



Particulate Matter (PM) Sensor Troubleshooting Guide - US14+OBD16 And Newer Emissions



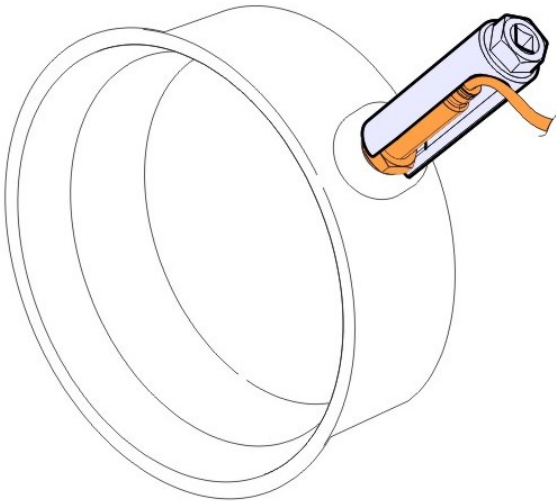
This guide should be used to determine if the PM sensor should be replaced based on the DTC(s) present on a readout.

Replacement Information

IMPORTANT

The PM Sensor is a smart sensor that reads solid matter (particulates) instead of a gas like most other smart sensors. Because of this care must be given when handling these sensors.

- Handle with extreme care. Sensors contain a ceramic element that is fragile.
 - Never use a lubricant on the sensor threads or tip.
 - Proper Orientation of the sensor is required.
-
- Replacement instructions can be found under the Service tab in [Impact](#).
 - **DO NOT CUT THE HARNESS** when initially attempting to remove the sensor. A 22 mm Oxygen Sensor socket should be used first to keep the harness intact.



- If damage to the threads occurs when removing the sensor, replace the bung as outlined in [FSB 258-039 SCR Fittings, One Box, Replacement, PM, NOx and Temperature Sensor Fittings](#), found under the service tab in [Impact](#).
- If multiple PM sensor failures have been experienced, check for water damage as outlined in [FSB 284-069 Exhaust Particulate Sensor, Repair \(2017 Vehicles\)](#), found under the service tab in [Impact](#).



Repair Instructions

REPLACE the sensor for any active and/or confirmed codes appearing on a DTC readout that are included in the chart below.

Fault Code	Fault Description
P103100	Particulate Matter Sensor Clogged Tip
P103200	Particulate Matter Sensor Removed from Exhaust
P24AE13	Particulate Matter Sensor
P24AF00	Particulate Matter Sensor Circuit Range/Performance
P24B000	Particulate Matter Sensor Circuit Low
P24B100	Particulate Matter Sensor Circuit High
P24B313	Particulate Matter Sensor Heater Control Circuit Open
P24B492	Particulate Matter Sensor Heater Control Circuit Range/Performance
P24B500	Particulate Matter Sensor Heater Control Circuit Low
P24B700	Particulate Matter Sensor Heater Resistance
P24D100	Particulate Matter Sensor Regeneration Incomplete
P24DA00	Particulate Matter Sensor Exhaust Sample Error Bank 1
P24FC00	Particulate Matter Sensor Heater Control Circuit Driver Current/Temperature Too High
P2AB047	Particulate Matter Sensor Processor

DO NOT REPLACE the sensor for any of the codes in the chart below. The sensor is not the failed component and diagnosis should be performed to find the root cause.

Fault Code	Fault Description	Probable Source
P103400	Particulate Matter Sensor System Voltage Too High	Power supply
P24D000	Particulate Matter Sensor Supply Voltage Circuit Low	Power supply
U02A300	Lost Communication With PM Sensor	Wiring harness and connectors
P200200	Diesel Particulate Filter Efficiency Below Threshold (Bank 1)	<ul style="list-style-type: none"> • Diesel Particulate Filter (DPF) damaged • Engine Control Module (EMS) software update required

 Tags

[volvo](#)

[mack](#)

[p103400](#)

[p24d000](#)

[u02a300](#)

 Live UI

[p200200](#)

[p103100](#)

[p103200](#)

[p24ae13](#)

p24af00	p24b000	p24b100	p24b313
p24b492	p24da00	p24fc00	p2ab047
p24b500	p24b700	p24d100	

Related links and attachments

No links or attachments available



Feedback

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to help improve the content of this article

25074-9 FSB 258-039, SCR Fittings, One Box, Replacement

PM, NOx and Temperature Sensor Fittings

(October 2020)

Certain Volvo Trucks VN, VAH, VHD models equipped with aftertreatment system (One box SCR) may require replacement of SCR fittings such as NOx sensor, temperature sensor, PM (Particulate Matter) sensor.

Follow the instruction outlined in this FSB to replace the sensor boss or bosses in the one box SCR. The one box SCR must be removed from vehicle to replace the sensor boss or bosses. Based on your vehicle configuration, perform any one of the below given standard repair procedures to remove and install the one box SCR.

Standard Repair Procedure

Labor Code	
Muffler, replace. (Combined DOC-DPF-SCR)	2589-03-02-43
OR	
Muffler, replace. (Combined DOC-DPF-SCR) (decontented)	2586-03-02-10

Note: Replacement of aftertreatment muffler is not necessary if the sensor boss threads are damaged during service.

Volvo Trucks released all ATD sensor bosses.

Note: This repair requires TIG or MIG welding and should be performed by a certified technician. Stainless Steel welding wire/rod (ER308) recommended with appropriate shielding gas (Argon).

Required Parts

Part Description	New part number	Quantity
Boss temperature sensor	23144461	1
Boss NOx sensor	23501651	1
Boss PM sensor	23501654	1

Required Tools

Carbide Tip Hole Saw Size	Sensor Boss
1-3/16 (30 mm)	PM Sensor Boss
1-1/4 (32 mm)	NOx Sensor Boss M20

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1-1/16 (27 mm)

Temperature Sensor
Boss M14

Procedure



Warning

Risk of burn injuries.

Allow the engine to cool before start work on the Aftermarket system.



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.

Note: This repair procedure only applies to the sensor bosses located on the SCR outlet pipe.

Note: The 1-Box SCR should be removed from the vehicle when the following procedure is performed.

