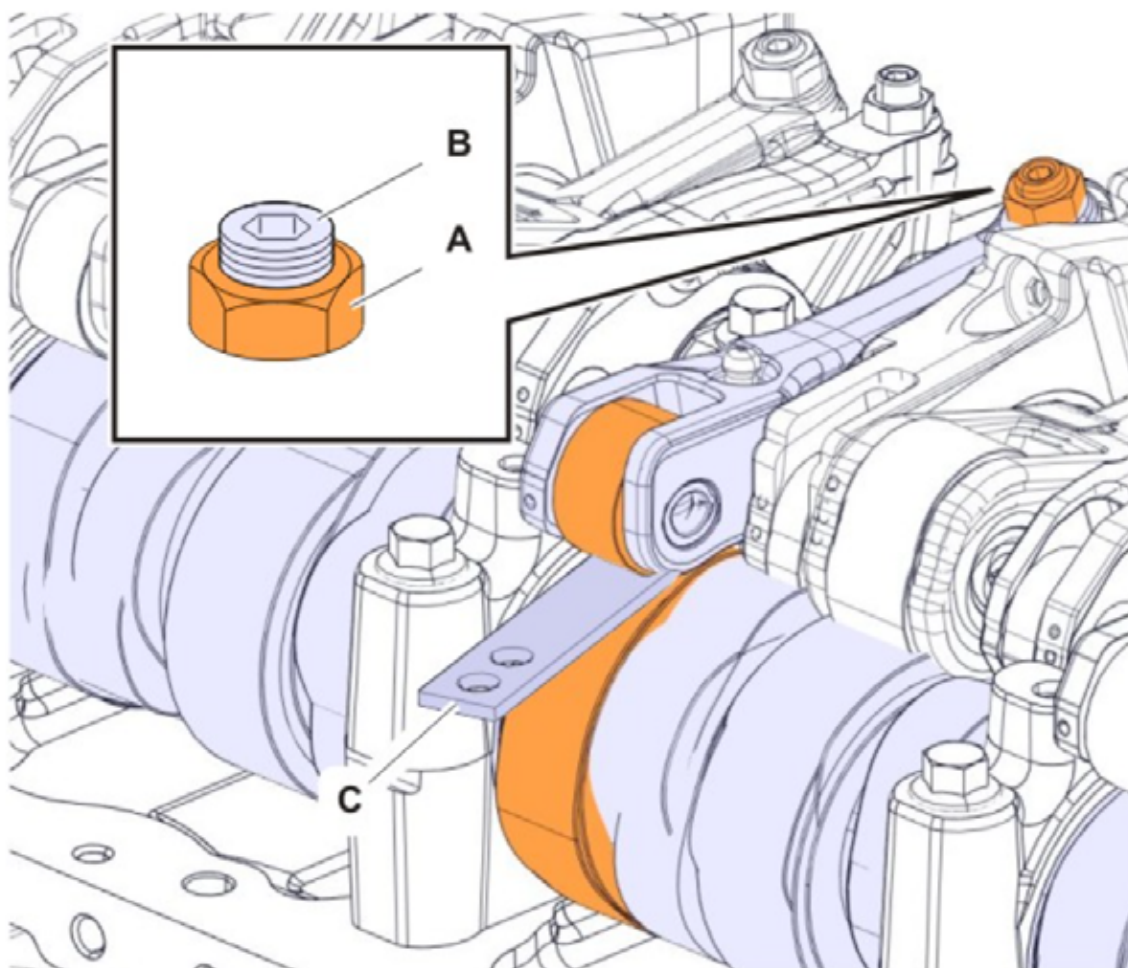
144 Keep the gauge in place.



145	Check the clearance using the setting tool (C).	
Tech data		
Setting Tool	2.50 mm (0.0984 in)	
Required material		
SETTING TOOL	88800232	



146	Perform this procedure when the condition below is met.	
Conditions		
•	If the valve clearance is not correct.	
▶	Loosen the nut (A) and screw (B).	
▶	Install the setting tool (C).	
▶	Tighten the screw (B) until the exhaust valve just begins to open.	
▶	Loosen the screw (B) until the setting tool (C) can be moved but with some resistance.	
▶	Prevent the screw from turning (B), and torque-tighten the nut (A).	
	Tightening torque	
	Injector, rocker arm, lock nut	52 ±4 Nm (38 ±3 lb _f ·ft)
▶	Remove the feeler gauge and setting tool.	



- Check the clearance using the mistake gauge(C).

Tech data

Control gauge

3.20 mm
(0.126 in)

Required material

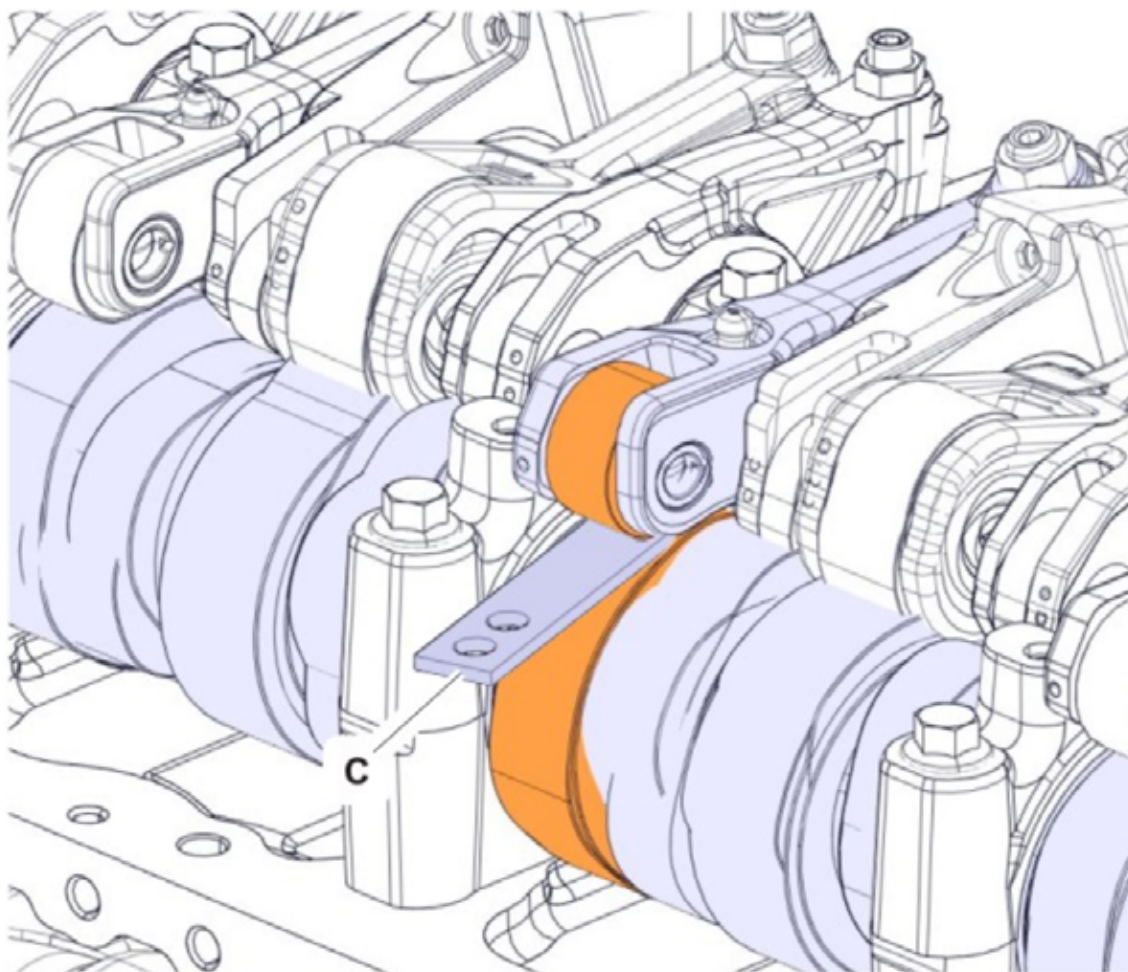
SETTING TOOL

[88800232](#)



Note

The mistake gauge should pass between the rocker arm and camshaft without resistance.



147 Adjust all the other rocker arms in the same way.



Note

Ask for assistance.

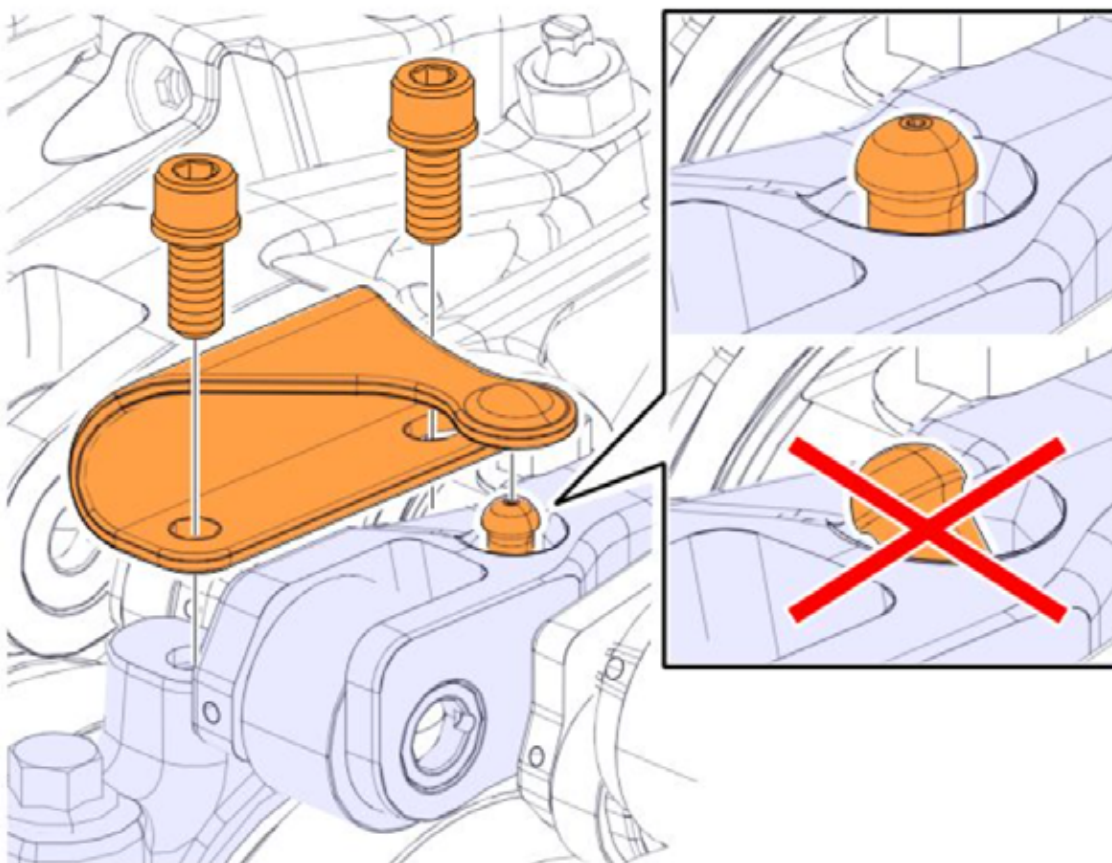
148 Install the leaf springs.



Note

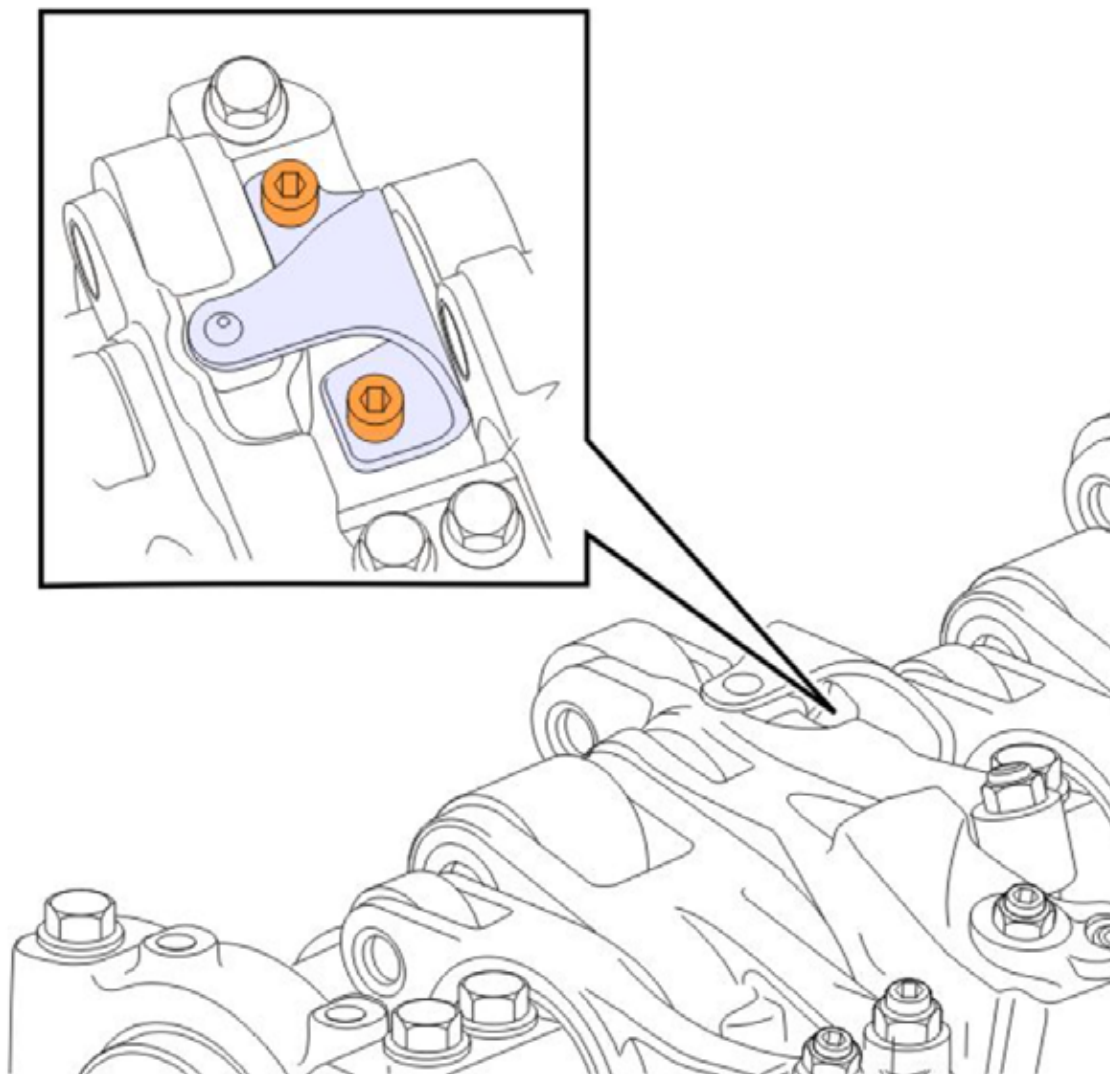
Ensure that the push rod is correctly placed.