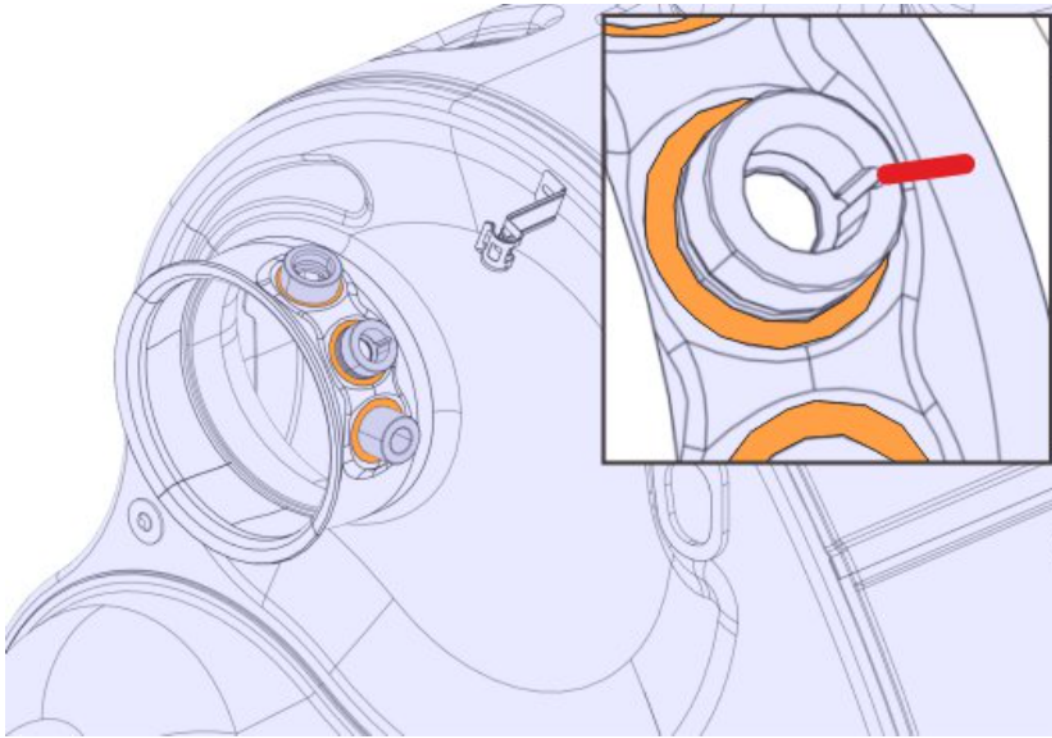
Note: The illustration shown in this procedure to remove or install the bosses is general, replace only the damaged boss/bosses. Do not replace the undamaged boss/bosses.

1. Remove the damaged boss welding.

Note: If the PM sensor boss is damaged as shown in the illustration mark the position of sensor boss notch before removing the boss welding. The notch of PM sensor boss is always set in the 3'o clock position.

Note: Use the sensor boss to pilot the hole saw.

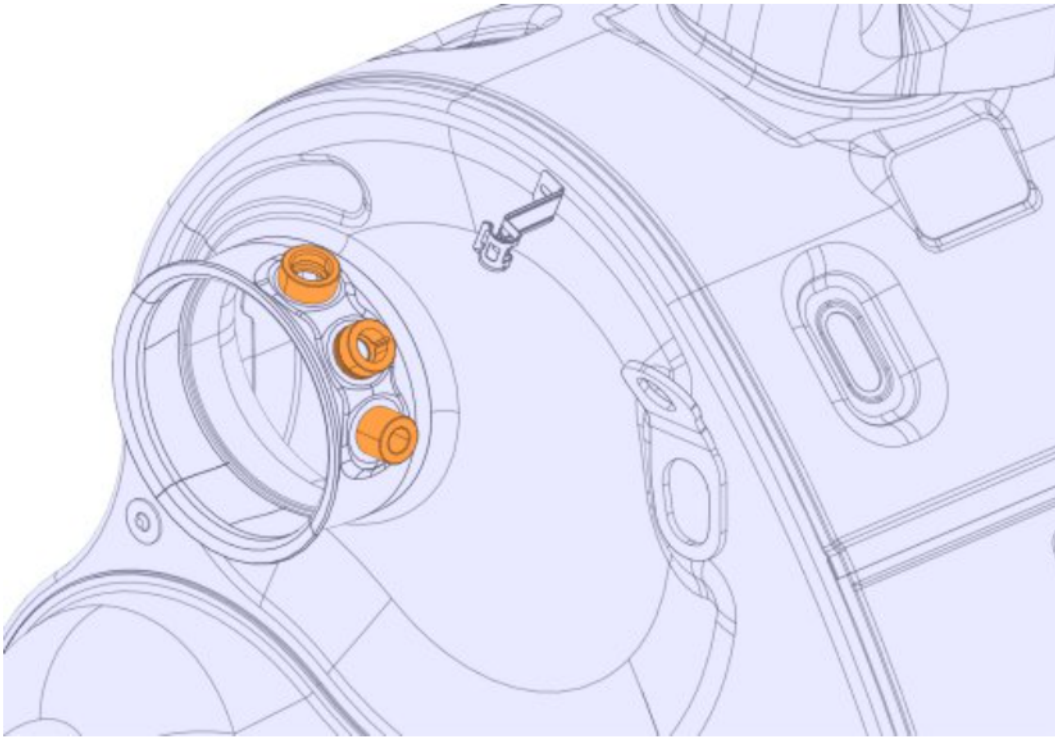
Note: When removing the sensor boss weld, check the depth frequently to prevent the damaged sensor boss from falling inside the aftertreatment muffler. Also ensure that the notch mark is not removed.