149 Install the screws.

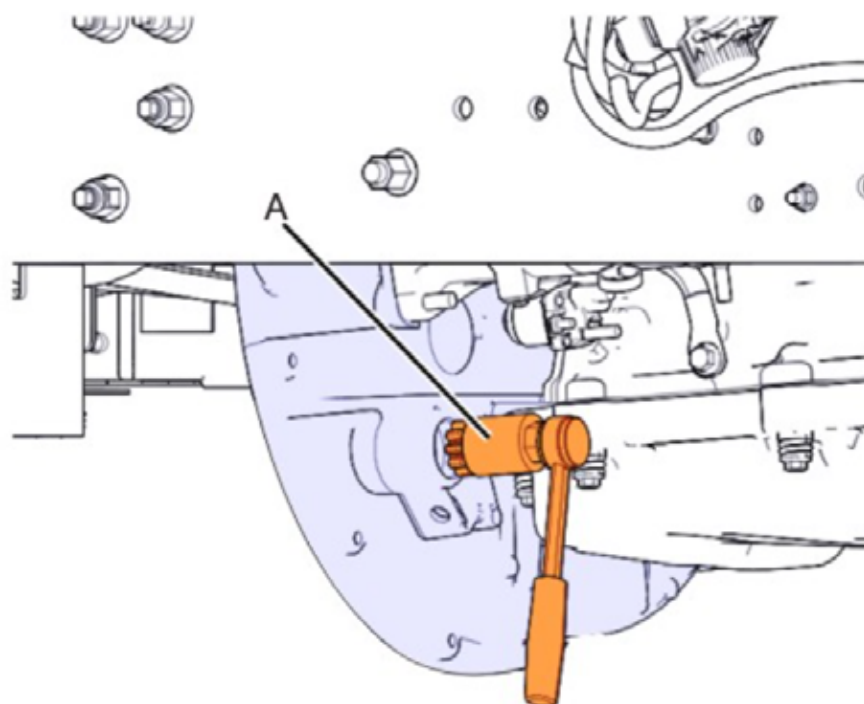


150	Torque tighten the screws.
-----	----------------------------

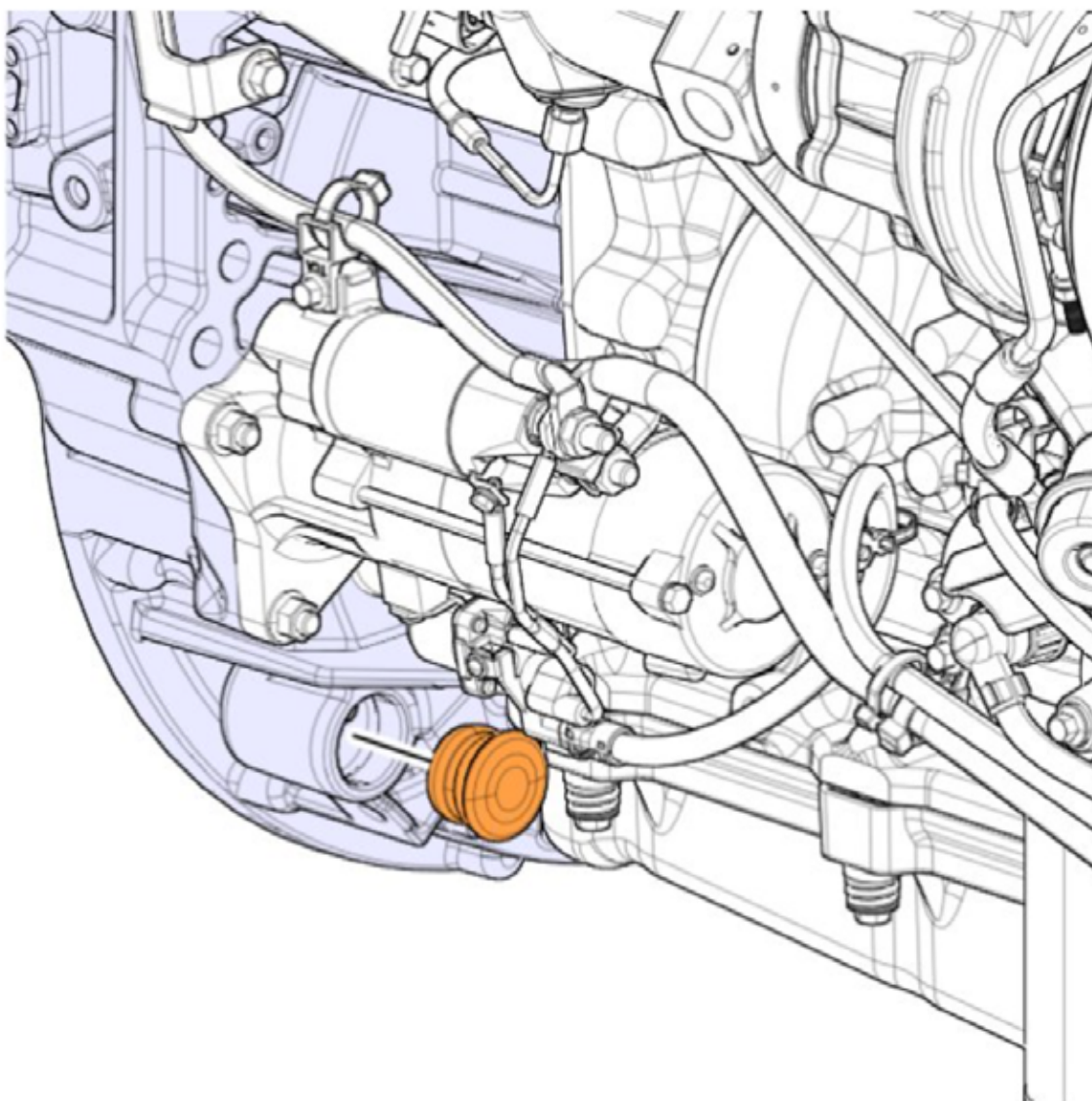
Tightening torque	
Leaf spring, screw	$25 \pm 3 \text{ Nm}$ $(18 \pm 2 \text{ lb}_f\text{ft})$



151	Remove the cranking tool (A).	
	Required material	
	CRANKING TOOL	88840317



152	Install the plug.
-----	-------------------



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



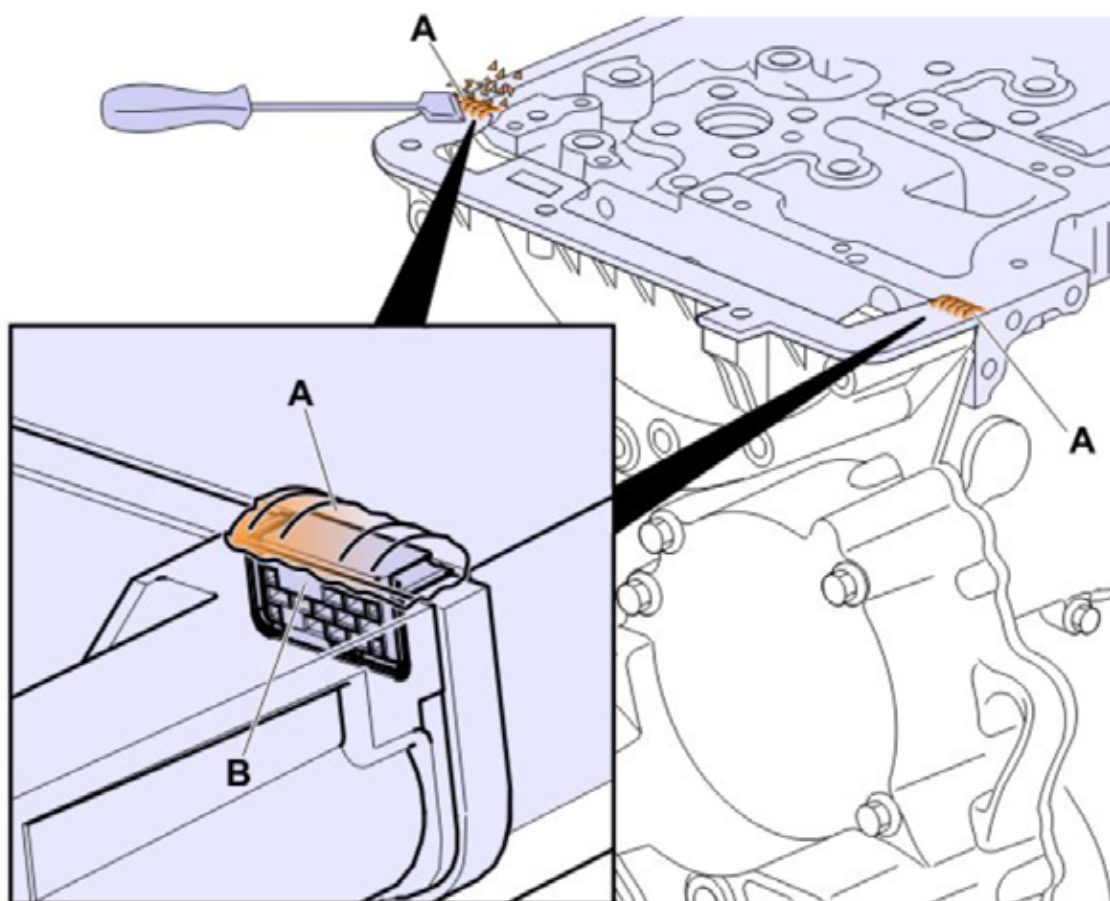
Note

Ensure that the surfaces are completely clean of sealant.



Note

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



154 Perform this procedure when the condition below is met.

Conditions

- Timing gear plate without integrated seal

► Apply sealant.

Tech data

Sealant, bead thickness

2 mm
(0.08 in)



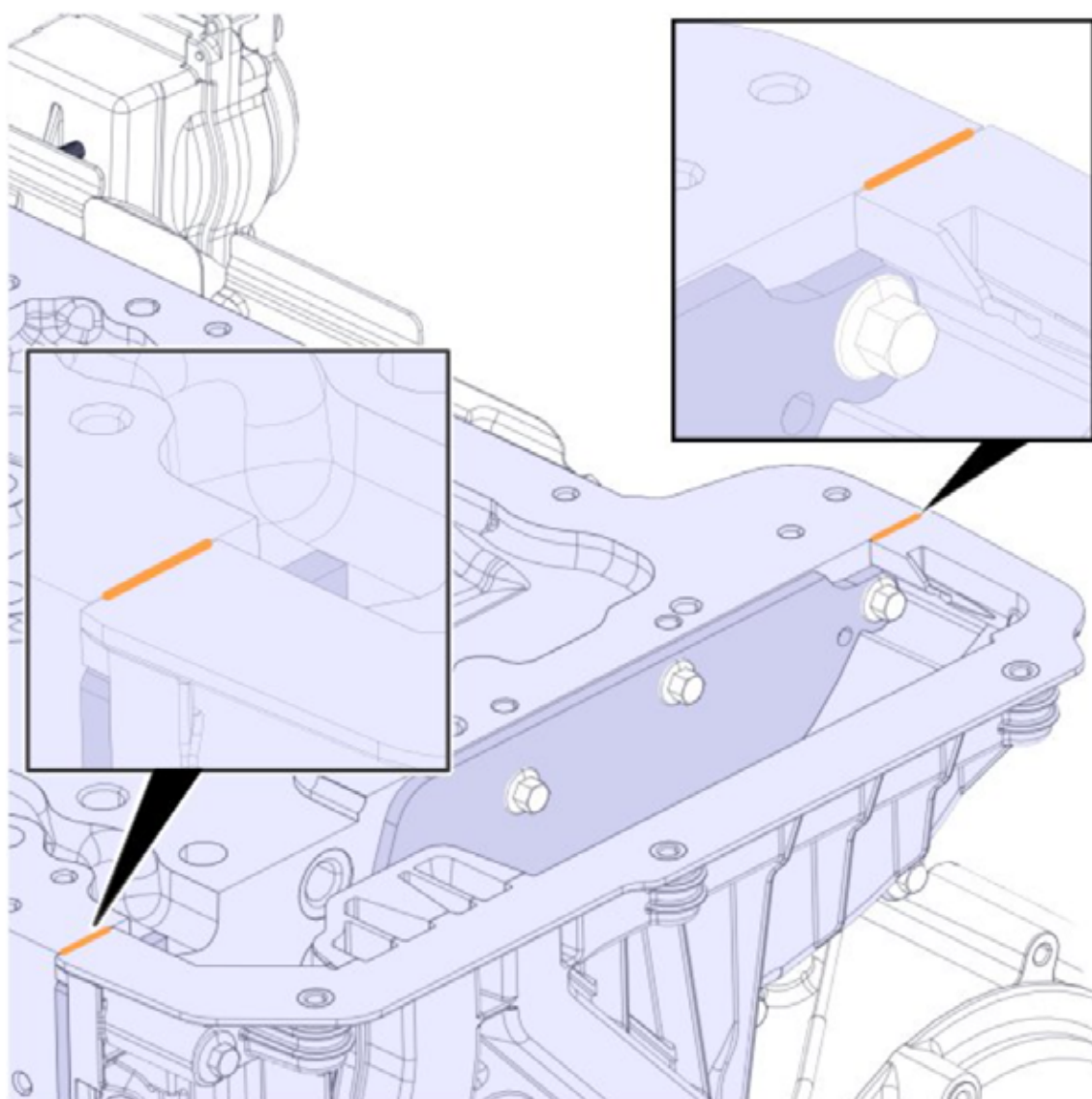
Note

Use recommended sealant.



Note

Install the valve cover within 20 minutes of applying the sealant.



155 Perform this procedure when the condition below is met.

Conditions

- Timing gear plate with integrated seal

► Apply sealant.

Tech data

Sealant, bead thickness

2 mm
(0.08 in)



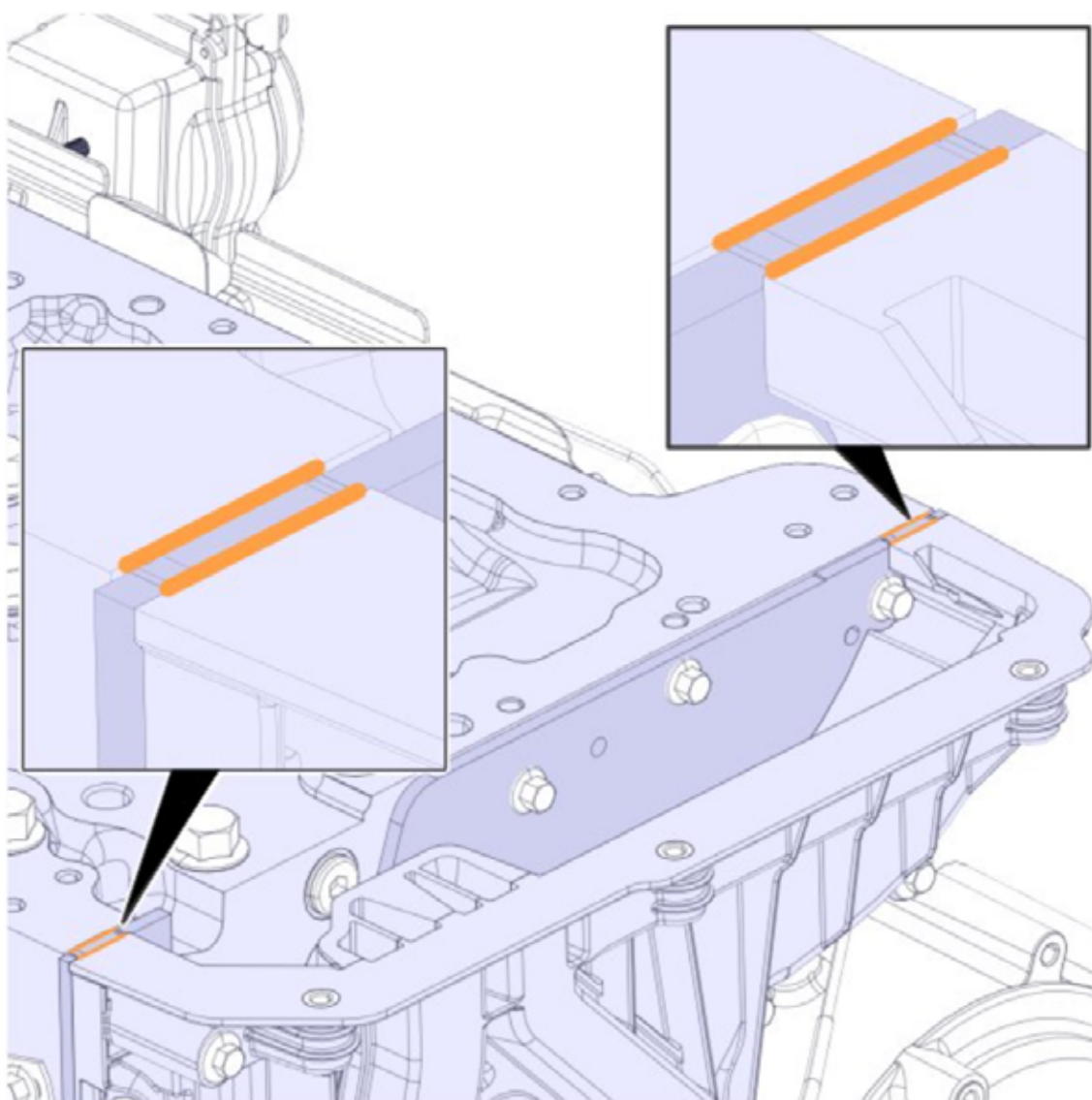
Note

Use recommended sealant.

Note



Install the valve cover within 20 minutes of applying the sealant.



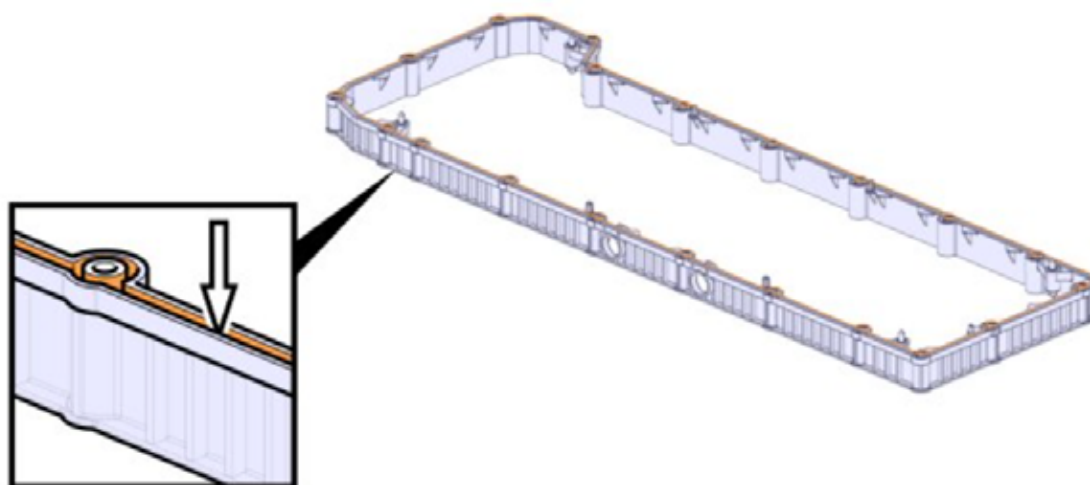
156 Clean the contact surfaces carefully.

157 Clean the groove.



Note

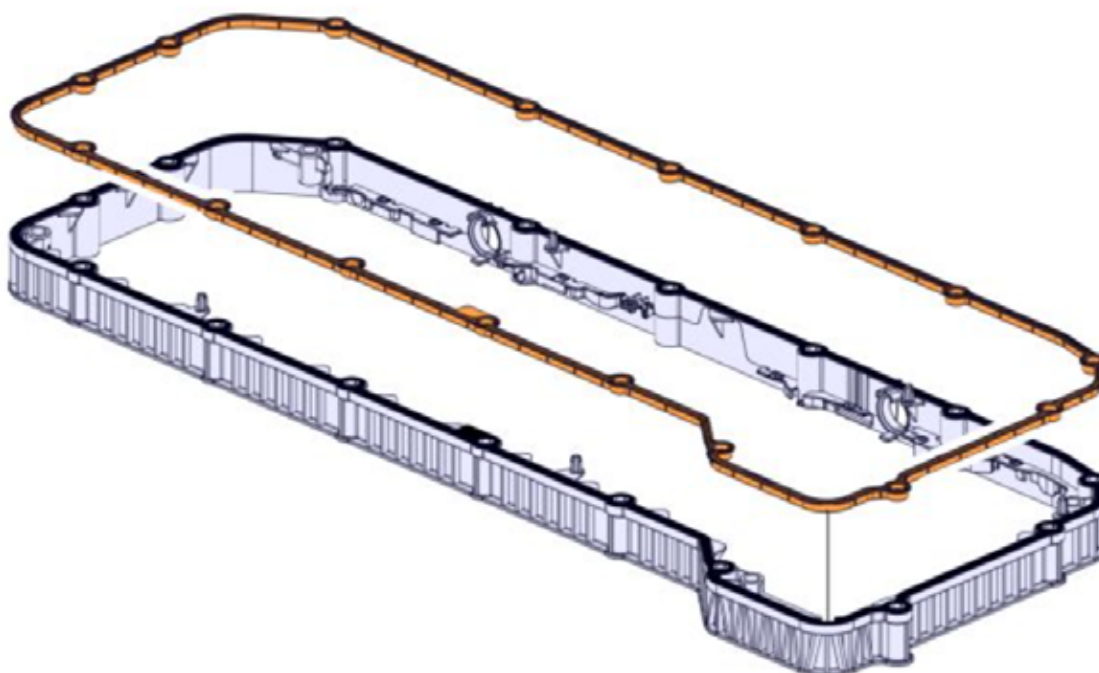
Ensure that the surfaces are completely free of oil and grease.



158 Install the gasket.

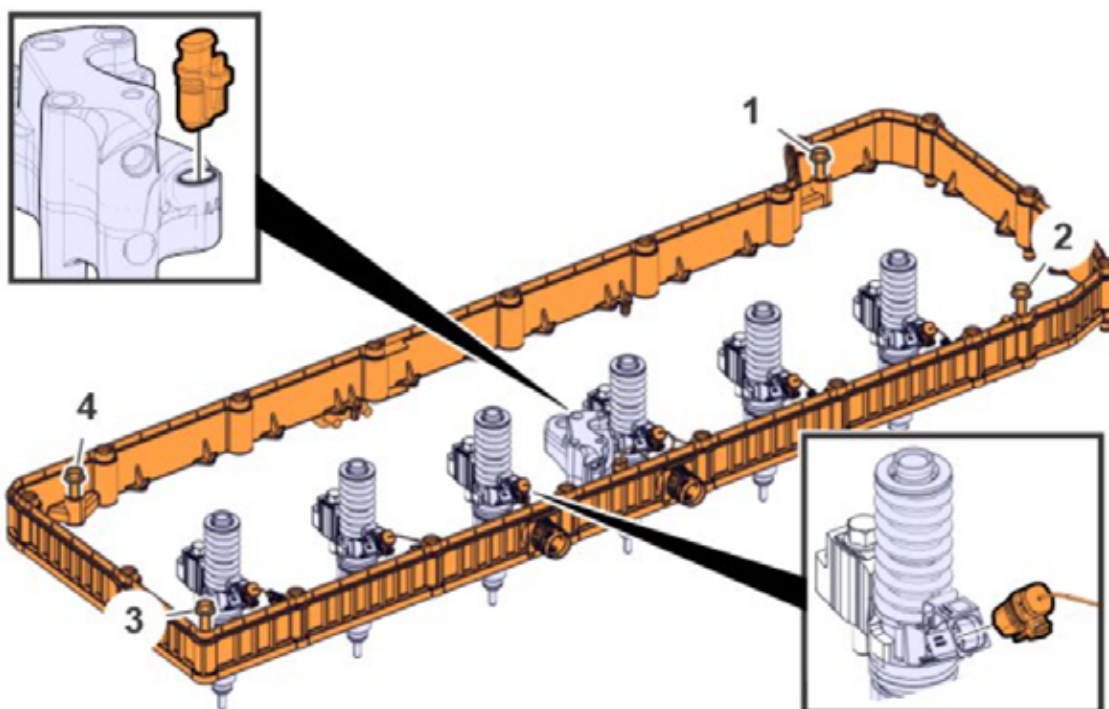


Note
Use a new part.

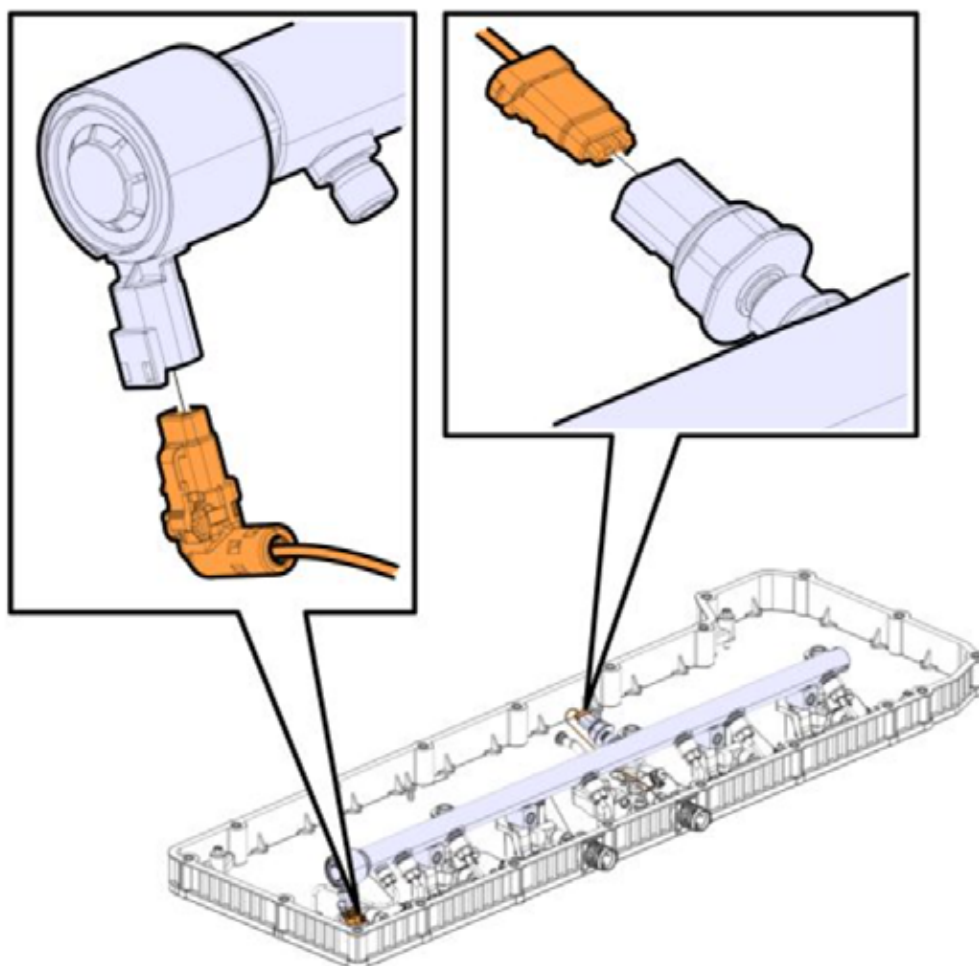


159 Install the frame.

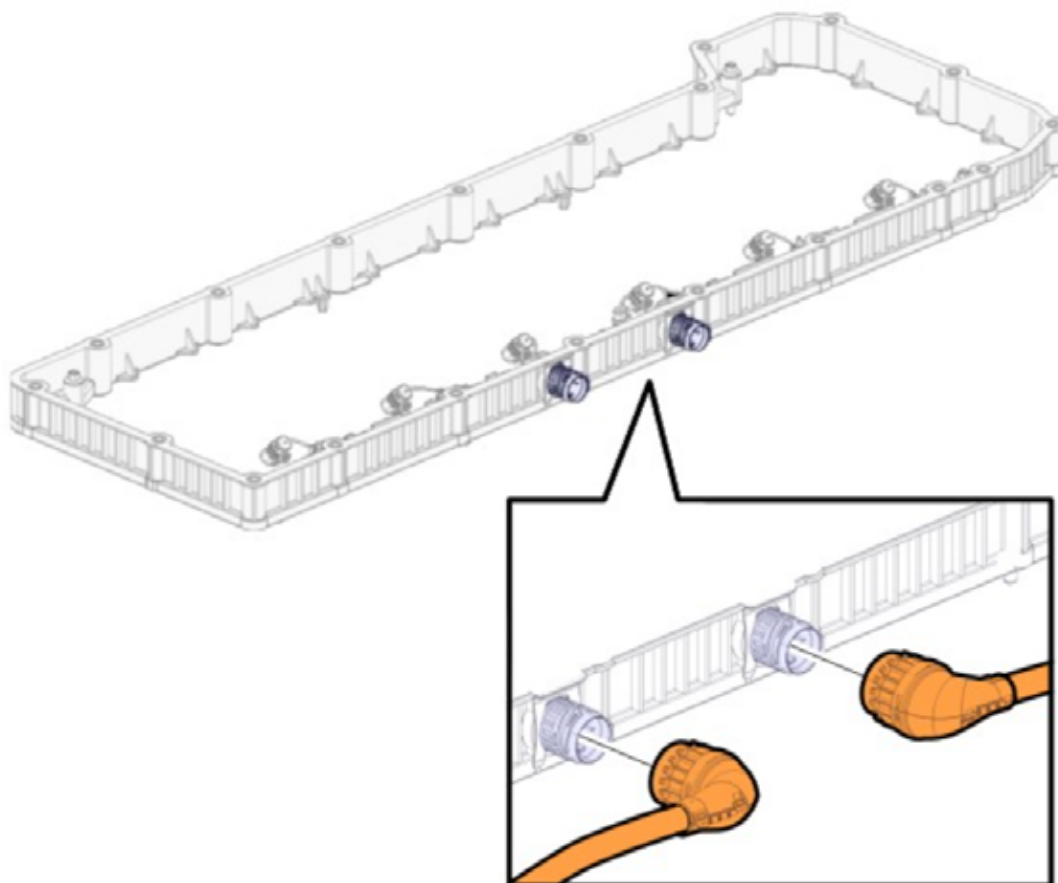
160	Tighten the screws to torque.	
	Tightening torque	
	Lower valve cover, screw	Tightening sequence: 1-4
		$24 \pm 4 \text{ Nm}$ $(18 \pm 3 \text{ lb}_f\text{ft})$
161	Connect the connectors.	



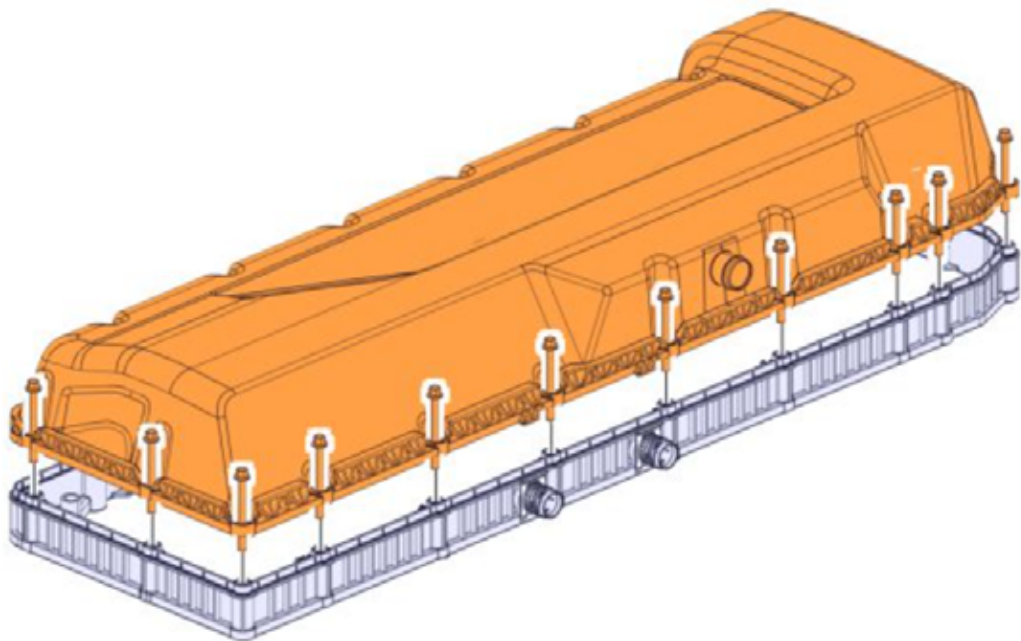
162	Connect the connectors.	
-----	-------------------------	--



163	Connect the connectors.
-----	-------------------------

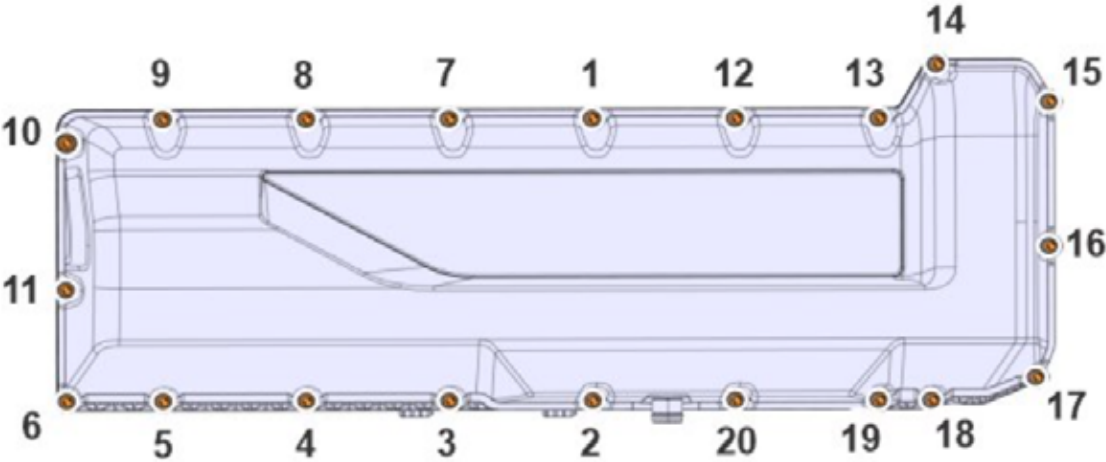


164	Position the screws.  Note Inspect the gasket, replace as needed.  Service hint Temporarily securing the screws at the rear of the cover in the uppermost position will aid in installation
165	Install the valve cover.