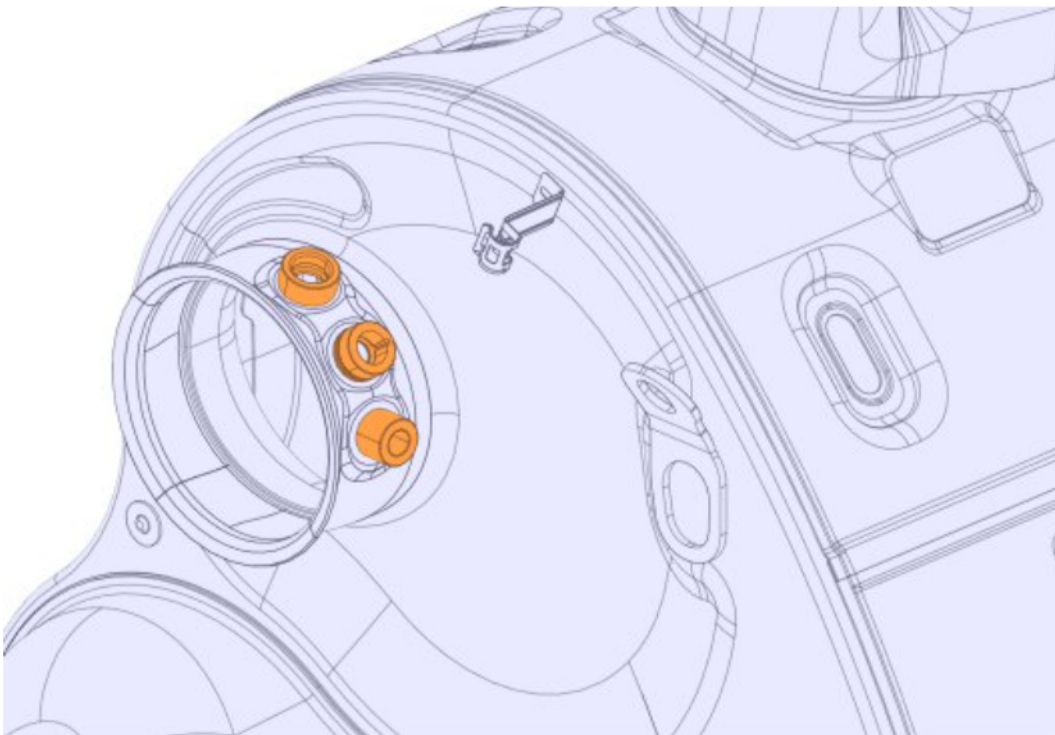
2. Remove the damaged boss/bosses (Temperature/NOx/PM sensors).

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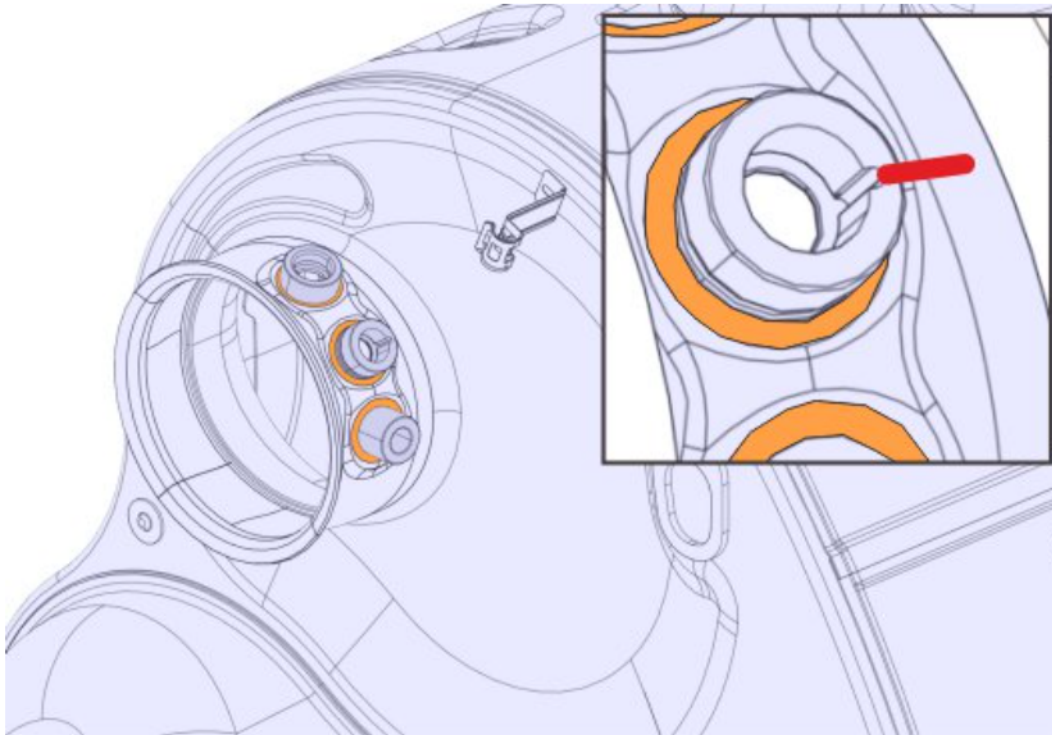
3. Clean off all metal shavings from around the sensor boss hole. Prevent metal chips from entering the Aftertreatment muffler.
4. Verify that the new sensor boss fits the sensor before welding in place.



5. Install the new sensor boss and perform the welding.

Note: When replacing the PM sensor boss, position the notch of new boss as marked. The notch of PM sensor boss is always set in the 3'o clock position.

6. Tack weld the sensor boss, complete the weld around the boss.



Reimbursement

<p>This repair may be eligible for reimbursement if a product failure was experienced within time and mileage limits of the applicable warranty coverage. Reimbursement is obtained via the normal claim handling process.</p>	<p>UCHP Reimbursement</p>
<p>Claim type (used only when uploading from the dealer Bus. Sys.)</p>	<p>01</p>
<p>Labor Code</p>	
<p>SCR Fittings, one box, replace (one boss)</p>	<p>2589-03-09-04 (0.3 hrs)</p>

Volvo Trucks reserves the right to make any changes in design or to make additions to or upon its products without incurring any obligations to install the same on vehicles previously built.

FSB 284-069, Exhaust Particulate Sensor, Repair (2017 Vehicles)

(October 2020)

Some trucks built between 1/1/2017 and 11/15/2017 may experience a Particulate Matter (PM) Sensor fault that can result in the MIL lamp illuminating. These faults may be P24DA, "PM Sensor Exhaust Sample Error," or P24D1, "PM Sensor Regen Incomplete." These faults may be caused by contamination of the PM sensor. In order to reduce the likelihood of sensor contamination, new exhaust pipe parts are being made available that contain an internal water management feature along with an integrated drain that will prevent contamination of the sensor. If either of these two faults occur, follow the instructions outlined in this bulletin to clean the exhaust pipes and install a new exhaust pipe with the new contamination prevention measures.

Required Parts – All Years

Inspect and replace the v-band clamp as needed

A new gasket will be needed when disconnecting the SCR exit.

Note: No gasket needed for vertical SCR.