166 Tighten the screws to torque.

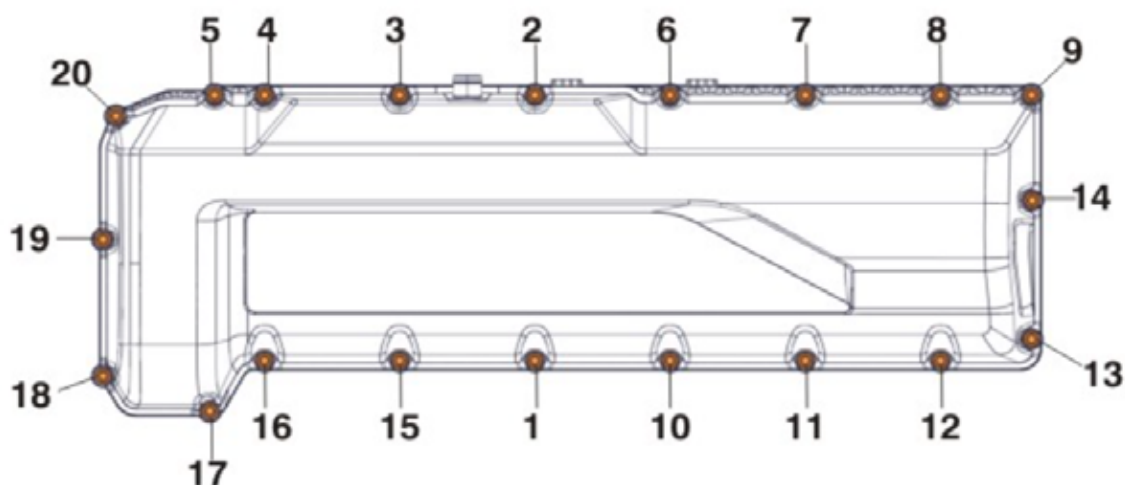
Tightening torque	
Valve cover, screw	Tightening sequence: 1–20
	24 ±4 Nm (18 ±3 lb _f -ft)



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

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167 Install the pipe.



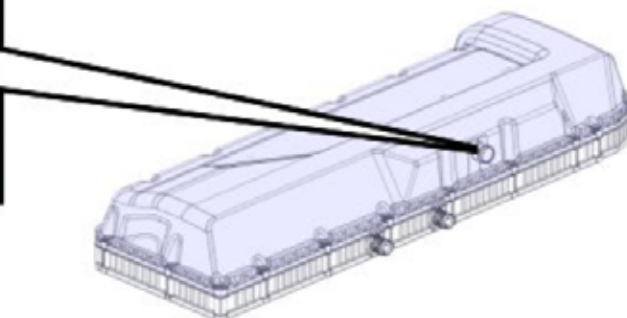
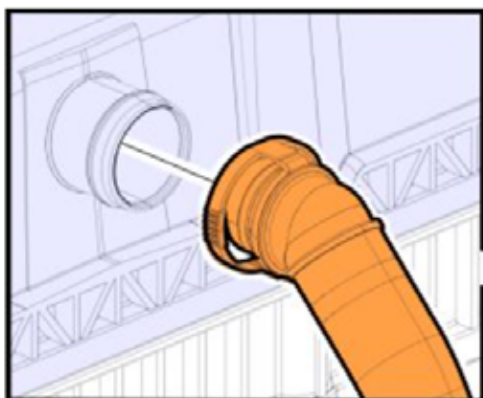
Note

If not previously installed.



Note

Inspect the internal sealing ring.

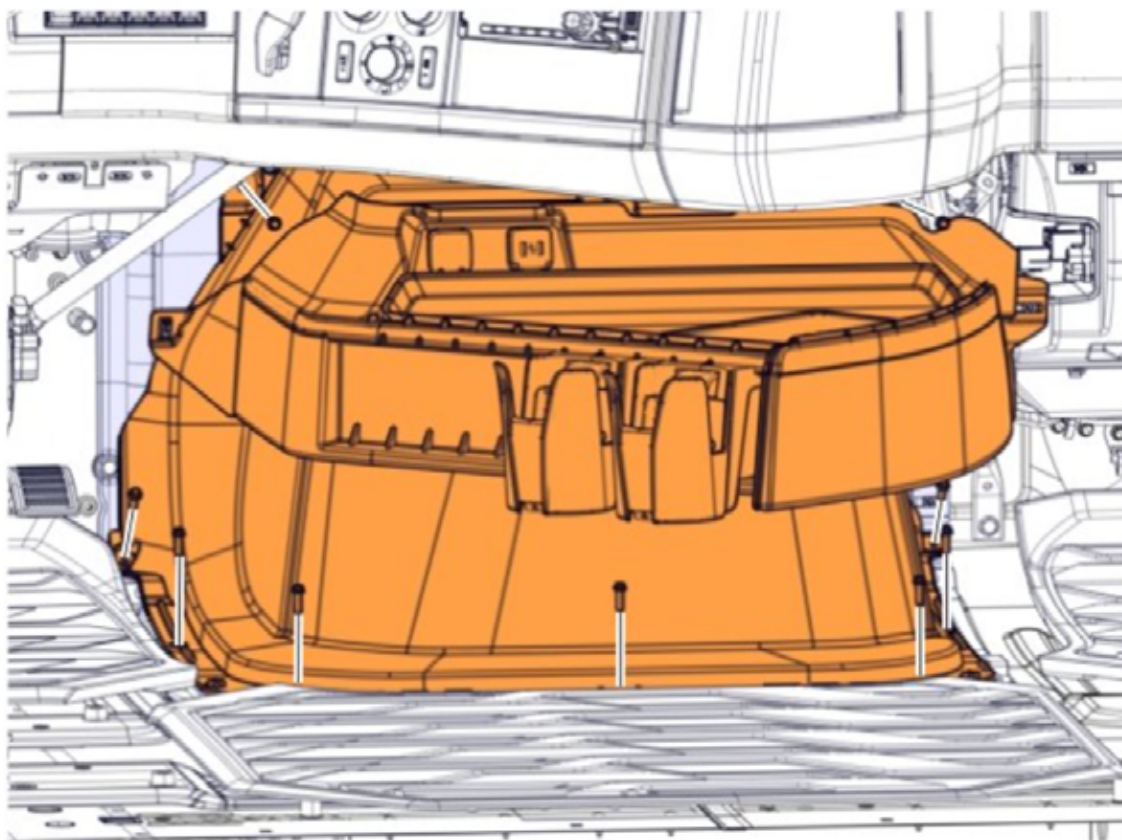


168 Connect the connector.

169 Install the engine cover.

170 Install the screws.

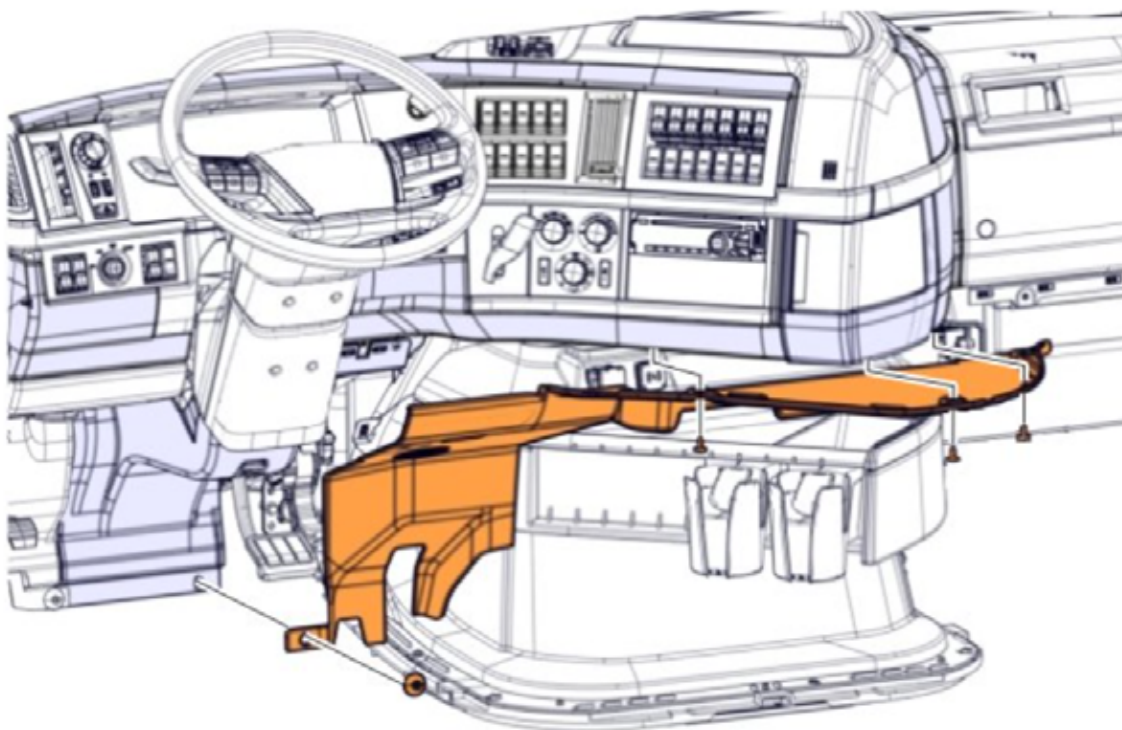
171	Tighten the screws to torque.	
	Tightening torque	
	Screw	M5
		3.1 ±0.8 Nm (27 ±7 lb _f ·in)



172	Install the plastic rivets.	
-----	-----------------------------	--

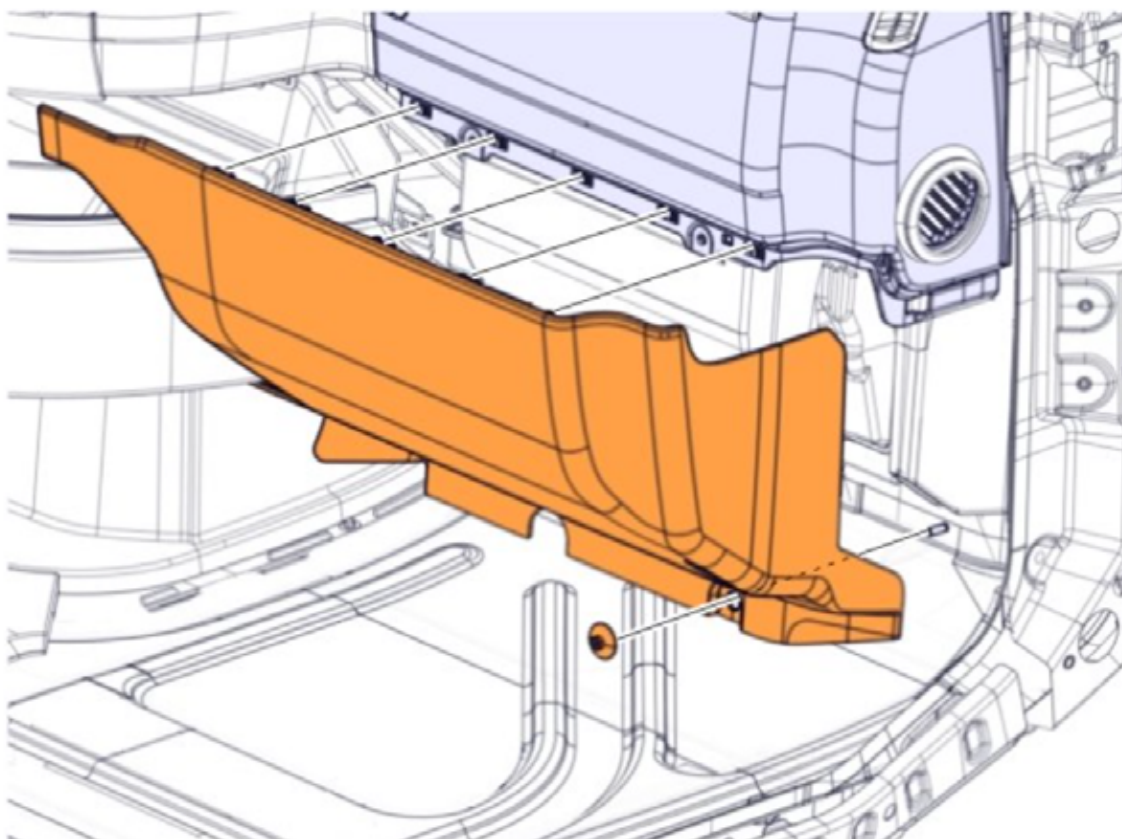
173	Install the screws.	
-----	---------------------	--

174	Tighten the screws to torque.	
	Tightening torque	
	Screw	M5
		3.1 ±0.8 Nm (27 ±7 lb _f ·in)



175	Install the panel.
-----	--------------------

176	Install the nut.
-----	------------------





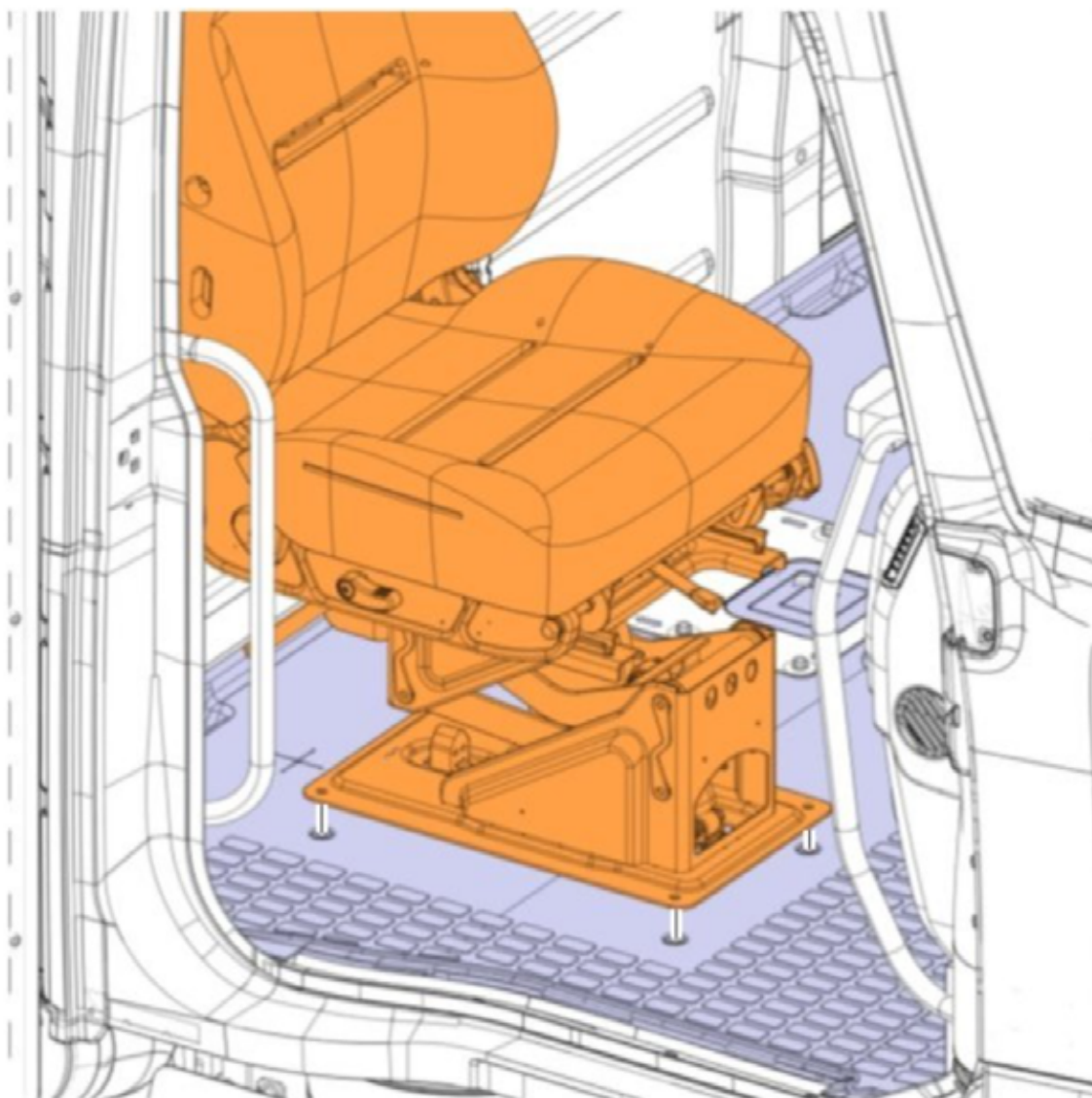
WARNING

Risk of serious injury.

Heavy component.

- ▶ Exercise caution when moving the component. Assistance is required.

177 Position the seat in the cab.



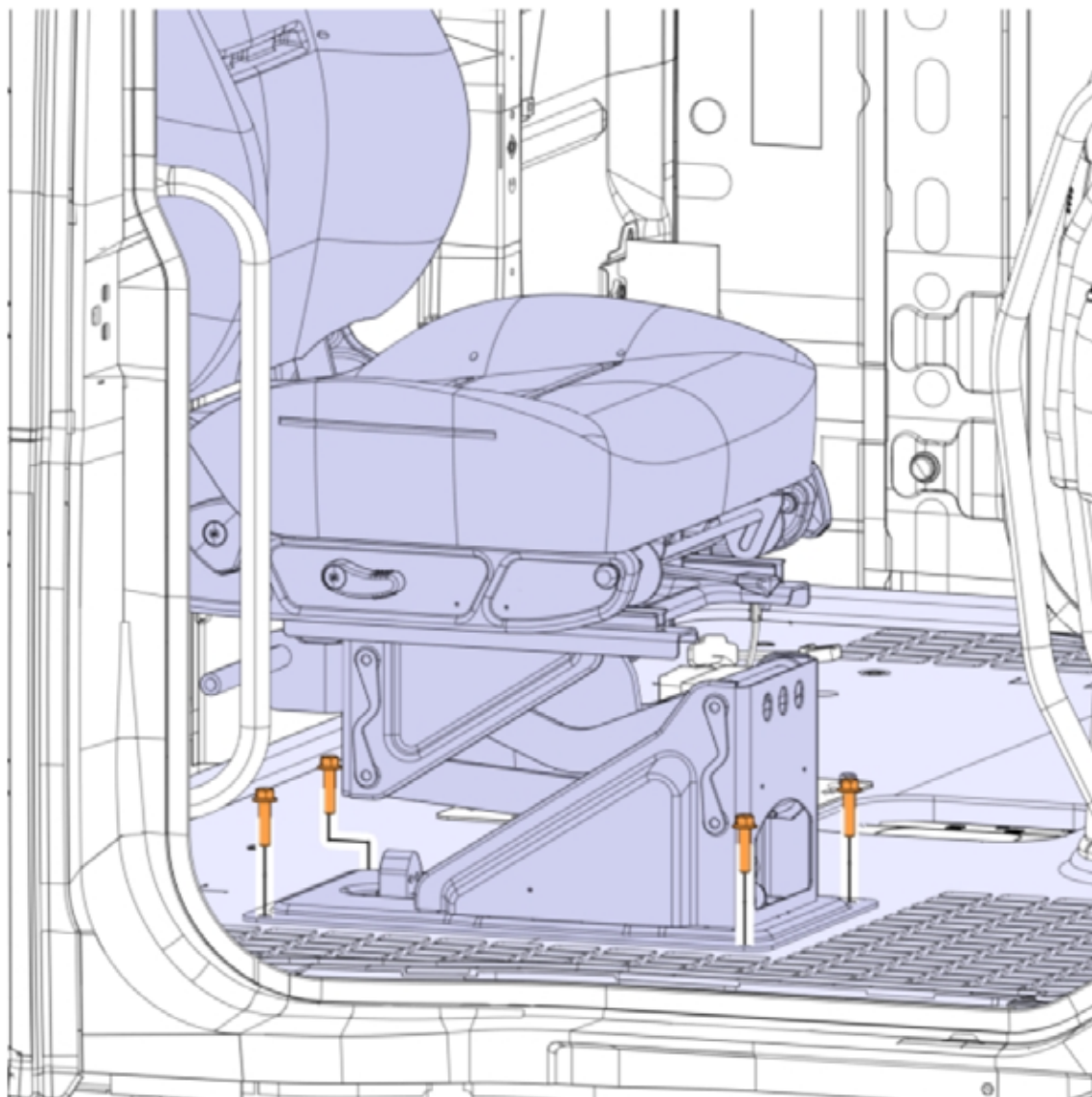
178 Install the screws.

Tightening torque

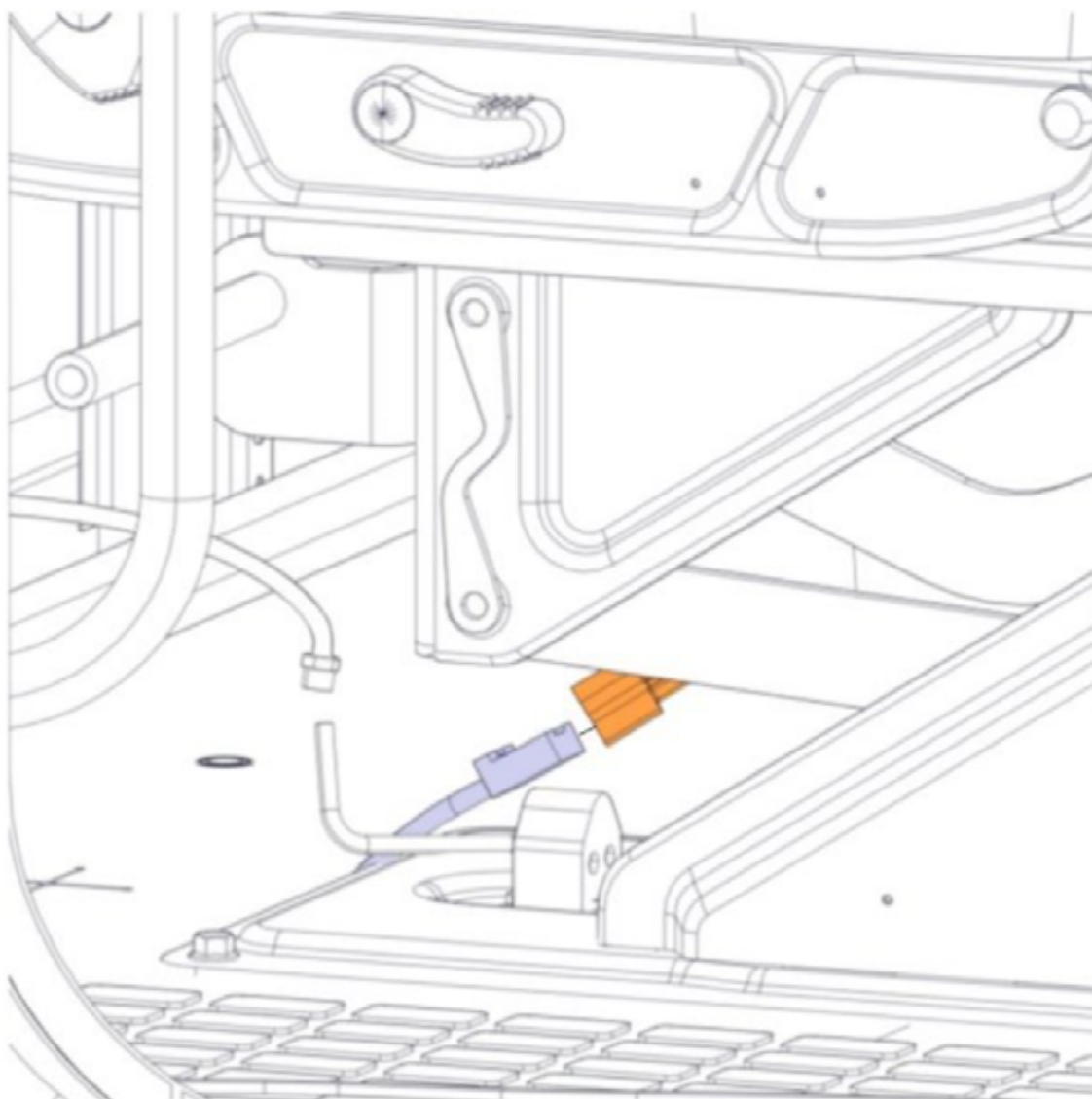
Seat, screw

M10

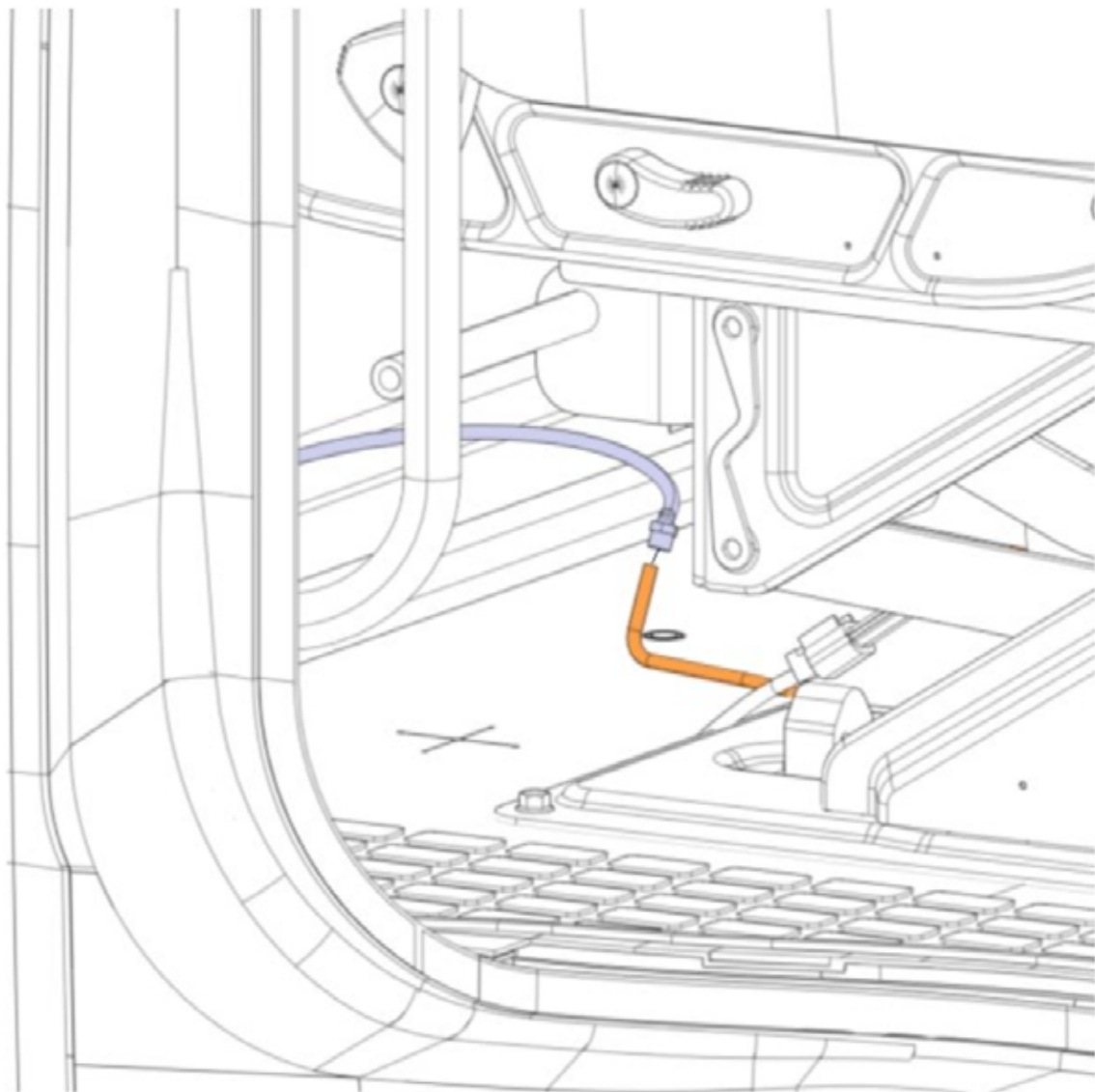
48 ±8 Nm
(35 ±6 lb_f·ft)



179 Connect the connector.



180	Connect the seat air hose.
-----	----------------------------



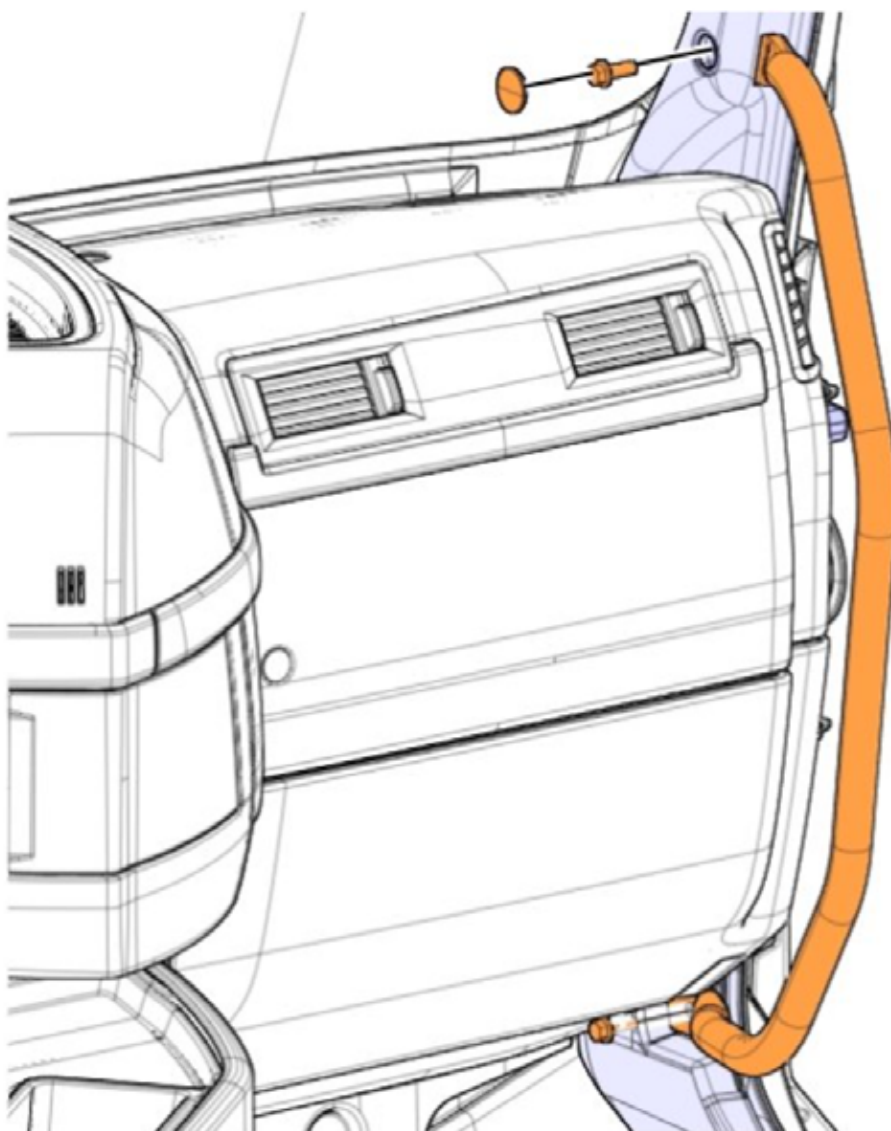
181	Install the seat belt.	
	Tightening torque	
	Seat belt, screw	M10
		64 ±3 Nm (47 ±2 lb _f ·ft)
182	Install the grab handle.	
183	Install the screws.	
184	Torque tighten the screws.	
	Tightening torque	
	Screw	M8
		24 ±4 Nm

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	(18 ±3 lb _f ·ft)
--	-----------------------------

185	Install the screw cover.
-----	--------------------------



186	Install the panel.
-----	--------------------

187	Install the screws.
-----	---------------------

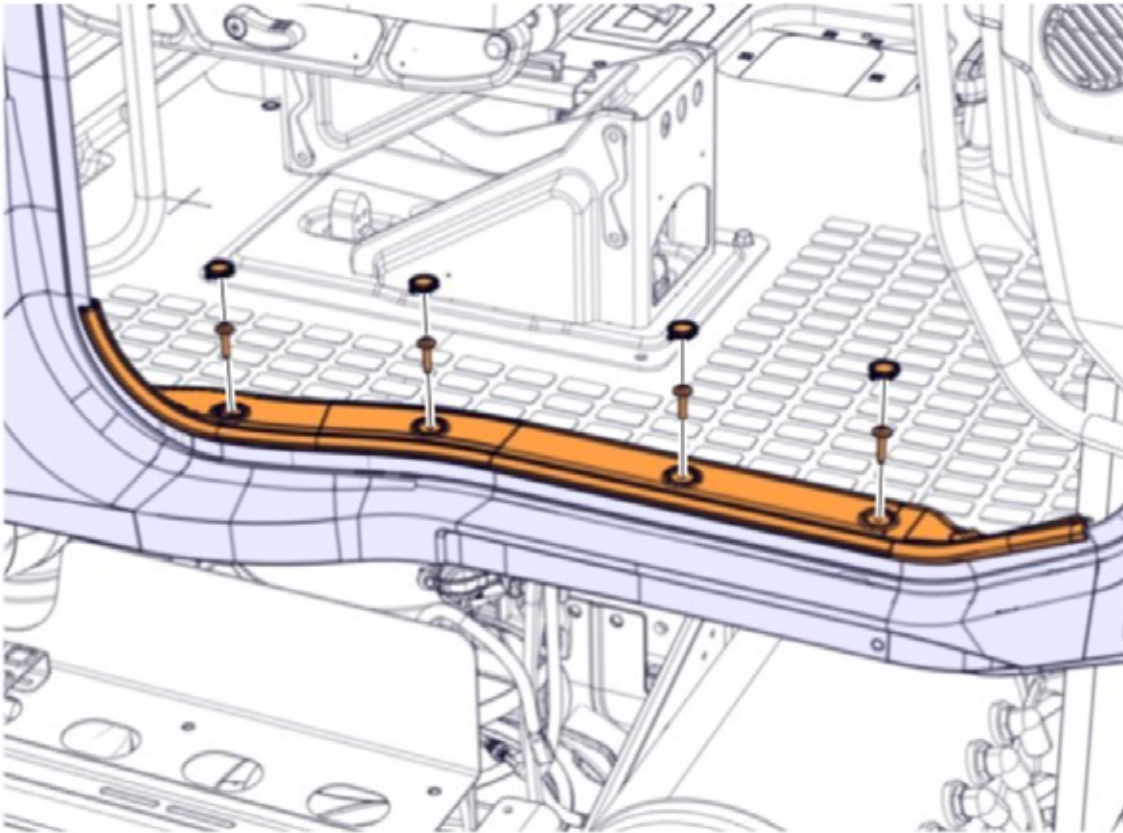
188	Torque tighten the screws.
-----	----------------------------