Part Description	Part Number
SCR Gasket	21095726
V-band Clamp	21021850
Particulate Matter Sensor	23320447

Note: Customer adaptations can change required parts. Check for adaptations before ordering parts. (For example, under-slung exhaust)

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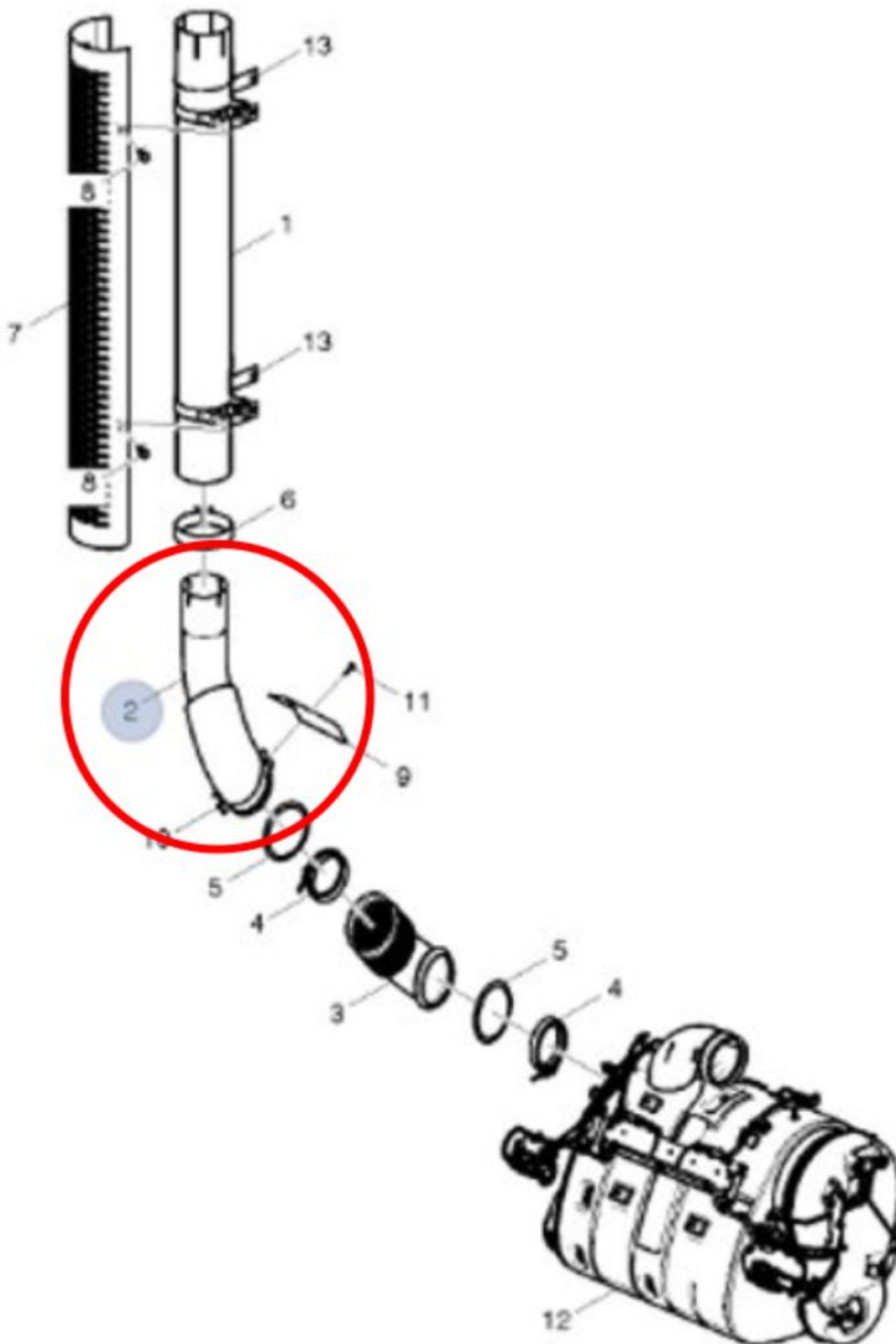
Model	Cab Type	Exhaust Configuration	Repair Number
VNL	Day Cab	Single Outlet Right Side Outboard	1
VHD Axle Fwd	Day Cab	Single Outlet Right Side Outboard	2
VNM, VHD Axle Bwd	Day Cab	Single Outlet Right Side Outboard	3
VHD Axle Bwd	Day Cab	Dual Outlet	4
VHD Axle	Day	Dual Outlet	4

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Fwd	Cab		
VNM, VHD, VNL	Sleeper Cabs	Single Outlet Right Side Outboard Dual Outlet	5
VNM, VHD, VNL	Sleeper Cabs	Single Outlet Right Side Outboard Dual Outlet	6

Repair 1



W2165470

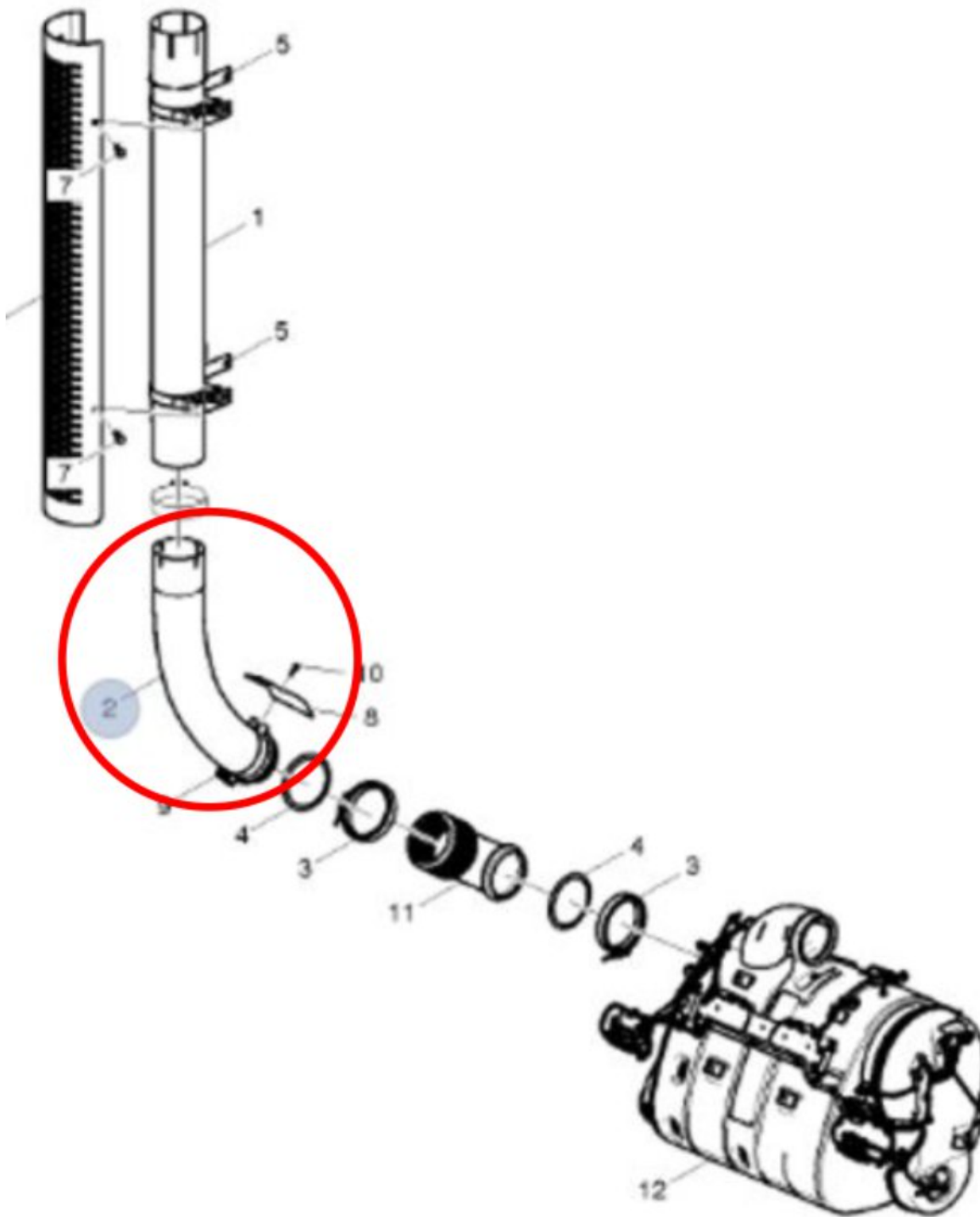
Model	Cab Type	Exhaust Configuration	Pipe 1 (Stack)	Pipe 2 (SCR Elbow)	Flex Pipe	Clamp