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

Interior panel, screw	
-----------------------	--

3.4 ±0.6 Nm (30 ±5 lb _f ·in)
--

189	Install the protecting covers.
-----	--------------------------------

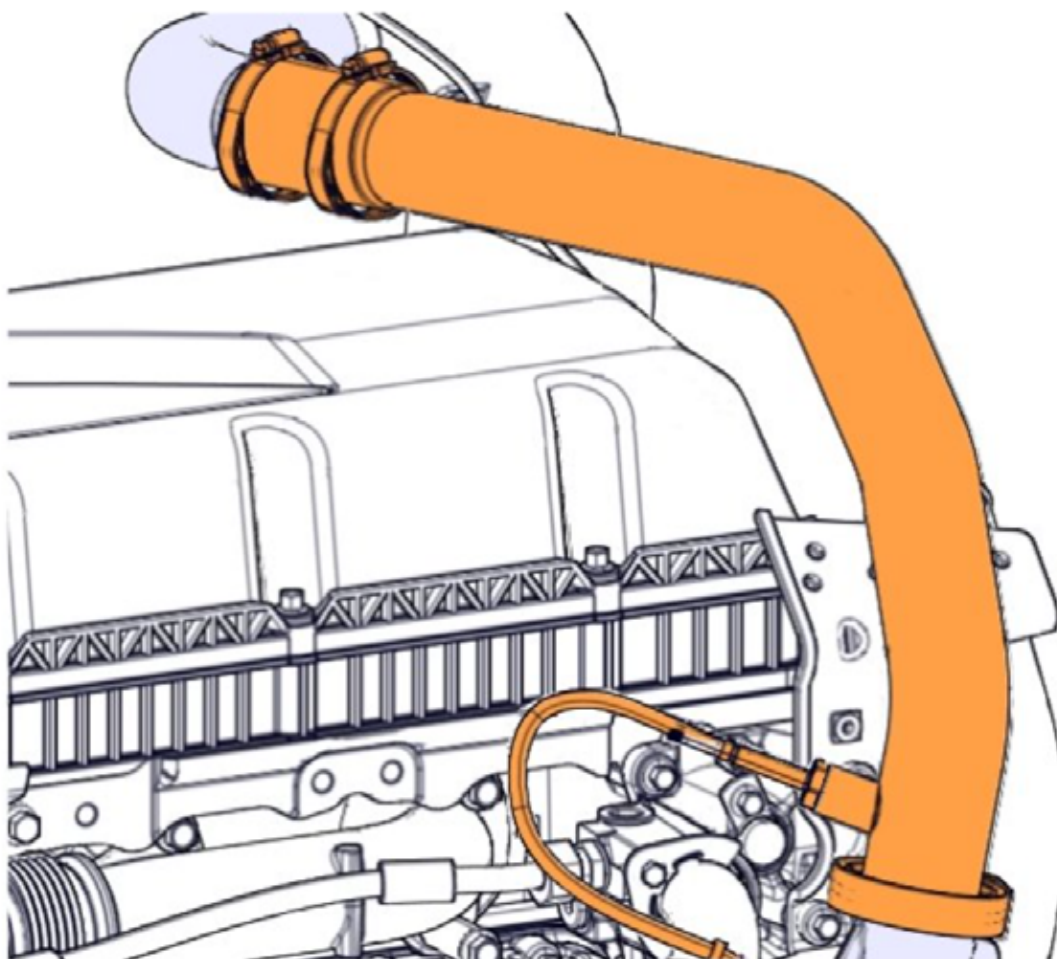


190 Install the pipe.

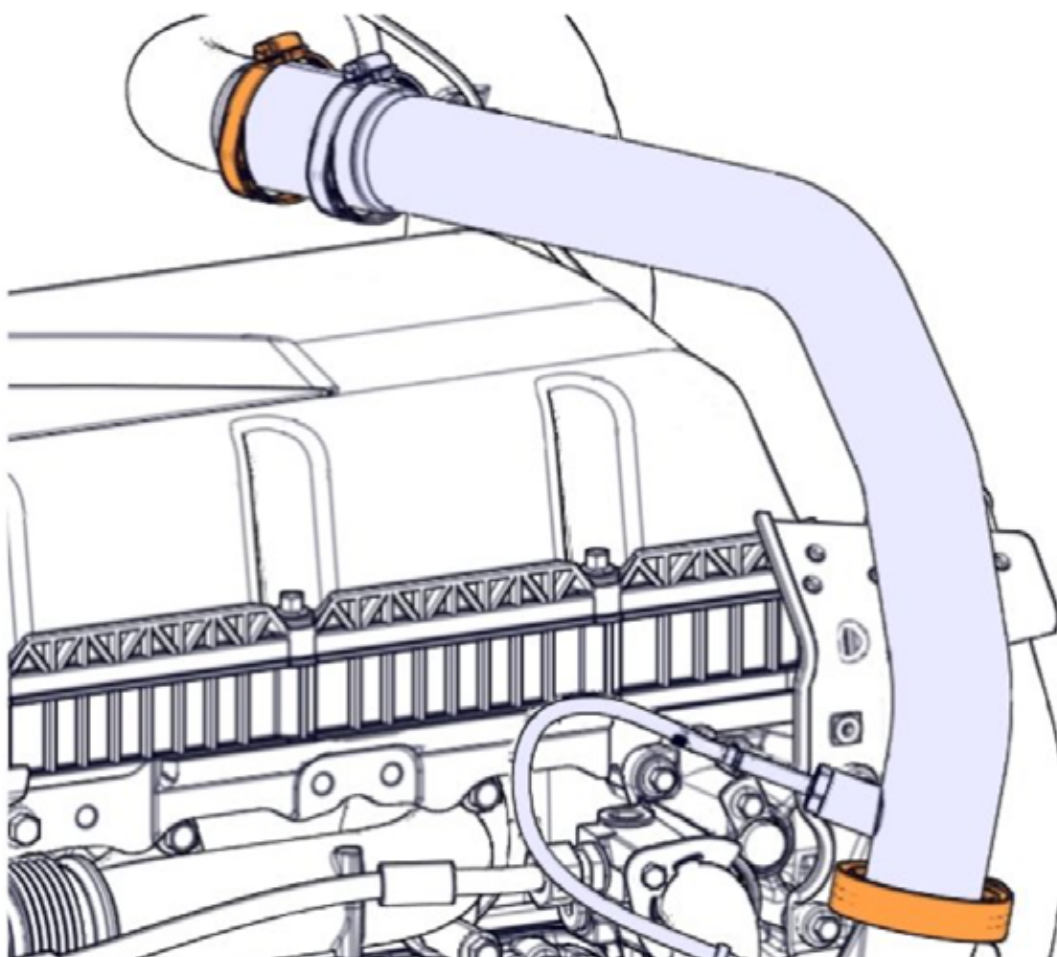


Note

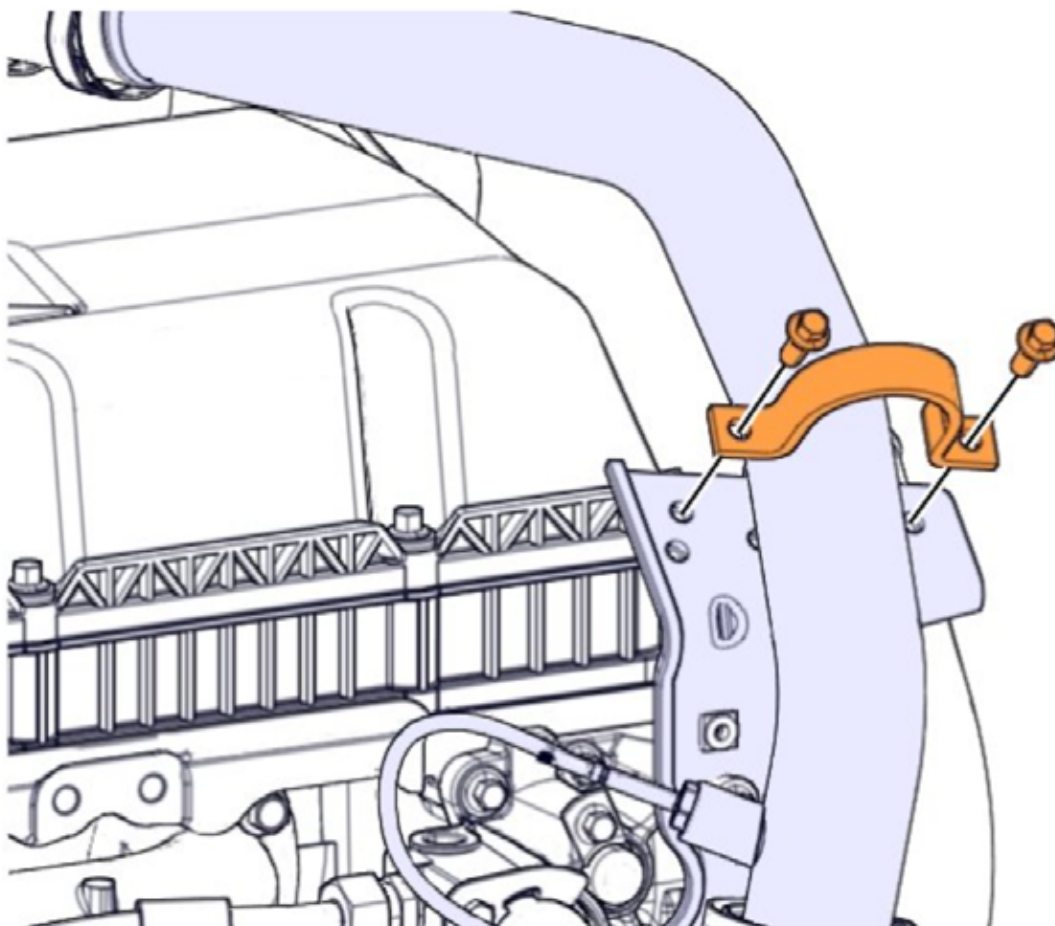
Check the sealing ring and hose for damage; replace as needed.



191	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)