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VNL	Day Cab	Single Outlet Right Side Outboard	23873123	22181981	20442244	Clamp 25172497 x 2
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Repair 2



R1278943

W2165471

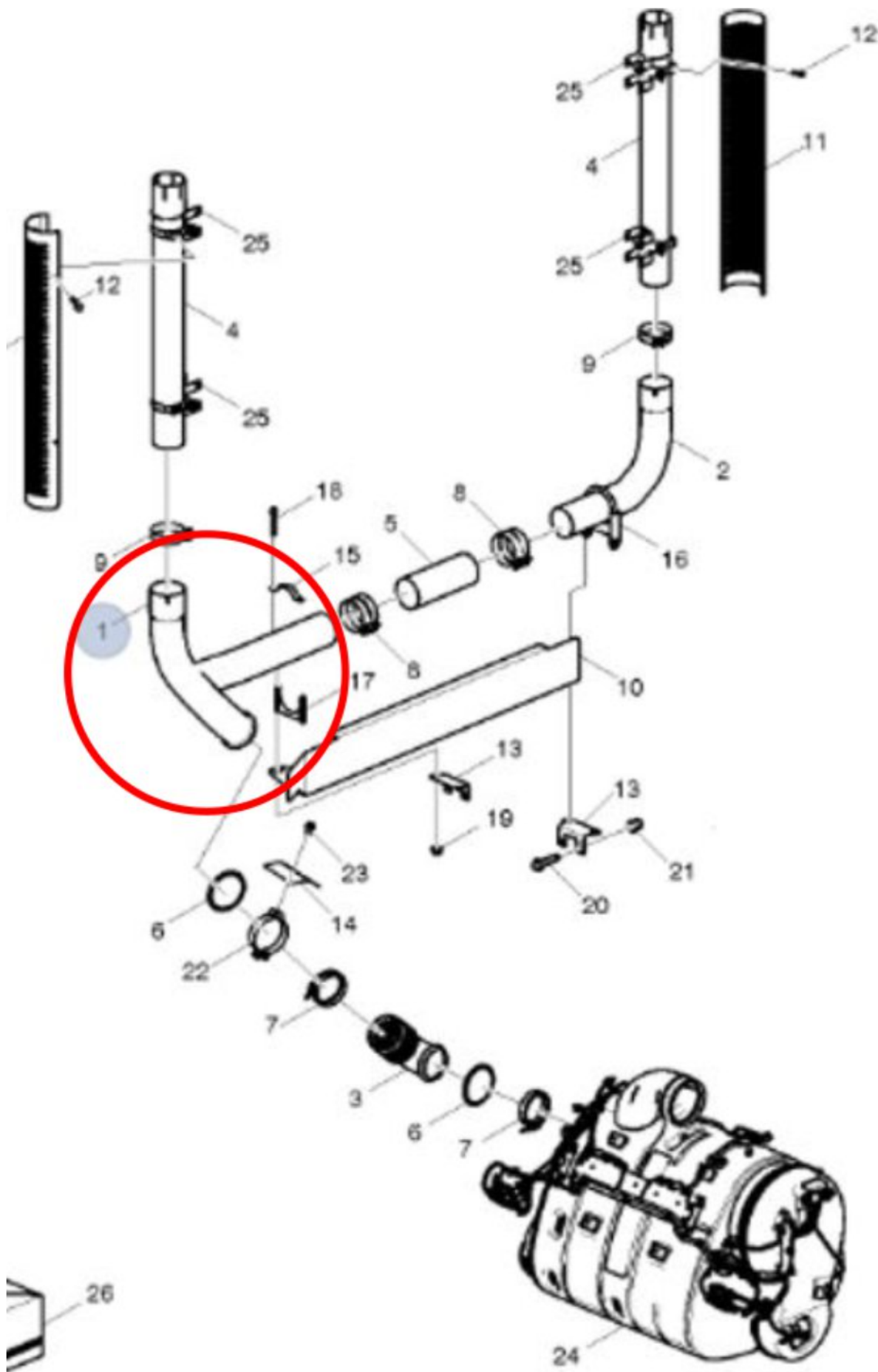
Model	Cab Type	Exhaust Configuration	Pipe 1

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VNM/VHD	Day Cab	Single Outlet Right Side Inboard	23630048
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Repair 3