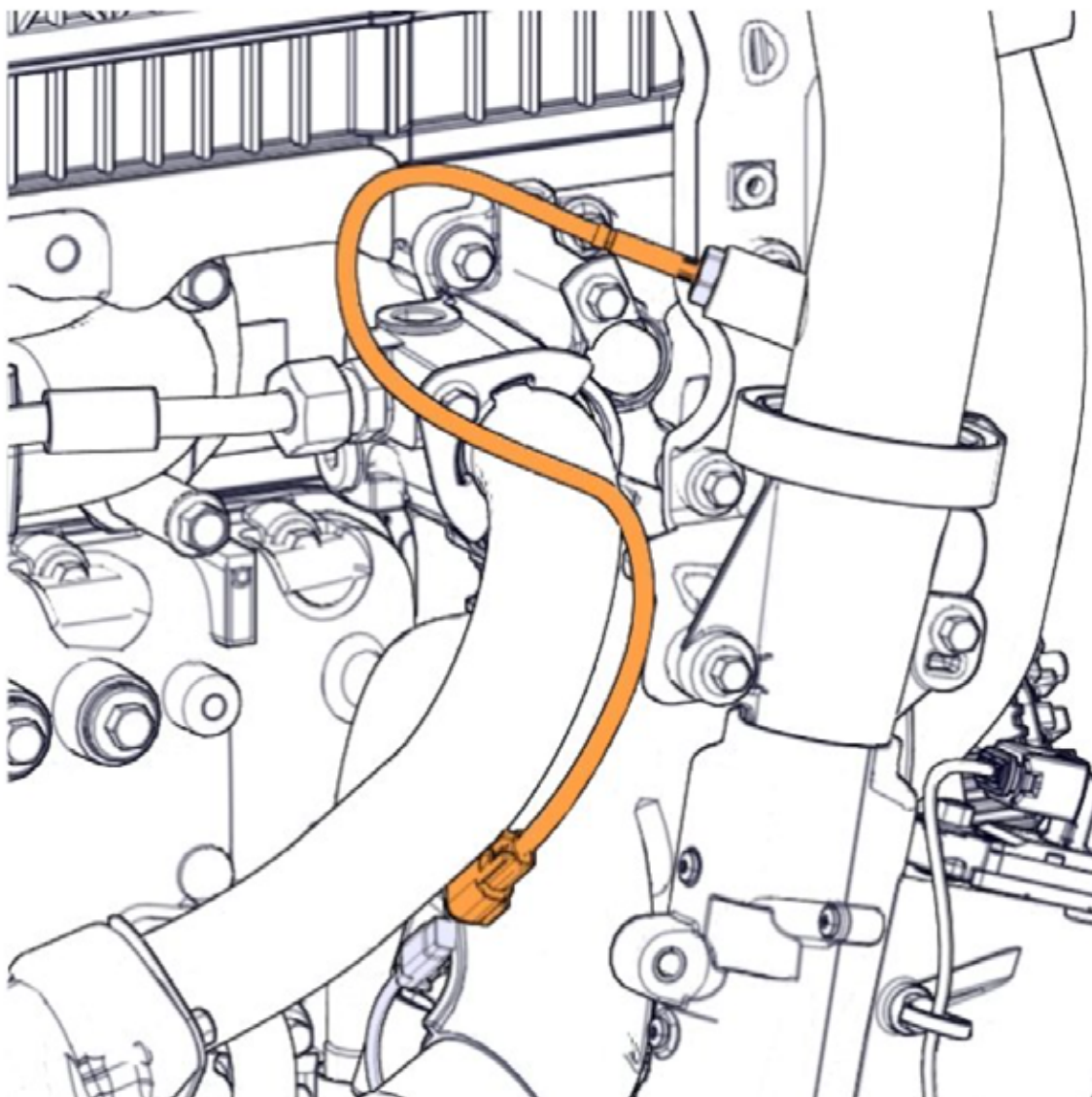


192	Install the clamp.	
193	Torque-tighten the screws.	
	Tightening torque	
	Screw	M8
		24 ±4 Nm (18 ±3 lb _f ·ft)

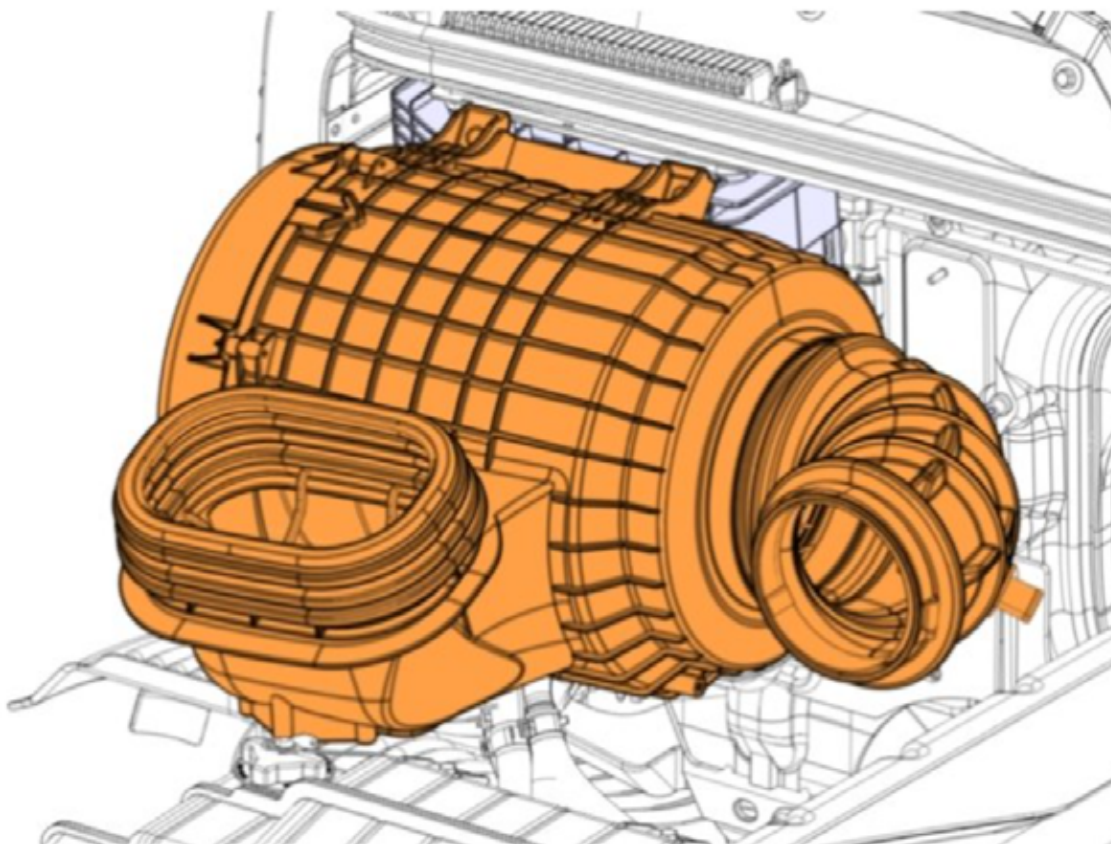


194	Connect the connector.
-----	------------------------

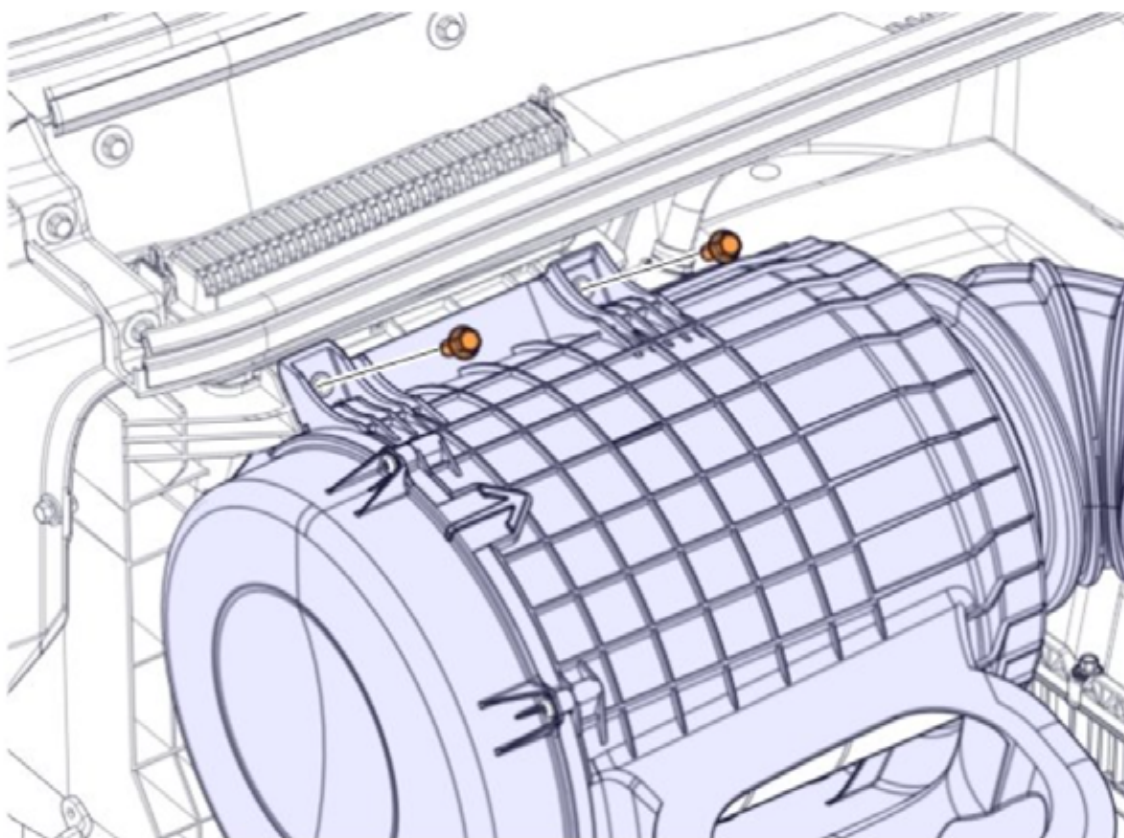
195	Install the ties as needed.
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196	Install the air filter housing.
-----	---------------------------------



197 Install the screws.



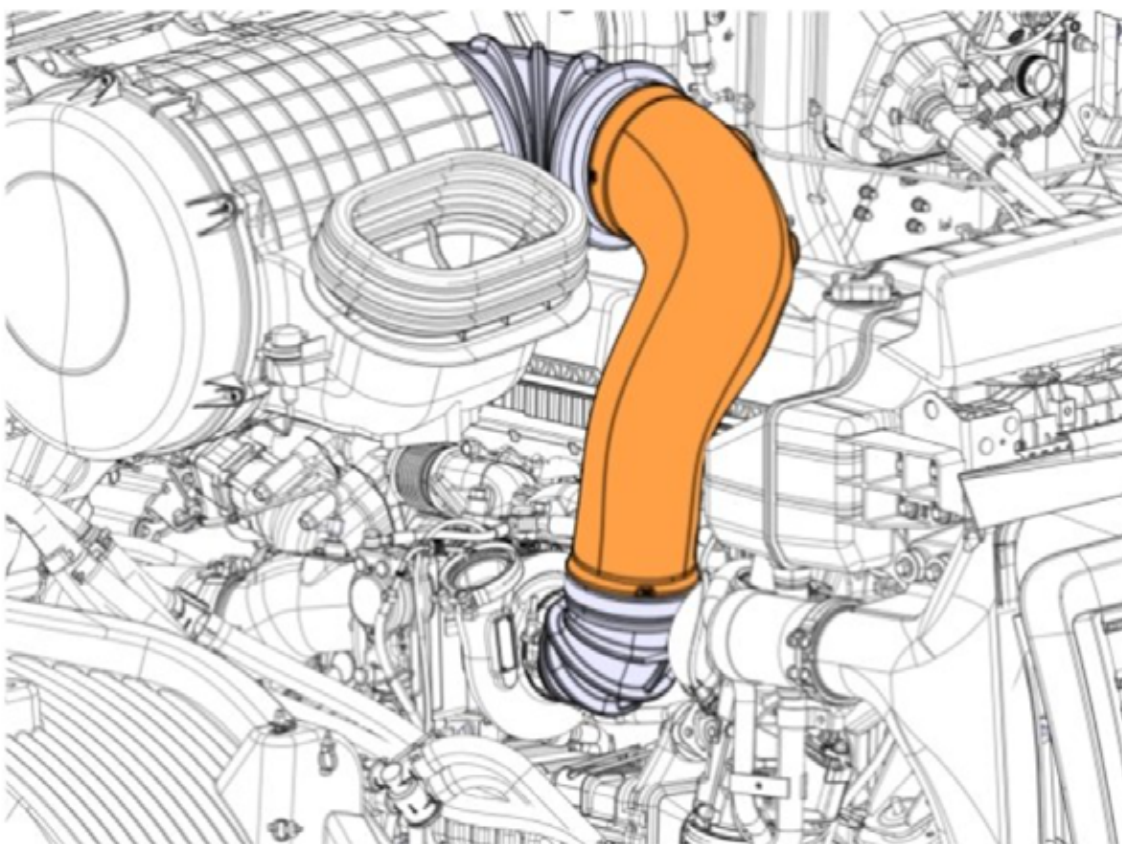
198 Tighten the screws to torque.

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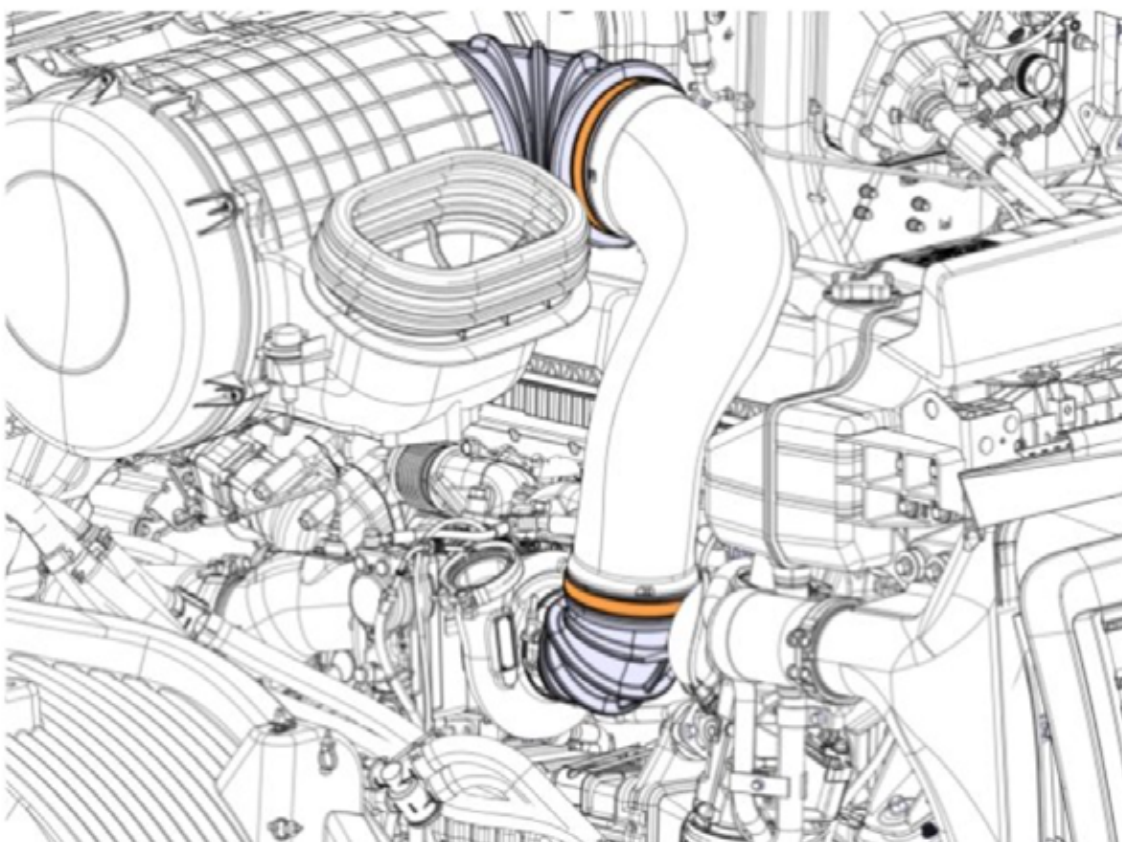
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Tightening torque	
Screw	M10
	48 ±8 Nm
	(35 ±6 lb _f ·ft)

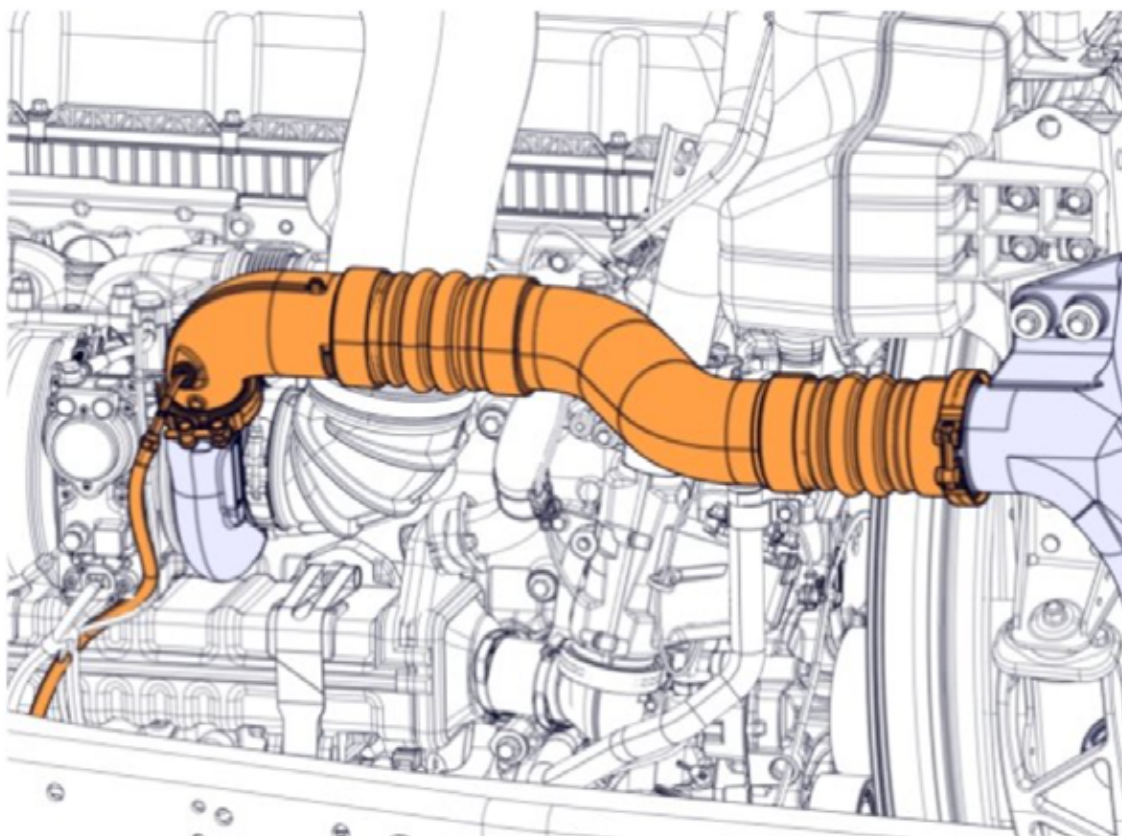
199	Install the air duct.
-----	-----------------------



200	Tighten the clamps to torque.
Tightening torque	
Air duct clamp	9 ±1 Nm
	(80 ±9 lb _f ·in)

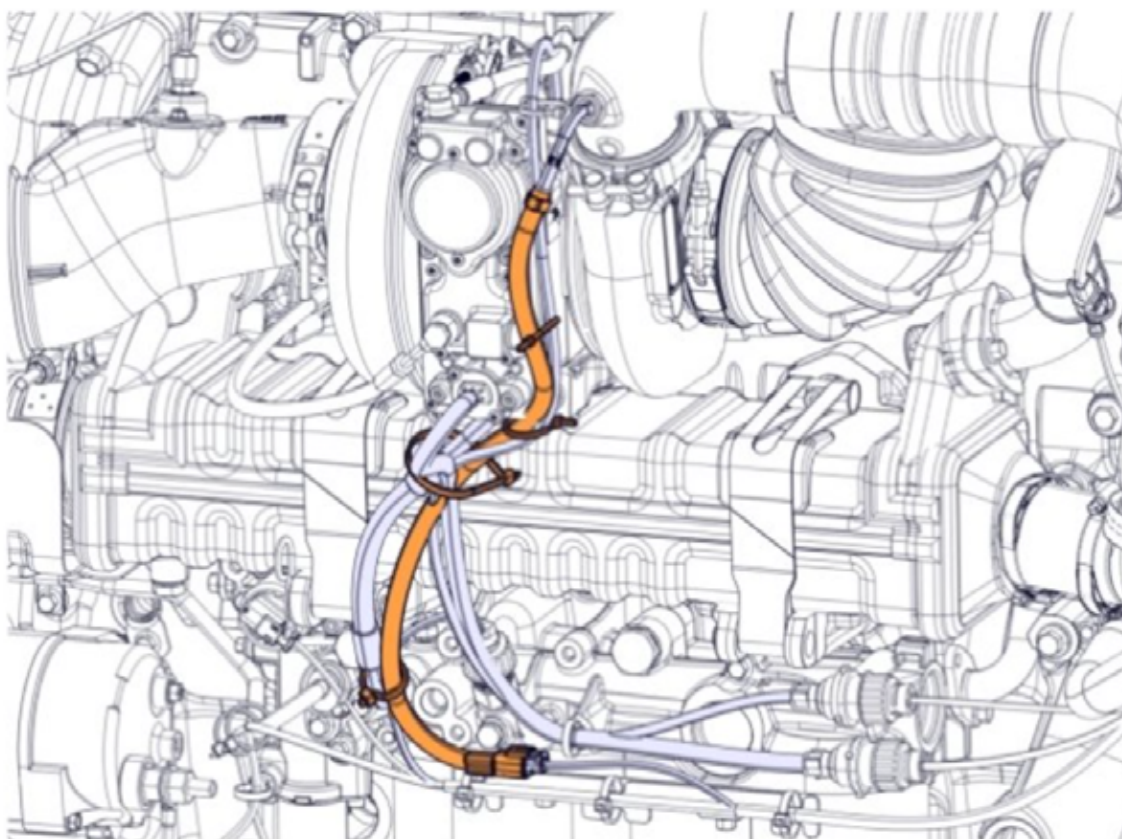


201	Install the pipe assembly. i Note Inspect the seals, replace as needed.				
202	Torque tighten the clamps. <table border="1" data-bbox="224 1291 1261 1451"> <tr> <th colspan="2" data-bbox="224 1291 852 1339">Tightening torque</th></tr> <tr> <td data-bbox="224 1339 852 1451">Air duct clamp</td><td data-bbox="852 1339 1261 1451"> $9 \pm 1 \text{ Nm}$ $(80 \pm 9 \text{ lb}_f\text{in})$ </td></tr> </table>	Tightening torque		Air duct clamp	$9 \pm 1 \text{ Nm}$ $(80 \pm 9 \text{ lb}_f\text{in})$
Tightening torque					
Air duct clamp	$9 \pm 1 \text{ Nm}$ $(80 \pm 9 \text{ lb}_f\text{in})$				