R1241574

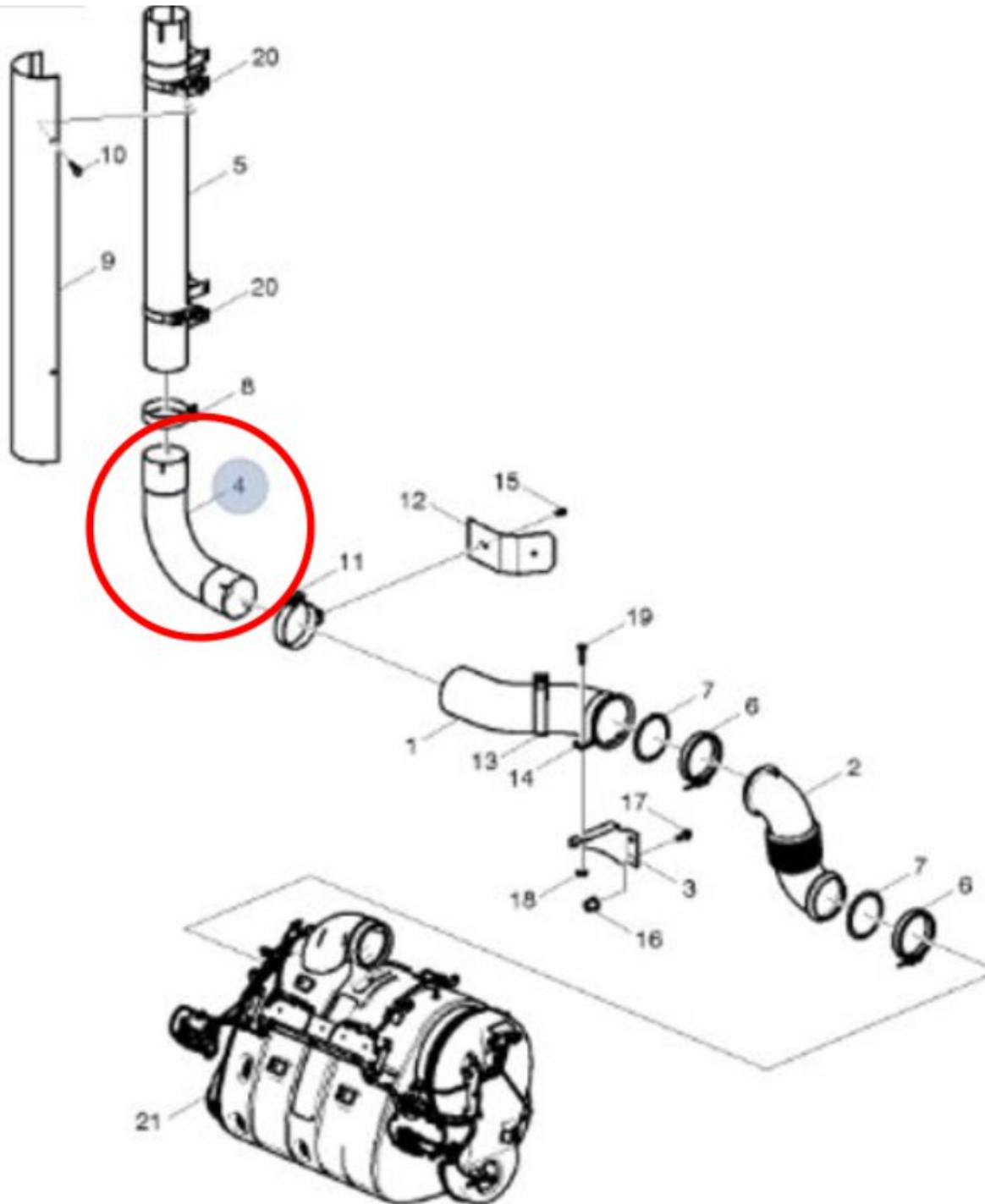
W2165472

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Model	Cab Type	Exhaust Configuration	Pipe 1
VHD Axle Bwd	Day Cab	Dual Outlet	23155774
VHD Axle Fd	Day Cab	Dual Outlet	23155785

Repair 4



W2165473

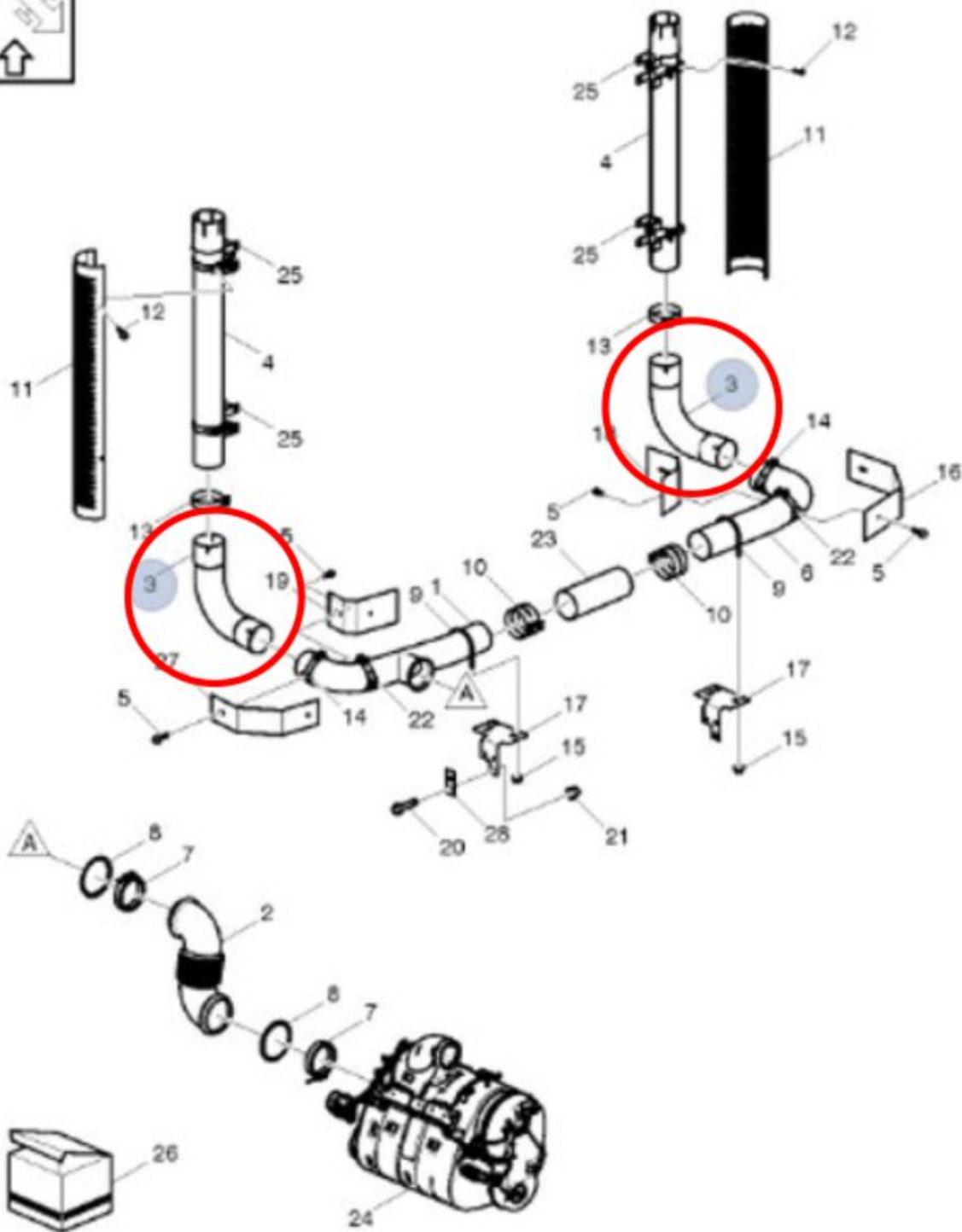
Model	Cab	Exhaust	Pipe 1

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	Type	Configuration	
VNM	Sleeper	Single Outlet Right	(Not Bright)
VHD	Cabs	Side Outboard	23154798
VNL			(Bright) 23154799

Repair 5



W2165474

Model	Cab	Exhaust	Pipe 1	Note
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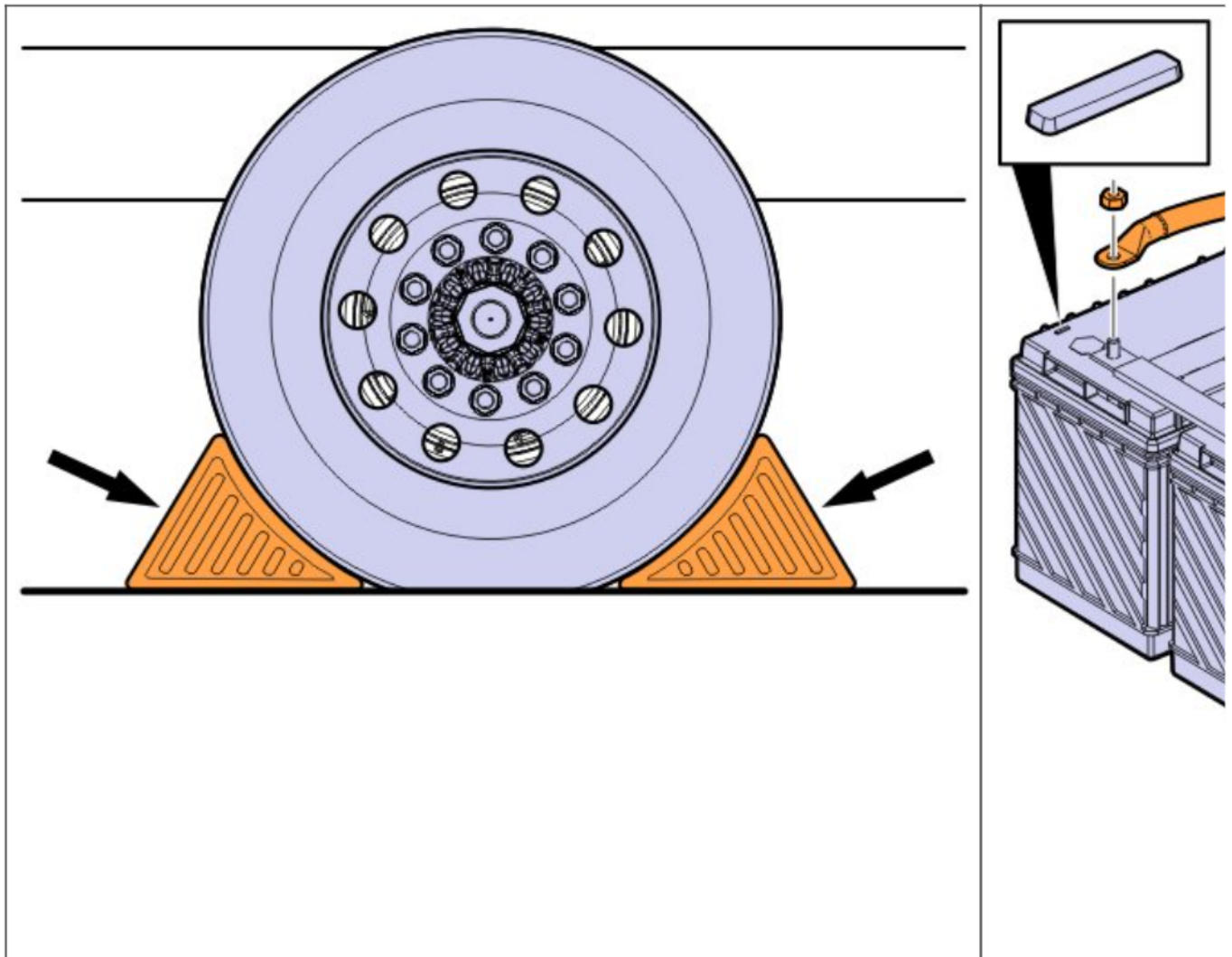
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	Type	Configuration		
VNM VHD VNL	Sleeper Cabs	Dual Outlet Right Side Outboard	(Not Bright) 23154798 (Bright) 23154799	Requires 2 elbows per chassis

Instructions

1. Decommission the vehicle. Install wheel chocks and disconnect the battery.



2. Remove the PM sensor and module.
3. Remove all exhaust pipes up to the SCR outlet pipe.
4. Pressure wash the inside of each pipe that will be reused.
5. Reassemble the exhaust system using the new parts referenced in the table above.
6. Mark the SCR outlet pipe 1.5" from the end also mark the new pipe (not flex) 1.5" from its inlet.
7. Slip the flex pipe as far over the SCR outlet pipe as possible.
8. Install the new exhaust pipe.
9. Using a new clamp assemble the new exhaust pipe to the new flex pipe using the 1.5" mark to get the correct amount of overlap.
10. Slide the assembly into place using the 1.5" mark on the SCR outlet as a reference point and to ensure the

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correct amount of overlap, once in both pipes are in place use clamps to secure.

Note: Correct installation is achieved when the flex pipe is in a "relaxed" state, there should be no compression or expansion visible on opposing sides of the pipe after installed.

11. Install the new PM sensor and module.

Note: Do not use any lubricant of any kind on the PM sensor threads.

Note: Align the tab on the sensor with the slot.