203	Connect the sensor connector.
-----	-------------------------------

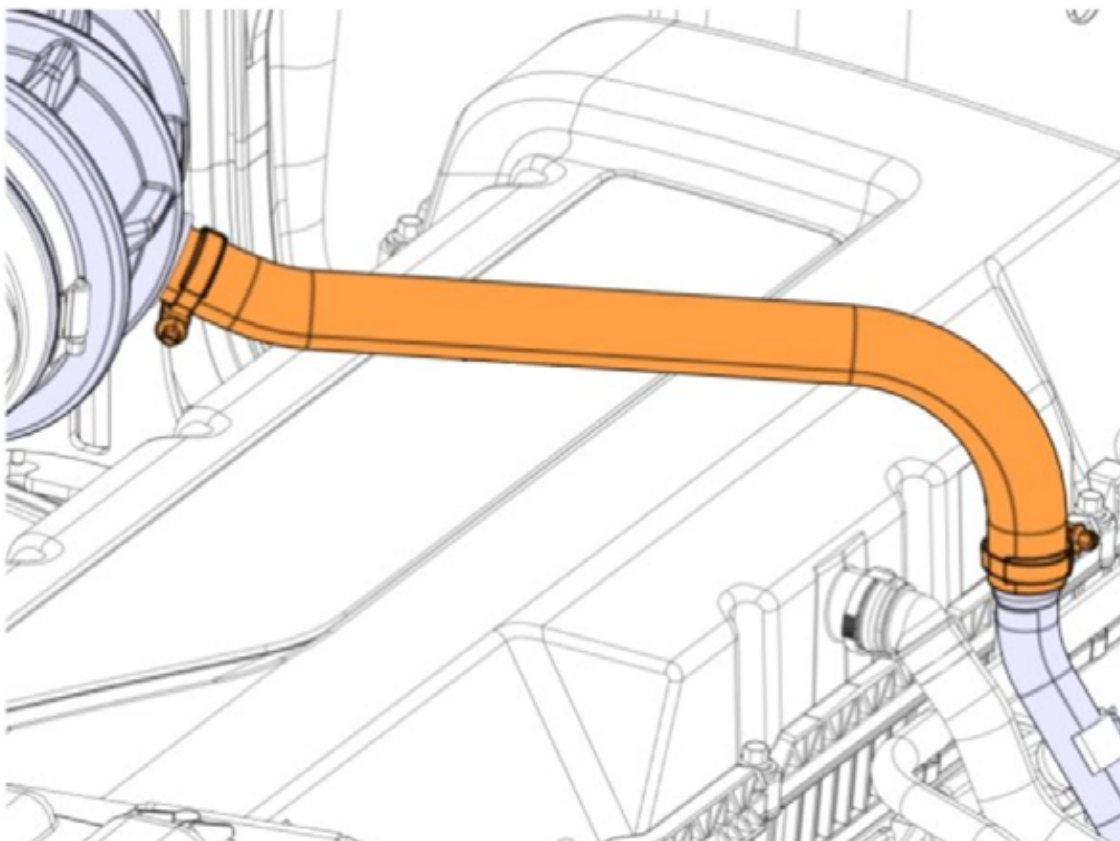
204	Secure the harness with the cable ties.
-----	---



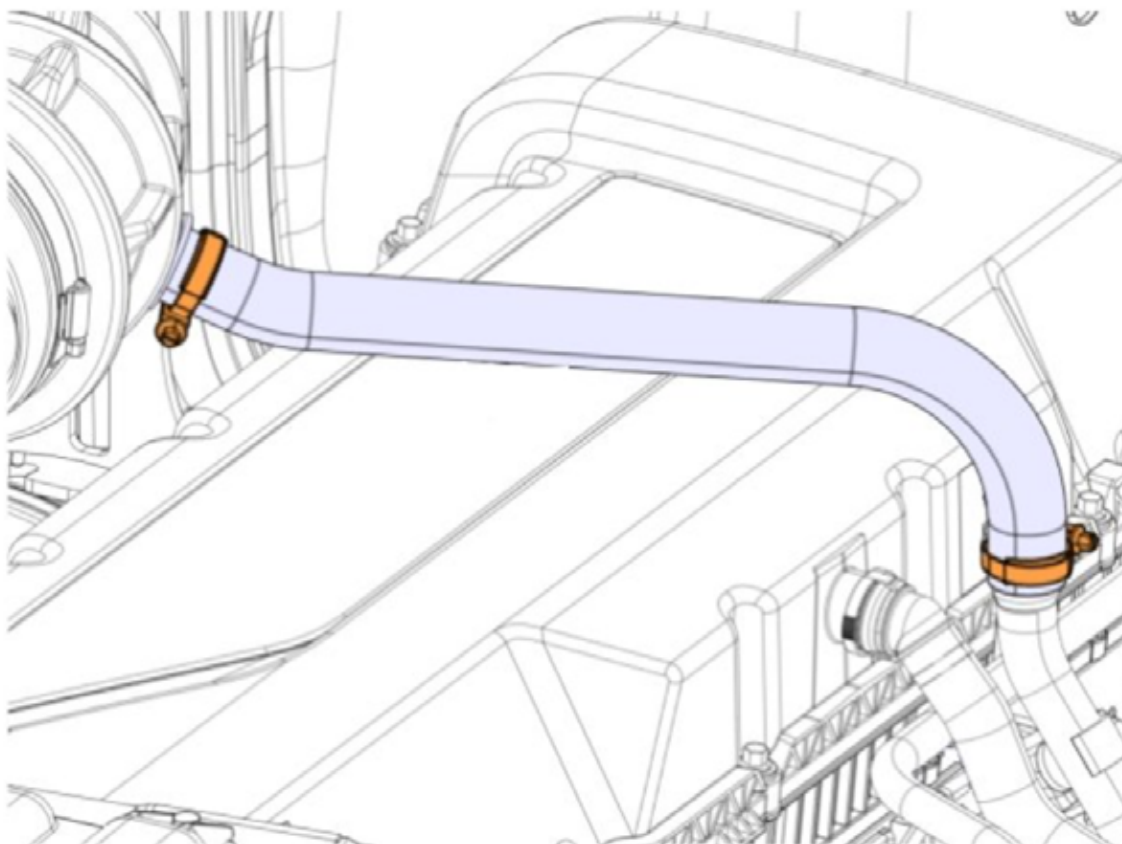
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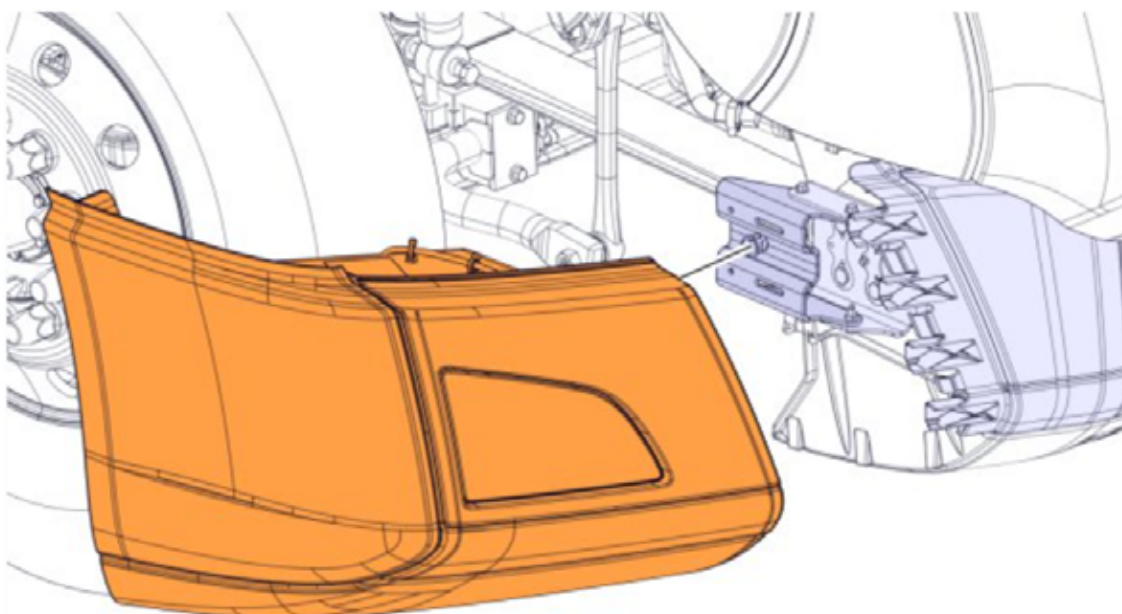
205	Install the hose.
-----	-------------------



206	Tighten the clamps to torque.	
	Tightening torque	
	Clamp, screw	$3.95 \pm 0.6 \text{ Nm}$ $(35.0 \pm 5 \text{ lb}_f\text{in})$

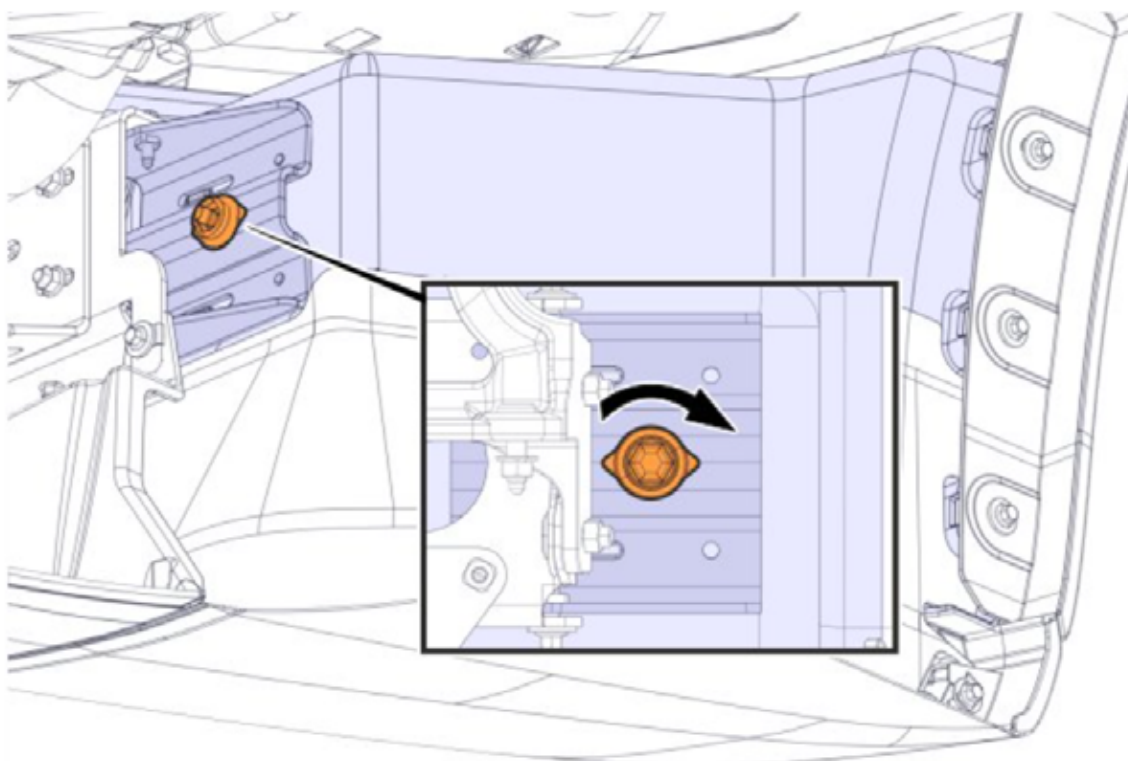


207 Install the bumper end cap.

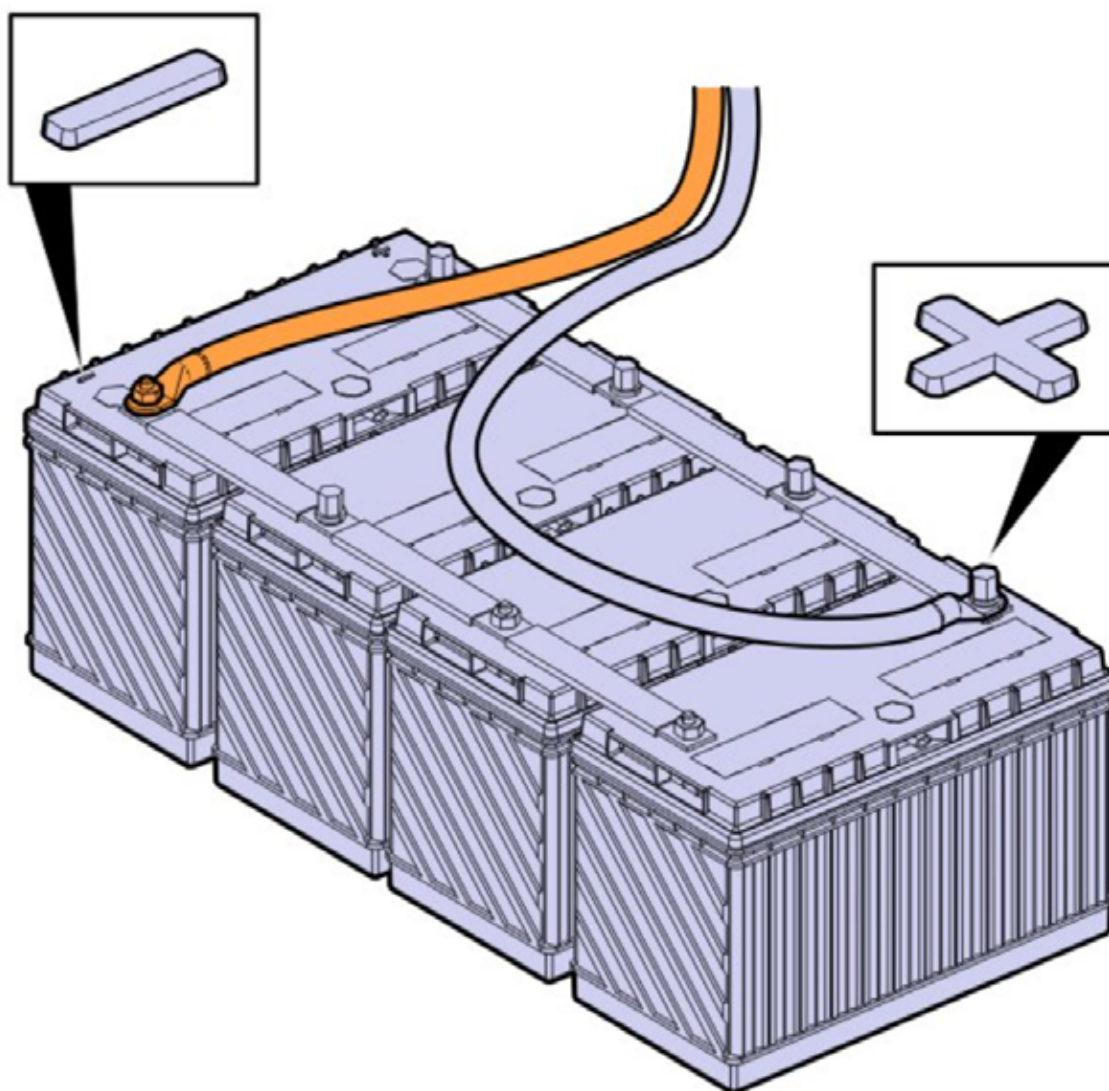


208 Latch the bumper end cap.

i **Note**
Do not over tighten.



209	Connect the cable to the negative terminal.
-----	---



DANGER

Risk of serious personal injury or death.

Failure to do so may result in serious personal injury or death.

- Ensure the engine cannot start while working around the fan area.

210 Start the engine and check for leaks and proper operation. After shutdown, replenish fluids as necessary.

211 Lower the hood.



Note

Ensure that the hood is latched

212	Remove the wheel chocks.
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