12. Torque the sensor to 35 +/- 5 Nm (26 +/- 4 Ft lb)

13. Install the sensor module.

14. Torque the nuts to

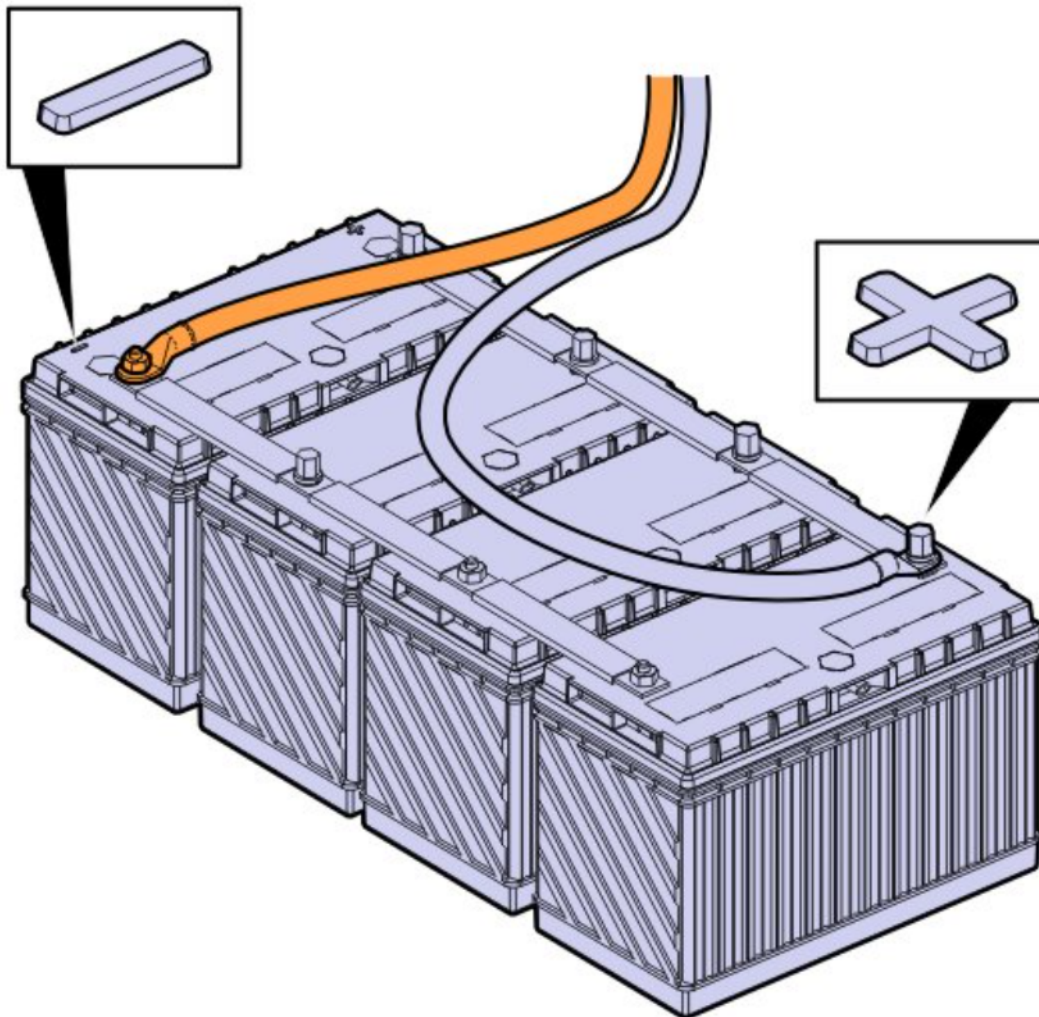
M6: 10 +/- 5 Nm (88 +/- 3 in lb)

M8: 24 +/- 4 Nm (17.1 +/- 3 ft lb)

15. Install the wire ties and clamps.

Note: Use high temperature cable ties.

16. Connect the battery.

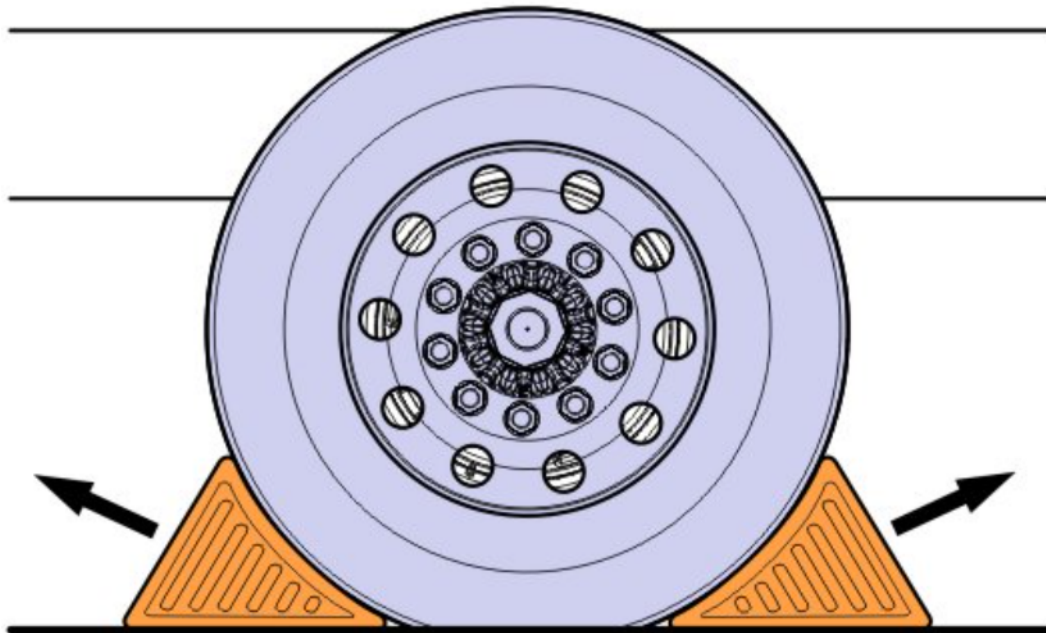


17. Clear any DTC codes.

18. Remove the wheel chocks.

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Reimbursement

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Claim Type (used only when uploading from the Dealer Bus. Sys.)	W
Labor Code	
Primary Labor Code (Exhaust Particulate Sensor, Repair)	2846-16-09-02 See table for times.
Causal Part	22946032

Labor Times Reference – 2017 Vehicles

Model	Cab Type	Exhaust Configuration	Pipe 1
VNL VNM VHD	Day Cab	Single Outlet Right Side Outboard	1.5
VHD	Day Cab	Dual Outlet	2.9
VNM	Sleeper	Single Outlet	3.5

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VHD VNL	Cabs	Right Side Outboard Dual Outlet	
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